eem 84 85

electronic engineers master catalog

VOLUME 3

EPCO POWER SUPPL
V
A
AUTOMATIC CROSSOVER
MODE
VOLTAGE
CURRENT
6020

power sources, instrumentation, computer products, and equipment

27th EDITION

1100	Amplifier Assemblies, Instrumentation
1300	Audio Equipment & Accessories
1900	Communications & Telemetry Equipment
2000	Computer Peripheral Equipment
2025	Computers (Mini/Micro)
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2200	Control Systems & Components
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2950	Panel Meters (Analog & Digital)
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3000	Instruments, Graphic Recording
3400	Microwave Systems & Equipment
3475	Military Systems & Equipment
3900	Batteries
4000	Power Supplies, DC
4050	Power Supplies, AC
4100	Production Equipment & Manufacturing Services
4900	Servomechanisms & Robotic Equipment

volume 1A Electronic components
volume 1B Electromechanical, electro-optical, and military components
volume 2 Interconnections, packaging, and hardware

BPA Hearst HEARST BUSINESS COMMUNICATIONS, INC.

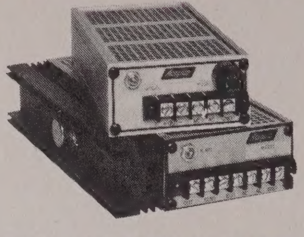
LOOKING FOR POWER SUPPLIES? SPECIFY ACOPIAN,

5V OR ±15V POWER FOR PCB'S

Acopian
MODEL
MINIATURE
AC to DC POWER MO

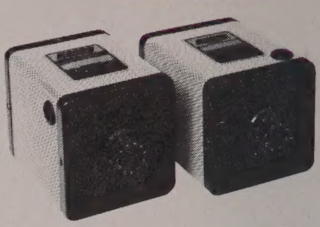
Mount these mini power modules, as small as 2.3" x 1.8" x 1.0", directly on printed circuit boards to save space and simplify wiring. Ratings at 5 volts from .250 to 2.5 amps; at ±15 volts from .025 to .5 amps. Short circuit protected. Prices start at $49. Guaranteed 3-day shipment.

SUPPLIES THAT FIT IN THIN SPACES



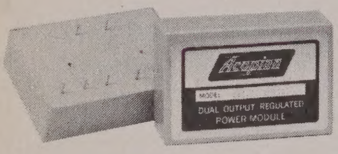
Measuring only 1.68" high, Acopian narrow profile power supplies fit where many others cannot. Available in a wide range of ratings from 1 to 150 volts, to 3.5 amps. Regulation to ±0.005%. Tracking dual output models for op amps also available. Guaranteed 3-day shipment.

SINGLE, DUAL PLUG-IN POWER



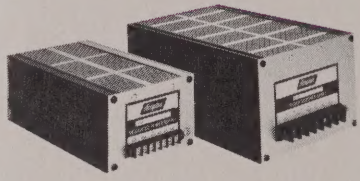
A plug-in power module can be installed in seconds. Simply plug it into a standard octal-type socket. Single output models from 1 to 200 volts. Duals combining two matched or dissimilar outputs in one case available in over 10,000 combinations. Warranty: 5 years. Shipment: 3 days.

MULTIPLE VOLTAGES FOR PCB'S



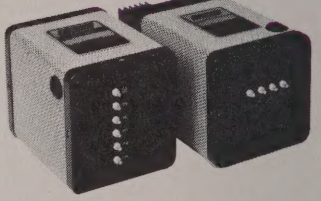
Simplify PC board layout with multiple output power mini's. Duals supply two isolated like or dissimilar outputs, 1 to 28 volts each. Op amp supplies provide ±12 or ±15 volts. Triples have two balanced, tracking outputs, a third for powering other circuits. Guaranteed 3-day shipment.

GENERAL PURPOSE POWER



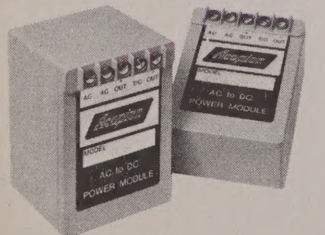
Series A offers premium performance, with regulation to ±0.005%, ripple of 0.25 mv maximum and electronic current limiting. Series B supplies provide a lower-cost approach, with regulation typically ±0.1%. Ratings to 200 volts, to 32 amps. Guaranteed 3-day shipment.

SOLDER TERMINAL MODULES



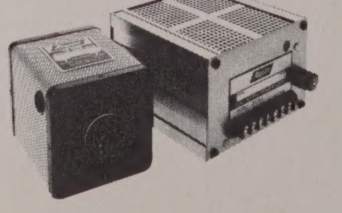
For applications where hard wiring is desired, Acopian offers modules with solder terminals. Included are single output models (regulated and unregulated), duals with two like or dissimilar voltages and high isolation supplies. Guaranteed 3-day shipment.

POWER MINI'S FOR LOGIC OR OP AMPS



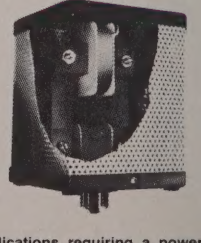
Terminal strip input output connections on these miniature power modules eliminate the need for sockets or soldering. They mount in an area only 3.5" x 2.5". Ratings: 5 volt models to 2.5 amps; ±15 volts to .5 amps. Other models from 1 to 75 volts, all with 3-day shipment guaranteed.

MATCHED OR DISSIMILAR DUAL OUTPUT



Select the combination of matched or dissimilar outputs that you require. Hundreds of ratings available, from 1.5 to 150 volts. Outputs are isolated, and may be used in the same or opposite polarities. Acopian's 3-day shipment promise applies for any combination.

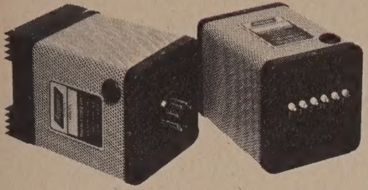
HIGHLY ISOLATED POWER



For applications requiring a power supply with unusually high isolation, such as for powering strain gage or other transducer circuits, Acopian offers models with ratings from 5 to 36 volts. Input/output isolation: 10,000 megohms minimum. Guaranteed 3-day shipment.

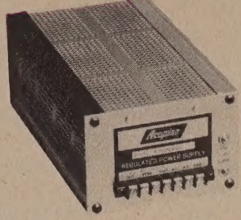
FAMOUS FOR 3-DAY SHIPMENTS . . . GUARANTEED

MIL-TESTED PLUG-IN POWER



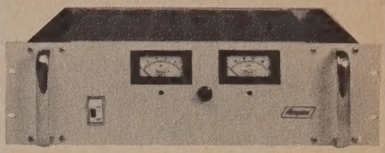
MIL-tested power supplies withstand unusually severe environmental conditions. These extended-temperature plug-in modules exceed MIL specs for humidity, altitude, vibration and shock. Hundreds of single output models, thousands of dual output combinations, all guaranteed for 3-day shipment.

BROAD VOLTAGE ADJUSTMENT



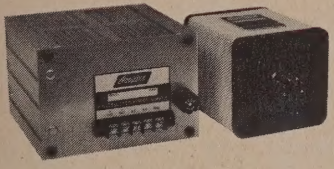
Power supplies with the broad adjustment capability required for analog instrumentation and circuitry, electronic system development, basic research, and similar applications. All may be remotely programmed. Many available with adjustable current limiting. Output voltage ranges from 0-6 to 0-150 volts, current ratings to 16 amps. Modular supplies shipped in 3 days; rack-mounting models, in 9 days.

RACK MOUNT POWER ...TO 60 AMPS



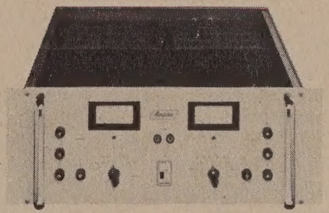
Designed for mounting in standard 19″ RETMA cabinet racks, these power supplies are available in 76 different output ratings from 1.5 to 60 volts, and from 5 to 60 amps. Regulation, ±0.05% or better; ripple, 1 mv rms or better. Options include metering and overvoltage protection. Shipment, 9 days after receipt of your order.

POWER FOR RELAYS AND DISPLAYS



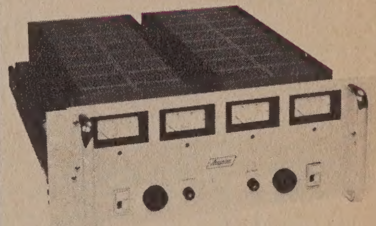
Drive relays, lamps, small motors and similar loads with low-cost Acopian unregulated power modules. Built-in fusing protects against overloads or shorts. Series U models use terminal strip connections. Plug-in modules mount in standard octal sockets; many have adjustable outputs. Guaranteed 3-day shipment.

NEED A POWER SYSTEM?

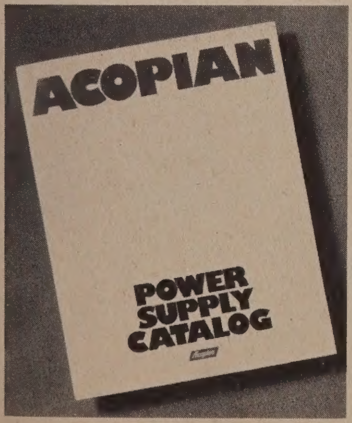


Order multiple output power systems without searching through a catalog, preparing mechanical layouts, item-by-item pricing and detailed purchase requisitions. Instead, call Acopian. We'll listen to your needs, quote a firm price, and then ship your built-to-order system, fully wired and tested, in just 9 days.

REDUNDANT POWER SYSTEMS



Output reliability is maximized by including two power modules for each voltage. If either fails, the other will continue to provide an uninterrupted output. Standard models from 5 to 28 volts, to 55 amps. Shipment, 9 days after receipt of your order.



Send for...

our 56-page catalog containing specifications and prices for the entire line of Acopian power supplies and power systems.

See EEM...

Volume 3, pages 3•1461-3•1495 for detailed information about the most widely used Acopian power supplies and power systems.

Acopian Corp., P.O. Box 638, Easton, PA 18042 • Toll free number: (800) 523-9478

POWERTEC

The ValuSwitcher™ family is Powertec's economical series of switching power supplies, both open frame and enclosed. ValuSwitchers are designed for low and medium power applications (50-400 watts). They are an extension of the SuperSwitcher™ family (240-1700 watts), introduced over ten years ago, and the MultiMod™ multiple output switcher family (300-1000 watts).

Designated Series 19, ValuSwitchers offer a fully regulated main output and a choice of fully regulated or semi-regulated auxiliary outputs. OVP is standard on the main output, optional on the others. Additional options include a power fail signal, EMI filter and cover.

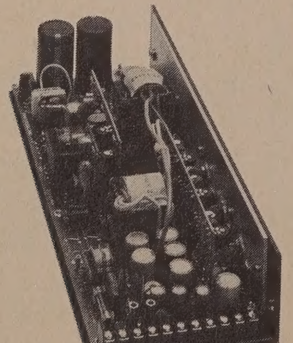
Common mode input filtering, logic inhibit, AC undervoltage inhibit and remote sense are all standard features.

Reliability, quality, and performance, which have long characterized SuperSwitchers, are also hallmarks of the ValuSwitchers. And at a price that offers the best DC power supply value in the industry.

The following standard Quad voltage output combinations are available: (+5, ±12, −5), (+5, ±12, +24), (+5, ±15, −5), (+5, ±15, +24), (+5, +12, ±12), (+8, ±16, +24).

FEATURES
FCC & VDE EMI Option • VDE, IEC, CSA, UL Safety Specs • Remote Sense • Fully Regulated All Outputs OR Fully Regulated Main Output and Semi-regulated Auxiliaries • Efficiencies of Greater Than 75% on Most Outputs • OVP with Crowbar and Inverter Shut-down • Brown Out Below 85 or 170 VAC • Power Fail Signal Option • Inhibit • Cover Option • Soft Start Circuit • Reverse Voltage Protection • Extended Input Voltage Range: 90-132/180-264 VAC, 47-440 Hz • Field Selectable 115/230 VAC • Hold-up Exceeds 20 ms • Full Power Outputs at 50°C; Derates to 50% at 70°C • 100% Burn-in • Powertec's 18 Years of Proven Value

44 Multiple Output Models
50 to 400 Watts



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ValuSwitcher™

MultiMod™ is a new concept in multiple output modular switching power supplies providing an alternative to costly customs. It allows you to choose your voltage/current combinations from a large selection of standard switching power supplies and standard auxiliary output modules, and we do the rest.

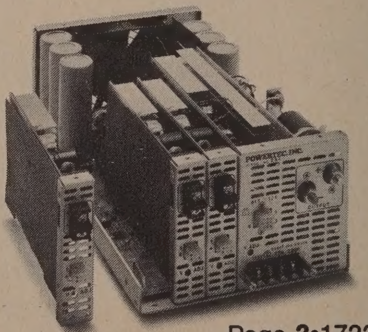
The MultiMod switchers have 2 to 7 fully regulated outputs, which consist of one main output and 1 to 3 fully isolated plug-in output modules. These output modules are off-the-shelf standards which the designer can select as building blocks to provide his ideal voltage/current combinations. He is assured of dependable delivery of supplies which exactly match his unique requirements. And MultiMods operate with proven field reliability because they are put together with standard building blocks produced in high volume.

Main outputs use only pure switch mode design. All auxiliaries are also available as fully switching. Thus, the designer can be assured of maximum efficiency and minimum thermal stress. Post-linear regulated auxiliaries are also available.

Multiple outputs are available from 2 through 48 volts with modules rated from 12 to 750 watts. Total output ratings available are 300, 400, 600, 850 and 1000 watts.

FEATURES
FCC & VDE EMI Specs • VDE, IEC, CSA, UL Safety Specs • Field Selectable 115/230 VAC • Switching or Linear Regulated Auxiliaries Available • Efficiency Typically 75% • Full Power Outputs at 50°C; Derates to 50% at 70°C • Remote Sense • Fully Regulated • Extended Input Voltage Range: 90-132/165-265 VAC, 47-63 Hz • OVP with Crowbar & Inverter Shut-down • Power Fail Signal • Logic Inhibit • Soft Start • Brown Out of 85 or 160 VAC • Reverse Voltage Protection • 100% Burn-in

2 to 7 Multiple Outputs
300 to 1000 Watts



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MultiMod™ Switchers

Quality, Reliability, Performance in Flexible, Economical, Designs.

SuperSwitcher™ is a Powertec first, developed over ten years ago. Today, it is the most second-sourced high power switching power supply on the market.

It's grown to a series consisting of more than 120 models, with both single and multiple outputs, ranging from 2 to 48 volts, and 240 to 1700 watts. Most models are the 5″x8″x10″ fan cooled box.

Reconfigured to meet the Safety Extra Low Voltage (SELV) requirements of the tough European safety specifications, the new 9N & 9K models are setting new standards of performance for high power switchers. The new designs offer 8mm spacing and 5300 VDC hipot capability. Add to this optional internal EMI filters to meet either FCC or VDE noise specifications in a 5″x8″x10″ package, and you can see how Powertec is leading the way. Need more power? Just give us 1″ and you can have the 9J, a real brute dependably delivering up to 1700 watts in a 5″x8″x11″ package. With a host of standard features and standard options, of course.

Too good to be true? Not from Powertec. We deliver. We set the standard for others to copy. But then, that's what creating a standard is all about.

Standard Models	
2V @ 120, 160, 200, 300, 400A	15V @ 32, 40, 50, 70, 105A
3.3 V @ 120, 160, 200, 300, 400A	24V @ 20, 26, 33, 45, 70A
5V @ 90, 120, 150, 200, 300A	28V @ 17, 28, 38, 60A
12V @ 40, 50, 62, 90, 130A	48V @ 10, 13, 17, 23, 36A

FEATURES

FCC & VDE EMI Specs • VDE & IEC Approved to Class I SELV, CSA Certified, UL Recognized • Field Selectable 115/230 VAC • All Outputs Switching • 75% Efficiency Typical for 5 Volt Outputs • Full Power Outputs at 50°C; Derates to 50% at 70°C • Remote Sense • Fully Regulated • Extended Input Voltage Range: 90-132/165-265 VAC, 47-63 Hz • OVP with Crowbar & Inverter Shut-down • Power Fail Signal • Inhibit • Soft Start • Brown Out Below 85 or 160 VAC • Reverse Voltage Protection • 100% Dynamic Burn-in: AC Cycled On & Off, Output Cycled from Full Load to No Load to Short Circuit • Standard Off-The-Shelf Delivery • Powertec's 18 Years of Proven Value

Over 100 Models
240 to 1700 Watts, 2 to 48 Volts

Page 3•1737

SuperSwitcher™

PowerSystems™ by Powertec is a highly flexible building block approach for your total system requirements using standard Powertec power supplies from our three families of switchers:

- ValuSwitcher™—44 Multiple Output Models from 50 to 400 Watts with Up to 5 Outputs—2 to 48 Volts.
- MultiMod™—300 to 1000 Watt Multiple Output Power Supplies with Up to 7 Outputs—2 to 48 Volts.
- SuperSwitcher™—240 to 1700 Watt Single Output Power Supplies from 2 to 48 Volts—Over 100 Models Available.

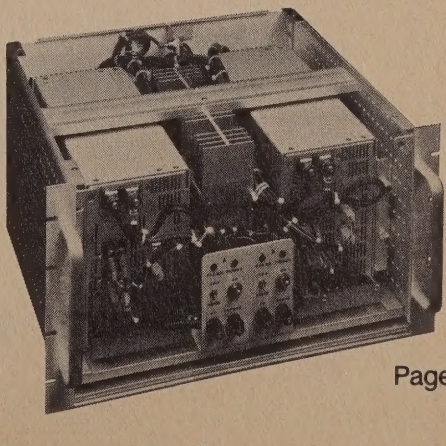
Powertec is capable of providing the following type of systems:

- True redundancy for 1 to 7 outputs to achieve maximum system reliability (not simply parallel operation).
- Up to 14 outputs and 2400 watts per system.
- Parallel operation for high current requirement on one or more voltages up to 3400 watts.

With PowerSystems™, individual outputs can be configured to your needs. All this in a standard 19″ rack mount or custom package that will meet UL, CSA, BT (formerly BPO) on some models, or VDE safety standards as required. PowerSystems™ by Powertec—deliver your total system power requirements.

FEATURES*

True Redundancy with Isolation Diodes for Fault Tolerance • VDE, IEC, CSA, UL Safety Specs • FCC and VDE EMI Specs • Standard 19″ Rack for Convenience • Safe "On-line" Repair/Replacement Capabilities in Redundant System • 100% Burn-in of Power Supplies
***Features apply to PS4001 shown below.**



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PowerSystems™

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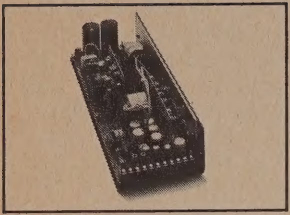
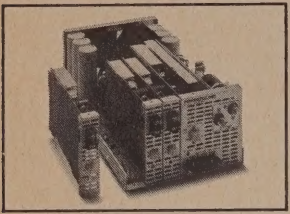
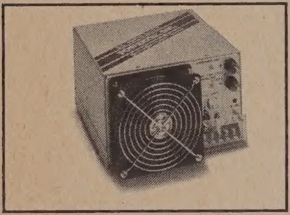


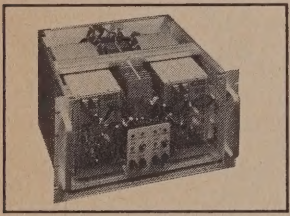
ValuSwitcher™—Economical Series of Multiple Output AC to DC Switching Power Supplies—44 Models from 50 to 400 Watts with Up to 5 Outputs—2 to 48 Volts 3•1729



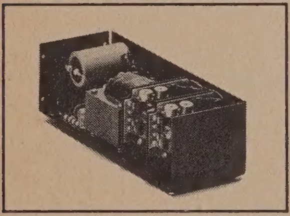
MultiMod™—High Power Series of Multiple Output AC to DC Switching Power Supplies—300 to 1000 Watts with Up to 7 Outputs—2 to 48 Volts 3•1733



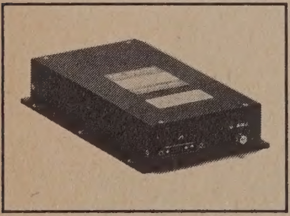
SuperSwitcher™—High Power Single Output Box Switchers—240 to 1700 Watts from 2 to 48 Volts—Over 100 Models Available 3•1737



PowerSystems™—Flexible Building Block Approach for Your Total System Requirements Using ValuSwitchers,™ MultiMods™ and SuperSwitchers™ for: True Redundancy, or Up to 14 Outputs and 2400 Watts per System or Parallel Operation for High Current Requirements Up to 3400 Watts 3•1741



OEM II—Economical Series of Linear Power Supplies—AC to DC Single and Multiple Outputs—4.5 to 25.2 Volts and 5 to 550 Watts 3•1740



HP—Linear Power Supplies Designed to Meet MIL-E-5400—3 Phase 400 Hz Input—50 to 950 Watts 3•1744

POWERTEC

The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

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how to use eem

The 27th edition of EEM has been further arranged, beyond the well-known EEM Product Sections, into four volumes, each composed of related Product Sections. And, for user convenience, each volume contains its own Product Index and Directory (green pages) and its own Manufacturers and Sales Offices Directory (yellow pages). Every Product Heading and every Manufacturer of electronic products is listed in each volume. Where, however, the Product Section is assigned to a volume other than that in use, a cross reference is made to the appropriate volume for further information.

To locate a specific product. Start by choosing the volume whose title describes the class of electronic product you are seeking. If you are not sure which volume is appropriate, pick up the first one at hand and find the product heading in the green pages. There you will find either a list of that product's manufacturers or you will be referred to the proper volume. All products are identified by their generic terms. Please read the detailed instructions on the first page of this section. Manufacturers with catalog data in this edition of EEM appear in bold face type and page numbers are shown. Manufacturers appearing in light face type have submitted verifying evidence that they supply the products shown. When you have located a product of interest, turn to the page(s) shown for further information. You will find these pages in each volume in the appropriate sections.

product selection guides

There are 33 Product Selection Guides included in this edition of EEM! They are located on the first pages of the Product Section to which they apply. Use these guides for basic selection parameters and then go to the EEM pages shown in the guide for more detailed information.

product selection index

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1500*	Capacitors	**1A**•1002			
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eem sales offices

Main Sales Office
Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, New York 11530
(516) 222-2500
TWX: 510-222-1673
CABLE: UNITECH GARDENCITYNY

New England
Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, New York 11530
(516) 222-2500

New York, New Jersey & Southern Connecticut
The Druker Company
1101 State Road, Building N
Princeton, New Jersey 08540
(609) 921-3686

Pennsylvania & Southeast
The Gittelman Company
Summit Office Centre
7266 Summit Avenue
Philadelphia Suburb
Fort Washington, PA 19034
(215) 646-5700 Atlanta Office (404) 523-1252

Upper Midwest
The Pattis Group
4761 W. Touhy Avenue
Lincolnwood, IL 60646
(312) 679-1100
TWX: 910-223-0736

Lower Midwest
LeBeau Associates
5934 Royal Lane
Preston Center, Suite 230
Dallas, TX 75230
(214) 987-4094

Southern California/ Nevada, Arizona & Utah
Media West
202 Fashion Lane
Suite 207
Tustin, California 92680
(714) 832-5005
TWX: 910-595-1581

Northern California/Pacific Northwest
Hearst Business Communications, Inc.
1333 Lawrence Expressway
Santa Clara, CA 95051
(408) 248-8044

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trademark and logofinder directories

A comprehensive trademark directory is included at the end of the EEM green pages in Volume 1B. NEW in this edition, the EEM logofinder shows the symbols and graphics used by manufacturers as identifiers on their products. Use these pages to locate manufacturers of specific trademarks and logos.

manufacturers' index

In the EEM yellow pages you will find pertinent details on all manufacturers listed in EEM including local sales offices and/or distributors. Please refer to the detailed instructions on the first page of the EEM yellow pages for additional information.

to order a product found in eem

When you have located the product that suits your needs, call the manufacturer or the local sales rep or distributor as shown in the EEM yellow pages. Give the EEM data page number and specs from that page. You and the supplier will be talking on the same wave length which should simplify your ordering and buying.

to file manufacturers' catalogs and data

The EEM File System has been revised and updated. The new EEM File System contains a complete Product Index. This Index tells you where to file which catalog. It also contains a cross-reference so you'll know where catalogs are filed.

In order to use the new EEM File System all you need is a supply of standard letter size, third-cut, manila file folders which are available locally. You then use the pressure sensitive labels which are supplied with the File System to go into as much detail as you want (or need).

Each label fits the third-cut file folder exactly. There are 308 of these labels in one System: 1 for the Index, 1 each for the 61 EEM Product Sections, 24 for the alphabetical file of multiproduct catalogs, plus 222 additional labels for System expansion.

The System also includes 61 Cross Reference Cards so you can quickly and easily find multiproduct catalogs. The EEM File System is complete and can save you countless hours of time and thousands of dollars. The price? Only $25.00. Send a check to: EEM File System, 645 Stewart Ave., Garden City, NY 11530 and we'll absorb postage and handling. Send a purchase order and add $2.00 for postage and handling. NY and CA residents, please add sales tax.

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† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 401-847-8000

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† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ... 201-CA8-0321
§ Edwards Co., Signaling Prods. Div., P.O. Box 1188, Farmington, CT 06032 ... 203-678-0410
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 ... 717-767-6517
§ ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 ... 201-641-3650
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 ... 216-951-8000
§ Fenwal, Inc., 400 Main St., Ashland, MA 01721 ...
Forma Scientific, Div. of Mallinckrodt Inc., Box 649, Marietta, OH 45750 ... 614-373-4763
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ... 613-226-4000
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ... 815-968-9661
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 ... 203-866-2573
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
Henschel, 14 Cedar St., Amesbury, MA 01913 ... 617-388-1103
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 ... 714-827-2135
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 ... 612-870-5186
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 ... 612-870-5346
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ... 800-321-5111, Ext. 596
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 ... 213-444-4000
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 ... 818-889-3179
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711
Kalglo Elctrns. Co., Inc., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017 ... 215-837-0700
† Keltron Corp., 225 Crescent St., Waltham, MA 02154 ... 617-894-8700
§ WALTER KIDDE, Div. of Kidde, Inc.;Fire Sys. Operations; P.O. Box 1147, Wake Forest, NC 27587 ... 919-556-6811
Kolin Inds., Box 357, Pondfield Rd. W., Bronxville, NY 10708 ... 914-961-5065
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 ... 914-664-7733
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 ... 312-541-3232
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 ... 201-283-4925
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ... 516-549-9272
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 ... 609-298-7300
§ Metrix Instrument Co., 1711 Townhurst, Houston, TX 77043 ... 713-461-2131
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820

Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Poly-Scientific, 1213 N. Main St., Blacksburg, VA 24060 703-552-3014
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§ Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918
§ PSG Inds., 1225 Tunnel Road, Perkasie, PA 18944 215-257-3621
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Risk, George, Inds., GRI Plaza, Kimball, NE 69145 308-235-4645
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ..... CA 415-965-0910;800-221-7060
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 800-628-8862
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ..... 516-957-8700;800-645-5516
Spectron Corp., 344 New Albany Rd., Moorestown, NJ 08057 609-234-5700
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854 201-572-9512
§ Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Tapeswitch Corp. of America, 100 Schmitt Blvd., Farmingdale, NY 11735 516-694-6312
Tegal Scientific, Inc., Box 5905, Concord, CA 94524 415-827-1054
§ Tektone Sound & Signal, 1331 S. Killian Dr., Lake Park, FL 33403 305-844-2383
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Trans-Met Engrg., 601 S. Palm St., La Habra, CA 90631 213-691-2266
Vibra-Metrics, 385 Putnam Ave., Hamden, CT 06517 203-288-6158
Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Alarms, Controls, Photoelectric-3700 — *See Vol. 1B*

Alloys, Brazing-5400 — *See Vol. 2*

Alloys, Metal/Ceramic-1600 — *See Vol. 2*

Alphanumeric Readouts — See Tubes, Readout (Vol. 1A)

Alternators-4050

† Georator Corp., Box 70, Manassas, VA 22110, 703-368-2101 ..... 3•1880
† American Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
† Columbia Elec. Mfg., 4519 Hamilton Ave. N.W., Cleveland, OH 44114 216-361-8060
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
Eastern Air Devices Motor Div., 1 Progress Dr., Dover, NH 03820 603-742-3330
† Electro Kinetics Co., Sub. HTL Inds., Inc., 402 E. Gutierrez St., Santa Barbara, CA 93102 805-963-2055
§† Hertner Div., 12690 Elmwood Ave., Cleveland, OH 44111 216-252-4242
† HTL Electro Kinetics, 402 E. Gutierrez St., Santa Barbara, CA 93101 805-963-2055
† IMC Magnetics Corp., Eastern Div., 570 Main St., Westbury, NY 11590 516-334-7070
Q-S Products Co., Inc., 3605 S.W. Snoqualmie St., Seattle, WA 98126 206-937-5505
Simmonds Precision, P.O. Box 310, Norwich, NY 13815 607-335-5000
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600

Aluminizers, Vacuum — See Deposition Equip. (Vol. 3), Evaporation Equipment, Electronic Beam (Vol. 3),

Amplifiers, AF-1300

Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 ..... 3•1834,1835
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 ..... 3•1871,1875
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 ..... 3•1886
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ..... 3•1255
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301, 518-355-8300 ..... 3•1263
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ..... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ..... 3•1012,1933
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 ..... 3•1046
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 ..... 1A•1614
§ RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 ..... 3•1066
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530, 914-681-0700 ..... 3•1055
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 ..... 3•1023,1024
A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 703-370-0900
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
§ Amperex Electronic Corp., Hicksville Div., Box 418 - 230 Duffy Ave., Hicksville, NY 11802 516-931-6200
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
§ Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ..... 203-268-4372; 800-243-8160
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
§ Bell Audio Sys., 994 Freeway Drive North, Columbus, OH 43229 614-846-2766
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ..... 619-279-8620;800-356-2244;800-821-1634
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
§ Cetec Raymer, 7315 Fulton Ave., No. Hollywood, CA 91605 213-875-0423
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§ Davis, J. W., & Co., P.O. Box 26177, Dallas, TX 75226 214-651-7341
§ Delta Elctrns., 145 Fayette St., Winston-Salem, NC 27101 919-725-4122
Dexter Research Ctr., Inc., 7300 Huron River Dr., Dexter, MI 48130 313-426-3921
§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
† Elantec, Inc., 1996 Tarob Ct., Milpitas, CA 95035 408-945-1323
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ..... 702-883-3400;800-648-7952
§ Ferranti Elec., 87 Modula Ave., Commack, NY 11725 516-543-0200
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† Gentex, Box 315, Carbondale, PA 18407 603-434-0311
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
† GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
HGA Elctrns., 519 S. Fifth Ave., Mt. Vernon, NY 10550 914-664-5393
† Instruments, Inc., 7263 Engineer Rd., San Diego, CA 92111 619-571-1111
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada 416-632-2996
LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
§ NEC Elctrns. USA Inc., NEC Electron Div., 252 Humboldt Ct., Sunnyvale, CA 94086 408-745-6520
Norton Assocs., 10 Di Tomas Ct., Copiague, NY 11726 516-842-4666
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
Peca, Inc., 4957 Pearson Ave., Philadelphia, PA 19114 215-824-1550
§ Perma Power Elctrns., 5615 W. Howard Ave., Chicago, IL 60648 312-647-9414
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
§ Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Roanwell, 180 Varick St., New York, NY 10014 212-989-1090
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Solitron Devices, 8808 Balboa Ave., San Diego, CA 92123 619-278-8780
Southwest Tech Prods Corp., 219 W. Rhapsody, San Antonio, TX 78216 512-344-0242
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ..... 516-957-8700;800-645-5516
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531

§† Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
† Telephonics, 770 Park Ave., Huntington, NY 11743 516-549-6000
Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Amplifiers, Antenna-1900

† Adams-Russell, Parisi Div., 280 Bear Hill Rd., Waltham, MA 02154 .617-890-0055
Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 703-370-0900
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
§ Kay-Townes Antenna, P.O. Box 593, Rome, GA 30161 404-291-9871
† Locus, Box 740, State College, PA 16801 814-466-6275
§ Macom Inds., 8230 Haskell Ave., Van Nuys, CA 91406 ....
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sitco Antennas, 10330 N.E. Marx St., Portland, OR 97220 503-253-2000
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Amplifiers, Compressor-1100

ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O, Box 6437, Ithaca, NY 14851-6437 607-272-7640
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada 416-632-2996
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531

Amplifiers, Current, AC-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
† **Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714, 602-746-0849 .... 3•1005**
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 .... 3•1888
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 ....1B•1860
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 .... 3•1023,1024
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Norton Assocs., 10 Di Tomas Ct., Copiague, NY 11726 516-842-4666
† Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Rotek Instr. Corp., 390 Main St., Waltham, MA 02254 617-899-4611
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ THORN EMI Gencom Inc., 23 Madison Rd., Fairfield, NJ 07006 516-433-5900

Amplifiers, DC-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
† **Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 .... 3•1930**
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 .... 3•1007
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377, 212-458-5811 .... 3•1010
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1933
† **NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663**
NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663
Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 .... 3•1046
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 .... 3•1023,1024
§ Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
† Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
Bell & Howell/CEC Div., 360 Sierra Madre Villa, Pasadena, CA 91109 213-796-9381
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 619-727-7420
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523 415-932-3911
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
† Elantec, Inc., 1996 Tarob Ct., Milpitas, CA 95035 408-945-1323
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
Fogg Sys., 15592 E. Batavia Dr., Aurora, CO 80011 303-344-1883
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
† Hades Mfg. Corp., 151-A Verdi St., Farmingdale, NY 11735 516-249-4244
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§ Hottinger Baldwin Measurements, 139 Newberry St., Framingham, MA 01701 617-875-8282
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Inertial Motors, 280 N. Broad St., Doylestown, PA 18901 215-345-1010
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
† Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
McFadden Sys., Inc., 8956 S. Atlantic Ave., South Gate, CA 90280-9990 213-564-5958
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
† Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701 813-822-2529
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 ....714-898-2691;800-854-2433
† Performance Controls Inc., 333 Byberry Rd., Hatboro, PA 19040 215-675-6500
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844

Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 617-922-5961
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ....215-EL5-1361
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
† Tegam, 7230 N. Ridge Rd., Madison, OH 44057 216-428-7505
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
† Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Amplifiers, Data — See Amplifiers, Instrumentation (Vol. 3)

Amplifiers, Decade-1100

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 .... 3•1003
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
Schaffner EMC Inc., Component Div., 825 Lehigh Ave., Union, NJ 07083 201-851-0644
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100

Amplifiers, Deflection-1100 (Also See Yokes, Deflection, Oscilloscopes, etc.)

† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 408-738-0530
Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
† Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620

Amplifiers, Differential-1100

† Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 .... 3•1007
§ RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 .... 3•1066
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
§† Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
§ Siliconix, Inc., 2201 Laurelwood Rd., Santa Clara, CA 95054 408-988-8000
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391

Amplifiers, Distribution-1100

Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, 512-251-2313 .... 1A•1315
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1154
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 .... 1A•1358
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
§ RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 .... 3•1066
Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
International Crystal Mfg., 10 N. Lee, P.O. Box 26330, Oklahoma City, OK 73126 405-236-3741
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
§ Macom Inds., 8230 Haskell Ave., Van Nuys, CA 91406 ....
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
§† Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ....215-EL5-1361
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
§ Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893

Amplifiers, Equalization-1300

Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 .... 3•1016,1018, 1019
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
Convex Corp., P.O. Box 17225, Dulles Intl. Airport, Washington, DC 20041 703-661-8900
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Amplifiers, Fiber Optic-1100

MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998, 213-828-7496 1B•1116
§ Augat Fiberoptics, 40 Perry Ave., Attleboro, MA 02703 617-222-2202
Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
Opto Technlg., 1674 S. Wolf Rd., Wheeling, IL 60090 312-537-4277
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621

Amplifiers, IF-1100

CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 .... 1A•1646-1648
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
§ A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800

AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 408-744-1320
Alpha Inds., Inc.-Microelectronic Div., 3015 Advance Lane, Colmar, PA 18915 215-822-1311
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
† Amplifonix Inc., 220 Rte. 13, Bristol, PA 19007 215-788-2350
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
§† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 516-694-1414
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
† M/A-COM OSW, Inc., 2626 S. Hardy Dr., Tempe, AZ 85282 602-966-1471
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 201-748-5089
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
† RFD, Inc., 5024 Nassau St., Tampa, FL 33607 813-872-1502
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
§ Rodelco Elctrns. Corp., 356A Comac Rd., Deer Park, NY 11729 516-643-5110
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000
† Techtrol Cyclonetics, Inc., 815 Market St., New Cumberland, PA 17070 717-774-2746
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Amplifiers, Instrumentation-1100

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 .... 3•1002,1003
† **Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 .... 3•1006**
† **Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1151**
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 .... 3•1007
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343, 612-931-2700 .... 1B•1144
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1251
† **Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301, 518-355-8300 .... 3•1263**
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1933
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518, 415-827-9010 .... 3•1015
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 .1A•1614,3•1016 1019,1286
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
† Amptek, Inc., 6 De Angelo Dr., Bedford, MA 01730 617-275-2242
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
Bell & Howell/CEC Div., 360 Sierra Madre Villa, Pasadena, CA 91109 213-796-9381
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Data, Inc., 7702 Emerald Ave., Box 2071, Ft. Collins, CO 80525 303-493-1222
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 201-227-1002
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Fogg Sys., 15592 E. Batavia Dr., Aurora, CO 80011 303-344-1883
† Genisco Technlg. Corp., Transducers Prods. Div., 650 Easy St., Simi Valley, CA 93065 805-581-3985
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
† Hades Mfg. Corp., 151-A Verdi St., Farmingdale, NY 11735 516-249-4244
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§ Hottinger Baldwin Measurements, 139 Newberry St., Framingham, MA 01701 617-875-8282
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
† Hytek Microsystems, 980 University Ave., Los Gatos, CA 95030 408-395-2300
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
† Paine Instrs., 2401 S. Bayview St., Seattle, WA 98144 800-426-0366
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 716-684-0001
Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
§† Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Seven Mountains Sci. Inc., P.O. Box 650, Boalsburg, PA 16827 814-466-6559
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
Universal Ad-Yu Elctrns., Inc., 2517 E. Norwich St., Milwaukee, WI 53207 414-482-4100
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Amplifiers, Integrating-1100 (Also See Amplifiers, perational; Integrators, Electronic)

† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929

Amplifiers, Isolation-1100

Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ....3•1152
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ....3•1251
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
† Amplifonix Inc., 220 Rte. 13, Bristol, PA 19007 215-788-2350
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
§ Brelonix, 106 No. 36th St., Seattle, WA 98103 206-633-1964
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111 619-278-0600
Fogg Sys., 15592 E. Batavia Dr., Aurora, CO 80011 303-344-1883
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
† Locus, Box 740, State College, PA 16801 814-466-6275
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Amplifiers, Klystron-3400

† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 ....3•1390
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
§† ITT Electron Tube, Box 100, Easton, PA 18042 215-252-7331
† Litton Inds., Electron Tube Div., 960 Industrial Rd., San Carlos, CA 94070 415-591-8411
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Amplifiers, Limiting-1100

† Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ....3•1004
AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 408-744-1320
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
§ Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada 416-632-2996
† Locus, Box 740, State College, PA 16801 814-466-6275
† M/A-COM OSW, Inc., 2626 S. Hardy Dr., Tempe, AZ 85282 602-966-1471
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Universal Ad-Yu Elctrns., Inc., 2517 E. Norwich St., Milwaukee, WI 53207 414-482-4100
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Amplifiers, Line-1100

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Delta Elctrns., 145 Fayette St., Winston-Salem, NC 27101 919-725-4122
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Amplifiers, Lock-in-1100

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Evans Assocs., Box 5055, Berkeley, CA 94705 415-653-3083
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010

Amplifiers, Logarithmic-1100

† Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ....3•1004
CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 ....1A•1646-1648
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010

† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Venable Industries, Inc., 3555 Lomita Blvd., Torrance, CA 90505 213-539-2522
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Amplifiers, Magnetic-1100

Adams-Russell, Parisi Div., 280 Bear Hill Rd., Waltham, MA 02154 .617-890-0055
Atlas Engrg. Corp., 10 Cheney St., Dorchester, MA 02121 617-445-7100
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Bicron Elctrns., Box 807, Barlow St., Canaan, CT 06018 203-824-5125
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 805-964-0751
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 ..201-245-3200;800-526-4048
† Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385 212-386-1300
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
† Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
HGA Elctrns., 519 S. Fifth Ave., Mt. Vernon, NY 10550 914-664-5393
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
Magnetic Specs., 10 Albemarle Ave., Trenton, NJ 08638 ....
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 617-843-5000
† Technitrol, 1952 E. Allegheny, Philadelphia, PA 19134 215-426-9105
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
† Torotel Prods. Inc., 13402 S. 71 Hwy., Grandview, MO 64030 816-761-6314
† Torwico Elctrns. Inc., Rte. 70, Lakewood, NJ 08701 201-364-1800
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
† TRW Inductive Products Div., 150 Varick St., New York, NY 10013 .212-255-3500
§† Zambre Co., Inc., 2134 Old Middlefield Way, Mountain View, CA 94043 415-968-9176

Amplifiers, Master Antenna — See Amplifiers, Distribution (Vol. 3)

Amplifiers, Microphone — See Amplifiers, AF (Vol. 3)

Amplifiers, Microwave-3400

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 ....3•1003
Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663, 714-759-2411 ....1A•1365
† **MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 ....3•1390**
Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235, 212-769-0200 ..1A•1713, 1714,1723,1756-1761,1772,1773
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....1A•1780,1782
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
§ A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 408-744-1320
† Airtron, 200 E. Hanover Ave., Morris Plains, NJ 07950 201-539-5500
Alpha Inds., Inc.-Microelectronic Div., 3015 Advance Lane, Colmar, PA 18915 215-822-1311
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Alpha Inds., Inc., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
† Amplifonix Inc., 220 Rte. 13, Bristol, PA 19007 215-788-2350
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
Central Microwave Co., Alpha Inds., Inc., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
† Comtech Microwave Corp., Comtech Corp., 63 Oser Ave., Hauppauge, NY 11788 516-435-4646
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Dexcel, Div. of Gould, 2285C Martin Ave., Santa Clara, CA 95050 ..408-727-9833
Drake, R. L., Co., 540 Richard St., Miamisburg, OH 45342 513-866-2421
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 617-329-1500
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
Harris Microwave Semiconductor, 1530 McCarthy Blvd., Milpitas, CA 95035 408-262-2222
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 516-694-1414
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
† Litton Inds., Electron Tube Div., 960 Industrial Rd., San Carlos, CA 94070 415-591-8411
† Locus, Box 740, State College, PA 16801 814-466-6275
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
† M/A-COM OSW, Inc., 2626 S. Hardy Dr., Tempe, AZ 85282 602-966-1471
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41
† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 201-469-3311
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 714-527-4896
† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
† RFD, Inc., 5024 Nassau St., Tampa, FL 33607 813-872-1502
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
§ Siemens Corp., 186 Wood Ave., S., Iselin, NJ 08830 201-494-1000
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 ..603-627-6000
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Amplifiers, Mixing-1300

Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ....3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ....3•1012
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
HGA Elctrns., 519 S. Fifth Ave., Mt. Vernon, NY 10550 914-664-5393
§ Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235 212-769-0200
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Amplifiers, Multichannel-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ....3•1004**
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 .1A•1614,3•1016 1019,1286
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010

RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Amplifiers, Narrow Band-1100

Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 .... 3•1007
AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 408-744-1320
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 617-522-8640
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
Ehrhorn Technological Opers., Inc., P.O. Box 888, Canon City, CO 81212 303-275-1613
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 516-694-1414
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
† Locus, Box 740, State College, PA 16801 814-466-6275
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 201-469-3311
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 714-527-4896
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Amplifiers, Null-1100

CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 ....1A•1646
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Amplifiers, Operational-1100

† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714, 602-746-0849 ....3•1005
CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 ....1A•1646,1647,1649,1650
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ....3•1933
§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 ....1A•1677
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
† Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523 415-932-3911
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
† Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§ Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
† Elantec, Inc., 1996 Tarob Ct., Milpitas, CA 95035 408-945-1323
§† Exar Integrated Sys., P.O.B. 62229, Sunnyvale, CA 94088 408-732-7970
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† Hytek Microsystems, 980 University Ave., Los Gatos, CA 95030 408-395-2300
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
§† Intersil, 10710 N. Tantau Ave., Cupertino, CA 95014 408-996-5000
Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352 212-461-7000
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada 416-632-2996
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
§† Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 408-727-5350
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§ NEC Elctrns. USA Inc., NEC Electron Div., 252 Humboldt Ct., Sunnyvale, CA 94086 408-745-6520
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 201-748-5089
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 415-968-9211
RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§ RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
§ Sanken Elec. Co., 1-22-8 Nishi-Ikebukuro, Toshima-Ku, Tokyo, Japan 03-986-6151
§† Signetics, 811 E. Arques Ave., Sunnyvale, CA 94086 408-739-7700
† Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
§† Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 415-968-9241

Amplifiers, Parametric-3400

† Comtech Microwave Corp., Comtech Corp., 63 Oser Ave., Hauppauge, NY 11788 516-435-4646
† Eaton Corp., A.I.L. Div., Comac Rd., Deer Park, NY 11729 516-595-3094
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600

Amplifiers, Peak Limiting-1100

§ RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 ....3•1066
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 ....714-546-4731 800-421-7915
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada 416-632-2996
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685

Amplifiers, Phase-Lock Loop-1100

Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
§† Exar Integrated Sys., P.O.B. 62229, Sunnyvale, CA 94088 408-732-7970
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085

Amplifiers, Photocell — See Amplifiers, Transducer (Vol. 3)

Amplifiers, Power-1100

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 .... 3•1002
Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 .... 1A•1686
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 .... 3•1834,1835
† **Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 .... 3•1930**
CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 .... 1A•1646,1649
§ **Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623, 716-473-6900 .... 3•1008,1009**
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 .... 3•1858
† **Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1871,1875**
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 .... 3•1886
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735, 516-694-1414 .... 3•1011
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1252
† **MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 .... 3•1390, 1391**
Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235, 212-769-0200 .. 1A•1713, 1714,1756-1761
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
§ **Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 .... 3•1046**
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897
§ **RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 .... 3•1066**
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 .... 3•1022-1024
§ A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
Alpha Inds., Inc.-Microelectronic Div., 3015 Advance Lane, Colmar, PA 18915 215-822-1311
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
§ Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
† Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
§ Bell Audio Sys., 994 Freeway Drive North, Columbus, OH 43229 614-846-2766
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 619-727-7420
Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634
Central Microwave Co., Alpha Inds., Inc., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§ Cetec Raymer, 7315 Fulton Ave., No. Hollywood, CA 91605 213-875-0423
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
§ Drake, R. L., Co., 540 Richard St., Miamisburg, OH 45342 513-866-2421
† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
§ Edwards Co., Signaling Prods. Div., P.O. Box 1188, Farmington, CT 06032 203-678-0410
Ehrhorn Technological Opers., Inc., P.O. Box 888, Canon City, CO 81212 303-275-1613
† Elantec, Inc., 1996 Tarob Ct., Milpitas, CA 95035 408-945-1323
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .... 714-546-4731 800-421-7915
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Instruments, Inc., 7263 Engineer Rd., San Diego, CA 92111 619-571-1111
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
M/A-COM OSW, Inc., 2626 S. Hardy Dr., Tempe, AZ 85282 602-966-1471
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286
McFadden Sys., Inc., 8956 S. Atlantic Ave., South Gate, CA 90280-9990 213-564-5958
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 201-469-3311
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
§ NEC Elctrns. USA Inc., NEC Electron Div., 252 Humboldt Ct., Sunnyvale, CA 94086 408-745-6520
§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 201-748-5089
† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 714-527-4896
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
Power Functions Engrg., 3831 Cavalier Dr., Garland, TX 75042 214-278-0996
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
† RFD, Inc., 5024 Nassau St., Tampa, FL 33607 813-872-1502
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Sanken Elec. Co., 1-22-8 Nishi-Ikebukuro, Toshima-Ku, Tokyo, Japan 03-986-6151
Sanken Elec. U.S.A. Corp., 3848 Carson St., Ste. 105, Torrance, CA 90503 213-540-2209
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Solar Elctrns. Co., 901 N. Highland, Hollywood, CA 90038 213-462-0806
Solitron Devices, 8808 Balboa Ave., San Diego, CA 92123 619-278-8780
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Ten-Tec, Industrial Park, Sevierville, TN 37862 615-453-7172
Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 813-855-4621
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 713-729-1183

Amplifiers, Programmable Gain-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1151
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 .... 3•1007
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518, 415-827-9010 .... 3•1015
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 .1A•1614,3•1016 1019,1286
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111

California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150 Convoy St., San Diego, CA 92111 ... 619-279-8620;800-356-2244;800-821-1634
Cyber Sys., Inc., 2031 E. Cerritos Ave., Anaheim, CA 92806 ... 714-722-2051
Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 ... 617-268-9696
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 ... 619-279-8620
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 ... 714-546-4731, 800-421-7915
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 ... 714-827-2135
† Hytek Microsystems, 980 University Ave., Los Gatos, CA 95030 ... 408-395-2300
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 ... 516-694-1414
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 ... 408-988-4930
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 ... 914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 ... 415-856-1800
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 ... 813-574-8788
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 ... 617-329-1508
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 ... 714-639-9246
§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 ... 714-776-6400
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 ... 213-548-1327
Tegam, 7230 N. Ridge Rd., Madison, OH 44057 ... 216-428-7505
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 ... 714-549-0391

Amplifiers, Public Address — See Amplifiers, AF (Vol. 3)

Amplifiers, Pulse-1100

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 ... 3•1003
† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ... 3•1004**
CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 ... 1A•1646,1648
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 ... 714-646-7165
AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 ... 408-744-1320
American Electronic Labs., Box 552, Lansdale, PA 19446 ... 215-822-2929
† Amptek, Inc., 6 De Angelo Dr., Bedford, MA 01730 ... 617-275-2242
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 ... 617-522-8640
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 ... 408-496-6710
Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710 ... 415-527-1121
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 ... 602-746-1111
Canberra Ind., One State St., Meriden, CT 06450 ... 203-238-2351
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 ... 814-238-2461
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 ... 401-885-3600
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 ... 303-669-9433
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 ... 214-381-7161
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 ... 716-473-6900
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 ... 714-557-7800
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 ... 617-329-1500
Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 ... 203-757-9291
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 ... 703-639-9045
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 ... 805-962-8336
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 ... 516-694-1414
§ Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 ... 314-243-3147
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 ... 516-349-1700
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 ... 516-231-1400
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 ... 619-279-5100
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 ... 312-354-4350
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 ... 617-329-1508
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ... 44-(582) 60-14-41
† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 ... 201-469-3311
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 ... 714-639-9246
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 ... 516-671-5700
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 ... 215-343-5900
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 ... 602-624-8358
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 ... 415-827-9010
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 ... 617-734-0844
Power Functions Engrg., 3831 Cavalier Dr., Garland, TX 75042 ... 214-278-0996
Products for Resch., 88 Holten St., Danvers, MA 01923 ... 617-774-3250
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 ... 213-548-1327
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 ... 516-242-1100
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ... 215-EL5-1361
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 ... 408-377-4621
Sensor Corp., Box 140, Scottdale, PA 15683 ... 412-887-4080
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ... 914-681-0700
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 ... 617-329-1600
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 ... 914-763-8893
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 ... 615-483-8405
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 ... 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 ... 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 ... 213-978-0516
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050 ... 408-727-7370
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 ... 415-493-4141
Westamp, 1542 15th St., Santa Monica, CA 90404 ... 213-393-0401

Amplifiers, Pulse Limiting-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ... 3•1004**
AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 ... 408-744-1320
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400
Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 ... 714-557-7800
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 ... 714-898-2691;800-854-2433
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 ... 813-884-1411
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 ... 415-493-4141

Amplifiers, Recording — See Amplifiers, AF (Vol. 3)

Amplifiers, Resolver — See Amplifiers, Servo (Vol. 3)

Amplifiers, RF-1100

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 ... 3•1002,1003
† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ... 3•1004**
§ **Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623, 716-473-6900 ... 3•1008**
Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663, 714-759-2411 ... 1A•1365
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735, 516-694-1414 ... 3•1011
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ... 3•1255
† **MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 ... 3•1390, 1391**
† **Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235, 212-769-0200 ... 1A•1713, 1714,1723,1756-1761**
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ... 1A•1780,1782
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 ... 671-273-3333
AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086 ... 408-744-1320
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 ... 305-448-6503
† Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 ... 703-370-0900
Alpha Inds., Inc.-Microelectronic Div., 3015 Advance Lane, Colmar, PA 18915 ... 215-822-1311
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 ... 617-681-8520
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 ... 617-935-5150
American Electronic Labs., Box 552, Lansdale, PA 19446 ... 215-822-2929
† Amplifonix Inc., 220 Rte. 13, Bristol, PA 19007 ... 215-788-2350
§ AmpTek Inc., Teksys Inc., 11103 Dennis Rd., P.O. Box 59841, Dallas, TX 75229 ... 214-241-2511
† AN/COM Industries, P.O. Box 530, 5521 Cleon Ave., N. Hollywood, CA 91603 ... 818-769-5518
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 ... 516-589-5656
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 ... 516-349-9200
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 ... 617-522-8640
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 ... 303-443-4844
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 ... 513-335-0031
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 ... 408-496-6710
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 ... 215-657-7510
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 ... 408-946-5600
† Aydin Vector Div., Box 328, Newtown, PA 18940 ... 215-968-4271
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 ... 814-238-2461
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 ... 303-669-9433
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 ... 516-271-0800
Compliance Design Inc., 593 Massachusetts Ave., Boxboro, MA 01719 ... 617-264-4668
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 ... 214-381-7161
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 ... 617-862-8998
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 ... 516-588-3600
Ehrhorn Technological Opers., Inc., P.O. Box 888, Canon City, CO 81212 ... 303-275-1613
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 ... 714-557-7800
FG Engrg., Box 476, Fredonia, AZ 86022 ... 602-643-7375
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 ... 305-894-3351
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 ... 516-364-0400
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 ... 213-517-6000

Amplifiers, RF-1100 (Cont'd)

ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640

§ Kay-Townes Antenna, P.O. Box 593, Rome, GA 30161 404-291-9871

† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210

§ KLM Electronics, 16890 Church St., P.O. Box 816, Morgan Hill, CA 95037 408-779-7363

† Locus, Box 740, State College, PA 16801 814-466-6275

LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700

† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282

§ Macom Inds., 8230 Haskell Ave., Van Nuys, CA 91406 ....

† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400

M/A-COM OSW, Inc., 2626 S. Hardy Dr., Tempe, AZ 85282 602-966-1471

† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508

MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496

Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000

Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England .... 44-(582) 60-14-41

† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 201-469-3311

§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873

† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700

§ NEC Elctrns. USA Inc., NEC Electron Div., 252 Humboldt Ct., Sunnyvale, CA 94086 408-745-6520

§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 201-748-5089

North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700

† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 714-527-4896

§† Omni Spectra, Inc., Microwave Subsystems Div., 2626 So. Hardy Dr., Tempe, AZ 85282 602-966-1471

§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290

† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844

§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979

§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000

§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000

Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600

RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100

§ Rodelco Elctrns. Corp., 356A Comac Rd., Deer Park, NY 11729 516-643-5110

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Signetics, 811 E. Arques Ave., Sunnyvale, CA 94086 408-739-7700

§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444

§ Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107

Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000

† Techtrol Cyclonetics, Inc., 815 Market St., New Cumberland, PA 17070 717-774-2746

§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300

Ten-Tec, Industrial Park, Sevierville, TN 37862 615-453-7172

† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411

† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880

§† TRW, RF Devices Div., 14520 Aviation Blvd., Lawndale, CA 90260 213-536-0888

§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Amplifiers, Sample & Hold-1100

Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880, 617-246-0300 .... 3•1141

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**

CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 .... 1A•1646-1648

† **Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1151**

ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1160

† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541

§ Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726

† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700

§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816

Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656

† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111

§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751

Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700

† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870

§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135

Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700

§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930

§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810

† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508

† Micro Networks, 324 Clark St., Worcester, MA 01606 617-852-5400

Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281

† Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358

§† Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528

§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222

§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400

Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700

§ Signetics, 811 E. Arques Ave., Sunnyvale, CA 94086 408-739-7700

Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600

Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391

Amplifiers, Servo-4900

Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 .... 3•1930

§ **Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343, 612-931-2700 .... 1B•1143,1144**

Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377, 212-458-5811 .... 3•1010

Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1933

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681

Adams-Russell, Parisi Div., 280 Bear Hill Rd., Waltham, MA 02154 617-890-0055

§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 412-963-7470

† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700

† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849

† Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454

§ A. S. R. Servotron, Inc., (Sub. Baldor Elec. Co.), 7945 Deering Ave., Canoga Park, CA 91304 818-999-6193

Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 619-727-7420

Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111

Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700

Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591

Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313

Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616

EG & G Torque Systems, 36 Arlington St., Watertown, MA 02172 617-924-6000

† Elantec, Inc., 1996 Tarob Ct., Milpitas, CA 95035 408-945-1323

† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670

§ Exar Integrated Sys., P.O.B. 62229, Sunnyvale, CA 94088 408-732-7970

† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700

§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135

Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 .... 800-321-5111, Ext. 596

† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105

Inland Motor, Specialty Prods. Div., Kollmorgen Corp., 4020 E. Inland Rd., Sierra Vista, AZ 85635 602-459-1150

† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045

† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003

Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383

IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045

Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495

Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000

† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166

McFadden Sys., Inc., 8956 S. Atlantic Ave., South Gate, CA 90280-9990 213-564-5958

† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508

† Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701 813-822-2529

Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203

§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566

Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 .... 714-898-2691;800-854-2433

† Performance Controls Inc., 333 Byberry Rd., Hatboro, PA 19040 215-675-6500

† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844

PMI Motors, Kollmorgen Corp., 5 Aerial Way, Syosset, NY 11791 516-938-8000

† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990 215-277-1300

§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800

§ Sanken Elec. Co., 1-22-8 Nishi-Ikebukuro, Toshima-Ku, Tokyo, Japan 03-986-6151

Sanken Elec. U.S.A. Corp., 3848 Carson St., Ste. 105, Torrance, CA 90503 213-540-2209

§† Signetics, 811 E. Arques Ave., Sunnyvale, CA 94086 408-739-7700

Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000

† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800

Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571

Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611

† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

† Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401

§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 713-729-1183

Amplifiers, Single Sideband-1900

† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000

† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000

Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161

Ehrhorn Technological Opers., Inc., P.O. Box 888, Canon City, CO 81212 303-275-1613

§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 ... 716-473-6900
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 ... 516-694-1414
§ KLM Electronics, 16890 Church St., P.O. Box 816, Morgan Hill, CA 95037 ... 408-779-7363
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 ... 516-231-1400
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 ... 312-354-4350
† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 ... 714-527-4896
Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 ... 213-325-1290
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 ... 714-540-9979
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 ... 213-684-2600
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 ... 516-759-0300
Ten-Tec, Industrial Park, Sevierville, TN 37862 ... 615-453-7172
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000

Amplifiers, Strain Gauge — See Amplifiers, Transducer (Vol. 3)

Amplifiers, Sweep-1100

Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 ... 617-935-5150
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 ... 215-723-8181
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 ... 201-327-1123
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 ... 716-473-6900
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 ... 516-364-0400
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 ... 213-517-6000
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 ... 516-231-1400
† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 ... 714-527-4896
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 ... 602-254-1570

Amplifiers, Synchro-4900

Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 ... 3•1930
† Analog Devices, P.O. Box 280, Norwood, MA 02062 ... 617-329-4700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 ... 516-328-1600
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 ... 619-727-7420
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 ... 516-261-3300
Farrand Controls, Div. of Farrand Inds., 99 Wall St., Valhalla, NY 10595 ... 914-RO1-2600
† Henschel, 14 Cedar St., Amesbury, MA 01913 ... 617-388-1103
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 ... 305-259-7105
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 ... 617-344-7383
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 ... 516-654-1166
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 ... 516-567-9620
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 ... 805-581-3950
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 ... 201-227-4800
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 ... 503-238-2440
† Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 ... 201-785-6000
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 ... 516-293-3100

Amplifiers, Telemetering-1900

Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235, 212-769-0200 ..1A•1713, 1714,1723,1756-1761
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ... 1A•1780
† Aydin Vector Div., Box 328, Newtown, PA 18940 ... 215-968-4271
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 ... 203-743-9241
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 ... 716-473-6900
EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 ... 813-371-0811
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 ... 216-361-3315
† Hades Mfg. Corp., 151-A Verdi St., Farmingdale, NY 11735 ... 516-249-4244
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 ... 201-569-8282
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 ... 516-231-1400
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 ... 617-329-1508
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 ... 203-866-8000
† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 ... 201-469-3311
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 ... 215-355-4443
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 ... 415-827-9010
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 ... 213-684-2600
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 ... 516-242-1100
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 ... 716-263-7700
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 ... 818-993-8257
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 ... 214-271-2561
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 ... 301-694-6666
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 ... 408-732-0880
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 ... 415-493-4141

Amplifiers, Thermocouple — See Amplifiers, Transducer (Vol. 3)

Amplifiers, Transducer-1100 (Also See Signal Conditioners)

† Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ... 3•1004
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ... 3•1205
† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ... 3•1006
Data Instruments Inc., 4 Hartwell Pl., Lexington, MA 02173, 617-861-7450 ... 1B•1840
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 ... 3•1007
Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 ... 3•1342
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 ... 1B•1860
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1013,1089,1137, 1346,1347
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518, 415-827-9010 ... 3•1015
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 ... 3•1285
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 ... 3•1016-1019
Transducers and Systems Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ... 1B•1880
Wilcoxon Resch., P.O. Box 5798, Bethesda, MD 20814, 301-770-3790 ... 1B•1886
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 ... 313-624-1541
§ Action Instrs., 8601 Aero Dr., San Diego, CA 92123 ... 619-279-5726
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 ... 305-451-1000
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 ... 714-646-7165
† Analog Devices, P.O. Box 280, Norwood, MA 02062 ... 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ... 617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 ... 617-246-0300
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 ... 201-227-5454
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 ... 516-328-1600
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 ... 815-877-0241
Bell, Floyd, Assocs., Inc., 897 Higgs Ave., Columbus, OH 43212 ... 614-488-3193
Bell & Howell/CEC Div., 360 Sierra Madre Villa, Pasadena, CA 91109 ... 213-796-9381
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 ... 702-782-3611
BLH Elctrns., 42 Fourth Ave., Waltham, MA 02254 ... 617-890-6700
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 ... 602-746-1111
† Centronic Inc., 5 Eastmans Rd., Parsippany, NJ 07054 ... 201-233-7200
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ... 215-532-9464
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 ... 203-368-6751
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 ... 412-776-1591
Data Translation, 100 Locke Dr., Marlboro, MA 01752 ... 617-481-3700
Datel, 11 Cabot Blvd., Mansfield, MA 02048 ... 617-339-9341
Dexter Research Ctr., Inc., 7300 Huron River Dr., Dexter, MI 48130 ... 313-426-3921
Dunegan/Endevco, Rancho Viejo Rd., San Juan Capistrano, CA 92675 ... 714-831-9131
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 ... 818-998-8281
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
EG&G, Inc., Electro-Optics Div., 35 Congress St., Salem, MA 01970 ... 617-745-3200
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 ... 716-473-6900
EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 ... 813-371-0811
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 ... 714-493-8181
ENI Power Sys., 3000 Winton Rd. S., Rochester, NY 14623 ... 716-473-7330
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 ... 201-227-1002
Farrand Controls, Div. of Farrand Inds., 99 Wall St., Valhalla, NY 10595 ... 914-RO1-2600
Fogg Sys., 15592 E. Batavia Dr., Aurora, CO 80011 ... 303-344-1883
General Magnetics, 211 Grove St., Bloomfield, NJ 07003 ... 201-743-2700
§† Gould Inc., Meas. Sys. Div., 2230 Statham Blvd., Oxnard, CA 93030 ... 805-487-8511
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 ... 216-361-3315
§ GSE, 23640 Research Dr., Farmington Hills, MI 48024 ... 313-476-7875
Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 ... 401-884-6800
† Hades Mfg. Corp., 151-A Verdi St., Farmingdale, NY 11735 ... 516-249-4244
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 ... 203-866-2573
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 ... 714-546-4731 800-421-7915
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 ... 714-827-2135
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 ... 303-773-4700

Amplifiers, Transducer-1100 (Cont'd)

§ Hottinger Baldwin Measurements, 139 Newberry St., Framingham, MA 01701 617-875-8282
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
Measurements Group, Inc., Box 27777, Raleigh, NC 27611 919-365-3800
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
§ Metrix Instrument Co., 1711 Townhurst, Houston, TX 77043 713-461-2131
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
Norton Assocs., 10 Di Tomas Ct., Copiague, NY 11726 516-842-4666
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 215-355-4443
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
Optoelectronics, Inc., 1309 Dynamic St., Petaluma, CA 94952 707-763-4181
Opto Technlg., 1674 S. Wolf Rd., Wheeling, IL 60090 312-537-4277
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 .... 714-898-2691;800-854-2433
† Paine Instrs., 2401 S. Bayview St., Seattle, WA 98144 800-426-0366
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 716-684-0001
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Schaevitz Engrg., U.S. 130, Union Ave , Pennsauken, NJ 08110 609-662-8000
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Sensor Techn., 21012 Lassen St., Chatsworth, CA 91311 213-882-4100
Sensotec Inc., 1200 Chesapeake Ave., Columbus, OH 43212 614-486-7723
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Stow Labs., Inc., Kane Ind'l. Dr., Hudson, MA 01749 617-562-9347
† Sundstrand Data Control, Overlake Ind'l. Pk., Redmond, WA 98052 206-885-3711
Tegam, 7230 N. Ridge Rd., Madison, OH 44057 216-428-7505
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Trans-Tek, P.O. Box 338, Rte. 83, Ellington, CT 06029 203-872-8351
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 213-978-0516
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 .... 800-631-3096;201-792-2400
§ Vibra-Metrics, 385 Putnam Ave., Hamden, CT 06517 203-288-6158
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 713-729-1183

Amplifiers, Travelling Wave Tube-1100

† **MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 .... 3•1390, 1391**
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
§† ITT Electron Tube, Box 100, Easton, PA 18042 215-252-7331
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700

Amplifiers, Ultrasonic-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 .... 3•1023,1024
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 617-522-8640
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Control Elctrns. Co., Inc., 107-B Allen Blvd., Farmingdale, NY 11735 516-694-0125
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
ENI Power Sys., 3000 Winton Rd. S., Rochester, NY 14623 716-473-7330
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400;800-648-7952
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
† Instruments, Inc., 7263 Engineer Rd., San Diego, CA 92111 619-571-1111
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 516-694-1414
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100

Amplifiers, Video-1100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
§ **Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 .... 3•1046**
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 703-370-0900
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
† Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
† Apex Microtechnology Corp., 1130 E. Pennsylvania St., Tucson, AZ 85714 602-746-0849
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 617-522-8640
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771
† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
† Comlinear Corp., 2468 E. 9th St., Loveland, CO 80537 303-669-9433
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
† Elantec, Inc., 1996 Tarob Ct., Milpitas, CA 95035 408-945-1323
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735 516-694-1414
International Crystal Mfg., 10 N. Lee, P.O. Box 26330, Oklahoma City, OK 73126 405-236-3741
§ Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
† MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 201-748-5089
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
§† RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 .... 215-EL5-1361
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§† Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
§ Television Microtime, Inc., 1280 Blue Hills Ave., Bloomfield, CT 06002 203-242-4242
† Third Domain, P.O. Box 35400, Tucson, AZ 85740-5400 602-293-6310
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 914-764-4613
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Amplifiers, Voltage Reference-1100

† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700

Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 ... 617-246-0300
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 ... 619-279-8620
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 ... 602-746-1111
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 ... 203-368-6751
Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 ... 617-729-7870
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 ... 818-998-8281
Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 ... 617-268-9696
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 ... 619-279-8620
General Magnetics, 211 Grove St., Bloomfield, NJ 07003 ... 201-743-2700
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† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
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Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
§ Vibro-Meter Corp., 1 Progress Rd., Billerica, MA 01821 617-663-7322
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† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900

Analyzers, Phase & Voltage-2900

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§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
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† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
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† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
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Power-Science, 7667 Vickers St., San Diego, CA 92111 619-292-4322
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir., Ste. F, Irvine, CA 92714 714-250-1172
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
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† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
Western Electro. Mech. Co. Inc., 300 Broadway, Oakland, CA 94607 415-452-1936
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Analyzers, Protocol-2900

§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.

Analyzers, Pulse-2900

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American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
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§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Analyzers, Servo-4900

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
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† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
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Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
Venable Industries, Inc., 3555 Lomita Blvd., Torrance, CA 90505 213-539-2522

Analyzers, Signature-2900

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
§† Nicolet Paratronics, 201 Fourier Ave., Fremont, CA 94539 415-490-8300
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Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

Analyzers, Sonic & Subsonic-2900

Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 .... 3•1019
A. P. Circuit Corp., 513 East 86th St., P.O. Box 1350, New York, NY 10028 212-737-1348
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† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
Voice Identification, Box 714, Somerville, NJ 08876 201-526-3408
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† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900

Analyzers, Spectrum-2900

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Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 .... 3•1019
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 .... 3•1025,1306,1307
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 .... 3•1318
A. P. Circuit Corp., 513 East 86th St., P.O. Box 1350, New York, NY 10028 212-737-1348
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
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Computer Design & Applications Inc., 411 Waverly Oaks Rd., Waltham, MA 02154 617-647-1900
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
§† Electro-Metrics, 100 Church St., Amsterdam, NY 12010 518-843-2600
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.

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Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
† Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 .. 201-227-2000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
Mathematical Systems Design, Inc., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405 213-450-9851
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§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 ... 805-964-6708
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir., Ste. F, Irvine, CA 92714 714-250-1172
Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
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Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625 813-855-6611
Voice Identification, Box 714, Somerville, NJ 08876 201-526-3408
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§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
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† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 ... 805-964-6708
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
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† Unique Optical Co., Diversified Optical Corp., P.O. Box 585, Farmingdale, NY 11735 516-420-0288
Venable Industries, Inc., 3555 Lomita Blvd., Torrance, CA 90505 213-539-2522
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
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Branden, T. G., Corp., 5565 S.E. Intl. Way, Portland, OR 97222 503-659-9366
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 . 914-425-2000
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§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
§† Nicolet Paratronics, 201 Fourier Ave., Fremont, CA 94539 415-490-8300
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
Power-Science, 7667 Vickers St., San Diego, CA 92111 619-292-4322
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Test & Measurement Systems, Inc., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086 408-720-8877

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§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
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Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
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§† Techsonics, Halfway, OR 97834 503-742-7475
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900

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ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
Bearing Inspection, 10041 Shoemaker Ave., Santa Fe Springs, CA 90670 213-944-6251
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§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 201-227-1002
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
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Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
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§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
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§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
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Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
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† Vibra-Metrics, 385 Putnam Ave., Hamden, CT 06517 203-288-6158
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
§ Vibro-Meter Corp., 1 Progress Rd., Billerica, MA 01821 617-663-7322
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† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900

Analyzers, Video — See Analyzers, Spectrum (Vol. 3)

Analyzers, Waveform-2900

Data Precision Corporation, Electronics Ave., Danvers, MA 01923, 617-246-1600 .... 3•1214,1215
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320, 818-889-8770 .... 1B•1118
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Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
§† Nicolet Paratronics, 201 Fourier Ave., Fremont, CA 94539 415-490-8300
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§† Electro-Metrics, 100 Church St., Amsterdam, NY 12010 518-843-2600
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† Photo Resch., 3000 N. Hollywood Way, Burbank, CA 91505 213-843-6100
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† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
§† UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 ... 408-738-3301

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Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ... 1B•1044,1046,1047
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§† Shelly Associates, Inc., 2942 Dow Ave., Tustin, CA 92680, 714-544-9970 . 1B•1096
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Automation Displays Inc., 3833 N. White Ave., Eau Claire, WI 54701 ... 715-834-9595
Cognitronics, 25 Crescent St., Stamford, CT 06906 ... 203-327-5307
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 ... 412-776-1591
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† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ... 201-CA8-0321
§ Edwards Co., Signaling Prods. Div., P.O. Box 1188, Farmington, CT 06032 ... 203-678-0410
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Henschel, 14 Cedar St., Amesbury, MA 01913 ... 617-388-1103
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 ... 513-426-2405
KMC Systems Inc., 140 Greenwood Ave. (Bldg. 3), Midland Pk., NJ 07432 ... 201-447-0007
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 ... 312-455-3600
MSC Prods./Eaton Corp., 1640 Monrovia St., Costa Mesa, CA 92627 ... 714-642-2427
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 ... 408-297-8530
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 ... 714-540-4914
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990 ... 215-277-1300
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 ... 201-341-8361
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 ... 716-263-7700
Show 'N Tell Products, AMG, Inc., 155 Franklin Street, Dayton, OH 45402 ... 513-223-8211
† Stacoswitch, 1139 Baker St., Costa Mesa, CA 92626 ... 714-549-3041
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Staver Co., Inc., 47 Saxon Ave., Bay Shore, NY 11706 ... 516-666-8000
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 ... 609-589-7500
§ Tektone Sound & Signal, 1331 S. Killian Dr., Lake Park, FL 33403 . 305-844-2383
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 ... 619-481-7177
Trans-Met Engrg., 601 S. Palm St., La Habra, CA 90631 ... 213-691-2266
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 ... 305-739-4300

Antenna Dummy Loads — See Dummy Loads (Vol. 3)

Antenna Feed Systems-3450 — *See Vol. 1A*

Antenna Groups (MIL)-3475

Compliance Design Inc., 593 Massachusetts Ave., Boxboro, MA 01719 ... 617-264-4668
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 ... 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 ... 516-462-5100
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 ... 203-792-6666
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 ... 712-258-6690
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 ... 201-851-0644
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 ... 619-583-3525

Antenna Groups (MIL), Elint-3475

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ...
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 ... 712-258-6690
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 ... 201-851-0644
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 ... 213-822-0800

Antenna Rotators-1900

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 ... 813-541-6681
Adams Rite Prods., Inc., 540 W. Chevy Chase Dr., Glendale, CA 91209 ... 213-241-5121
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 ... 516-694-6700
§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 ... 818-889-9304
Antenna Resch. Assocs., 11317 Frederick Ave., Beltsville, MD 20705 ... 301-937-8888
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 ... 818-882-9616
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 ... 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
§ Lance Inds., P.O. Box 4156, Sylmar, CA 91342-0156 ... 818-367-1811
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 ... 714-987-4715
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 ... 315-437-9951
Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 ... 301-462-1700
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 ... 203-792-6666
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 ... 712-258-6690
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 ... 617-653-0844
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 ... 818-786-1760
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 ... 213-341-3010
† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 ... 213-341-4010
§ Wilson Electronics, PO Box 19000, Las Vegas, NV 89119 ... 702-739-1931

Antenna Sets (MIL), DF-3475

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ...
† AN/COM Industries, P.O. Box 530, 5521 Cleon Ave., N. Hollywood, CA 91603 ... 818-769-5518
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 ... 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 ... 201-851-0644
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 ... 213-822-0800

Antenna Switching Matrices-1900

CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445, 716-381-4740 ... 3•1213
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 ... 671-273-3333
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 ... 716-334-9649
† Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 ... 703-370-0900
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 ... 617-935-5150
American Electronic Labs., Box 552, Lansdale, PA 19446 ... 215-822-2929
† Daico Inds., Inc., Box 5225, Compton, CA 90224 ... 213-631-1143
† Dielectric Communications, General Signal, Tower Hill Rd., Raymond, ME 04071 ... 207-655-4555,800-341-9678
† Dow Key Div., Kilovac Corp., Box 4422-EM, Santa Barbara, CA 93103 ... 805-684-4560
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
Kilovac Corp., Box 4422-EM, Santa Barbara, CA 93103 ... 805-684-4560
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ... 44-(582) 60-14-41
† Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 ... 408-377-4621
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 ... 603-669-4615
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 ... 617-449-2000
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 ... 213-822-0800

Antenna Towers-1900

Andrew Corp., 10500 W. 153rd St., Orland Pk., IL 60462 ... 312-349-3300
CGTI, 2 Windward Ave., White Plains, NY 10605 ... 914-949-3719
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
Microflect, 3575 25th S.E., Salem, OR 97302-0985 ... 503-363-9267
Milliflect, 7752 B Enterprise Dr., Newark, CA 94560 ... 415-791-5188
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 ... 203-792-6666
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 ... 712-258-6690
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 ... 201-851-0644
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 ... 617-449-2000
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 ... 213-341-3010

Antennas, Airborne-1900

† Adams-Russell, Antenna & Microwave Div., Haverhill Rd., Amesbury, MA 01913 ... 617-388-5210
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 ... 516-694-6700
§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 ... 818-889-9304
American Electronic Labs., Box 552, Lansdale, PA 19446 ... 215-822-2929
American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ...
† AN/COM Industries, P.O. Box 530, 5521 Cleon Ave., N. Hollywood, CA 91603 ... 818-769-5518
Andrew Corp., 10500 W. 153rd St., Orland Pk., IL 60462 ... 312-349-3300
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 ... 703-321-9625
§ Brelonix, 106 No. 36th St., Seattle, WA 98103 ... 206-633-1964
† Eastern Microwave, 4 Gill St., Woburn, MA 01801 ... 617-935-8600
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 ... 818-882-6333
Electronic Space Sys. Corp., Old Powder Mill Rd., Concord, MA 01742 ... 617-369-7200
§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 ... 914-235-9400
§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 ... 214-272-0515
† Milliflect, 7752 B Enterprise Dr., Newark, CA 94560 ... 415-791-5188
† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 ... 301-462-1700
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 ... 818-885-8223
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 ... 914-939-8900
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 ... 203-792-6666
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 ... 214-996-5000
§ Russell Inds., 3000 Lawson Blvd., Oceanside, NY 11572 ... 516-536-5000
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 ... 712-258-6690
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 ... 603-669-4615
Sensor Systems, Inc., 8929 Fullbright Ave., Chatsworth, CA 91311 . 818-341-5366
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 ... 818-786-1760
† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 ... 213-341-4010

† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525

† Titchener, E. H., & Co., 1 Titchener Pl., Binghamton, NY 13902 607-772-1161

† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300

Antennas, Citizens Band — See Antennas, Whip & Accessories (Incl. Marine & Mobile Types) (Vol. 3)

Antennas, Direction Finding-1900

† Adams-Russell, Antenna & Microwave Div., Haverhill Rd., Amesbury, MA 01913 617-388-5210

† Adams-Russell, Parisi Div., 280 Bear Hill Rd., Waltham, MA 02154 .617-890-0055

† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700

American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....

† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000

† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333

† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004

§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 914-235-9400

§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515

General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000

Glatzer Industry Corp., 15 River St., New Rochelle, NY 10801 914-576-2700

GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000

Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515

Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800

† Milliflect, 7752 B Enterprise Dr., Newark, CA 94560 415-791-5188

† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700

OAR Corp., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121 619-453-4013

Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223

† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900

Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615

Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644

Sensor Systems, Inc., 8929 Fullbright Ave., Chatsworth, CA 91311 .818-341-5366

Synergetics Intl., Inc., 6565 Odell Pl., P.O. Box E, Boulder, CO 80306-1236 303-530-2020

† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010

† Titchener, E. H., & Co., 1 Titchener Pl., Binghamton, NY 13902 607-772-1161

† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300

Antennas, Ground Plane-1900

† Adams-Russell, Antenna & Microwave Div., Haverhill Rd., Amesbury, MA 01913 617-388-5210

American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181

§ Antenna Specialists, 12435 Euclid Ave., Cleveland, OH 44106 216-791-7878

† Eastern Microwave, 4 Gill St., Woburn, MA 01801 617-935-8600

† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333

† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004

GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000

§ Kreckman, Herb, Co., Cresco, PA 18326 717-595-2212

† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700

Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223

§ Premax Prods. Div., Highland & College Aves., Niagara Falls, NY 14305 716-285-9186

† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900

† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444

† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000

§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760

† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010

† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300

§ Wilson Electronics, PO Box 19000, Las Vegas, NV 89119 702-739-1931

Antennas, Helical-1900

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American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929

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Andrew Corp., 10500 W. 153rd St., Orland Pk., IL 60462 312-349-3300

Antenna Resch. Assocs., 11317 Frederick Ave., Beltsville, MD 20705 301-937-8888

Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616

† Eastern Microwave, 4 Gill St., Woburn, MA 01801 617-935-8600

Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600

† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333

† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004

§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515

GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000

Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700

† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900

§ Russell Inds., 3000 Lawson Blvd., Oceanside, NY 11572 516-536-5000

Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644

§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 213-341-3010

† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010

† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525

† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

Antennas, Log Periodic-1900

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 ...... 3•1003

American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929

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§ Antenna Specialists, 12435 Euclid Ave., Cleveland, OH 44106 216-791-7878

Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988

CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000

† Eastern Microwave, 4 Gill St., Woburn, MA 01801 617-935-8600

§† Electro-Metrics, 100 Church St., Amsterdam, NY 12010 518-843-2600

† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004

§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515

† Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 408-727-3101

GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000

§ Kay-Townes Antenna, P.O. Box 593, Rome, GA 30161 404-291-9871

§ KLM Electronics, 16890 Church St., P.O. Box 816, Morgan Hill, CA 95037 408-779-7363

§ Lance Inds., P.O. Box 4156, Sylmar, CA 91342-0156 818-367-1811

† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700

† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690

Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615

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§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

§ Sitco Antennas, 10330 N.E. Marx St., Portland, OR 97220 503-253-2000

† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010

† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525

† Tensor, Box 14843, Austin, TX 78761 512-251-4131

Antennas, Loop-1900

Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646, 312-539-3108 ...... 2•1244

Antenna Resch. Assocs., 11317 Frederick Ave., Beltsville, MD 20705 301-937-8888

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Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600

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GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000

§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400

§ Russell Inds., 3000 Lawson Blvd., Oceanside, NY 11572 516-536-5000

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Sensor Systems, Inc., 8929 Fullbright Ave., Chatsworth, CA 91311 .818-341-5366

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Solar Elctrns. Co., 901 N. Highland, Hollywood, CA 90038 213-462-0806

Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827

† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010

† Tensor, Box 14843, Austin, TX 78761 512-251-4131

§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696

§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Antennas, Microwave-1900

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Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150

Alpha Inds., Inc. - TRG Millimeter Comp., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150

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CGTI, 2 Windward Ave., White Plains, NY 10605 914-949-3719

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Epsilon-Lambda Elctrns. Corp., 427 Stevens St., Geneva, IL 60134 312-232-9611
† Gabriel Elctrns., Box 70, Scarborough Indl. Pk., Scarborough, ME 04074 207-883-5161
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GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
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HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
† Interconics, BMC Industries, Inc., 610 Bremer Tower, St. Paul, MN 55101 612-228-6512
Lance Inds., P.O. Box 4156, Sylmar, CA 91342-0156 818-367-1811
LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
M/A-COM Millimeter Prods., Inc., South Ave., Burlington, MA 01803 617-272-3000
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
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† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

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Lattin Radio Labs., 1431 Sweeney, P.O. Box 44, Owensboro, KY 42301 502-683-2868
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Sensor Systems, Inc., 8929 Fullbright Ave., Chatsworth, CA 91311 .818-341-5366
§ Sitco Antennas, 10330 N.E. Marx St., Portland, OR 97220 503-253-2000

Antennas, Phased Array-1900

† Adams-Russell, Antenna & Microwave Div., Haverhill Rd., Amesbury, MA 01913 617-388-5210
† Airtron, 200 E. Hanover Ave., Morris Plains, NJ 07950 201-539-5500
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American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
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§ Antenna Specialists, 12435 Euclid Ave., Cleveland, OH 44106 216-791-7878
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† Eastern Microwave, 4 Gill St., Woburn, MA 01801 617-935-8600
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
§ KLM Electronics, 16890 Church St., P.O. Box 816, Morgan Hill, CA 95037 408-779-7363
† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
§† Sitco Antennas, 10330 N.E. Marx St., Portland, OR 97220 503-253-2000
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

Antennas, Rhombic-1900

† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Antennas, Spiral-1900

† Adams-Russell, Antenna & Microwave Div., Haverhill Rd., Amesbury, MA 01913 617-388-5210
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
Antenna Resch. Assocs., 11317 Frederick Ave., Beltsville, MD 20705 301-937-8888
Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Eastern Microwave, 4 Gill St., Woburn, MA 01801 617-935-8600
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515
† Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 408-727-3101
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
† Tecom Inds., 21526 Osborne St., Canoga Pk., CA 91304 213-341-4010
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525
† Tensor, Box 14843, Austin, TX 78761 512-251-4131
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

Antennas, Telescopic-1900

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ...
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Premax Prods. Div., Highland & College Aves., Niagara Falls, NY 14305 716-285-9186
§ Russell Inds., 3000 Lawson Blvd., Oceanside, NY 11572 516-536-5000
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Antennas, Whip & Accessories (Incl. Marine & Mobile Types-1900

Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
† AN/COM Industries, P.O. Box 530, 5521 Cleon Ave., N. Hollywood, CA 91603 818-769-5518
§ Antenna Specialists, 12435 Euclid Ave., Cleveland, OH 44106 216-791-7878
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 703-321-9625
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Instru-Lec, 520 Homestead Ave., Mt. Vernon, NY 10550 914-668-3754
§ KLM Electronics, 16890 Church St., P.O. Box 816, Morgan Hill, CA 95037 408-779-7363
La Pointe Industries, Inc., Electronics Products Div., 155 W. Main St., Rockville, CT 06066 203-872-8581
§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400
Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
§ Premax Prods. Div., Highland & College Aves., Niagara Falls, NY 14305 716-285-9186
§ Russell Inds., 3000 Lawson Blvd., Oceanside, NY 11572 516-536-5000
† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
§ Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Ten-Tec, Industrial Park, Sevierville, TN 37862 615-453-7172
§ Wilson Electronics, PO Box 19000, Las Vegas, NV 89119 702-739-1931
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

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Antennas (MIL), DF-3475

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Antennas (MIL), ECM-3475

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Antennas (MIL), EW-3475

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666

† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Antennas (MIL), Multibeam-3475

† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Instru-Lec, 520 Homestead Ave., Mt. Vernon, NY 10550 914-668-3754
† Microwave Applications Grp., 3030 Industrial Pkwy., Santa Maria, CA 93455 805-928-5711
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525

Antennas (MIL), Phased Array-3475

American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Microwave Applications Grp., 3030 Industrial Pkwy., Santa Maria, CA 93455 805-928-5711
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525

Antenna Systems (MIL)-3475

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
Compliance Design Inc., 593 Massachusetts Ave., Boxboro, MA 01719 617-264-4668
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
M/A-Com Cable/Home Communication Prodelin Satellite Antenna Systems, M/A-Com, Inc., P.O. Box 468, Newton, NC 28658 .800-222-1195;704-464-4141
† Microwave Applications Grp., 3030 Industrial Pkwy., Santa Maria, CA 93455 805-928-5711
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Sabre Comms. Corp., 117 Main St., Soiux City, IA 51102 712-258-6690
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
† Teledyne Micronetics, 7155 Mission Gorge Rd., San Diego, CA 92120 619-583-3525
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Antenna Systems (MIL), DF-3475

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
American Elctrn. Labs., Inc., Antenna Div., P.O. Box 552, Lansdale, PA 19446 ....
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

Antistatic Devices, Blowers, Guns, etc.-4100

Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
§ Clean Room Prods., 56 W. Penataquit Ave., Bay Shore, NY 11706 .516-968-8282
Republic Packaging Corp., 9160 S. Green St., Chicago, IL 60620 ...312-233-6530
§ Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171
Wescorp Antistatic Prods., 144 S. Whisman Rd., Mountain View, CA 94041 415-969-7717

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Antitheft Devices — See Alarms & Alarm Systems (Vol. 3)

Armatures — See Motor & Generator Armatures, Rotors, Stators (Vol. 1B)

Arms & Manipulators, Robotic-4900

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
Adams Rite Prods., Inc., 540 W. Chevy Chase Dr., Glendale, CA 91209 213-241-5121
Adaptive Intelligence, 2944 Scott Blvd., Santa Clara, CA 95050 408-970-0777
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Everett/Charles Automation Sys. Inc., 700 E. Harrison Ave., Pomona, CA 91767 714-625-5571
† Poly-Scientific, 1213 N. Main St., Blacksburg, VA 24060 703-552-3014
Seiko Instruments U.S.A., Inc., Robotics/Automation Div., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777

Array Processors-2025

§ Floating Point Systems, Inc., P.O. Box 23489, Portland, OR 97223 .503-641-3151
Mathematical Systems Design, Inc., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405 213-450-9851
Numerix Corp., 320 Needham St., Newton, MA 02161 617-964-2500

Arresters, Electrical Surge — See Protectors, Surge (Vol. 1B)

Arresters, Electrical Surge/Lightning (MIL)-2440 — *See Vol. 1B*

Artificial Loads — See Dummy Loads (Vol. 3)

Assembly & Fabrication Services (Incl. R & D) — See Services, Assembly & Fabrication (Vol. 3)

Attenuators, Audio-1300

Bourns, Inc., Resistive Components Group, 1200 Columbia Ave., Riverside, CA 92507, 714-781-5050 ....1A•2028
§ ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 ....2•1393
§ Shallco, Box 1089, Smithfield, NC 27577, 919-934-3135 ....3•1052,1053
† Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 ....1B•1755
VRN International, Div. Vernitron, 2801 72nd St. N., Box 44000, St. Petersburg, FL 33743, 813-347-2181 ....3•1067
Allen Avionics, 224 E. 2nd St., Mineola, NY 11501 516-248-8080
§ Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706 516-231-8400
Centralab, Inc., A North American Philips Co., Hwy. 20 W., P.O. Box 858, Ft. Dodge, IA 50501 515-573-1300
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§ Davis, J. W., & Co., P.O. Box 26177, Dallas, TX 75226 214-651-7341
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Duncan Electronics, Inc., 2865 Fairview Rd., Costa Mesa, CA 92626 714-545-8261
Elcom Systems, Inc., 4032 Clint Moore Rd., Boca Raton, FL 33431 305-994-1774
† GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
§ JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875
Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 ..201-227-2000
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ......213-515-6432; 800-421-5334
§† Kings Elctrns., 40 Marbledale Rd., Tuckahoe, NY 10707 914-793-5000
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302 .213-992-6776
Noble U.S.A., Inc., 151 Stanley St., Elk Grove Vllg., IL 60007 312-364-6038
§ Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076 312-675-2600
Piher Intl., 565 W. Golf Rd., Arlington Hgts., IL 60005 ....312-640-8300; 800-323-6693
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
§ Switchcraft, Inc., 5555 N. Elston, Chicago, IL 60630 312-792-2700
§ Trimm, Inc., Div. of Newton Instr. Co., 400 W. Lake St., Box 489, Libertyville, IL 60048 312-362-3700
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355 215-644-1300
Waters Mfg., Longfellow Ctr., Wayland, MA 01778 617-358-2777
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Attenuators, Audio (T, L, LL Pads)-4750 — *See Vol. 1A*

Attenuators, Coaxial-3450 — *See Vol. 1A*

Attenuators, Fiber Optic-2475 — *See Vol. 1B*

Attenuators, Fixed-3450 — *See Vol. 1A*

Attenuators, IF-1900

§ ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 ....2•1393
§ JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203, 317-783-9875 .1A•1705 1707
† Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 ....1B•1755
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 ....1A•1785
† Alan Inds., P.O. Box 1203, Columbus, IN 47201 812-372-8869
† Amplifonix Inc., 220 Rte. 13, Bristol, PA 19007 215-788-2350
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706 516-231-8400
§† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
† Daico Inds., Inc., Box 5225, Compton, CA 90224 213-631-1143
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
† Elcom Systems, Inc., 4032 Clint Moore Rd., Boca Raton, FL 33431 305-994-1774
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hyletronics, Newtown Rd., Littleton, MA 01460 617-486-8911
Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 ..201-227-2000
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300

† Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235 212-769-0200
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Shallco, Box 1089, Smithfield, NC 27577 919-934-3135
§ Solitron/Microwave, Box 278, Port Salerno, FL 33492 305-287-5000
† Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ...... 214-348-8800;800-527-4642
Vermont Precision Resistor, Box 1170, Stowe, VT 05672 802-253-8567
Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ...... 301-948-3434; 800-638-2048

Attenuators, Impedance Matching-3450 — *See Vol. 1A*

Attenuators, Logarithmic-3450 — *See Vol. 1A*

Attenuators, Microwave-3450 — *See Vol. 1A*

Attenuators, Programmable-3450 — *See Vol. 1A*

Attenuators, RF-1900

† Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 ...... 1A•1687
Compac, 279 Skidmore Rd., Deer Park, NY 11729, 516-667-3933 ...... 1A•1690
† Daico Inds., Inc., Box 5225, Compton, CA 90224, 213-631-1143 ...... 1A•1698-1700
† Electro Impulse, Box 870, Red Bank, NJ 07701-0870, 201-741-0404 ...... 3•1220
§ ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 ...... 2•1393
§ JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203, 317-783-9875 ...... 1A•1705 1707
† Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797, 201-227-2000 ...... 1A•1708
Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235, 212-769-0200 ...... 1A•1713, 1714,1762,1764,1765
† Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 ...... 1B•1755
† Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652, 714-494-9401 ...... 1A•1777
VRN International, Div. Vernitron, 2801 72nd St. N., Box 44000, St. Petersburg, FL 33743, 813-347-2181 ...... 3•1067
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 ...... 1A•1785
† Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 ...... 1A•1787
† Alan Inds., P.O. Box 1203, Columbus, IN 47201 812-372-8869
§ Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 617-522-8640
Armtec Industries, Inc., Daven Components Grp., Manchester Airport, Manchester, NH 03103 603-669-0940
† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706 516-231-8400
† Artech Corp., 2901 Telestar Ct., Falls Church, VA 22042 703-560-3292
§ Astrolab, 345 Dalziel Rd., Linden, NJ 07036 201-862-0022
Automatic Connector, Inc., 400 Moreland Rd., Commack, NY 11725 516-543-5000
§† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Elcom Systems, Inc., 4032 Clint Moore Rd., Boca Raton, FL 33431 305-994-1774
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550 914-664-2333
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ...... Call Local Sls. Off.
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
§ KDI Electronics, Inc., 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-8100
§† Kings Elctrns., 40 Marbledale Rd., Tuckahoe, NY 10707 914-793-5000
§ Macom Inds., 8230 Haskell Ave., Van Nuys, CA 91406
M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
M/A-COM Millimeter Prods., Inc., South Ave., Burlington, MA 01803 617-272-3000
§† M/A-COM Omni Spectra, Inc., 21 Continental Blvd., Merrimack, NH 03054 603-424-4111
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
MarLee Switch Co., 933-D N. Central Ave., Upland, CA 91786 714-982-8988
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302 213-992-6776
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
† Metropole Products Inc., P.O. Box 10275, Alexandria, VA 22310 ...... 703-971-8606; 703-971-7082
§† Micronetics, 36 Oak St., Norwood, NJ 07648 201-767-1320
Noble U.S.A., Inc., 151 Stanley St., Elk Grove Vllg., IL 60007 312-364-6038
§† Omni Spectra, 21 Continental Blvd., Merrimack, NH 03054 603-424-4111
† RFI Corporation, 100 E. Pine Aire Dr., Bay Shore, NY 11706 516-231-6400
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
RLC Elctrns., Inc., 83 Radio Cir., Mt. Kisco, NY 10549 914-241-1334
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
§ Solitron/Microwave, Box 278, Port Salerno, FL 33492 305-287-5000
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ...... 214-348-8800;800-527-4642
Uniform Tubes, Collegeville, PA 19426 215-539-0700
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Vermont Precision Resistor, Box 1170, Stowe, VT 05672 802-253-8567
§† Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Attenuators, Turret-3450 — *See Vol. 1A*

Attenuators, Variable-3450 — *See Vol. 1A*

Attenuators, Voltage Controlled-3450 — *See Vol. 1A*

Attenuators (MIL)-2440 — *See Vol. 1B*

Attenuators (MIL), Inductive-2440 — *See Vol. 1B*

Audible Alarms & Transducers-1300 (Also see Piezoelectric Ceramics; Transducers, Audio)

§ Mallory Capacitor Co., Mallory Comps. Grp., 3029 E. Washington St., Indianapolis, IN 46201, 317-636-5353 ...... 3•1032-1035
Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 ...... 3•1042
Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854, 201-572-9512 ...... 3•1056-1059
Arstan Products Intl. Ltd., 99 Jericho Tpke., Jericho, NY 11753 516-333-8100
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ...... 203-268-4372; 800-243-8160
† Briggs, C. A., Co., P.O. Box 151, Glenside, PA 19038 215-885-2244
§ Edwards Co., Signaling Prods. Div., P.O. Box 1188, Farmington, CT 06032 203-678-0410
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
NTK Technical Ceramics, NGK Spark Plugs (U.S.A.), Inc., 1701 N. Greenville Ave. 05, Richardson, TX 75081 214-235-8332
Piezo Elec. Prods., Inc., 212 Durham Ave., CN-15, Metuchen, NJ 08840 201-548-2800
§ Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918
Relay Service Co., 1310 N. Pulaski Rd., Chicago, IL 60651 ...... 312-AL2-2700
§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 312-679-8200
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057
§ Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880

Audio Equipment — See Amplifiers (Vol. 3), Microphones (Vol. 3), Speakers (Vol. 3), etc.

Awls-5400 — *See Vol. 2*

Backpanel Interconnect Systems-3200 — *See Vol. 2*

Backplane Wiring Services — See Services, Backplane Wiring (Vol. 3)

Baffles, Speaker-1300

§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637, 312-488-5800 ...... 3•1049
§† Abalon Precision Mfg., 540 Casanova St., Bronx, NY 10474 212-589-5682
§ Argos Prods., 600 S. Sycamore St., Genoa, IL 60135 815-784-5118
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Fourjay Industries, Box 1465 Northridge Br., Dayton, OH 45414 513-278-9416
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Hammond Mfg. Co., 1690 Walden Ave., Buffalo, NY 14225 716-894-5710
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
§ Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443
§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286
§ Oaktron Inds., 1000 30th St., Monroe, WI 53566 608-328-5560
§ Paso Sound Prods., 14 First St., Pelham, NY 10803 914-738-4800
† Permaluster, Inc., 1844 N. Keystone St., Burbank, CA 91504 818-849-4543
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444

Ballasts — See Resistors, Ballast (Vol. 1A)

Baluns — See Transformers, Matching (Vol. 1A)

Barrier Blocks & Strips — See Terminal Blocks (Vol. 2), Terminal Strips (Vol. 2),

Bargraphs — See Meters, Bargraph (Vol. 3)

Bars, Shorting-3200 — *See Vol. 2*

§—Product sold through distributors †—Product meets MIL specs

Baths, Controlled Temperature (Air & Liquid)-4100

† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 ..... 3•1175
Electro Impulse, Box 870, Red Bank, NJ 07701-0870, 201-741-0404 ..... 2•1817
† Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 ..... 3•1178
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 ..... 3•1181
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 312-385-9000
Corning Glass Works, Corning Elctrns., Houghton Pk., Bldg. A-2, Corning, NY 14830 607-974-9000
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 214-353-9950
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730 617-275-0300
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
Marlow Inds., 10451 Vista Park Rd., Dallas, TX 75238 214-340-4900
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Products for Resch., 88 Holten St., Danvers, MA 01923 617-774-3250
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 513-228-6011
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280
§ Temptronic, 55 Chapel St., Newton, MA 02158 617-969-2501
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 ..... 800-631-3096;201-792-2400

Baths, Ultrasonic — See Cleaners, Ultrasonic (Vol. 3)

Batteries, Alkaline Manganese-3900

§† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 ..... 3•1404-1405
§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 ..... 3•1423
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 ..... 3•1433
§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1434
§ Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 ..... 3•1436
§† Duracell Intl., S. Broadway, Tarrytown, NY 10591 914-591-7000
Energy Concepts, PO Box 128, Carlsbad, CA 92008 619-942-3144
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460

Batteries, Carbon Zinc-3900

§† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 ..... 3•1404-1406
Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 ..... 3•1433
§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1434
§† Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 ..... 3•1436
Arstan Products Intl. Ltd., 99 Jericho Tpke., Jericho, NY 11753 516-333-8100
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§ Marathon Battery Co., 8301 Imperial Dr., Waco, TX 76714 817-776-0650
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
Polaroid Corp., 784 Memorial Dr., Cambridge, MA 02139 617-577-2024
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703 608-252-7400
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460
§ Wonder Corp of America, 22 Elizabeth St., South Norwalk, CT 06856 203-866-3033

Batteries, Gelled Electrolyte-3900

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020, 215-638-3300 ..... 3•1403
§ Power-Sonic, Box 5242, 3106 Spring St., Redwood City, CA 94063, 415-364-5001 ..... 3•1422
§ SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, 912-247-2331 ..... 3•1398
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085, 203-677-5846 ..... 3•1431
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 ..... 3•1433
Yuasa Battery (America), Inc., 9728 Alburtis Ave., Santa Fe Springs, CA 90670, 213-949-4266 ..... 3•1437
§† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
§ Elpower, 2117 S. Anne St., Santa Ana, CA 92704 714-540-6155
Energy Concepts, PO Box 128, Carlsbad, CA 92008 619-942-3144
§† Gates Energy Prods., 1050 S. Broadway, Denver, CO 80217 303-744-4806
§ Johnson Controls, Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, WI 53201 414-228-1200
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460
† TNR Technical Inc., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735 516-249-3777

Batteries, Lead Acid-3900

§ Elpower, 2117 S. Anne St., Santa Ana, CA 92704, 714-540-6155 ..... 3•1408
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420, 612-890-1360 ..... 3•1421
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094, 201-348-7000 ..... 3•1414,1415
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337, 612-890-1360 ..... 3•1421
§ Power-Sonic, Box 5242, 3106 Spring St., Redwood City, CA 94063, 415-364-5001 ..... 3•1422
§ SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, 912-247-2331 ..... 3•1398
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085, 203-677-5846 ..... 3•1431
Yuasa Battery (America), Inc., 9728 Alburtis Ave., Santa Fe Springs, CA 90670, 213-949-4266 ..... 3•1437
† Accudyne Corp., P.O. Box 1429, Janesville, WI 53547 608-752-9081
§ Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
§† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
Exide Corp., 101 Gibraltar Rd., Horsham, PA 19044 215-674-9500
§† Gates Energy Prods., 1050 S. Broadway, Denver, CO 80217 303-744-4806
General Electric Co., Battery Business Dept., P.O. Box 992, Gainesville, FL 32602 904-462-4480
§ GNB Batteries Inc., Ind'l. Battery Div., 2010 Cabot Blvd. W., Langhorne, PA 19047 215-752-0555
§ Johnson Controls, Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, WI 53201 414-228-1200
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460
§ TNR Technical Inc., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735 516-249-3777
Tungstone Batteries, Inc., 18 Billings St., Sharon, MA 02067 617-784-2000

Batteries, Lead Dioxide-3900

† Accudyne Corp., P.O. Box 1429, Janesville, WI 53547 608-752-9081
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
§ Johnson Controls, Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, WI 53201 414-228-1200
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
§ SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601 912-247-2331

Batteries, Lithium-3900

† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 ..... 3•1404
† Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209, 301-296-7000 ..... 3•1407
Elpower, 2117 S. Anne St., Santa Ana, CA 92704, 714-540-6155 ..... 3•1410
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420, 612-890-1360 ..... 3•1421
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094, 201-348-7000 ..... 3•1418,1419
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337, 612-890-1360 ..... 3•1421
§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 ..... 3•1423
SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, 912-247-2331 ..... 3•1398
Sanyo Elec. Inc., 200 Riser Rd., Little Ferry, NJ 07643, 201-641-2333 ..... 3•1430
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 ..... 3•1433
§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1435
§† Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 ..... 3•1436
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§† Duracell Intl., S. Broadway, Tarrytown, NY 10591 914-591-7000
† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000

§† ElectroChem Inds., Wilson Greatbatch Ltd., 10000 Wehrle, Clarence, NY 14031 716-759-6901

General Electric Co., Battery Business Dept., P.O. Box 992, Gainesville, FL 32602 904-462-4480

† Hellesens Battery Engrg., Inc., A/S Hellesens, 1636 Hyde Park Ave., Hyde Park, MA 02136 617-361-7555

† Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186

Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566

SAFT America Inc., Advanced Battery Sys. Div., 107 Beaver Ct., Cockeysville, MD 21030 301-666-3200

§ Strategic Sys. Div. Power Sys. Operations, GTE Prods. Corp. Sylvania Sys. Grp., 520 Winter St., Waltham, MA 02254 617-466-3000

Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460

† TNR Technical Inc., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735 516-249-3777

Batteries, Lithium Manganese Dioxide-3900

† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 .... 3•1404

Elpower, 2117 S. Anne St., Santa Ana, CA 92704, 714-540-6155 .... 3•1410

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300

† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360

Polaroid Corp., 784 Memorial Dr., Cambridge, MA 02139 617-577-2024

† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703 608-252-7400

SAFT America Inc., Advanced Battery Sys. Div., 107 Beaver Ct., Cockeysville, MD 21030 301-666-3200

Seiko Instrs. U.S.A., Inc., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777

Batteries, Lithium Thionyl Chloride-3900

Elpower, 2117 S. Anne St., Santa Ana, CA 92704, 714-540-6155 .... 3•1410

Batteries, Mercury-3900

§† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 .... 3•1404-1406

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 .... 3•1423

Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 .... 3•1433

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300

§† Duracell Intl., S. Broadway, Tarrytown, NY 10591 914-591-7000

Energy Concepts, PO Box 128, Carlsbad, CA 92008 619-942-3144

† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360

Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360

Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460

§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817 203-794-5300

§† Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523 914-592-2500

Batteries, Mercury Oxide-3900

§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 .... 3•1435

Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 .... 3•1436

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300

§† Gould Inc., Micro Power Prods. Div., 2777 Eagandale Blvd., Eagan, MN 55121 612-681-4200

† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360

† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703 608-252-7400

Batteries, Nickel Cadmium-3900

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020, 215-638-3300 .... 3•1403

§† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 .... 3•1404

Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 .... 3•1517

Elpower, 2117 S. Anne St., Santa Ana, CA 92704, 714-540-6155 .... 3•1409

§ Motorola, Inc., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131, 312-451-1000 .... 3•1413

† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420, 612-890-1360 .... 3•1420

Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094, 201-348-7000 .... 3•1416-1418

† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337, 612-890-1360 .... 3•1420

§ Power-Sonic, Box 5242, 3106 Spring St., Redwood City, CA 94063, 415-364-5001 .... 3•1422

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 .... 3•1423

§ SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, 912-247-2331 .... 3•1398,1424-1429

Sanyo Elec. Inc., 200 Riser Rd., Little Ferry, NJ 07643, 201-641-2333 .... 3•1430

§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 .... 3•1433

§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 .... 3•1435

§† Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 .... 3•1436

§ Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500

† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000

Energy Concepts, PO Box 128, Carlsbad, CA 92008 619-942-3144

§† Gates Energy Prods., 1050 S. Broadway, Denver, CO 80217 303-744-4806

General Electric Co., Battery Business Dept., P.O. Box 992, Gainesville, FL 32602 904-462-4480

§† Marathon Battery Co., 8301 Imperial Dr., Waco, TX 76714 817-776-0650

Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566

§† SAFT America Inc., Box 1886, Valdosta, GA 31601 912-247-2331

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460

§† TNR Technical Inc., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735 516-249-3777

Tungstone Batteries, Inc., 18 Billings St., Sharon, MA 02067 617-784-2000

† Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411

† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Batteries, Rechargeable-3900

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020, 215-638-3300 .... 3•1403

§† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 .... 3•1404

Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 .... 3•1517

§ Elpower, 2117 S. Anne St., Santa Ana, CA 92704, 714-540-6155 .... 3•1408,1409

Motorola, Inc., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131, 312-451-1000 .... 3•1413

† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420, 612-890-1360 .... 3•1420

Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094, 201-348-7000 .... 3•1414-1418

† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337, 612-890-1360 .... 3•1420

§ Power-Sonic, Box 5242, 3106 Spring St., Redwood City, CA 94063, 415-364-5001 .... 3•1422

§ SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, 912-247-2331 .... 3•1398,1424-1429

Sanyo Elec. Inc., 200 Riser Rd., Little Ferry, NJ 07643, 201-641-2333 .... 3•1430

Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 .... 3•1433

§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 .... 3•1435

§ Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 .... 3•1436

Yuasa Battery (America), Inc., 9728 Alburtis Ave., Santa Fe Springs, CA 90670, 213-949-4266 .... 3•1437

† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220

Digital Pathways, Inc., 1060 E. Meadow Cir., Palo Alto, CA 94303 415-493-5544

† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000

Energy Concepts, PO Box 128, Carlsbad, CA 92008 619-942-3144

Exide Corp., 101 Gibraltar Rd., Horsham, PA 19044 215-674-9500

§† Gates Energy Prods., 1050 S. Broadway, Denver, CO 80217 303-744-4806

§ GNB Batteries Inc., Ind'l. Battery Div., 2010 Cabot Blvd. W., Langhorne, PA 19047 215-752-0555

§ Gould Inc., Micro Power Prods. Div., 2777 Eagandale Blvd., Eagan, MN 55121 612-681-4200

§† Marathon Battery Co., 8301 Imperial Dr., Waco, TX 76714 817-776-0650

Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566

Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703 608-252-7400

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460

§† TNR Technical Inc., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735 516-249-3777

Tungstone Batteries, Inc., 18 Billings St., Sharon, MA 02067 617-784-2000

† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Batteries, Silver Cadmium-3900

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300

† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360

† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360

Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566

† Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411

† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Batteries, Silver Oxide-3900

§† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 .... 3•1404

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 .... 3•1423

§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 .... 3•1433

§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1435
§† Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 ..... 3•1436
§† Duracell Intl., S. Broadway, Tarrytown, NY 10591 914-591-7000
† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
§† Gould Inc., Micro Power Prods. Div., 2777 Eagandale Blvd., Eagan, MN 55121 612-681-4200
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
Plainview Elctrns., 28 Cain Dr., Plainview, NY 11803 516-249-6677
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
§ Seiko Instrs. U.S.A., Inc., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460
† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Batteries, Silver Zinc-3900

§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 ..... 3•1433
† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
† SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601 912-247-2331
§ Seiko Instrs. U.S.A., Inc., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085 203-677-5846
† TNR Technical Inc., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735 516-249-3777
† Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411
† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

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Batteries, Standard Cell-3900

§ SAFT America Inc., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, 912-247-2331 ..... 3•1398
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085, 203-677-5846 ..... 3•1431
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
† Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Batteries, Thermal-3900

Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566

Batteries, Zinc Air-3900

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 ..... 3•1423
Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1434
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§† Gould Inc., Micro Power Prods. Div., 2777 Eagandale Blvd., Eagan, MN 55121 612-681-4200
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
Plainview Elctrns., 28 Cain Dr., Plainview, NY 11803 516-249-6677
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460
† Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Batteries, Zinc Carbon-3900

† Bren-Tronics, Inc., 10 Brayton Ct., Commack, NY 11725, 516-499-5155 ..... 3•1404-1406
Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1434
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
Plainview Elctrns., 28 Cain Dr., Plainview, NY 11803 516-249-6677
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703 608-252-7400
Telecommunications Devices, 2320 Wisconsin Ave., Downers Grove, IL 60515 312-971-3460

Batteries, Zinc Chloride-3900

Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 ..... 3•1433
Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, 203-794-5300 ..... 3•1434
Varta Batteries, Inc., 150 Clearbrook Rd., Elmsford, NY 10523, 914-592-2500 ..... 3•1436
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Plainview Elctrns., 28 Cain Dr., Plainview, NY 11803 516-249-6677
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power-Pak, Inc., 6232 N. Pulaski Rd., Chicago, IL 60646 312-286-5566
§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703 608-252-7400

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§ Bell, Floyd, Assocs., Inc., 897 Higgs Ave., Columbus, OH 43212, 614-488-3193 ..... 3•1026-1028
Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 ..... 3•1029
§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 ..... 3•1030
§ Mallory Capacitor Co., Mallory Comps. Grp., 3029 E. Washington St., Indianapolis, IN 46201, 317-636-5353 ..... 3•1032-1035
Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854, 201-572-9512 ..... 3•1056-1059
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076, 312-679-8200 ..... 3•1061
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
§ Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ..... 203-268-4372; 800-243-8160
Cole Hersee, 20 Old Colony Ave., Boston, MA 02127-2467 617-268-2100
Deltrol Controls, 2745 S. 19th St., Milwaukee, WI 53215 414-671-6800
§ EAO Switch Corp., 198 Pepe's Farm Rd., P.O. Box 552 MO, Milford, CT 06460 203-877-4577
§ Edwards Co., Signaling Prods. Div., P.O. Box 1188, Farmington, CT 06032 203-678-0410
Endicott Coil, 22 E. Charlotte St., Binghamton, NY 13905 607-797-1263
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
§ Inductive Prods. Inc., 11733 Markon Dr., Garden Grove, CA 92641 714-891-2572
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Molex, 2222 Wellington Ct., Lisle, IL 60532 312-969-4550
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
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§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
§ Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918
Relay Service Co., 1310 N. Pulaski Rd., Chicago, IL 60651 ..... 312-AL2-2700
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ..... 201-797-3313; 800-526-5376
§ Seiko Instrs. U.S.A., Inc., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ..... 516-957-8700; 800-645-5516
Trinetics Inc., 55807 Currant Rd., Mishawaka, IN 46545-4899 219-259-8535
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Benches, Consoles, Tables (Work Stations, Lab & Shop)-1400 (Also See Enclosures, Equipment and Panel Mounting) — ***See Vol. 2***

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Bimetals, Thermostatic-5300 — *See Vol. 1B*

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Blackbody Radiation Sources-2900

† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660

Blowers, Centrifugal-2600 — *See Vol. 2*

Board Computers & Subassemblies, Multibus Compatible-2025

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Heurikon Corp., 3001 Latham Dr., Madison, WI 53713, 608-271-8700 .... 3•1083, 1084
National Instruments, 12109 Technology Blvd., Austin, TX 78759, 512-250-9119 .... 3•1266
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
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CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
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ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
Mathematical Systems Design, Inc., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405 213-450-9851
§ Micro Digital Assocs., Inc., 12791 Western Ave., Unit C, Garden Grove, CA 92641 714-891-2363
† PTL Elctrns., 10211 Vinemont St., Dallas, TX 75218 214-327-3180
Relational Memory Sys., 1650 Berry Essa Rd., Ste. B, San Jose, CA 95133-1082 408-729-3011
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

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CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
Diversified Technlg., P.O. Box 748, Ridgeland, MS 39157 601-856-4121
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GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
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Pacific Microcomputers, Inc., 119 Aberdeen, Cardiff, CA 92007 619-436-8649

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§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
† Interconnection Technology, Inc., 5542 Buckingham Drive, Huntington Beach, CA 92649 714-891-5305
Seattle Computer Products, Inc., 1114 Ind. Dr., Seattle, WA 98188 ....206-575-1830;800-426-8936

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Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
Computer Dynamics, 105 S. Main St., Greer, SC 29651 803-877-7471
§ DY-4 Systems Inc., 888 Lady Ellen Pl., Ottawa, ON K1Z 5M1 Canada 613-728-3711
Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754 512-926-8840
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† Interconnection Technology, Inc., 5542 Buckingham Drive, Huntington Beach, CA 92649 714-891-5305
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Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625 813-855-6611

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Bolometers, Infrared-2900

Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
† Barnes Engrg., 44 Commerce Rd., P.O. Box 53, Stamford, CT 06904 203-348-5381
Mikron Instr., Box 211, Ridgewood, NJ 07451 201-891-7330
Optoelectronics, Inc., 1309 Dynamic St., Petaluma, CA 94952 707-763-4181
† Thermometrics, Inc., 808 U.S. Hwy. , Edison, NJ 08817-4695 201-287-2870
§ Victory Engrg. Corp., Victory Rd., Springfield, NJ 07081 201-379-5900
Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241

Bolometers, Microwave-2900

Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Alpha Inds., Inc. - TRG Millimeter Comp., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
M/A-COM Millimeter Prods., Inc., South Ave., Burlington, MA 01803 617-272-3000
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
§† Micronetics, 36 Oak St., Norwood, NJ 07648 201-767-1320
MSI Electronics, Inc., 34-32 57th St., Woodside, NY 11377 212-672-6500
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048

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Bridge Rectifiers, Silicon-4800 (Also See Rectifiers, Bridges & Assemblies) — *See Vol. 1A*

Bridges, Admittance-2900

Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

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Bridges, Audio-2900

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§ Delta Elctrns., 145 Fayette St., Winston-Salem, NC 27101 919-725-4122
Electro-Dynamics Dev. Co., 475 Mt. Hood Dr. S.W., Issaquah, WA 98027 206-392-2493
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642

Bridges, Calorimeter-2900

† Electro Impulse, Box 870, Red Bank, NJ 07701-0870 201-741-0404
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000

Bridges, Capacitance-2900

Cambridge Technology, Inc., 2464 Massachusetts Ave., Cambridge, MA 02140, 617-876-0891 ...... 3•1207
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 ...... 3•1309
§ AEMC, 99 Chauncy, Boston, MA 02111 ......617-451-0227;800-343-1391
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§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
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Bridges, Power, RF-2900

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Phoenix Microsystems, P.O. Box 4206, Huntsville, AL 35802 205-881-2173

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Cable Retractors-1400 — *See Vol. 2*

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Calculators, Electronic, Desk Top-4200 — *See Vol. 2*

Calculators, Electronic, Hand Held-4200 — *See Vol. 2*

Calibration & Instrument Repair Services — See Services, Calibration & Instrument Repair (Vol. 3)

Calibrators, Accelerometer-2900

Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
† Genisco Technlg. Corp., Rotating Test Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 716-684-0001
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
Wilcoxon Resch., P.O. Box 5798, Bethesda, MD 20814 301-770-3790

Calibrators, Attenuation-2900

§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
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Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ..... 301-948-3434; 800-638-2048

Calibrators, Crystal-2900

Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
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Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
§ Sloan Technology, P.O. Box 4608, Santa Barbara, CA 93103 805-963-4431

Calibrators, Current-2900

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1327
† **Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1224,1225**
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 .... 3•1239
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1248,1249,1252
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1662
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228, 614-274-7160 .... 1B•1877
† **Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840, 201-549-9280 .... 3•1305**
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935

Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
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Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Rotek Instr. Corp., 390 Main St., Waltham, MA 02254 617-899-4611
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Calibrators, Frequency-2900

§† EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715, 714-752-2891 ....1A•1350
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 ....1A•1358
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ....3•1248
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 ....3•1319
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
Compliance Design Inc., 593 Massachusetts Ave., Boxboro, MA 01719 617-264-4668
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300

Calibrators, LVDT-2900

† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Robinson-Halpern, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248 215-825-9200
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000

Calibrators, Magnetic Field-2900

LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, 313-528-2202 ....3•1256
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226 317-545-2102
§ Magnos, Old School House Rd., Harvard, MA 01451 617-456-8880
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000

Calibrators, Meter — See Testers, Meter (Vol. 3)

Calibrators, Sound Level-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ....3•1205
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
§ Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Calibrators, Sweep — See Generators, Sweep (Vol. 3)

Calibrators, Synchro-2900

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 ....3•1189
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, 516-582-6500 ....3•1277
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† ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Calibrators, Time Base-2900

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§ EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715, 714-752-2891 ....1A•1350
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ....3•1248
California Avionics Labs., Box 701, Palo Alto, CA 94302 415-328-7999
Cincinnati Electrosys., 469 Wards Corner Rd., Loveland, OH 45140 513-831-4347
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
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† Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072 201-935-5220

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Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 ....3•1007
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228, 614-274-7160 ....1B•1877
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660

Calibrators, Voltage-2900

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 ....3•1191
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ....3•1323
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ....3•1327
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 ....3•1007
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General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ....3•1239
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Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228, 614-274-7160 ....1B•1877
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Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Data Precision Corporation, Electronics Ave., Danvers, MA 01923 ..617-246-1600
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335
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† Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072 201-935-5220
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ Linear Instrs., 500 Edison Way, Reno, NV 89502 702-786-3636
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Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
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Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000
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Calibrators, VSWR-2900

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§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
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Calorimeters, Microwave-2900

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† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
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† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150
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Video Logic Corp., 597 No. Mathilda Ave., Sunnyvale, CA 94086 408-245-8622

Cameras, Image Converter-1900

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§ Chorus Data Systems, P.O. Box 810, 27 Proctor Hill Rd., Hollis, NH 03049 603-465-7100
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
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Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
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Princeton Elctrn. Prods., Box 101, North Brunswick, NJ 08902 201-297-4448
Spiricon Inc., 2600 North Main, Logan, UT 84321 801-753-3729

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Spiricon Inc., 2600 North Main, Logan, UT 84321 801-753-3729

Cameras, Oscilloscope-2975

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Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ......800-547-1512; Oregon only 800-452-1877

Cameras, Television-1900

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Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
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Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 914-764-4613
Video Logic Corp., 597 No. Mathilda Ave., Sunnyvale, CA 94086 408-245-8622

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Capacitors, Fixed, Laboratory Standard-1500 — *See Vol. 1A*

Capacitors, Fixed, Mica-1500 — *See Vol. 1A*

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Capacitors, Fixed, Polyester — See Capacitors, Fixed, Film (Vol. 1A)

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Capacitors, Variable, Film-1500 — *See Vol. 1A*

Capacitors, Variable, Gas Filled-1500 — *See Vol. 1A*

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Caps, Lenses, Indicator Light-2450 — *See Vol. 1B*

Caps, Wire Splicing — See Splicers, Wire (Vol. 2)

Caps (MIL)-2440 — *See Vol. 1B*

Card Equipment, Mark Sense-2000

HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386, 612-443-2500 ....1B•1219
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820

Card Equip., Punch-2000

HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386, 612-443-2500 ....1B•1219
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351

Card Equip., Reader-2000

† **Taurus Corp., Academy Hill, P.O. Box 278, Lambertville, NJ 08530, 609-397-2390 .... 3•1095**
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402, 213-454-0302 .... 3•1104
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
Elcom Industries, Inc., 10268 Bach Blvd., St. Louis, MO 63132 314-429-3100
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
XCP Inc., 8 W. Main St., Dryden, NY 13053 607-844-9143

Card Equip., Reader/Punch-2000

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Opto Technlg., 1674 S. Wolf Rd., Wheeling, IL 60090 312-537-4277
† Plessey Electro-Products, 3860 Centinela Ave., Los Angeles, CA 90066 213-390-3585

Card Holders, Circuit Board — See Enclosures, Circuit Board, Module, & Relay Mounting (Vol. 2)

Cards, Data Communication/Interfaces-2000

GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754, 512-926-8840 ...... 3•1078, 1079,1081
Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 .... 3•1139
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ..617-752-5690
Grant Technology Sys. Corp., 11 Summer St., Chelmsford, MA 01824 617-256-8881
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Cards, Linear Function-2000

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 .... 3•1107
Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ... 3•1012,1933
Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 .... 3•1139
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
† Eastern Electronics Mfg. Corp., 180 Roberts St., East Hartford, CT 06108 203-528-9821
Elgenco, Inc., Box 460, Hurricane, UT 84737 801-635-4954
§ GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754 512-926-8840
§ Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003 201-743-6800
§ Gunther, W., GmbH, Virnsberger Strasse 51, D 8500 Nurnberg 82, West Germany 0911/65521
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Standard Grigsby, Inc., 920 Rathbone Ave., Aurora, IL 60507 312-844-4300
Sylvania Electronic, Box 360, Muncy, PA 17756 717-546-3191
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107

Cards, Memory — See Memory Devices (Vol. 3), Memory Systems (Vol. 3),

Cards, Logic-2000

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 3•1116
§ Advanced Microcomputers, 3340 Scott Blvd., Santa Clara, CA 95051 408-732-2400
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
† Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ Distributed Logic Corp. (DILOG), 12800-G Garden Grove Blvd., Garden Grove, CA 92643 714-534-8950
Douglas Elctrns., 718 Marina Blvd., San Leandro, CA 94577 415-483-8770
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
† Eastern Electronics Mfg. Corp., 180 Roberts St., East Hartford, CT 06108 203-528-9821
Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123 619-292-0242
Elgenco, Inc., Box 460, Hurricane, UT 84737 801-635-4954
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§† Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903 201-249-6600
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
Information Control Corp., Abacus Div. Dept. EM7, 9610 Bellanca Ave., Los Angeles, CA 90045 213-641-8520
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
§ Intra-computer, 101 W. 31st St., New York, NY 10001 212-947-5533
Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 415-361-1012
† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
Logic Technology, Inc., 2452 Charleston Rd., Mtn. View, CA 94043 415-967-1007
§ Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
Matrix Corp., 1639 Green St., Raleigh, NC 27603 919-833-2837
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
Onset Computer Corp., 199 Main St., P.O. Box 1016, N. Falmouth, MA 02556 617-563-2267
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
Sylvania Electronic, Box 360, Muncy, PA 17756 717-546-3191
Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191

Carriers — See Holders & Carriers, Chip (Vol. 2)

Carts & Dollies, Instrument & Equipment-3800 — *See Vol. 2*

Cases, Equipment, Instrument, Meter (Portable) — See Enclosures, Portable, Metallic & Nonmetallic (Vol. 2)

Cases, Equipment, Instrument, Meter (Stationary) — See Enclosures, Equipment & Panel Mounting (Vol. 2)

Cases, Shielded — See Enclosures, Shielded (Vol. 2)

Cases, Transit — See Enclosures, Shipping (Vol. 2)

Casters-1400 — *See Vol. 2*

Cathode-Ray Readout Tubes — See Tubes, Readout (Vol. 1A)

CATV Systems & Equipment-1900

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
§ CATV Div., GTE Communications Prods. Corp., 1790 Lee Trevino Dr., El Paso, TX 79936 .... 915-594-3555;800-351-2345
C-COR Elctrns., 60 Decibel Rd., State College, PA 16801 814-238-2461
Communications Technology Corp., 2237 Colby Ave., Los Angeles, CA 90064 213-478-5061
§ Daburn Elctrns. & Cable, 70 Oak St., Norwood, NJ 07648 201-768-5400
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
§† Electrovert Inc., 399 Executive Blvd., Elmsford, NY 10523 914-592-7322
§ Johnson Controls, Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, WI 53201 414-228-1200
† Kalart Victor Corp., Hultenius St., Plainville, CT 06062 203-747-1663
§ Kay-Townes Antenna, P.O. Box 593, Rome, GA 30161 404-291-9871
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
§ Macom Inds., 8230 Haskell Ave., Van Nuys, CA 91406 ....
§† Magnum Microwave Corp., 365 Ravendale Dr., Mountain View, CA 94043 415-968-9281
§† Manhattan Elec. Cable Corp., 1 Station Plaza, Rye, NY 10580 914-967-8000
† Microwave Filter Inc., 6743 Kinne St., East Syracuse, NY 13057 .... 315-437-4529; 800-448-1666
§ Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183
† Nurad, Inc., 2165 Druid Pk. Dr., Baltimore, MD 21211 301-462-1700
Peca, Inc., 4957 Pearson Ave., Philadelphia, PA 19114 215-824-1550
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
RLC Elctrns., Inc., 83 Radio Cir., Mt. Kisco, NY 10549 914-241-1334
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sitco Antennas, 10330 N.E. Marx St., Portland, OR 97220 503-253-2000
Stainless, Inc., 3rd St., N. Wales, PA 19454 215-699-4871
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
§ Television Microtime, Inc., 1280 Blue Hills Ave., Bloomfield, CT 06002 203-242-4242
Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001 214-233-6631
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 914-764-4613
§ Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Cavities, Microwave-3450 — *See Vol. 1A*

Cells, Electrolytic (Timing) — See Timers, Electrolytic Cell (Vol. 3)

Cells, Load-5500 — *See Vol. 1B*

Cells, Photoconductive-3700 — *See Vol. 1B*

Cells, Photoemissive-3700 — *See Vol. 1B*

Cells, Photovoltaic-3700 — *See Vol. 1B*

Cells, Solar — See Cells, Photovoltaic (Vol. 1B)

Cements — See Adhesives, (All Types) (Vol. 2)

Chaff Systems (MIL)-3475

† Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
Transmet Corp., 4290 Perimeter Dr., Columbus, OH 43228 .... 614-276-5522; 800-245-5253

Chambers, Altitude-2550

Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-381-1873
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Chambers, Environmental-2550

† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 .... 3•1175
Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178
Sigma Systems Corp., 3163 Adams Ave., San Diego, CA 92116, 619-283-3193 .... 3•1179
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
§† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
† Emerson & Cuming, W. R. Grace & Co., 59 Walpole St., Canton, MA 02021 617-828-3300
Forma Scientific, Div. of Mallinckrodt Inc., Box 649, Marietta, OH 45750 614-373-4763
† Formulated Resins Inc., Box 508, Greenville, RI 02828 401-949-2060
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Gruenberg Oven Co., Inc., P.O. Box 3246, 2121 Reach Rd., Williamsport, PA 17701 717-326-1755
Hotpack Corp., Heinicke Instrs., 10940 Dutton Rd., Philadelphia, PA 19154 .... 215-824-1700;800-523-3608
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
OAL Assocs., P.O. Box J, Escondido, CA 92025 619-743-7143
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
§ Temptronic, 55 Chapel St., Newton, MA 02158 617-969-2501

Chambers, Explosion-2550

† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083 201-686-7870

Chambers, Fluid Conditioner-2550

Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 .... 3•1175
Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178
Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083 201-686-7870

Chambers, Humidity-2550

† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 .... 3•1175
† Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178
Sigma Systems Corp., 3163 Adams Ave., San Diego, CA 92116, 619-283-3193 .... 3•1179
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
Forma Scientific, Div. of Mallinckrodt Inc., Box 649, Marietta, OH 45750 614-373-4763
Gruenberg Oven Co., Inc., P.O. Box 3246, 2121 Reach Rd., Williamsport, PA 17701 717-326-1755
Hotpack Corp., Heinicke Instrs., 10940 Dutton Rd., Philadelphia, PA 19154 .... 215-824-1700;800-523-3608
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 513-228-6011
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
† Thunder Sci. Corp., 623 Wyoming S.E., Albuquerque, NM 87123 505-265-8701

Chambers, Magnetic, Degaussing Coil-4525

† Magnetic Shield Div., Perfection Mica Co., 750 North Thomas Dr., Bensenville, IL 60106, 312-766-7800 .... 2•1913
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
† Ad-Vance Magnetics, Inc., 625 Monroe St., Rochester, IN 46975 219-223-3158
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 617-272-1313
Jan Hardware Mfg. Co., 47-27 36th St., Long Island City, NY 11101 212-361-0800
§ Lectro Magnetics, Inc., 6056 W. Jefferson Blvd., Los Angeles, CA 90016 .... 213-870-9383;800-325-9814
† MuShield Co., Div. Bomco, Inc., 121 Madison St., P.O. Box W, Malden, MA 02148 617-321-4410
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223

Chambers, Pressure-2550

† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
§ Benthos, Inc., Edgerton Dr., N. Falmouth, MA 02556 617-563-5917
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083 201-686-7870

Chambers, Radiation-2550

Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735, 516-694-1414 .... 3•1011
Centronic Inc., 5 Eastmans Rd., Parsippany, NJ 07054 201-233-7200
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223

Chambers, Shock-2550

† **Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173**
† **Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181**
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
† Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033 805-487-7777
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200

Chambers, Space Simulation-3475

† **Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 .... 3•1175**
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033 805-487-7777
† Spectrolab, Inc., 12500 Gladstone Ave., Sylmar, CA 91342 213-365-4611
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083 201-686-7870
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Chambers, Temperature-2550

† **Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173**
† **Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 .... 3•1175**
† **Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178**
Sigma Systems Corp., 3163 Adams Ave., San Diego, CA 92116, 619-283-3193 .... 3•1179
† **Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181**
§ Aerotronic Assocs., Inc., Riverside Dr., Contoocook, NH 03229 603-746-4631
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Custom Sci. Instrs., 13 Wing Dr., Cedar Knolls, NJ 07927 201-538-8500
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
Forma Scientific, Div. of Mallinckrodt Inc., Box 649, Marietta, OH 45750 614-373-4763
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
Gruenberg Oven Co., Inc., P.O. Box 3246, 2121 Reach Rd., Williamsport, PA 17701 717-326-1755
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hotpack Corp., Heinicke Instrs., 10940 Dutton Rd., Philadelphia, PA 19154 .... 215-824-1700;800-523-3608
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
Instron Corp., 100 Royall St., Canton, MA 02021 617-828-2500
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
OAL Assocs., P.O. Box J, Escondido, CA 92025 619-743-7143
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Products for Resch., 88 Holten St., Danvers, MA 01923 617-774-3250
Reliability Inc,, 16400 Park Row, P.O. Box 218370, Houston, TX 77218 713-492-0550
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 513-228-6011
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
§ Temptronic, 55 Chapel St., Newton, MA 02158 617-969-2501

Chambers, Vacuum-2550

† **Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173**
Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178
† **Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181**
§ Abalon Precision Mfg., 540 Casanova St., Bronx, NY 10474 212-589-5682
§ Alzbear Corp., 15411 Red Hill Ave., Unit F, Tustin, CA 92680 714-557-0910
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
† Astro Dynamics, Inc., 2 Gill St., Woburn, MA 01801 617-935-4944
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
§ Brew, Richard D., & Co., Inc., 90 Airport Rd., Concord, NH 03301 .603-225-6605
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
CHA Industries, 3565 Haven Avenue, Menlo Park, CA 94025 415-363-8011
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Forma Scientific, Div. of Mallinckrodt Inc., Box 649, Marietta, OH 45750 614-373-4763
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 ...617-272-1313
Hotpack Corp., Heinicke Instrs., 10940 Dutton Rd., Philadelphia, PA 19154 .... 215-824-1700;800-523-3608
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Chambers, Vibration-2550

Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033, 805-487-7777 .... 3•1178
† **Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181**
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
Instron Corp., 100 Royall St., Canton, MA 02021 617-828-2500
† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 201-256-2200

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Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000

Character Recognition Equip., Optical-2000

BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
§ EG&G Reticon, Div. of EG&G, 345 Potrero Ave., Sunnyvale, CA 94086-9930 408-738-4266
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 .... 312-231-3511; 312-932-9380
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
Penn Video Inc., 929 Sweitzer Ave., Akron, OH 44311 216-762-4840
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 617-922-5961

Chargers, Battery-4000

Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869, 201-989-0095 .... 3•1824
ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 .... 3•1827
§† **Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 .... 3•1502**
Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 .... 3•1517
† **CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 .... 3•1845**
† **D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706, 516-586-5955 ... 3•1543**
† **Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 .... 3•1566**
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1876
Pan-Magnetics Intl., Inc., 455-A Carson Plaza Dr., Carson, CA 90746, 213-532-1790 .... 1A•2215,2221
§† **Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, 619-274-7242 .... 3•1433**
Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 .... 3•1795
Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716, 516-563-1117 .... 3•1802
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 .... 1A•1682
§† Adapter/Charger Prdts., Box 3218, Peoria, IL 61614 309-691-0810
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
† American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 ..612-788-9161
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
A-Systems Inc., Box 13, Ivy, VA 22945 804-295-7200
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
† Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 617-653-0355
§ C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 814-864-4921
Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
Dattilo Electronics, 11621 Electron Dr., Louisville, KY 40299 502-267-4446
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
§ Dormeyer Inds., 3418 N. Milwaukee, Chicago, IL 60641 312-283-4000
Eastern Delta Corp., 29-09 S. Broadway, Fair Lawn, NJ 07410 201-797-4200
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 206-743-1313
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§ Elpower, 2117 S. Anne St., Santa Ana, CA 92704 714-540-6155
Engineering Design & Sls., Rt. 2, Box 305, Danville, VA 24540 804-685-7073

† Exide Elctrns., P.O. Box 58189, Raleigh, NC 27658 919-872-3020
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ GNB Batteries Inc., Ind'l. Battery Div., 2010 Cabot Blvd. W., Langhorne, PA 19047 215-752-0555
§ HDR Power Sys., Inc., 600 Oakland Park Ave., Columbus, OH 43214 614-262-6832
HGA Elctrns., 519 S. Fifth Ave., Mt. Vernon, NY 10550 914-664-5393
† Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201 201-353-5700
§ Johnson Controls, Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, WI 53201 414-228-1200
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
§ La Marche Mfg., 106 Bradrock Dr., Des Plaines, IL 60018 312-299-1188
Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Magnetran Corp., 5701 Savoy Lane, Houston, TX 77036 713-785-4202
§ Marathon Flite-Tronics Company, A Marathon Battery Co., 2525 N. Naomi St., Burbank, CA 91504 213-841-3210
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
§ Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 412-782-3120
Power Conversion Prods., 42 East St., Box 380, Crystal Lake, IL 60014 815-459-9100
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
† Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
§ Power-Sonic, Box 5242, 3106 Spring St., Redwood City, CA 94063 415-364-5001
§ Ratelco, 1260 Mercer, Dept. EEM, Seattle, WA 98109 206-624-7770
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 .... 215-EL5-1361
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 .516-593-2025;Outside NY 800-645-5900
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† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§ Schauer Mfg., 4500 Alpine Ave., Cincinnati, OH 45242 513-791-3030
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Silicon Sensors, Hwy. 18 East, Dodgeville, WI 53533 608-935-2707
Spectra Lux Corp., 12840 N.E. 21 St. Pl., Bellevue, WA 98005 206-747-0560
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
§† Terado, 1068 Raymond Ave., St. Paul, MN 55108 612-646-2868
§ Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750 219-356-6500
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Tungstone Batteries, Inc., 18 Billings St., Sharon, MA 02067 617-784-2000
§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817 203-794-5300
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† Voltampere Corp., 146 Horton Ave., Lynbrook, NY 11563 516-887-9443
† Ward Leonard Elec., 31 South St., Mt. Vernon, NY 10550 914-664-1000
§ Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200
† Western Reserve Elctrns., 2150 Highland Rd., Twinsburg, OH 44087 216-425-4951
Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

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Chemicals, Epoxy Stripping-1600 — *See Vol. 2*

Chemicals, Etching-1700 — *See Vol. 2*

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Choppers-4050 (Also See Light Choppers)

Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
† Balzers Optical Grp., 170 Locke Dr., Marlboro, MA 01752 617-481-9860
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 516-567-7300
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
† Philamon, Inc., 33 Dubon Ct., Farmingdale, NY 11735 516-249-2700
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257

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Clamps & Clips, Ground-2825

§† Accessories for Elctrns., Inc., 800 Merrick Rd., Baldwin, NY 11510 ..516-546-1751
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
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§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§† Keystone Elctrns. Corp., 49 Bleecker St., New York, NY 10012 212-475-4600
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§† Mueller Elec. Co., 1583 E 31st St., Dept. 20, Cleveland, OH 44114 .216-771-5225
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§ Kulka Smith, Inc., 1913 Atlantic Ave., Manasquan, NJ 08736 201-223-9400
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Thomas & Betts, Electronics Group Hdqtrs., 920 Route 202, Raritan, NJ 08869 201-469-4000
§ Vector Electronic Co., Inc., 12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342 818-365-9661
§ Waldom Elctrns., 4301 W. 69th St., Dept. EEM, Chicago, IL 60629 .312-585-1212
§ Zierick Mfg. Corp., 44 Radio Circle, Mt. Kisco, NY 10549 914-666-2911

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§ APA Division, 399 Executive Blvd., Elmsford, NY 10523, 914-592-7322 ...... 2•1924
§† Alpha Metals, 600 Rte 440, Jersey City, NJ 07304 201-434-6778
Auric Corp., 470 Frelinghuysen Ave., Newark, NJ 07114 201-242-4100
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 516-654-1197
Baron-Blakeslee, Inc., Sub. Purex Inds., Inc., 2001 N. Janice Ave., Melrose Pk., IL 60160 312-450-3900
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† DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 302-773-3218
§† Electrovert Inc., 399 Executive Blvd., Elmsford, NY 10523 914-592-7322
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Heat Systems-Ultrasonics, Inc., 1938 New Highway, Farmingdale, NY 11735 516-694-9555
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† Isochem Prods. Co., A Sub. of Rohm and Haas Adv. Matls. Co., 99 Cook St., Lincoln, RI 02865 401-723-2100
† Keuffel & Esser/Kratos, 20 Whippany Rd., Morristown, NJ 07960 ...201-285-5181
§† L & R Mfg., 577 Elm St., Kearny, NJ 07032 201-991-5330
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
NTK Technical Ceramics, NGK Spark Plugs (U.S.A.), Inc., 1701 N. Greenville Ave. 05, Richardson, TX 75081 214-235-8332
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 800-628-8862
Sonicor Instrument Corp., 1365 Marconi Blvd., Copiague, NY 11726 516-842-3344
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
§ Tech Spray, Inc., Box 949, Amarillo, TX 79105 806-372-8523
Transene, Rte. 1, Rowley, MA 01969 617-948-2501

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Clean Room Equipment & Supplies-2550

Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173
§† Aluminum Filter, P.O. Box 1311, Santa Barbara, CA 93102 805-684-7651
§ Alzbear Corp., 15411 Red Hill Ave., Unit F, Tustin, CA 92680 714-557-0910
§ Cambridge Filter Corp., P.O. Box 4906, Syracuse, NY 13221 315-457-1000
§† Chemtronics Inc., 681 Old Willets Path, Hauppauge, NY 11788 516-582-3322
† Clean Room Prods., 56 W. Penataquit Ave., Bay Shore, NY 11706 .516-968-8282
† Controlled Envir. Equip. Corp., 3 Delta Drive, Westbrook, ME 04092 207-854-9126
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
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† Manufacturing Sys., Div. LeDoux Inds., Inc., 2022-C S. Grand Ave., Santa Ana, CA 92705 714-540-6630
Precision Tech. Sewing, 921 E. Charleston Rd., Palo Alto, CA 94303 415-856-2128
§† Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 800-628-8862
Static Inc., Rte. 113 & Mensch Rd., P.O. Box 80, Skippack, PA 19474 215-584-9600
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§ Tech Spray, Inc., Box 949, Amarillo, TX 79105 806-372-8523
Tegal Scientific, Inc., Box 5905, Concord, CA 94524 415-827-1054

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Clips, Logic Test-2900

§ A P PRODUCTS INCORPORATED, 9450 Pineneedle Dr., Box 540, Mentor, OH 44060, 216-354-2101 .... 2•1900
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Augat Inc., 33 Perry Ave., Box 779, Attleboro, MA 02703 617-222-2202
§† E-Z-Hook, Div. Tektest Inc., Box 450 - 225 N. Second Ave., Arcadia, CA 91006 818-446-6175
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.

§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990

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Clips (MIL), Electrical-2440 — *See Vol. 1B*

Clocks, Time Keeping — Also See Oscillators, Clock-2200

Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 .... 3•1121
† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, 512-251-2313 ....1A•1315
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209, 301-296-7000 .... 3•1407
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 ...... 3•1074
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ....1B•1044,1045
Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716, 201-291-0500; 800-631-2165 .... 3•1132
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1339
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....3•1097-1102
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
CTS Knights, 400 Reimann Ave., Sandwich, IL 60548 815-786-8411
§ Custom Control Sys., 21 E. Canon Perdido St., Santa Barbara, CA 93101 805-965-7577
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ....201-CA8-0321
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
Digital Pathways, Inc., 1060 E. Meadow Cir., Palo Alto, CA 94303 ..415-493-5544
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406 ...805-544-3800
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
§† Fox Elctrns., P.O. Box 1078, Cape Coral, FL 33910 813-482-7212
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915 617-927-8220
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† Greenray Inds., Inc., 840 W. Church Rd., Mechanicsburg, PA 17055 717-766-0223
Gregg Elec., 608 W. Emporia, Ontario, CA 91761 714-983-1794
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
† Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
Holt Inc., 8 Chrysler Ave., Irvine, CA 92714 714-859-8800
§ Inmac, 2465 Augustine Dr., Santa Clara, CA 95051 408-727-1970
† Isotemp Research, Inc, Box 3389, Charlottesville, VA 22901 804-295-3101
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
§† Lite-On Corp., Sub. Taiwan Liton Elctrn. Co. Ltd., 4951 Airport Pkwy., Ste. 570, Dallas, TX 75248 214-239-3565
§ Midland-Ross Corp., NEL Unit, 357 Beloit St., Burlington, WI 53105 414-763-3591
§ Monitor Labs, Inc., 10180 Scripps Ranch Blvd., San Diego, CA 92131 619-578-5060
Motorola, Inc., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131 312-451-1000
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Paccom, 3928 148th NE, Redmond, WA 98052 ....206-883-9200;800-426-6254
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
SaRonix, 4010 Transport at San Antonio, Palo Alto, CA 94303 415-856-6900
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
Spectrum Technology, Inc., 300 Lopez Rd., Goleta, CA 93116 805-964-7791
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 .415-676-5000
† UCE, Inc., 24 Fitch St., Norwalk, CT 06855 203-838-7509
† Vectron Labs., 166 Glover Ave., Norwalk, CT 06850 203-853-4433
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

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Clutches, Magnetic-3500 — *See Vol. 1B*

Clutches, Positive-3500 — *See Vol. 1B*

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Coatings, Fungicidal-1600 — *See Vol. 2*

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Coders, AF-1300

Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100

Coders, Telephone, Dial-1900

Rath Microtech Corp., Rath Affiliated Cos., 2505 Foster Ave., Janesville, WI 53545 ....608-754-2222;800-356-9464

Coders, Transponder-3400

† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
Leonard Elec. Prods., 85 Industrial Dr., Brownsville, TX 78521 512-546-1625
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073
† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300

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Coils, Saturable Reactor-1800 — *See Vol. 1A*

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Collection Systems (MIL)-3475

Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41

Collimators-2900

§ Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
KLC/Karl Lambrecht Corp., 4204 N. Lincoln Ave., Chicago, IL 60618 312-472-5442

Combiners, Microwave — See Couplers, Microwave (Vol. 1A)

Communications Intelligence (Comint) Systems (MIL)-3475

† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Magnavox Advanced Prods. & Sys. Co., Magnavox Govt. Indl. Elctrns. Co., 2829 Maricopa St., Torrance, CA 90503 213-618-1200
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
§ Teltone, 10801-120 Ave. NE, Kirkland, WA 98033 206-827-9626
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Communications Systems, FM-1900

† **GRIM Corporation, Box 67, Medford, NJ 08055, 609-267-7950 .... 3•1064**
Acquis Communications, 17192 Gillette Ave., Irvine, CA 92714 714-545-3732
† AN/COM Industries, P.O. Box 530, 5521 Cleon Ave., N. Hollywood, CA 91603 818-769-5518
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ..617-752-5690
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
† California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 914-235-9400
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
§ Glatzer Industry Corp., 15 River St., New Rochelle, NY 10801 914-576-2700
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Magnavox Advanced Prods. & Sys. Co., Magnavox Govt. Indl. Elctrns. Co., 2829 Maricopa St., Torrance, CA 90503 213-618-1200
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
Pacific Communications, 2041-A S. Grand Ave., Santa Ana, CA 92705 714-546-0147
Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 312-432-7915
§† REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854 305-843-8484
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100

† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 ... 818-993-8257
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ... 516-957-8700;800-645-5516
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 ... 617-449-2000
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 ... 516-759-0300
§ Wilson Electronics, PO Box 19000, Las Vegas, NV 89119 ... 702-739-1931

Communications Systems, Laser-1900

† MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998, 213-828-7496 1B•1116
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 ... 805-967-0423
Codenoll Technology Corp., 1086 N. Bwy., Yonkers, NY 10701 ... 914-965-6300
Fairchild Camera & Instr. Corp., 464 Ellis St., MS15-1035, Mountain View, CA 94042 ... 415-962-5011
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ... 613-226-4000
† General Optronics, 3005 Hadley Rd., So. Plainfield, NJ 07080 ... 201-549-9000
§ International Laser Sys., 3404 N. Orange Blossom Trail, Orlando, FL 32804 ... 305-295-4010
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 ... 415-552-1247
M/A-COM Laser Diode, Inc., M/A-COM, Inc., 1130 Somerset St., New Brunswick, NJ 08901 ... 201-249-7000
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 ... 201-233-6010
† Optelecom, 15940 Lauanne Dr., Gaithersburg, MD 20760 ... 301-948-4232
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 ... 216-871-7617

Communications Systems, Microwave-3400

Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 ... 703-642-4000
Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 ... 408-496-6710
† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 ... 215-657-7510
† Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 ... 408-946-5600
California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 ... 408-732-4000
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 ... 516-921-7300
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 ... 415-825-7500
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 ... 408-263-8100
§ Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 ... 203-743-9241
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 ... 714-533-6333
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ... 213-670-8611
Drake, R. L., Co., 540 Richard St., Miamisburg, OH 45342 ... 513-866-2421
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 ... 415-594-3000
FG Engrg., Box 476, Fredonia, AZ 86022 ... 602-643-7375
† Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 ... 408-727-3101
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 ... 703-620-6200
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 ... 213-517-6000
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 ... 415-552-1247
Loral TerraCom, Div. of Loral Corp., 9020 Balboa Ave., San Diego, CA 92123 ... 619-278-4100
§† Magnum Microwave Corp., 365 Ravendale Dr., Mountain View, CA 94043 ... 415-968-9281
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ... 44-(582) 60-14-41
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 ... 315-437-9951
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 ... 213-684-2600
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 ... 516-242-1100
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 ... 214-996-5000
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 ... 213-341-3010
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 ... 408-732-0880
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
§ Waveline, Box 718, W. Caldwell, NJ 07006 ... 201-226-9100

Communications Systems, Multiplex-1900

† GRIM Corporation, Box 67, Medford, NJ 08055, 609-267-7950 ... 3•1064
† Allied Corp. Aerospace Sector, Bendix Communications Div., East Joppa Rd., Towson, MD 21204 ... 301-583-4000
Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 ... 213-822-3202
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ... 313-779-8700
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ... 617-752-5690
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 ... 215-657-7510
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 ... 408-946-5600
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 ... 203-575-3000
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 ... 516-921-7300
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 ... 415-825-7500
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 ... 516-231-1550
Computrol Div. Kidde Automated Sys., Inc., 15 Ethan Allen Hwy., Ridgefield, CT 06877 ... 203-544-9371
Control Module, 380 Enfield St., Enfield, CT 06082 ... 203-745-2433
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 ... 203-743-9241
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 ... 714-987-2511
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 ... 201-947-9500
† Dataproducts, 6200 Canoga Ave., Woodland Hills, CA 91365 ... 213-887-8000
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ... 213-670-8611
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 ... 312-584-2300
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 ... 603-742-7363
† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England ... 01 994-3670
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 ... 415-594-3000
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ... 613-226-4000
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 ... 312-541-6060
Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 ... 408-727-3101
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
§ Intra-computer, 101 W. 31st St., New York, NY 10001 ... 212-947-5533
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 ... 415-552-1247
Loral TerraCom, Div. of Loral Corp., 9020 Balboa Ave., San Diego, CA 92123 ... 619-278-4100
† Optelecom, 15940 Lauanne Dr., Gaithersburg, MD 20760 ... 301-948-4232
Proteon, Inc., 4 Tech Circle, Natick, MA 01760 ... 617-655-3340
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 ... 216-871-7617
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 ... 201-334-3100
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 ... 214-996-5000
† Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201 ... 818-244-6541
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 ... 818-993-8257
Telephonics, 770 Park Ave., Huntington, NY 11743 ... 516-549-6000
† Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 ... 201-930-4600
† Tro Dyne Corp., 900 Corporate Dr., Mahwah, NJ 07430 ... 201-529-1800
Wescom, PO Box 1458, Downers Grove, IL 60515 ... 312-985-9000

Communications Systems, Telemetering-1900

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 ... 3•1003
§† REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854, 305-843-8484 ... 3•1065
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 ... 805-967-0423
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 ... 703-642-4000
† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 ... 215-657-7510
† Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 ... 215-646-8100
† Aydin Vector Div., Box 328, Newtown, PA 18940 ... 215-968-4271
† Base Ten Sys., One Electronics Dr., Box 3151, Trenton, NJ 08619 ... 609-586-7010
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 ... 203-575-3000
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 ... 516-921-7300
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 ... 516-567-7300
Computrol Div. Kidde Automated Sys., Inc., 15 Ethan Allen Hwy., Ridgefield, CT 06877 ... 203-544-9371
Continental Data Sys., 131 N. Ludlow St., Dayton, OH 45402 ... 513-222-8626
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 ... 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 ... 203-743-9241
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 ... 201-947-9500
Data Signal Corp., 149 California St., Newton, MA 02158 ... 617-926-5080
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 ... 714-533-6333
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 ... 619-744-1002
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ... 213-670-8611
§ Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 ... 201-831-1615
† EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 ... 716-924-4000
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 ... 714-879-6021
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 ... 214-783-2004
§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 ... 914-235-9400
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 ... 813-371-0811
FG Engrg., Box 476, Fredonia, AZ 86022 ... 602-643-7375
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ... 613-226-4000
Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 ... 408-727-3101
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 ... 213-517-6000
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 ... 215-643-2000
Metraplex Corp., Berkshire Indl. Park, Bethel, CT 06801 ... 203-748-0606
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 ... 516-671-5700
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 ... 215-355-4443
Pacific Communications, 2041-A S. Grand Ave., Santa Ana, CA 92705 ... 714-546-0147
§ Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 ... 602-278-8528
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 ... 201-341-8361
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 ... 213-684-2600
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 ... 201-334-3100
† RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 ... 516-242-1100

Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
§† Systron-Donner Inertial Div., 2700 Systron Dr., Concord, CA 94518 415-682-6161
TANO Corp., 4301 Poche Ct., New Orleans, LA 70129 504-254-3500
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 213-341-3010
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666

Communications Systems, Telephone-1900

§ **RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 ...... 3•1066**
Acquis Communications, 17192 Gillette Ave., Irvine, CA 92714 714-545-3732
ADC Prods., 4900 W. 78th St., Minneapolis, MN 55435 612-835-6800
§ Aiphone, 1700 130th St. NE, Bellevue, WA 98005 206-455-0510
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 805-967-0423
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ...... 203-268-4372; 800-243-8160
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
Centigram Corp., 155A Moffett Park Dr., Sunnyvale, CA 94086 408-734-3222
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
Conklin Instr. Corp., West Rd., Pleasant Valley, NY 12569 914-635-2136
Continental Data Sys., 131 N. Ludlow St., Dayton, OH 45402 513-222-8626
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
† Dataproducts, 6200 Canoga Ave., Woodland Hills, CA 91365 213-887-8000
§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
Electro Physics, 1910 West Birchwood Ave., Chicago, IL 60626 312-274-9669
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
† GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
GTE Automatic Elec., 400 N. Wolf Rd., Northlake, IL 60164 312-681-7071
GTE Switching & Telephone Products, 400 N. Wolf Rd., Northlake, IL 60164 312-681-7100
Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
§ ITT Telecommunications, Apparatus Dept., Fulton Dr., Corinth, MS 38834 601-287-3771
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 415-552-1247
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
National Telephone & Elctrns. Inc., 7561 N.W. 77th Terr., Miami, FL 33166 305-885-9423
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 914-693-9001
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 312-432-7915
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§† Rolm Corp., 1 River Oaks Pl., San Jose, CA 95134 408-988-2900
§ Solid State Systems, 1990 Delk Industrial Blvd., Marietta, GA 30067 404-952-9401
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
§ SYT, 1220 Barranca, El Paso, TX 79935 915-593-1234
§ Tektone Sound & Signal, 1331 S. Killian Dr., Lake Park, FL 33403 305-844-2383
Telephonics, 770 Park Ave., Huntington, NY 11743 516-549-6000
Telesensory Speech Sys., Telesensory Sys., Inc., 3408 Hillview Ave., Palo Alto, CA 94304 415-856-8255
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
§† TRW Connector Div., TRW Electronic Components Grp., 1501 Morse Ave., Elk Grove Village, IL 60007 312-981-6000
Viking Electronics, Industrial St., Hudson, WI 54016 715-386-8861
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Commutators-3500 — *See Vol. 1B*

Comparators, Analog — See Comparators, Voltage (Vol. 3)

Comparators, Attenuation-3400

Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Comparators, Capacitance — See Bridges, Capacitance (Vol. 3)

Comparators, Digital-2900

§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 ...... 3•1126**
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ...... 3•1327
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 ...... 3•1164**
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ...... 3•1340, 1341**
§ **Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 ...... 3•1343**
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ...... 617-777-4500; 17-246-0300;800-451-1816
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
† Automation Dynamics, 77 Brookside Pl., Hillsdale, NJ 07642 201-666-2458
Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
Interswitch, 770 Airport Blvd., Burlingame, CA 94010 415-347-8217
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
Texmate, Inc., 348 S. Cedros Ave.; P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Comparators, Dimension Calibrators-4100

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Trans-Tek, P.O. Box 338, Rte. 83, Ellington, CT 06029 203-872-8351

Comparators, Frequency-2900

† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107 818-795-2220
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 512-929-2051
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Comparators, Impedance — See Bridges, Impedance (Vol. 3)

Comparators, Inductance — See Bridges, Inductance (Vol. 3)

Comparators, Optical-2900

BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Cooner Wire Co., 9186 Independence Ave., Chatsworth, CA 91311 818-882-8311
† Keyan Inds., Inc., P.O. Box 1228, Middleboro, MA 02346 617-947-7719
Metron Optics Inc., P.O. Box 690, Solana Beach, CA 92075-0690 619-755-4477
§ 3D Optics, Box 224, 4 Strathmore Cir., Braintree, MA 02184 617-848-8002
Vision Engrg. Inc., 570 Danbury Rd., New Milford, CT 06776 203-355-3776

Comparators, Phase-2900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ...... 3•1154
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 ...... 3•1154
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Corcom, Inc., 1600 Winchester Rd., Libertyville, IL 60048 312-680-7400

† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Universal Ad-Yu Elctrns., Inc., 2517 E. Norwich St., Milwaukee, WI 53207 414-482-4100
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Comparators, Resistance — See Bridges, Resistance (Vol. 3)

Comparators, Voltage-2900

CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906, 317-463-2565 ....1A•1647
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1297
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1297
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523 415-932-3911
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Leeds & Northrup Instrs., A Unit of General Signal Corp,, Sumneytown Pike, North Wales, PA 19454 215-643-2000
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 ..415-968-9211
§ RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
§ Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401 405-223-4773
Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Compounds, Encapsulating, Molding, Potting-1600 (Also See Plastic Raw Materials) — *See Vol. 2*

Compounds, Insulating-3100 — *See Vol. 2*

Computer-Aided Design Services — See Computers, CAD, CAM, & CAD/CAM (Vol. 3), Services, Computer-Aided Design (Vol. 3),

Computer Logic Circuits — See Cards, Logic (Vol. 3), Circuits, Hybrid (Vol. 1A), Integrated Circuits (Vol. 1A), Modules, Logic (Vol. 1A),

Computer Tape Recorders — See Recorders, Computer Data (Vol. 3)

Computer Type Indicators — See Displays, Indicator Lights (Vol. 1B)

Computers, Analog-2025

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
General Computers, 1624 Veteran Ave., Los Angeles, CA 90024 ....
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
§ STD Microsystems, 399 Sherman Ave., Palo Alto, CA 94306 415-327-6800
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900

Computers, CAD, CAM, & CAD/CAM-2025

Wintek Corp., 1801 South St., Lafayette, IN 47904-2993, 317-742-8428 .... 3•1118
Advanced Elctrns. Design, 440 Potrero Ave., Sunnyvale, CA 94086 408-733-3555
Alden Computer Systems, 27 Strathmore Rd., Natick, MA 01760 ...617-655-6610
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ..617-752-5690
† Auto-trol Tech., 12500 N. Washington St., Denver, CO 80233 303-452-4919
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
§† Aydin Controls, 414 Commerce Dr., Ft. Washington, PA 19034 215-542-7800
Bishop Graphics, Inc., 5388 Sterling Center, Westlake Village, CA 91359 818-991-2600
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
Catronix Corp., 120 Ralph McGill Blvd. N.E., Ste. 800, Atlanta, GA 30308 404-872-2300
CGIS, A COMSAT Co., 7701 N. Lamar Blvd., Austin, TX 78752 512-451-7938
Compact Software, Inc., Comsat Corp., 1131 San Antonia Rd., Palo Alto, CA 94303 415-966-8440
Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
DGS Assocs., 1353 Sarita Way, Santa Clara, CA 95051 408-554-1469
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
Gerber Sys. Technlgy., Inc., 40 Gerber Rd. E., South Windsor, CT 06074 203-644-2581
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
International Microelectronic Prods., 2830 North First Street, San Jose, CA 95134 408-262-9100
Lexidata Corp., 755 Middlesex Tpke., Billerica, MA 01865 ....617-663-8550; 800-472-4747
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
§† Megatek Corp., 9605 Scranton Rd., San Diego, CA 92121 619-455-5590
Seattle Computer Products, Inc., 1114 Ind. Dr., Seattle, WA 98188 .... 206-575-1830;800-426-8936
Spectragraphics Corp., 10260 Sorrento Valley Rd., San Diego, CA 92121 619-450-0611
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Wayne Kerr, Inc., W.K.R. Ltd., 400 West Cummings Pk., Woburn, MA 01801 617-938-8390
Wire Graphics, 215 B. Central Ave., Farmingdale, NY 11735 516-293-1525

Computers, Digital, Mini-2025

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010
Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
§ Computer Maintenance Corp., 111-117 Enterprise Ave. S., Secaucus, NJ 07094 201-866-6400
Computer Talk, Inc., Box 148, Morrison, CO 80465 303-697-5485
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
† Dataware Sys. Lease, Inc., 30 Bay St., Staten Island, NY 10301 212-447-4911
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
ECD Corp., 196 Broadway, Cambridge, MA 02139 617-661-4400
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000

Computers, Digital, Mini-2025 (Cont'd)

† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800

Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170

Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000

Mylee Digital Sciences, 155 Weldon Pkwy., Maryland Heights, MO 63043 314-567-3420

§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120

† Rolm Corp., 1 River Oaks Pl., San Jose, CA 95134 408-988-2900

Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900

† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877

† Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270

§† Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611

§ Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Computers, Digital, Micro-2025

Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 .... 3•1109

Heurikon Corp., 3001 Latham Dr., Madison, WI 53713, 608-271-8700 .... 3•1082-1084

Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1110

§ **InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362, 818-991-1410 .... 3•1085**

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112

Mizar Inc., 302 Chester St., St. Paul, MN 55107, 612-224-8941 .... 3•1113

Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 3•1114,1115

Wintek Corp., 1801 South St., Lafayette, IN 47904-2993, 317-742-8428 .... 3•1118

Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726

† Adaptive Science, 4700 San Pablo Ave., Emeryville, CA 94608 415-652-1805

§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ....208-263-1471;800-323-3343

§ Advanced Microcomputers, 3340 Scott Blvd., Santa Clara, CA 95051 408-732-2400

§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400

† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700

Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821

Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651

† Applied Data Communications, 14272 Chambers Rd., Tustin, CA 92680 714-731-9000

§ Applied Digital Data Systems Inc., 100 Marcus Blvd., Hauppauge, NY 11787 516-231-5400

Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200

Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510

Boston Systems Office, 469 Moody St., Waltham, MA 02154 617-894-7800

Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000

† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111

Catronix Corp., 120 Ralph McGill Blvd. N.E., Ste. 800, Atlanta, GA 30308 404-872-2300

CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640

Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491

Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010

Chrislin Inds., 31352 Via Colinas, Westlake Village, CA 91361 213-991-2254

§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909

§ Computer Devices, 25 North Ave., Burlington, MA 01803 617-273-1550

§ Computer Maintenance Corp., 111-117 Enterprise Ave. S., Secaucus, NJ 07094 201-866-6400

§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911

Computerwise, 4006 E 137th Terr., Grandview, MO 64030 816-765-3330

§† Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400

Cybersystems, Inc., 7540 South Memorial Pkwy., Huntsville, AL 35802 205-883-4410

§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911

Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500

§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822

Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313

Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700

† Dataware Sys. Lease, Inc., 30 Bay St., Staten Island, NY 10301 212-447-4911

Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002

Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600

§ Digital Data Sys., 1551 N.W. 65 Ave., Plantation, FL 33313 305-792-3290

Digital Equip., One Iron Way, Marlborough, MA 01752 ....

§ Digital Microsystems, 1840 Embarcadera, Oakland, CA 94606 415-261-1034

Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 .617-899-6619

Diversified Technlg., P.O. Box 748, Ridgeland, MS 39157 601-856-4121

§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281

ECD Corp., 196 Broadway, Cambridge, MA 02139 617-661-4400

† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090

Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363

Facit, Inc., 66 Field Point Rd., Greenwich, CT 06830 203-622-9150

First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050

§ Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100

§ Giltronix, 3780 Fabian Way, Palo Alto, CA 94303 415-493-1300

§ Gimix, Inc., 1337 W. 37th Place, Chicago, IL 60609 312-927-5510

§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663

§ Heath Co., Benton Harbor, MI 49022 616-982-3886

Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000

† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800

Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170

§ Innotronics, Brooks Rd., Lincoln, MA 01773 617-678-8720

† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003

International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614

§ Intra-computer, 101 W. 31st St., New York, NY 10001 212-947-5533

Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005

§ Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 415-361-1012

Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000

Matrix Corp., 1639 Green St., Raleigh, NC 27603 919-833-2837

Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182

Micro Computer Rentals, 742D Hampshire Rd., Westlake Village, CA 91361 213-991-1704

Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600

Mitronics, 18039 Crenshaw Blvd., Torrance, CA 90504 213-323-7934

Monolithic Sys., 84 Inverness Circle E., Englewood, CO 80112 303-790-7400

Multi-Tronix, 3210 Terry Dr, Toledo, OH 43613 419-472-0723

§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120

Omnibyte Corp., 245 W. Roosevelt Rd., Bldg. 1-5, W. Chicago, IL 60185 312-231-6880

Onset Computer Corp., 199 Main St., P.O. Box 1016, N. Falmouth, MA 02556 617-563-2267

PCM-PAC Cyber-Metric, 6800 Sierra Ct., Dublin, CA 94568 415-829-8700

Quartic Systems, Inc., 3575 South West Temple , Salt Lake City, UT 84115 801-268-9264

Quay Corp., 22 Meridian Rd., P.O. Box 783, Eatontown, NJ 07724 .201-542-7340

Qwint Systems, 3693 Commercial Ave., Northbrook, IL 60062 312-498-5060

RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000

RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361

§† Rockwell Int'l., 4311 Jamboree Rd., Newport Beach, CA 92660 800-854-8099

Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684

Standard Engrg., 44800 Girmmer, Fremont, CA 94538 415-657-7555

§ STD Microsystems, 399 Sherman Ave., Palo Alto, CA 94306 415-327-6800

§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468

SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898

Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740

§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600

Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270

§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760

§ Terra Technlg. Corp., 3860 148th Ave. N.E., Redmond, WA 98052 .206-883-7300

§ Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611

§ Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300

§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Ziatech, 3433 Roberto Ct., San Luis Obispo, CA 93401 805-541-0488

Computers, Hybrid, Analog/Digital-2025

Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1110

† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700

Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200

† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800

Cyber Sys., Inc., 2031 E. Cerritos Ave., Anaheim, CA 92806 714-722-2051

Dataware Sys. Lease, Inc., 30 Bay St., Staten Island, NY 10301 212-447-4911

Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002

§ Encoder Prods., 1601B Dover Rd., Sandpoint, ID 83864 208-263-8541

General Computers, 1624 Veteran Ave., Los Angeles, CA 90024 ....

† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000

Heurikon Corp., 3001 Latham Dr., Madison, WI 53713 608-271-8700

§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135

† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800

ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 607-272-7640

† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777

Matrix Corp., 1639 Green St., Raleigh, NC 27603 919-833-2837

Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684

§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760

† Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270

Computers, Mainframe-2025

Vector Electronic Co., Inc., 12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342, 818-365-9661 .... 2•1069

Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700

§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911

Computervision Corp., 201 Burlington Rd., Bedford, MA 01730 617-275-1800

Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000

Computers, Micro-2025

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
§ **Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1110**
§ **InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362, 818-991-1410 .... 3•1085**
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
Mizar Inc., 302 Chester St., St. Paul, MN 55107, 612-224-8941 .... 3•1113
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625, 813-855-6611 .... 3•1317
Advanced Elctrns. Design, 440 Potrero Ave., Sunnyvale, CA 94086 408-733-3555
Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821
Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
Computer Dynamics, 105 S. Main St., Greer, SC 29651 803-877-7471
§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911
§† Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Cybersystems, Inc., 7540 South Memorial Pkwy., Huntsville, AL 35802 205-883-4410
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Dexter Research Ctr., Inc., 7300 Huron River Dr., Dexter, MI 48130 313-426-3921
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 .617-899-6619
§ DY-4 Systems Inc., 888 Lady Ellen Pl., Ottawa, ON K1Z 5M1 Canada 613-728-3711
§ Electric Switches, Inc., 2478 Fletcher Dr., Los Angeles, CA 90039 ...213-660-1310
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
† Exergetic Sys., Inc., 1499 Franklin St., Oakland, CA 94612 415-763-3460
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
§ General Instrument Corp., Microelectronics Div., 600 W. John St., Hicksville, NY 11802 516-733-3107
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ Gimix, Inc., 1337 W. 37th Place, Chicago, IL 60609 312-927-5510
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045 213-417-8888
§ Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 415-361-1012
Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 617-444-7000
Microbar Sys., Inc., 1121 San Antonio Rd., Palo Alto, CA 94303 415-964-2862
Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Omnibyte Corp., 245 W. Roosevelt Rd., Bldg. 1-5, W. Chicago, IL 60185 312-231-6880
Onset Computer Corp., 199 Main St., P.O. Box 1016, N. Falmouth, MA 02556 617-563-2267
Pacific Microcomputers, Inc., 119 Aberdeen, Cardiff, CA 92007 619-436-8649
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
§ Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 415-962-0224
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
Quartic Systems, Inc., 3575 South West Temple, Salt Lake City, UT 84115 801-268-9264
Quay Corp., 22 Meridian Rd., P.O. Box 783, Eatontown, NJ 07724 .201-542-7340
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Seattle Computer Products, Inc., 1114 Ind. Dr., Seattle, WA 98188 ....206-575-1830;800-426-8936
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
§ STD Microsystems, 399 Sherman Ave., Palo Alto, CA 94306 415-327-6800
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
§ TANO Corp., 4301 Poche Ct., New Orleans, LA 70129 504-254-3500
Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Computers, Mini, High End-2025

Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Modular Computer Systems, P.O. Box 6099, Ft. Lauderdale, FL 33310 305-974-1380
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Computers, Mini, Low End-2025

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
Computer Maintenance Corp., 111-117 Enterprise Ave. S., Secaucus, NJ 07094 201-866-6400
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Computers, Mini, Midrange-2025

Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Computers, Personal-2025

Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§ Chorus Data Systems, P.O. Box 810, 27 Proctor Hill Rd., Hollis, NH 03049 603-465-7100
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
§ Electric Switches, Inc., 2478 Fletcher Dr., Los Angeles, CA 90039 ...213-660-1310
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ Gimix, Inc., 1337 W. 37th Place, Chicago, IL 60609 312-927-5510
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§† Megatek Corp., 9605 Scranton Rd., San Diego, CA 92121 619-455-5590

Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
§ Multitech Elctrns. Inc., 195 W. El Camino Real, Sunnyvale, CA 94086 408-773-8400
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
§ Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 415-962-0224
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Computers, Small Business-2025

§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 ....3•1110
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
Computer Maintenance Corp., 111-117 Enterprise Ave. S., Secaucus, NJ 07094 201-866-6400
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 .....516-435-2808;800-DIAL EDL; 800 342-5335
§ Electric Switches, Inc., 2478 Fletcher Dr.; Los Angeles, CA 90039 ...213-660-1310
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ Gimix, Inc., 1337 W. 37th Place, Chicago, IL 60609 312-927-5510
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Mitsubishi Elctrns. America, Computer Peripheral Div., 991 Knox St., Torrance, CA 90502 213-515-3993
§ Multitech Elctrns. Inc., 195 W. El Camino Real, Sunnyvale, CA 94086 408-773-8400
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
§ Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 415-962-0224
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
Quay Corp., 22 Meridian Rd., P.O. Box 783, Eatontown, NJ 07724 .201-542-7340
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 301-881-7655
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Computer Sets (MIL), Digital Data-3475

† Analytics Communications Sys., 1820 Michael Faraday Dr., Reston, VA 22090 703-471-0892
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932

Computer Systems (MIL)-3475

Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 ...206-363-0217
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 408-748-1200
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Base Ten Sys., One Electronics Dr., Box 3151, Trenton, NJ 08619 .609-586-7010
§† Chorus Data Systems, P.O. Box 810, 27 Proctor Hill Rd., Hollis, NH 03049 603-465-7100
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§† Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
† Custom Prods. Grp., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301 215-648-2241
† Cyber Sys., Inc., 2031 E. Cerritos Ave., Anaheim, CA 92806 714-722-2051
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ Electric Switches, Inc., 2478 Fletcher Dr., Los Angeles, CA 90039 ...213-660-1310
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500

§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Computing Equipment, Peripheral — See Converters, Digital To Paper Tape (Vol. 3), Printers (Vol. 3), Terminals, Data Display (Vol. 3), etc.

Concentrators, Communications-1900

Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ..617-752-5690
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Kaufman Data Comms., Inc., Orange Nassau Elctrns. Co., 145 E. Dana St., Mountain View, CA 94041 415-962-8811
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
§ Multi-Tech Systems, Inc., 82 Second Ave. S.E., New Brighton, MN 55112 612-631-3550
§† Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 .201-930-4600

Conditioners, Power Line — See Regulators & Stabilizers, Voltage (Vol. 3), Line Conditioners (Vol. 3),

Conductive Elastomers-4525 — *See Vol. 2*

Conductive Fabrics, Films & Tapes — See Fabrics, Conductive (Vol. 2)

Conductive Plastic Materials & Parts-4525 — *See Vol. 2*

Conduit, Electrical-6000 — *See Vol. 2*

Connector Adapters-2100 — *See Vol. 2*

Connector Backshells-2100 — *See Vol. 2*

Connector Blocks, Mother Board-2100 — *See Vol. 2*

Connector Boxes & Strips, Power Outlet-2800 — *See Vol. 2*

Connectors, Antenna — See Connectors, RF, Coaxial & Triaxial (Vol. 2)

Connectors, Audio-2100 — *See Vol. 2*

Connectors, Back Panel — See Connectors, Wirewrap (Z-3 Level) (Vol. 2)

Connectors, Battery-2100 — *See Vol. 2*

Connectors, Cable-2100 — *See Vol. 2*

Connectors, Circular, MS/AN-2100 — *See Vol. 2*

Connectors, DIN-2100 — *See Vol. 2*

Connectors, D Subminiature-2100 — *See Vol. 2*

Connectors, Edgeboard — See Connectors, Printed Circuit, Card Edge (Vol. 2)

Connectors, Elastomeric-2100 — *See Vol. 2*

Connectors, Fiber Optic-2475 — *See Vol. 1B*

Connectors, Filtered-2100 — *See Vol. 2*

Connectors, Flat Cable (Incl. Flexible)-2100 — *See Vol. 2*

Connectors, Fused-2100 — *See Vol. 2*

Connectors, Heavy Duty, Power-2100 — *See Vol. 2*

Connectors, Hermetically Sealed, Pressurized, or Waterproof-2100 — *See Vol. 2*

Connectors, High Voltage (1,000 Volts & Over)-2100 — *See Vol. 2*

Connectors, Integrated Circuit — See Sockets, Integrated Circuit (Vol. 2)

Connectors, LCD-2100 — *See Vol. 2*

Connectors, Magnetron-2100 — *See Vol. 2*

Connectors, Miniature, Subminiature & Microminiature-2100 — *See Vol. 2*

Connectors, Missile (Umbilicals, Interstage, Post Boost)-3475

† AirBorn, Inc., 4321 AirBorn Dr., Addison, TX 75001 214-931-3200
† Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160
§ Astrolab, 345 Dalziel Rd., Linden, NJ 07036 201-862-0022
§† Bendix Corp., Electrical Comps. Div., Sidney, NY 13838 607-563-5324
§ Burndy Corporation, Richards Ave., Norwalk,, CT 06852 203-838-4444
§ Dale Electronics, Inc., Yankton Div., E. Hwy. 50, Box 180, Yankton, SD 57078 605-665-9301
† Dataware Sys. Lease, Inc., 30 Bay St., Staten Island, NY 10301 212-447-4911
Hughes Aircraft Co., Connecting Devices Div., 17150 Von Karman Ave., Irvine, CA 92714 714-660-5701
† ITT Cannon, 10550 Talbert Avenue, P.O. Box 8040, Fountain Valley, CA 92708 714-964-7400
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
Sabritec, 16631 Noyes Ave., Irvine, CA 92714 714-549-7350
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
§† TRW Cylindrical Connector Div., TRW Electronic Components Grp., 8821 Science Center Dr., Minneapolis, MN 55428 612-537-1010
§† Viking Connectors, 21001 Nordhoff St., P.O. Box 2379, Chatsworth, CA 91311 818-341-4330

Connectors, Piggy Back — See Connectors, Wirewrap (Z-3 Level) (Vol. 2)

Connectors, Plug-in, Program Board-2100 — *See Vol. 2*

Connectors, Printed Circuit, Card Edge-2100 — *See Vol. 2*

Connectors, Printed Circuit (Other than Card Edge)-2100 — *See Vol. 2*

Connectors, Rack & Panel-2100 — *See Vol. 2*

Connectors, RF, Coaxial & Triaxial-2100 — *See Vol. 2*

Connectors, Solderless-2100 — *See Vol. 2*

Connectors, Stripline-2100 — *See Vol. 2*

Connectors, Test-2100 — *See Vol. 2*

Connectors, Thermocouple-2100 — *See Vol. 2*

Connectors, Wirewrap (Z-3 Level)-2100 — *See Vol. 2*

Connectors, Wire — See Wire Nuts (Vol. 2)

Connectors, Zero & Low Insertion Force-2100 — *See Vol. 2*

Connectors & Terminals, Push-on, Quick Disconnect-2100 — *See Vol. 2*

Connectors (MIL), Flat Cable-2440 — *See Vol. 1B*

Connectors (MIL), Power-2440 — *See Vol. 1B*

Connectors (MIL), Printed Circuit-2440 — *See Vol. 1B*

Connectors (MIL), RF-2440 — *See Vol. 1B*

Consoles, Cabinet — See Benches, Consoles etc. (Vol. 2)

Consoles (MIL), ECCM-3475

† Amco Engrg., 3801 N. Rose St., Schiller Pk., IL 60176 312-671-6670

Contact Cleaners — See Cleaners & Solvents (Vol. 2), Burnishers, Contact (Vol. 2),

Contact Strips, Finger-4525 — *See Vol. 2*

Contactors (MIL)-2440 — *See Vol. 1B*

Contactors — See Relays, Power (Vol. 1B)

Contacts, Electrical-2800 — *See Vol. 2*

Contacts (MIL), Assemblies & Holders-2440 — *See Vol. 1B*

Containers, Shielded (All Types) — See Enclosures, Shielded (Vol. 2)

Containers, Shipping, Metal & Fiberglass — See Enclosures, Shipping, Metallic & Nonmetallic (Vol. 2)

Containers, Storage-3800 — *See Vol. 2*

Controllers, Card Reader/Punch, Add-in-2000

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008

Controllers, Card Reader/Punch, Standalone-2000

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200

Controllers, Energy Conservation-2200

§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660

Controllers, Error-1900

§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844

Controllers, Floppy Disk Drive, Add-in-2000

Ciprico Inc., 2405 Annapolis La., Plymouth, MN 55441, 612-559-2034 .... 3•1075
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 3•1115,1116
Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Advanced Elctrns. Design, 440 Potrero Ave., Sunnyvale, CA 94086 408-733-3555
§ Analog & Digital Peripherals, Inc. (ADPI), 815 Diana Dr., Troy, OH 45373 513-339-2241
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
§ Distributed Logic Corp. (DILOG), 12800-G Garden Grove Blvd., Garden Grove, CA 92643 714-534-8950
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
† Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Controllers, Floppy Disk Drive, Standalone-2000

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ...619-566-3911
§ E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 415-361-1012
§ Shugart Assocs., 475 Oakmead Pkwy., Sunnyvale, CA 94086 408-733-0100
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Controllers, Hard Disk Drive, Add-in-2000

Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 3•1115,1116
Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Advanced Elctrns. Design, 440 Potrero Ave., Sunnyvale, CA 94086 408-733-3555
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Ball Elctrn., Systems Div., 1950 33rd St., Boulder, CO 80302 303-441-5400
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Ciprico Inc., 2405 Annapolis La., Plymouth, MN 55441 612-559-2034
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909

§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 .. 619-566-3911
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 . 617-899-6619
§ Distributed Logic Corp. (DILOG), 12800-G Garden Grove Blvd., Garden Grove, CA 92643 714-534-8950
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600
§ Mini Computer Technlg., 696 E. Trimble Rd., San Jose, CA 95131 .. 408-942-1616
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Controllers, Hard Disk Drive, Standalone-2000

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 .. 619-566-3911
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Mini Computer Technlg., 696 E. Trimble Rd., San Jose, CA 95131 .. 408-942-1616
§ Shugart Assocs., 475 Oakmead Pkwy., Sunnyvale, CA 94086 408-733-0100
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Controllers, IEEE 488 (GPIB) Bus-2900

National Instruments, 12109 Technology Blvd., Austin, TX 78759, 512-250-9119 .... 3•1266
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 . 617-899-6619
§ Dylon Data Corp., 9561 Ridgehaven Ct., San Diego, CA 92123 619-292-5584
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
ICS Electronics Corp., 2185 Old Oakland Rd., San Jose, CA 95131 408-263-4844
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Ziatech, 3433 Roberto Ct., San Luis Obispo, CA 93401 805-541-0488

Controllers, Magnetic Tape Drive, Add-in-2000

Ciprico Inc., 2405 Annapolis La., Plymouth, MN 55441, 612-559-2034 .... 3•1075
§ Analog & Digital Peripherals, Inc. (ADPI), 815 Diana Dr., Troy, OH 45373 513-339-2241
Ball Elctrn., Systems Div., 1950 33rd St., Boulder, CO 80302 303-441-5400
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digi-Data Corp., 8580 Dorsey Run Rd., Jessup, MD 20794 301-498-0200
§ Distributed Logic Corp. (DILOG), 12800-G Garden Grove Blvd., Garden Grove, CA 92643 714-534-8950
§ Dylon Data Corp., 9561 Ridgehaven Ct., San Diego, CA 92123 619-292-5584
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
§ Mini Computer Technlg., 696 E. Trimble Rd., San Jose, CA 95131 .. 408-942-1616
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Controllers, Magnetic Tape Drive, Standalone-2000

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1154
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
§ Analog & Digital Peripherals, Inc. (ADPI), 815 Diana Dr., Troy, OH 45373 513-339-2241
Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761 512-251-2313
Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ Dylon Data Corp., 9561 Ridgehaven Ct., San Diego, CA 92123 619-292-5584
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
§ Mini Computer Technlg., 696 E. Trimble Rd., San Jose, CA 95131 .. 408-942-1616

Controllers, Memory Device, Add-in-2000

Advanced Elctrns. Design, 440 Potrero Ave., Sunnyvale, CA 94086 408-733-3555
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550

Controllers, Memory Device, Standalone-2000

Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550

Controllers, Paper Tape Reader/Punch, Add-in-2000

Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ Remex, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714 714-957-0039

Controllers, Paper Tape Reader/Punch, Standalone-2000

Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ Remex, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714 714-957-0039

Controllers, Plotter, Add-in-2000

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190

Controllers, Plotter, Standalone-2000

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663

Controllers, Printer, Add-in-2000

Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
Seacliff Technology, Inc., 320 Judah Street, San Francisco, CA 94122 415-661-4800
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
§ Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854 201-572-9512
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Controllers, Printer, Standalone-2000

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
§ Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854 201-572-9512

Controllers, Programmable-2200

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1189
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1156
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 .... 3•1139
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 .... 3•1119
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 .... 208-263-1471;800-323-3343
Advanced Control Sys., 24 Teed Dr., Randolph, MA 02368 617-963-4543
† Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 703-370-0900
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Allied Systems Corp., Box 18077, Greensboro, NC 27419 919-299-2294
§ American Magnetics, 740 Watson Center Rd., Carson, CA 90745 ... 213-775-8651
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
† Analytics Communications Sys., 1820 Michael Faraday Dr., Reston, VA 22090 703-471-0892
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 215-828-2490
Automation Unltd., 10H Roessler Rd., Woburn, MA 01801 617-933-7288
B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238 412-963-0515

† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 312-385-9000
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
† Calcomp, 2411 W. La Palma Ave., Anaheim, CA 92801 714-821-2011
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Cole Instr., 2650 S. Croddy Way, Santa Ana, CA 92704 714-556-3100
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 216-354-4111
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
Dataprofits Corp., 2260 Distributors Dr., Indianapolis, IN 46241 ....
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
§ EG&G Reticon, Div. of EG&G, 345 Potrero Ave., Sunnyvale, CA 94086-9930 408-738-4266
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§ Encoder Prods., 1601B Dover Rd., Sandpoint, ID 83864 208-263-8541
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
Everett/Charles Automation Sys. Inc., 700 E. Harrison Ave., Pomona, CA 91767 714-625-5571
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
§ Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
§ Giltronix, 3780 Fabian Way, Palo Alto, CA 94303 415-493-1300
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
§ Klockner Moeller, 4 Strathmore Rd., Natick, MA 01760 617-655-1910
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241 317-248-2036
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
McGill Mfg. Co., Inc., Electrical Div., 1002 N. Campbell St., Valparaiso, IN 46383 219-465-2200
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
† Methods Research, 54D Asbury Ave., Farmingdale, NJ 07727 201-938-6000
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 408-297-8530
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
Modicon Programmable Control Div., Gould Inc., P.O. Box 83 S.V.S., Andover, MA 01810 617-475-4700
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 914-693-9001
Phoenix Microsystems, P.O. Box 4206, Huntsville, AL 35802 205-881-2173
Photobell, 26 Just Rd., Fairfield, NJ 07006 201-227-3613
Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Rath Microtech Corp., Rath Affiliated Cos., 2505 Foster Ave., Janesville, WI 53545 ....608-754-2222;800-356-9464
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sequential Info. Sys., 249 N. Saw Mill River Rd., Elmsford, NY 10523 914-592-5930
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
§ Sloan Technology, P.O. Box 4608, Santa Barbara, CA 93103 805-963-4431
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Standard Logic, 2215 S. Standard Ave., Santa Ana, CA 92707 714-979-4770
§ Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
Techniques, Inc., 235 Jackson St., Englewood, NJ 07631 201-569-5900
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Telesis Laboratory, Box 1972, Chillocothe, OH 45601 614-642-5000
Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 401-884-6800
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971
Ziatech, 3433 Roberto Ct., San Luis Obispo, CA 93401 805-541-0488

Controllers, Protocol, Communications-2000

† Analytics Communications Sys., 1820 Michael Faraday Dr., Reston, VA 22090 703-471-0892
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898

Controllers, Terminal, Add-in-2000

Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 .617-899-6619
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ G. R. Electronics, 1640 5th St., Suite 224, Santa Monica, CA 90401 213-395-4774
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550

Controllers, Terminal, Standalone-2000

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550

Controls, Audio System Consoles-2200

§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 ....3•1046
† Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911

Controls, Capacitance Operated-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Bindicator, P.O. Box 9, 1915 Dove St., Port Huron, MI 48060 313-987-2700
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600

Electron-Machine Corp., Box M, Umatilla, FL 32784 904-669-3101
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 203-775-4501
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ..215-355-1500
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Controls, Carbon — See Potentiometers (Vol. 1A), Rheostats (Vol. 1A),

Controls, Computer Input, Joysticks, Mouse Devices, etc.-2000

Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809, 219-747-3121 .... 3•1124
† **Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854, 203-838-5561 .... 3•1134**
† **Orbit Instrument Corp., 80 Cabot Ct., Hauppauge, NY 11788, 516-435-8300 ....1B•1790,1791**
† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
Adams Rite Prods., Inc., 540 W. Chevy Chase Dr., Glendale, CA 91209 213-241-5121
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 412-963-7470
§ Alco Elctrn. Prods., Inc., 1551 Osgood St., N. Andover, MA 01845 .617-685-4371
Alessi Inds., Inc., 3195-C Airport Loop Dr., Costa Mesa, CA 92626 .714-979-8912
Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 408-946-6000
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
§ Burgess Switch Co., Inc., 638 Anthony Trail, North Brook, IL 60062 312-291-1760
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Femco, Inc., P.O. Box 26710 Parkmoor Sta., San Jose, CA 95159 ..408-946-1188
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
Icon, 156 Sixth St., Cambridge, MA 02142 617-868-5400
§ infoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Magnetoelastic Devices, 326 Springside Ave., Box 625, Pittsfield, MA 01201 413-445-5608
† Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
§ Mouse Sys. Corp., 2336H Walsh Ave., Santa Clara, CA 95051 408-988-0211
Optomicronix, 10080 N. Wolfe Rd., SW 3-360, Cupertino, CA 95014 408-725-1220
† Orbit Instrument of Cal., 6431 Global Dr., Cypress, CA 90630 714-527-0561
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
Power Functions Engrg., 3831 Cavalier Dr., Garland, TX 75042 214-278-0996
† PTL Elctrns., 10211 Vinemont St., Dallas, TX 75218 214-327-3180
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Summit Engineering Corp., Box 938, Bozeman, MT 59715 406-587-4511
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911

Controls, Constant Impedance — See Attenuators (Vol. 1A)

Controls, Counting & Sorting-2200

§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127**
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
Electric Device, PO Box 337, Canfield, OH 44406 216-533-3060
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electron, Inc., P.O. Box 28640, San Diego, CA 92128 216-681-4700
Essex Group, 9933 13th St., Ft. Wayne, IN. 46809 219-478-1521
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
HH Controls Co., Inc., 16 Frost St., Arlington, MA 02174 617-646-2626
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
§ National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Controls, Density-2200

† Automation Prods., Inc., 3030 Max Roy, Houston, TX 77008 713-869-0361
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
Electron-Machine Corp., Box M, Umatilla, FL 32784 904-669-3101
Lektra Labs., 129-07 18th Ave., P.O. Box 222, College Point, NY 11356 212-939-7171
§ National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 .215-355-1500
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ....215-EL5-1361
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911

Controls, Dimension-4100

API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
Electron-Machine Corp., Box M, Umatilla, FL 32784 904-669-3101
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .914-373-9003
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Magnetoelastic Devices, 326 Springside Ave., Box 625, Pittsfield, MA 01201 413-445-5608
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Trans-Tek, P.O. Box 338, Rte. 83, Ellington, CT 06029 203-872-8351

Controls, Environmental Test Equipment-2550

† **Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173**
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
§† Analytical Meas., 31 Willow St., Chatham, NJ 07928 201-273-7500
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
Chadwick-Helmuth, 4601 N. Arden Dr., El Monte, CA 91731 213-575-6161
† Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
§ Kurz Instrs., 20 Village Sq., Carmel Valley, CA 93924 408-659-3421
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
OAL Assocs., P.O. Box J, Escondido, CA 92025 619-743-7143
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Oven Inds., 191 Hempt Rd., P.O. Box 290, Mechanicsburg, PA 17055 717-766-0721
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253

Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033 805-487-7777
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Sigma Systems Corp., 3163 Adams Ave., San Diego, CA 92116 619-283-3193
Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§ Temptronic, 55 Chapel St., Newton, MA 02158 617-969-2501
† Tenney Engrg., 109 Springfield Rd., Union, NJ 07083 201-686-7870
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300

Controls, Fader-1300

Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 408-946-6000
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ Duncan Electronics, Inc., 2865 Fairview Rd., Costa Mesa, CA 92626 714-545-8261
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
Noble U.S.A., Inc., 151 Stanley St., Elk Grove Vllg., IL 60007 312-364-6038
§ Oaktron Inds., 1000 30th St., Monroe, WI 53566 608-328-5560
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911

Controls, Fluid Conductivity-2200

Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§† Transamerica Delaval, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990 203-677-1311

Controls, Fluid Flow-2200

§ Airmatic-Allied, 185 Park Dr., Wilmington, OH 45177 513-382-1691
† Astro Dynamics, Inc., 2 Gill St., Woburn, MA 01801 617-935-4944
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ....617-272-2100;800-225-1031
† Bendix Corp., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605 818-765-1010
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
† Brooks Instr. Div., Emerson Elec. Co., 407 W. Vine St., Hatfield, PA 19440 215-362-3500
Computer Instrs., 100 Madison Ave., Hempstead, NY 11550 516-483-8200
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
† EEMCO Div., 4585 Electronics Pl., Los Angeles, CA 90039 213-247-7060
§ Harwil, 1548 17th St., Santa Monica, CA 90404 213-829-2310
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
ITT General Controls Div., Intl. Telephone & Telegraph Corp., 801 Allen Ave., Glendale, CA 91201 213-842-6131
§ IVEK Corp., 43 School St., N. Springfield, VT 05150 802-886-8278
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Ocean Resch. Equip., Inc., Box 709, Falmouth, MA 02541 617-548-5800
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Plant Specialties, Inc., PO Box 1097, Carrollton, TX 75006 214-245-9673
† Pressure Controls, Inc., 681 Main St., Belleville, NJ 07109 201-751-5002
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§ Transamerica Delaval, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990 203-677-1311
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
† Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411
§ ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Controls, Frequency-2200

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 .... 3•1120
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
§† Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
† Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663 714-759-2411
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Ovenaire, 706 Forrest St., Charlottesville, VA 22901 804-977-8050
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 ....714-898-2691;800-854-2433
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300

Controls, Gas-2200

§ Airmatic-Allied, 185 Park Dr., Wilmington, OH 45177 513-382-1691
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ....617-272-2100;800-225-1031
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
§ Dayco Corp., 333 W. First St., Dayton, OH 45402 513-226-5927
† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ....201-CA8-0321
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
§ ITT General Controls Div., Intl. Telephone & Telegraph Corp., 801 Allen Ave., Glendale, CA 91201 213-842-6131
§ Kurz Instrs., 20 Village Sq., Carmel Valley, CA 93924 408-659-3421
§† MKS Instrs., Inc., 22 Third Ave., Burlington, MA 01803 617-272-9255
§† Pres-Air-Trol Corp., 895 Mamaroneck Ave., Mamaroneck, NY 10543 ....914-698-2026;800-431-2625 (exc NY)
† Pressure Controls, Inc., 681 Main St., Belleville, NJ 07109 201-751-5002
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000

Controls, Humidity-2200

Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855, 203-866-2573 .... 3•1131
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 312-385-9000
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
§ Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
MKC Elctrns., 454 E. Donovan Rd., Kansas City, KS 66115 913-371-1351
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
† PSG Inds., 1225 Tunnel Road, Perkasie, PA 18944 215-257-3621
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
† Thunder Sci. Corp., 623 Wyoming S.E., Albuquerque, NM 87123 505-265-8701

Controls, Ignitron Firing-2200

Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
§ Delta Prods., Box 1147, Grand Junction, CO 81501 303-242-9000
§ Fenwal, Inc., 400 Main St., Ashland, MA 01721 ....
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911

Controls, Joystick, Mouse Devices, etc. — See Controls, Computer Input (Vol. 3)

Controls, Lamp Dimming, Flashing-2200

Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ....208-263-1471;800-323-3343
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Cole Hersee, 20 Old Colony Ave., Boston, MA 02127-2467 617-268-2100
§ Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
Electronic Prods. Corp., Interstate Indl. Plaza, R. D., York, PA 17402 717-767-6517
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
§ Hughey & Phillips, Inc., 3050 N. California St., Burbank, CA 91504 .818-849-1104
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
Kalglo Elctrns. Co., Inc., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017 215-837-0700
KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 212-257-3300
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
† Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
§ Lutron Elctrns., Box 205, Suter Rd., Coopersburg, PA 18036 215-282-3800
Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ...213-452-1336
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076 312-675-2600
§ Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
§ Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
§ Plant Specialties, Inc., PO Box 1097, Carrollton, TX 75006 214-245-9673
Power Controls, P.O. Box 5860, San Antonio, TX 78201 512-734-7155
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400

Controls, Level, Dry Material-2200

† Automation Prods., Inc., 3030 Max Roy, Houston, TX 77008 713-869-0361
Bindicator, P.O. Box 9, 1915 Dove St., Port Huron, MI 48060 313-987-2700
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Control Engrg., Inc., 1686 Riverdale St., West Springfield, MA 01089 413-781-1330
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
§ Dumont Instrumentation, Inc., 75 Mall Dr., Commack, NY 11725 516-864-8500
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 203-775-4501
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
§ National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
§† Pres-Air-Trol Corp., 895 Mamaroneck Ave., Mamaroneck, NY 10543 ....914-698-2026;800-431-2625 (exc NY)
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ..215-355-1500
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ....215-EL5-1361
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Controls, Level, Liquid-2200

§ Air-O-Tronics Prods., Box K, Morrisville, NY 13408 315-684-3705
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
§ Ametek, 2 Station Square, Paoli, PA 19301 215-355-6900
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
† Automation Prods., Inc., 3030 Max Roy, Houston, TX 77008 713-869-0361
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Barksdale Controls Div., Transamenca DeLaval, 3211 Fruitland Ave., P.O. Box 58843, Los Angeles, CA 90058 213-589-6181
Bindicator, P.O. Box 9, 1915 Dove St., Port Huron, MI 48060 313-987-2700
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
† Brooks Instr. Div., Emerson Elec. Co., 407 W. Vine St., Hatfield, PA 19440 215-362-3500
Computer Instrs., 100 Madison Ave., Hempstead, NY 11550 516-483-8200
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
Control Engrg., Inc., 1686 Riverdale St., West Springfield, MA 01089 413-781-1330
§ Controls Protoelectric, 1 Memorial Dr., Cambridge, MA 02142 617-864-8000
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
§ Dumont Instrumentation, Inc., 75 Mall Dr., Commack, NY 11725 516-864-8500
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
† EEMCO Div., 4585 Electronics Pl., Los Angeles, CA 90039 213-247-7060
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
§ GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754 512-926-8840
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 203-775-4501
§ Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003 201-743-6800
§ Gunther, W., GmbH, Virnsberger Strasse 51, D-8500 Nurnberg 82, West Germany 0911/65521
§ Harwil, 1548 17th St., Santa Monica, CA 90404 213-829-2310
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730 617-275-0300
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ....201-291-0500; 800-631-2165
Keystone Carbon, Thermistor Div., St. Marys, PA 15857 814-781-1591
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ...213-452-1336
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
Midwest Comps., 1981 Port City Blvd., Muskegon, MI 49443 616-777-2602
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 ...312-932-6900
§† National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
§† Pres-Air-Trol Corp., 895 Mamaroneck Ave., Mamaroneck, NY 10543 ....914-698-2026;800-431-2625 (exc NY)
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 .215-355-1500
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ....215-EL5-1361
Robinson-Halpern, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248 215-825-9200
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Temposonics, 131 East Ames Ct, Plainview, NY 11803 516-349-1950
§† Transamerica Delaval, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990 203-677-1311
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
§ ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Controls, Machine Tool-2200

BEI Motion Systems Co., Corporate Off., 681 Market St., Ste. 741, San Francisco, CA 94105, 415-974-1275 ....1B•1832¢5561;5562;5563;5564;5565
Computer Prod. Div., BEI Motion Sys. Co., 1755 B La Costa Meadows Dr., San Marcos, CA 92069, 619-471-2600 ....1B•1832
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238, 412-963-0515 ....1B•1832
BEI Motion Sys. Co., Industrial Encoder Div., 7230 Hollister Ave., Goleta, CA 93117, 805-968-0782 ....1B•1832
BEI Motion Sys. Co., Position Controls Div., 819 Reddick Ave., Santa Barbara, CA 93103, 805-966-1538 ....1B•1832
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716, 516-567-9620 ....1B•1173
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ....208-263-1471;800-323-3343
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 412-963-7470
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Ambi-Tech Inds., 319 Knickerbocker Ave., Hillsdale, NJ 07642 201-666-0504
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ....617-272-2100;800-225-1031
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 ...203-828-6379
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491

† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 216-354-4111
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
Data Instruments Inc., 4 Hartwell Pl., Lexington, MA 02173 617-861-7450
† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ....201-CA8-0321
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
Electron, Inc., P.O. Box 28640, San Diego, CA 92128 216-681-4700
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 203-775-4501
Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
Icon, 156 Sixth St., Cambridge, MA 02142 617-868-5400
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
§ KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 212-257-3300
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
† Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854 203-838-5561
Mesur-Matic Elctrns., 50 Grove St., Salem, MA 01970-2294 617-745-7000
Metis, P.O. Box 1499, Bowie, MD 20716 301-249-1702
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
§ Namco Controls, An Acme-Cleveland Co., 7567 Tyler Blvd., Mentor, OH 44060 216-946-9900
§† Nolatron, P.O. Box 4042, Harrisburg, PA 17111 717-564-3398
§ Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076 312-675-2600
Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ Remex, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714 714-957-0039
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Summit Engineering Corp., Box 938, Bozeman, MT 59715 406-587-4511
Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§ Tapeswitch Corp. of America, 100 Schmitt Blvd., Farmingdale, NY 11735 516-694-6312
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 518-272-6300
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Temposonics, 131 East Ames Ct, Plainview, NY 11803 516-349-1950
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
§ Ward Leonard Elec., 31 South St., Mt. Vernon, NY 10550 914-664-1000
Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Controls, Moisture — See Controls, Humidity (Vol. 3)

Controls, Motor Speed-2200

Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083, 619-727-7420 ....1B•1134
§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618, 312-478-3515 ....1B•1135
Canon U.S.A., Elctrn. Comps. Div., One Canon Plaza, Lake Success, NY 11042, 516-488-6700 ....1B•1138
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955, 305-259-7105 ....3•1932
Japanese Prods. Corp., 31368 Via Colinas, Ste. 103-104, West Lake Village, CA 91362, 818-991-6111 ....1B•1158
† Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701, 813-822-2529 ....3•1135
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716, 516-567-9620 ....1B•1173
Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 ....3•1139
† Sierracin/Magnedyne, 2258 Rutherford Rd., P.O. Box 458, Carlsbad, CA 92008, 619-438-3321 ....1B•1179
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 ....1B•1183
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 ....3•1119
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 ....1A•1683
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
Advanced Control Sys., 24 Teed Dr., Randolph, MA 02368 617-963-4543
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 412-963-7470
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 206-363-0217
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
§ A. S. R. Servotron, Inc., (Sub. Baldor Elec. Co.), 7945 Deering Ave., Canoga Park, CA 91304 818-999-6193
ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
Barber-Colman Co., Motor Div., 14116 Rock St., Rockford, IL 61101 815-877-0241
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
Carson Mfg. Co., 5453 N. Rural St., P.O. Box 20464, Indianapolis, IN 46220 317-257-3191
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Control Engrg., Inc., 1686 Riverdale St., West Springfield, MA 01089 413-781-1330
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 216-354-4111
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
§ Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
Duncan Electronics, Inc., 2865 Fairview Rd., Costa Mesa, CA 92626 714-545-8261
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
§ Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
§† Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
Elmwood Sensors, 500 Narragansett Park Drive, Pawtucket, RI 02861 401-727-1300
§ Emerson, Indl. Controls Div., 3300 Standard St., Santa Ana, CA 92702 714-545-5581
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
ETI Systems, Polaris Indl. Entprs., 215 Via Del Norte, Oceanside, CA 92054 619-757-7770
§ Gentron Corp., 6667 N. Sydney Pl., Milwaukee, WI 53209 414-351-1660
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
§ Hampton Prods., 2995 Eastrock Dr., Rockford, IL 61109 815-398-2770
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Icon, 156 Sixth St., Cambridge, MA 02142 617-868-5400
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
Kalglo Elctrns. Co., Inc., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017 215-837-0700
§ KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 212-257-3300
Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495
Leach Corp., Relay Div., 5915 Avalon Blvd., Los Angeles, CA 90003 213-232-8221
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
§ Lutron Elctrns., Box 205, Suter Rd., Coopersburg, PA 18036 215-282-3800
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Mesur-Matic Elctrns., 50 Grove St., Salem, MA 01970-2294 617-745-7000
Metis, P.O. Box 1499, Bowie, MD 20716 301-249-1702
Micronel U.S., 2142F Industrial Ct., Sycamore Research Center, Vista, CA 92083 619-727-7400
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§ Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076 312-675-2600
§ Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262

Pacific Scientific Co., 4301 Kishwaukee, Rockford, IL 61105 ... 815-966-3600
§ Payne Engrg., Box 70, Scott Depot, WV 25560 ... 304-757-7353
PIC Design, P.O. Box 1004, Middlebury, CT 06762 ... 203-758-8272
§ Plant Specialties, Inc., PO Box 1097, Carrollton, TX 75006 ... 214-245-9673
PMI Motors, Kollmorgen Corp., 5 Aerial Way, Syosset, NY 11791 ... 516-938-8000
§ Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 ... 412-782-3120
Power Controls, P.O. Box 5860, San Antonio, TX 78201 ... 512-734-7155
Power Functions Engrg., 3831 Cavalier Dr., Garland, TX 75042 ... 214-278-0996
Rapidsyn, 3233 Roymar Rd., Oceanside, CA 92054 ... 619-439-7500
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 ... 213-442-5981
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ... 203-562-2555; 800-243-4570
Sensor Corp., Box 140, Scottdale, PA 15683 ... 412-887-4080
† Sequential Info. Sys., 249 N. Saw Mill River Rd., Elmsford, NY 10523 ... 914-592-5930
Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506 ... 201-427-3100
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 ... 617-843-5000
§ Square D Co., Executive Plaza, Palatine, IL 60067 ... 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ... 315-488-4911
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 ... 513-426-6000
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 ... 518-272-6300
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 ... 516-694-4400
Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 ... 214-995-6611
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 ... 201-227-1700
§ Torq Corp., 32 W. Monroe St., Bedford, OH 44146 ... 216-232-4100
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 ... 215-256-4611
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 ... 305-739-4300
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 ... 414-886-5678
§ Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 ... 813-855-4621
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 ... 203-527-7201
Voltex, 3460 Great Neck Rd., Amityville, NY 11701 ... 516-842-2772
Ward Leonard Elec., 31 South St., Mt. Vernon, NY 10550 ... 914-664-1000
Westamp, 1542 15th St., Santa Monica, CA 90404 ... 213-393-0401
Whedco, Inc., 6107 Jackson Rd., Ann Arbor, MI 48103 ... 313-665-5473
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 ... 201-664-7997

Controls, Oscillator-2200

Anders, Inc., 77 Wolcott Rd., Simsbury, CT 06070 ... 203-658-7666
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 ... 412-967-7700
CTS Corp., 905 North West Blvd., Elkart, IN 46514 ... 219-293-7511
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 ... 516-794-4500
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ... 312-231-3511; 312-932-9380
Power Functions Engrg., 3831 Cavalier Dr., Garland, TX 75042 ... 214-278-0996
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ... 315-488-4911
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 ... 203-265-3929
† Vectron Labs., 166 Glover Ave., Norwalk, CT 06850 ... 203-853-4433

Controls, Photoelectric-2200

EG & G Vactec, 10900 Page Blvd., St. Louis, MO 63132, 314-423-4900 ... 1B•1253
HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386, 612-443-2500 ... 1B•1219
Optek, Crown Semi, 345 Industrial Blvd., McKinney, TX 75069, 214-542-9461 ... 1B•1232
TRW Optoelectronics Div., 1201 Tappan Circle, Carrollton, TX 75006, 214-323-2200 ... 1B•1234-1237,1240,1244,1245
A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 ... 201-722-9800
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 ... 201-227-5454
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ... 215-337-5500;800-441-8245
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 ... 203-673-7151
§ Banner Engrg. Corp., 9714 - 10th Ave. N., Minneapolis, MN 55441 ... 612-544-3164
Centronic Inc., 5 Eastmans Rd., Parsippany, NJ 07054 ... 201-233-7200
§ Controls Protoelectric, 1 Memorial Dr., Cambridge, MA 02142 ... 617-864-8000
§ Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 ... 414-354-1500
Disc Instrs., 102 E. Baker St., Costa Mesa, CA 92626 ... 714-979-5300
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 ... 617-935-7444
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 ... 414-449-7487
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 ... 312-837-4600
† Electron-Machine Corp., Box M, Umatilla, FL 32784 ... 904-669-3101
Enerco, Inc., 9615 W. Marginal Way S., Seattle, WA 98108 ... 206-762-1422
Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England ... 01-994-3670
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 ... 312-932-9380
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ... 312-231-3511; 312-932-9380
§ Gould Inc., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157 ... 301-876-2214
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 ... 201-825-9696
HH Controls Co., Inc., 16 Frost St., Arlington, MA 02174 ... 617-646-2626
§ Honeywell Optoelectronics, 830 E. Arapaho Dr., Richardson, TX 75080 ... 214-234-4271
§ Hughey & Phillips, Inc., 3050 N. California St., Burbank, CA 91504 ... 818-849-1104
§ Intermatic, Intermatic Plaza, Spring Grove, IL 60081 ... 815-675-2321
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 ... 914-359-3800
Lektra Labs., 129-07 18th Ave., P.O. Box 222, College Point, NY 11356 ... 212-939-7171
Luft Instrs., Hillside Rd, Lincoln, MA 01773 ... 617-259-9215
Macro Electronics Corp., 23 Royalston Lane, So. Setauket, NY 11720 ... 516-698-3357
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ... 516-549-9272
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ... 213-452-1336
McGill Mfg. Co., Inc., Electrical Div., 1002 N. Campbell St., Valparaiso, IN 46383 ... 219-465-2200
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 ... 815-235-6600
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 ... 312-741-6600
Namco-Leuze, A Namco Controls Affiliate Co., 7567 Tyler Blvd., Mentor, OH 44060 ... 216-946-9900
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 ... 312-843-7900
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 ... 414-793-1161
Photobell, 26 Just Rd., Fairfield, NJ 07006 ... 201-227-3613
§† Power Instrs., Inc., 7352 N. Lawndale Ave., Skokie, IL 60076 ... 312-676-2300
Regent Controls, 39 Fanny St., P.O. Box 767, Shelton, CT 06484-0767 ... 203-736-2924
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 ... 203-635-2200
Scanning Devices, 108 Elm St., Waltham, MA 02154 ... 617-891-8991
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ... CA 415-965-0910;800-221-7060
Sensor Corp., Box 140, Scottdale, PA 15683 ... 412-887-4080
§ Sigma Instrs., 170 Pearl St., Braintree, MA 02184 ... 617-843-5000
Skan-A-Matic, Box S, Elbridge, NY 13060 ... 315-689-3961
§ Square D Co., Executive Plaza, Palatine, IL 60067 ... 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ... 315-488-4911
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 ... 813-855-4453
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 ... 414-886-5678
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 ... 213-978-0516
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 ... 203-527-7201
§ Xercon, Inc., P.O. Box 554, Portland, OR 97207 ... 503-641-9525

Controls, Positioning-4100

† BEI Motion Systems Co., Corporate Off., 681 Market St., Ste. 741, San Francisco, CA 94105, 415-974-1275 ... 1B•1832¢5561;5562;5563;5564;5565
Computer Prod. Div., BEI Motion Sys. Co., 1755 B La Costa Meadows Dr., San Marcos, CA 92069, 619-471-2600 ... 1B•1832
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238, 412-963-0515 ... 1B•1832
BEI Motion Sys. Co., Industrial Encoder Div., 7230 Hollister Ave., Goleta, CA 93117, 805-968-0782 ... 1B•1832
BEI Motion Sys. Co., Position Controls Div., 819 Reddick Ave., Santa Barbara, CA 93103, 805-966-1538 ... 1B•1832
§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618, 312-478-3515 ... 1B•1135
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343, 612-931-2700 ... 1B•1143,1145
ETI Systems, Polaris Indl. Entprs., 215 Via Del Norte, Oceanside, CA 92054, 619-757-7770 ... 1B•1149
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 ... 3•1165
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 ... 3•1112
† Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854, 203-838-5561 ... 3•1134
Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701, 813-822-2529 ... 3•1135
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032, 815-235-6600 ... 1B•1680-1684
† Orbit Instrument Corp., 80 Cabot Ct., Hauppauge, NY 11788, 516-435-8300 ... 1B•1790
Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 ... 3•1139
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 ... 3•1119
ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 ... 813-541-6681
Adams Rite Prods., Inc., 540 W. Chevy Chase Dr., Glendale, CA 91209 ... 213-241-5121
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ... 208-263-1471;800-323-3343
Advanced Control Sys., 24 Teed Dr., Randolph, MA 02368 ... 617-963-4543
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 ... 412-963-7470
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 ... 206-363-0217
Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 ... 602-293-4923
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 ... 201-227-5454
§ A. S. R. Servotron, Inc., (Sub. Baldor Elec. Co.), 7945 Deering Ave., Canoga Park, CA 91304 ... 818-999-6193
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 ... 516-328-1600
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ... 215-337-5500;800-441-8245
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 ... 216-585-5800
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 ... 203-673-7151
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ... 617-272-2100;800-225-1031
Bendix Corp., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605 ... 818-765-1010
Bowmar/TIC, Inc., 850 Lawrence Dr., Newbury Park, CA 91320 ... 805-498-2161
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 ... 203-575-3000
§ Burgess Switch Co., Inc., 638 Anthony Trail, North Brook, IL 60062 ... 312-291-1760
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 ... 716-924-9355
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 ... 203-744-3300
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 ... 714-979-6491
§† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ... 215-532-9464
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 ... 516-261-3300

Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 216-354-4111
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
Disc Instrs., 102 E. Baker St., Costa Mesa, CA 92626 714-979-5300
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 617-899-6619
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
EG & G Torque Systems, 36 Arlington St., Watertown, MA 02172 617-924-6000
Electric Device, PO Box 337, Canfield, OH 44406 216-533-3060
Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
Farrand Controls, Div. of Farrand Inds., 99 Wall St., Valhalla, NY 10595 ....914-RO1-2600
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003 201-743-6800
Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Icon, 156 Sixth St., Cambridge, MA 02142 617-868-5400
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
§ ITT General Controls Div., Intl. Telephone & Telegraph Corp., 801 Allen Ave., Glendale, CA 91201 213-842-6131
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Magnetoelastic Devices, 326 Springside Ave., Box 625, Pittsfield, MA 01201 413-445-5608
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
Mesur-Matic Elctrns., 50 Grove St., Salem, MA 01970-2294 617-745-7000
Metis, P.O. Box 1499, Bowie, MD 20716 301-249-1702
† Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
MKC Elctrns., 454 E. Donovan Rd., Kansas City, KS 66115 913-371-1351
§ National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Orbit Instrument of Cal., 6431 Global Dr., Cypress, CA 90630 714-527-0561
PIC Design, P.O. Box 1004, Middlebury, CT 06762 203-758-8272
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990 215-277-1300
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716 516-567-9620
† Precision Mechanisms, 44 Brooklyn Ave., Westbury, NY 11590 ....516-ED3-5955
Rapidsyn, 3233 Roymar Rd., Oceanside, CA 92054 619-439-7500
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Robinson-Halpern, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248 215-825-9200
Scanning Devices, 108 Elm St., Waltham, MA 02154 617-891-8991
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Sequential Info. Sys., 249 N. Saw Mill River Rd., Elmsford, NY 10523 914-592-5930
Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506 201-427-3100
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
Summit Engineering Corp., Box 938, Bozeman, MT 59715 406-587-4511
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 518-272-6300
§ Temposonics, 131 East Ames Ct, Plainview, NY 11803 516-349-1950
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Trans-Tek, P.O. Box 338, Rte. 83, Ellington, CT 06029 203-872-8351
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 214-350-4978
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100
† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300
Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401
Whedco, Inc., 6107 Jackson Rd., Ann Arbor, MI 48103 313-665-5473
Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Controls, Pressure-2200

Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855, 203-866-2573 ....3•1131
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ....3•1341
§ Airmatic-Allied, 185 Park Dr., Wilmington, OH 45177 513-382-1691
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
§ Ametek, 2 Station Square, Paoli, PA 19301 215-355-6900
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
Barksdale Controls Div., Transamenca DeLaval, 3211 Fruitland Ave., P.O. Box 58843, Los Angeles, CA 90058 213-589-6181
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ....617-272-2100;800-225-1031
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
Columbus Elec. Mfg., Box 289A Rt ; Piney Flats, TN 37686 615-538-8191
Computer Instrs., 100 Madison Ave., Hempstead, NY 11550 516-483-8200
† Conrac Corp., System Comps. Div., 1700 S. Mountain Ave., Duarte, CA 91010 213-359-9141
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Data Instruments Inc., 4 Hartwell Pl., Lexington, MA 02173 617-861-7450
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
§ Dayco Corp., 333 W. First St., Dayton, OH 45402 513-226-5927
§ Dynisco, 10 Oceana Way, Norwood, MA 02062 617-769-6600
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Fasco Industries, Inc., Div. of Hawker Siddeley Group, 601 North Federal Highway, Boca Raton, FL 33432 305-368-0600
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
§ IVEK Corp., 43 School St., N. Springfield, VT 05150 802-886-8278
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Macro Electronics Corp., 23 Royalston Lane, So. Setauket, NY 11720 516-698-3357
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
§† MKS Instrs., Inc., 22 Third Ave., Burlington, MA 01803 617-272-9255
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Pressure Controls, Inc., 681 Main St., Belleville, NJ 07109 201-751-5002
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Robinson-Halpern, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248 215-825-9200
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Texas Instrs., Matls. & Controls Grp., 34 Forrest St., Attleboro, MA 02703 617-699-3800
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Controls, Proportional-2200

§ Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891, 203-599-2075 ....1B•1344,1345
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 ....3•1166
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716, 516-567-9620 ....1B•1173
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 ....1B•1183
§ Ametek, 2 Station Square, Paoli, PA 19301 215-355-6900
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 215-828-2490
† Automation Prods., Inc., 3030 Max Roy, Houston, TX 77008 713-869-0361
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
† Bendix Corp., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605 818-765-1010
† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 312-385-9000
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491

Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Dantronics, Inc., 3175 Hafner Ct., St. Paul, MN 55112 612-484-2108
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 415-494-7303
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
§ Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
§ Gould Inc., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157 301-876-2214
Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
§ ITT General Controls Div., Intl. Telephone & Telegraph Corp., 801 Allen Ave., Glendale, CA 91201 213-842-6131
§ IVEK Corp., 43 School St., N. Springfield, VT 05150 802-886-8278
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
Kalglo Elctrns. Co., Inc., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017 215-837-0700
Ledex Inc., P.O. Box 427, Vandalia, OH 45377 513-898-3621
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Machine Components Corp., 70 Newtown Rd., Plainview, NY 11803 516-694-7222
† Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854 203-838-5561
MKC Elctrns., 454 E. Donovan Rd., Kansas City, KS 66115 913-371-1351
§† National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Oven Inds., 191 Hempt Rd., P.O. Box 290, Mechanicsburg, PA 17055 717-766-0721
§ Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
Phalo Corp., Transitron Elctrn. Corp., 530 Boston Tpke., Shrewsbury, MA 01545 617-845-5000
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
§ RFL Inds., Thermocontrol Div., W. Prospect St., Box 250, Brandon, VT 05733 802-247-6811
Scanning Devices, 108 Elm St., Waltham, MA 02154 617-891-8991
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 617-843-5000
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
§ Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 813-855-4621
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 401-884-6800

Controls, Proximity-2200 (Also See Controls, Capacitance Operated)

§ Airmatic-Allied, 185 Park Dr., Wilmington, OH 45177 513-382-1691
§ Alco Elctrn. Prods., Inc., 1551 Osgood St., N. Andover, MA 01845 617-685-4371
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
§ Clare Division, General Instrument Corp., 3101 W. Pratt Blvd., Chicago, IL 60645 312-262-7700
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
† Eldec Corp., Sensing Systems Div., 18009 Hwy. 99, P.O. Box 5110, Lynnwood, WA 98036 206-771-7350
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
Essex Group, 9933 13th St., Ft. Wayne, IN. 46809 219-478-1521
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 203-775-4501
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200

§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
§ Namco Controls, An Acme-Cleveland Co., 7567 Tyler Blvd., Mentor, OH 44060 216-946-9900
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 215-355-1500
§ Reed Switch Dev. Co. Inc., PO Box 1464, Kerrville, TX 78028 512-896-4444
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411

Controls, Remote-2200

§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618, 312-478-3515 ..1B•1135
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 ....3•1112
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700
§ Alco Elctrn. Prods., Inc., 1551 Osgood St., N. Andover, MA 01845 617-685-4371
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 408-946-6000
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
Automation Unltd., 10H Roessler Rd., Woburn, MA 01801 617-933-7288
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ....617-272-2100;800-225-1031
Bindicator, P.O. Box 9, 1915 Dove St., Port Huron, MI 48060 313-987-2700
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
§ Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Digitek Inc., P.O. Box 468, Kenmore, WA 98028 206-485-6571
† D. O. Industries, 317 E. Chestnut St., E. Rochester, NY 14445 716-385-4920
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
ETI Systems, Polaris Indl. Entprs., 215 Via Del Norte, Oceanside, CA 92054 619-757-7770
Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Ledex Inc., P.O. Box 427, Vandalia, OH 45377 513-898-3621
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Luft Instrs., Hillside Rd, Lincoln, MA 01773 617-259-9215
Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
† Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854 203-838-5561
Metis, P.O. Box 1499, Bowie, MD 20716 301-249-1702
† Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
Oak Switch Sys., 100 S. Main St., Crystal Lake, IL 60014 815-459-5000
§ Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076 312-675-2600

§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§† Pres-Air-Trol Corp., 895 Mamaroneck Ave., Mamaroneck, NY 10543 .....914-698-2026;800-431-2625 (exc NY)
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 .....CA 415-965-0910;800-221-7060
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
§ SYT, 1220 Barranca, El Paso, TX 79935 915-593-1234
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Controls, Run, Shutdown Command, Start-2200

C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 ..... 3•1126
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ..... 3•1088, 1136,1167
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
Advanced Control Sys., 24 Teed Dr., Randolph, MA 02368 617-963-4543
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Ambi-Tech Inds., 319 Knickerbocker Ave., Hillsdale, NJ 07642 201-666-0504
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Digitek Inc., P.O. Box 468, Kenmore, WA 98028 206-485-6571
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
Ledex Inc., P.O. Box 427, Vandalia, OH 45377 513-898-3621
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 408-297-8530
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
§† Nolatron, P.O. Box 4042, Harrisburg, PA 17111 717-564-3398
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 .....CA 415-965-0910;800-221-7060
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Tapeswitch Corp. of America, 100 Schmitt Blvd., Farmingdale, NY 11735 516-694-6312
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
§† Transamerica Delaval, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990 203-677-1311
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ TRW, Dynalco Controls Div., 5200 NW. 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300

Controls, SCR-2200

§ Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891, 203-599-2075 .....1B•1345
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .....1A•2099,2104
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ..... 3•1663
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ..... 3•1663
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Anders, Inc., 77 Wolcott Rd., Simsbury, CT 06070 203-658-7666
API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
† Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 215-828-2490
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 312-385-9000
§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618 312-478-3515
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Chromalox Instrs. & Controls, 100 Heil-Quaker Blvd., Lavergne, TN 37086 615-793-7561
† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Conditioning Semiconductor Devices, Box 2116, Wayne, NJ 07470 201-335-6723
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Datatran Labs, P.O. Box 384, Sussex, NJ 07461 914-856-4313
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
Elec-Trol, Inc., 26477 N. Golden Valley Rd., Saugus, CA 91350 805-252-8330
§† Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 805-964-0751
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 415-494-7303
Essex Group, 9933 13th St., Ft. Wayne, IN. 46809 219-478-1521
§ Gentron Corp., 6667 N. Sydney Pl., Milwaukee, WI 53209 414-351-1660
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
§ Hampton Prods., 2995 Eastrock Dr., Rockford, IL 61109 815-398-2770
International Devices Inc., 3200 Pendleton, Santa Ana, CA 92704 .....714-557-9394; 800-854-7651
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
Kalglo Elctrns. Co., Inc., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017 215-837-0700
§ KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 212-257-3300
Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Magnetic Specs., 10 Albemarle Ave., Trenton, NJ 08638 .....
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 516-549-9272
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
§ Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
§ Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 412-782-3120
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716 516-567-9620
† PSG Inds., 1225 Tunnel Road, Perkasie, PA 18944 215-257-3621
† PTL Elctrns., 10211 Vinemont St., Dallas, TX 75218 214-327-3180
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
§ RFL Inds., Thermocontrol Div., W. Prospect St., Box 250, Brandon, VT 05733 802-247-6811
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 .....203-562-2555; 800-243-4570
Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506 201-427-3100
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 617-843-5000
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§ Thomson-CSF Comps. Corp., Semiconductor Div., 6660 Variel Ave., Canoga Pk., CA 91304 213-887-1010
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
§ Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 813-855-4621
Voltex, 3460 Great Neck Rd., Amityville, NY 11701 516-842-2772
Ward Leonard Elec., 31 South St., Mt. Vernon, NY 10550 914-664-1000
† Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 401-884-6800
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Controls, Sensing/Monitoring-Voltage, Phase, Frequency-2200

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 ..... 3•1120
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 ..... 3•1917
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 201-989-0095
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
Control Engrg., Inc., 1686 Riverdale St., West Springfield, MA 01089 413-781-1330
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133

§ Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Digitek Inc., P.O. Box 468, Kenmore, WA 98028 206-485-6571
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§ Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ Hughey & Phillips, Inc., 3050 N. California St., Burbank, CA 91504 .818-849-1104
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 212-257-3300
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
§† Kistler-Morse, 10201 Willows Road NE, Redmond, WA 98052 206-881-8000
Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
§† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620 714-739-0770
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Optima Enclosures, 2166 Mountain Indl. Blvd., Tucker, GA 30084 ..404-939-6340
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 914-693-9001
§ Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 412-782-3120
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Controls, Servo System-4900

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1189
† **BEI Motion Systems Co., Corporate Off., 681 Market St., Ste. 741, San Francisco, CA 94105, 415-974-1275 ....1B•1832¢5561;5562;5563;5564;5565**
Computer Prod. Div., BEI Motion Sys. Co., 1755 B La Costa Meadows Dr., San Marcos, CA 92069, 619-471-2600 ....1B•1832
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238, 412-963-0515 ....1B•1832
BEI Motion Sys. Co., Industrial Encoder Div., 7230 Hollister Ave., Goleta, CA 93117, 805-968-0782 ....1B•1832
BEI Motion Sys. Co., Position Controls Div., 819 Reddick Ave., Santa Barbara, CA 93103, 805-966-1538 ....1B•1832
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083, 619-727-7420 ....1B•1134
† **Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 .... 3•1930,1931**
§ **Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343, 612-931-2700 ....1B•1143,1145**
ETI Systems, Polaris Indl. Entprs., 215 Via Del Norte, Oceanside, CA 92054, 619-757-7770 ....1B•1149
† **Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955, 305-259-7105 .... 3•1932**
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1165**
Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701, 813-822-2529 .... 3•1135
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1933
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716, 516-567-9620 ....1B•1173
Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 .... 3•1139
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 ....1B•1183
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 .... 3•1119

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ....208-263-1471;800-323-3343
Advanced Control Sys., 24 Teed Dr., Randolph, MA 02368 617-963-4543
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 412-963-7470
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 ..206-363-0217
§ A. S. R. Servotron, Inc., (Sub. Baldor Elec. Co.), 7945 Deering Ave., Canoga Park, CA 91304 818-999-6193
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
† Bendix Corp., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605 818-765-1010
Bowmar/TIC, Inc., 850 Lawrence Dr., Newbury Park, CA 91320 805-498-2161
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 216-354-4111
Dantronics, Inc., 3175 Hafner Ct., St. Paul, MN 55112 612-484-2108
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
EG & G Torque Systems, 36 Arlington St., Watertown, MA 02172 ..617-924-6000
Electric Device, PO Box 337, Canfield, OH 44406 216-533-3060
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
† Genisco Technlg. Corp., Rotating Test Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
Gould Inc., Programmable Control Div., Box 83, S.V.S., Andover, MA 01810 617-475-4700
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
Icon, 156 Sixth St., Cambridge, MA 02142 617-868-5400
§ Inertial Motors, 280 N. Broad St., Doylestown, PA 18901 215-345-1010
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Ledex Inc., P.O. Box 427, Vandalia, OH 45377 513-898-3621
Macro Electronics Corp., 23 Royalston Lane, So. Setauket, NY 11720 516-698-3357
Magnetoelastic Devices, 326 Springside Ave., Box 625, Pittsfield, MA 01201 413-445-5608
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ..516-549-9272
McFadden Sys., Inc., 8956 S. Atlantic Ave., South Gate, CA 90280-9990 213-564-5958
Mesur-Matic Elctrns., 50 Grove St., Salem, MA 01970-2294 617-745-7000
Micronel U.S., 2142F Industrial Ct., Sycamore Research Center, Vista, CA 92083 619-727-7400
Modicon Programmable Control Div., Gould Inc., P.O. Box 83 S.V.S., Andover, MA 01810 617-475-4700
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
PMI Motors, Kollmorgen Corp., 5 Aerial Way, Syosset, NY 11791 516-938-8000
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990 215-277-1300
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
† Sequential Info. Sys., 249 N. Saw Mill River Rd., Elmsford, NY 10523 914-592-5930
Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506 201-427-3100
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
§† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ..212-932-1800
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§ Temposonics, 131 East Ames Ct, Plainview, NY 11803 516-349-1950
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100
† Vernitron Corp., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073 619-428-5581
Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401

Controls, Stepping Motor-2200

§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618, 312-478-3515 ..1B•1135
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 ... 3•1111
Japanese Prods. Corp., 31368 Via Colinas, Ste. 103-104, West Lake Village, CA 91362, 818-991-6111 ...1B•1158
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 ...1B•1183
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 ...1A•1683
† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 ...813-541-6681
Advanced Control Sys., 24 Teed Dr., Randolph, MA 02368 ...617-963-4543
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 ...412-963-7470
Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410 ...203-272-0301
§ Astrosyn America, 14349 Victory Blvd., Ste. 304, Van Nuys, CA 91401 ...213-785-2197
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ...215-337-5500;800-441-8245
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 ...203-673-7151
Berger-Lahr Corp., Fitzgerald Dr., Jaffrey, NH 03452 ...603-532-7701
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 ...714-979-6491
Control-O-mation, Inc, 7300 W. Huron River Dr., Dexter, MI 48130 313-426-3935
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 ...415-726-3000
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 ...818-882-9616
Dynapar, 1675 Delany Rd., Gurnee, IL 60031 ...312-662-2666
Eastern Air Devices Motor Div., 1 Progress Dr., Dover, NH 03820 ..603-742-3330
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 ... 414-449-7487
† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England ...01-994-3670
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 ...312-879-6000
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 ...516-273-0909
§ Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 ...414-921-7100
Gould Inc., Programmable Control Div., Box 83, S.V.S., Andover, MA 01810 ...617-475-4700
Honeywell, Process Control Div., 1100 Virginia Dr.; Ft. Washington, PA 19034 ...800-321-5111, Ext. 596
Icon, 156 Sixth St., Cambridge, MA 02142 ...617-868-5400
† IMC Magnetics Corp., Western Div., 12627 Hiddencreek Way, Cerritos, CA 90701 ...213-926-0927
Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 ...703-639-9045
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 ...617-344-7383
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 ...815-838-0005
Matrix Corp., 1639 Green St., Raleigh, NC 27603 ...919-833-2837
Mesur-Matic Elctrns., 50 Grove St., Salem, MA 01970-2294 ...617-745-7000
Metis, P.O. Box 1499, Bowie, MD 20716 ...301-249-1702
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 ...617-491-5400
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 ...312-741-6600
Modicon Programmable Control Div., Gould Inc., P.O. Box 83 S.V.S., Andover, MA 01810 ...617-475-4700
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 ...201-227-4800
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ...404-429-9061
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 ...516-234-3800
§ Rapidsyn, 3233 Roymar Rd., Oceanside, CA 92054 ...619-439-7500
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 ...914-698-5600
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 ...617-843-5000
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 ...201-785-6000
Summit Engineering Corp., Box 938, Bozeman, MT 59715 ...406-587-4511
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ...315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 ...201-839-0740
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 ...216-349-0600
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 ...518-272-6300
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 ...201-227-1700
TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 ...617-828-3000
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 ...516-586-5100
Whedco, Inc., 6107 Jackson Rd., Ann Arbor, MI 48103 ...313-665-5473
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 ...313-429-4971

Controls, Temperature-2200

DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 ... 3•1324
† Elmwood Sensors, 500 Narragansett Park Drive, Pawtucket, RI 02861, 401-727-1300 ... 1B•1802
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855, 203-866-2573 ... 3•1131
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108, 603-669-6400 ... 3•1333
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
† McLean Engrg., Div. of Zero Corp., 70 Washington Rd., Princeton Junction, NJ 08550, 609-799-0100 ... 2•1824
Micro Devices Product Group, Therm-O-Disc, Inc., 1320 South Main Street, P.O. Box 3538, Mansfield, OH 44907, 419-756-5005 ...1B•1823
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ... 1B•1735,1819,1868,1869,3•1137
TECA, ThermoElectric Cooling America Corp., 448 N. Halsted St., Chicago, IL 60622, 312-666-1600 ... 2•1805
Therm-O-Disc, Inc., Sub. Emerson Elec. Co., 1320 South Main St., P. O. Box 3538, Mansfield, OH 44907, 419-756-5911 ...1B•1823
Acme Elec. Heating Corp., 4685 E. 11th, Hialeah, FL 33013 ...305-685-8326
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 ...313-624-1541
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 ...714-646-7165
§ AEMC, 99 Chauncy, Boston, MA 02111 ...617-451-0227;800-343-1391
Airpax Corp., Frederick Div., A North American Philips Co., Husky Park P.O. Box 500, Frederick, MD 21701 ...301-663-5141
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 ...414-671-2000
§ Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 ...214-620-0021
§ Ametek, 2 Station Square, Paoli, PA 19301 ...215-355-6900
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ...617-777-4500; 17-246-0300;800-451-1816
§† Analytical Meas., 31 Willow St., Chatham, NJ 07928 ...201-273-7500
† Anders, Inc., 77 Wolcott Rd., Simsbury, CT 06070 ...203-658-7666
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 ...617-890-2000
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ...313-779-8700
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 ...713-468-7971
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 ...215-828-2490
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 ...216-585-5800
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 ...815-877-0241
Barksdale Controls Div., Transamenca DeLaval, 3211 Fruitland Ave., P.O. Box 58843, Los Angeles, CA 90058 ...213-589-6181
† Barnes Engrg., 44 Commerce Rd., P.O. Box 53, Stamford, CT 06904 ...203-348-5381
§ Bayley Instr. Co., Box 357, Kenwood, CA 95452 ...707-833-6014
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 ...603-753-6362
† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 ...312-385-9000
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 ...203-575-3000
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Burling Instr., P.O. Box 298, Chatham, NJ 07928 ...201-635-9481
Caig Labs., 1175-0 Industrial Ave., Escondido, CA 92025 ...619-743-7143
CAL Controls Inc., 1155 Waukegan Rd., Glenview, IL 60025 ...312-998-5720
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 ...201-825-9500
Capitol Temptrol, 5 Coulton Rd., Old Lyme, CT 06371 ...203-739-4421
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 ...714-979-6491
† Chatham Controls, 33 River Rd., Chatham, NJ 07928 ...201-635-8892
Chromalox Instrs. & Controls, 100 Heil-Quaker Blvd., Lavergne, TN 37086 ...615-793-7561
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 ...516-567-7300
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ...215-532-9464
Columbus Elec. Mfg., Box 289A Rt , Piney Flats, TN 37686 ...615-538-8191
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 ...203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 ...212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 ...412-776-1591
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 ...619-292-5000
† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ...201-CA8-0321
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
Dreefs Switch Inc., 3782 Hawthorn Ct., Waukegan, IL 60085 ...312-662-7667; 800-323-9605
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 ...512-837-8401
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 ...414-449-7487
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ..... 516-435-2808;800-DIAL EDL; 800 342-5335
§† Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 ...717-848-1722
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 ...312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 ...717-767-6517
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 ...415-494-7303
Elnik Instrs., 410 Garibaldi Ave., Lodi, NJ 07644 ...201-779-7388
§ E Technology Corp., 1545 Morse Ave., Ventura, CA 93003 ...805-644-9544
ETI Systems, Polaris Indl. Entprs., 215 Via Del Norte, Oceanside, CA 92054 ...619-757-7770
Fasco Industries, Inc., Div. of Hawker Siddeley Group, 601 North Federal Highway, Boca Raton, FL 33432 ...305-368-0600
§ Fenwal, Inc., 400 Main St., Ashland, MA 01721 ...
† FTS Sys., POB 158, Stone Ridge, NY 12484 ...914-687-7664
Gordon, Claud S., Co., 5710 Kenosha St., Richmond, IL 60071 ...815-678-2211
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 ...203-775-4501
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 ...201-825-9696
§ Hexacon Elec., 161 W. Clay Ave., Roselle Park, NJ 07204 ...201-245-6200
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 ...612-870-5346
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ...800-321-5111, Ext. 596
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 ...213-444-4000
Inconix Corp., 10 Tech Circle, Natick, MA 01760 ...617-655-1170
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 ...213-991-9614
§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 ...203-795-4711
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 ...602-748-7900
† Isotemp Research, Inc, Box 3389, Charlottesville, VA 22901 ...804-295-3101
§ ITT General Controls Div., Intl. Telephone & Telegraph Corp., 801 Allen Ave., Glendale, CA 91201 ...213-842-6131
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 ...619-275-1500
Kalglo Elctrns. Co., Inc., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017 ...215-837-0700
KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 ...212-257-3300
Keystone Carbon, Thermistor Div., St. Marys, PA 15857 ...814-781-1591
§ Kurz Instrs., 20 Village Sq., Carmel Valley, CA 93924 ...408-659-3421
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 ...914-359-3800

Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 ... 215-643-2000
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 ... 617-835-1000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 ... 312-541-3232
Luft Instrs., Hillside Rd, Lincoln, MA 01773 ... 617-259-9215
Macro Electronics Corp., 23 Royalston Lane, So. Setauket, NY 11720 ... 516-698-3357
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 ... 612-633-8820
§ Markat Div., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803 ... 516-549-9272
† Marlow Inds., 10451 Vista Park Rd., Dallas, TX 75238 ... 214-340-4900
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ... 213-452-1336
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241 ... 317-248-2036
Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 ... 714-957-6904
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 ... 617-491-5400
Midwest Comps., 1981 Port City Blvd., Muskegon, MI 49443 ... 616-777-2602
Mikron Instr., Box 211, Ridgewood, NJ 07451 ... 201-891-7330
Minco Prods., 7300 Commerce La., Minneapolis, MN 55432 ... 612-571-3121
MKC Elctrns., 454 E. Donovan Rd., Kansas City, KS 66115 ... 913-371-1351
† NANMAC Corp., 9 Mayhew St., Framingham, MA 01701 ... 617-872-4811
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 ... 714-540-4914
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 ... 215-343-5900
OAL Assocs., P.O. Box J, Escondido, CA 92025 ... 619-743-7143
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 ... 312-843-7900
Ovenaire, 706 Forrest St., Charlottesville, VA 22901 ... 804-977-8050
† Oven Inds., 191 Hempt Rd., P.O. Box 290, Mechanicsburg, PA 17055 ... 717-766-0721
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 ... 414-793-1161
§ Payne Engrg., Box 70, Scott Depot, WV 25560 ... 304-757-7353
§† Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 ... 412-782-3120
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 ... 216-292-6006
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ... 215-355-1500
† PSG Inds., 1225 Tunnel Road, Perkasie, PA 18944 ... 215-257-3621
† PTL Elctrns., 10211 Vinemont St., Dallas, TX 75218 ... 214-327-3180
Raychem Corp., Elctrns. Grp., 300 Constitution Dr., Menlo Park, CA 94025 ... 415-361-3860
§ Research, Inc., Box 24064, Minneapolis, MN 55424 ... 612-941-3300
§ RFL Inds., Thermocontrol Div., W. Prospect St., Box 250, Brandon, VT 05733 ... 802-247-6811
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ... 215-EL5-1361
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ... 203-562-2555; 800-243-4570
† Sierracin/Thermal Sys., 13920 S. Broadway, Los Angeles, CA 90061 ... 213-321-4350
§ Sigma Instrs., 170 Pearl St., Braintree, MA 02184 ... 617-843-5000
Sigma Instrs., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711
Sigma Systems Corp., 3163 Adams Ave., San Diego, CA 92116 ... 619-283-3193
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 ... 800-628-8862
§ Square D Co., Executive Plaza, Palatine, IL 60067 ... 312-397-2600
Sun Electronic Systems, Inc., 1331 S. Dixie Hwy., Pompano, FL 33060 ... 305-785-1155
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Sylvania Control Devices, Rte. 35, Standish, ME 04084 ... 207-642-4535
§† Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ... 315-488-4911
† Syscon Intl., Inc., 1108 So. High St., So. Bend, IN 46618-1096 ... 219-232-3900; 800-348-2993
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 ... 312-679-8200
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 ... 516-694-4400
§ Temptronic, 55 Chapel St., Newton, MA 02158 ... 617-969-2501
Texas Instrs., Matls. & Controls Grp., 34 Forrest St., Attleboro, MA 02703 ... 617-699-3800
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 ... 619-481-7177
† Thermo Elec., 109 Fifth St., Saddle Brook, NJ 07662 ... 201-843-5800
§ Tohoku Metal Inds., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan ... Tokyo 03-402-6161
Trans-Met Engrg., 601 S. Palm St., La Habra, CA 90631 ... 213-691-2266
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 ... 305-739-4300
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 ... 207-985-7169
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ... 617-WA6-1000
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 ... 813-855-4621
VirTis Co., Rte. 208, Gardiner, NY 12525 ... 914-255-5000
Voltex, 3460 Great Neck Rd., Amityville, NY 11701 ... 516-842-2772
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 ... 201-992-6200
§ Wellman Thermal Sys., 1 Progress Rd, Shelbyville, IN 46176 ... 317-398-4411
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 ... 401-884-6800
§ Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 ... 513-767-7241
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000

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Controls, Torque, Electronic-2200

§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618, 312-478-3515 ... 1B•1135
Canon U.S.A., Elctrn. Comps. Div., One Canon Plaza, Lake Success, NY 11042, 516-488-6700 ... 1B•1138
POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716, 516-567-9620 ... 1B•1173
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 ... 1B•1183
† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 ... 813-541-6681
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 ... 201-989-0095
Ambi-Tech Inds., 319 Knickerbocker Ave., Hillsdale, NJ 07642 ... 201-666-0504
§ Ametek, 2 Station Square, Paoli, PA 19301 ... 215-355-6900
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ... 313-779-8700
§ A. S. R. Servotron, Inc., (Sub. Baldor Elec. Co.), 7945 Deering Ave., Canoga Park, CA 91304 ... 818-999-6193
§† B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 ... 203-673-7151
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 ... 714-979-6491
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ... 215-532-9464
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 ... 212-361-2133
§ Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 ... 707-527-5555
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 ... 414-449-7487
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 ... 717-848-1722
§ GSE, 23640 Research Dr., Farmington Hills, MI 48024 ... 313-476-7875
§ Hampton Prods., 2995 Eastrock Dr., Rockford, IL 61109 ... 815-398-2770
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ... 800-321-5111, Ext. 596
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 ... 305-259-7105
KB Elctrns., 73 Wortman Ave., Brooklyn, NY 11207 ... 212-257-3300
Magnetoelastic Devices, 326 Springside Ave., Box 625, Pittsfield, MA 01201 ... 413-445-5608
§ Payne Engrg., Box 70, Scott Depot, WV 25560 ... 304-757-7353
PMI Motors, Kollmorgen Corp., 5 Aerial Way, Syosset, NY 11791 ... 516-938-8000
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ... 203-562-2555; 800-243-4570
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ... 315-488-4911
Vibrac, 1 Columbia Dr., Amherst, NH 03031 ... 603-882-6777
Waters Mfg., Longfellow Ctr., Wayland, MA 01778 ... 617-358-2777
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 ... 313-429-4971

Controls, Vibrator-2200

Anders, Inc., 77 Wolcott Rd., Simsbury, CT 06070 ... 203-658-7666
§ Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403 ... 513-253-1191
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 ... 315-488-4911

Controls, Voltage Regulating — See Regulators & Stabilizers, Voltage (Vol. 3)

Controls, Volume & Tone — See Potentiometers (Vol. 1A), Rheostats (Vol. 1A),

Control Systems, Air Traffic-3475

Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 ... 203-744-3300
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 ... 516-921-7300
Seiko Instruments U.S.A., Inc., Robotics/Automation Div., 2990 W. Lomita Blvd., Torrance, CA 90505 ... 213-530-8777

Control Systems, Robotics-4900

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 ... 3•1112
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 ... 3•1119
† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 ... 813-541-6681
Adams Rite Prods., Inc., 540 W. Chevy Chase Dr., Glendale, CA 91209 ... 213-241-5121
Adaptive Intelligence, 2944 Scott Blvd., Santa Clara, CA 95050 ... 408-970-0777
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 ... 206-363-0217
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 ... 516-328-1600
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 ... 203-673-7151
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238 ... 412-963-0515
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 ... 203-744-3300
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 ... 714-979-6491
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 ... 516-261-3300
Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311 ... 818-709-5510
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 ... 216-354-4111
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 ... 212-361-2133
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
Femco, Inc., P.O. Box 26710 Parkmoor Sta., San Jose, CA 95159 ... 408-946-1188
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 ... 818-889-3179
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 ... 408-733-4045
Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 ... 215-355-7200
R. E. Law Instru. Inc., 7735 W. 112th Pl., Palos Hills, IL 60465 ... 312-974-4000
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ... CA 415-965-0910;800-221-7060
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 ... 617-481-1684
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ... 212-932-1800
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 ... 516-293-3100

Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
Video Logic Corp., 597 No. Mathilda Ave., Sunnyvale, CA 94086 408-245-8622

Convection Cooling Packages, Semiconductor — See Heat Sinks, Semiconductor (Vol. 2)

Converters, AC to DC (Nonrotary) — See Power Supplies, AC Input, DC Output (Vol. 3)

Converters, Analog to Digital-2325

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204, 414-671-2000 .... 1A•1801
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880, 617-246-0300 .... 3•1140
† **Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1105,1150-1152**
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1045
§ **GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754, 512-926-8840 .... 3•1081**
† **ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1160**
§ **Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111**
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .... 3•1164**
§ **Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805, 714-776-6400 .... 3•1169**
Tedea USA, 7800 Deering Ave., Canoga Park, CA 91304, 818-884-8818 .... 3•1172
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726
† Addacon, Inc., 3708 Alliance Dr., Greensboro, NC 27407 919-852-6200
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
§† Advanced Microcomputers, 3340 Scott Blvd., Santa Clara, CA 95051 408-732-2400
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
BEI Motion Sys. Co., Industrial Encoder Div., 7230 Hollister Ave., Goleta, CA 93117 805-968-0782
BEI Motion Sys. Co., Position Controls Div., 819 Reddick Ave., Santa Barbara, CA 93103 805-966-1538
† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Circuit Techn., 160 Smith St., Farmingdale, NY 11735 516-293-8686
CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
§† Columbus Instruments, 950 N. Hague Ave., Columbus, OH 43204 614-488-6176
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
§ Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
Digital Graphic Sys., 935 Industrial Ave., Palo Alto, CA 94303 415-856-2500
† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
§ Fairchild Camera & Instr. Corp., 464 Ellis St., MS15-1035, Mountain View, CA 94042 415-962-5011
Ferranti Elec., 87 Modula Ave., Commack, NY 11725 516-543-0200
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§ Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003 201-743-6800
Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 408-727-3101
§ Gunther, W., GmbH, Virnsberger Strasse 51, D 8500 Nurnberg 82; West Germany 0911/65521
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† HyComp Inc., 75 Union Ave., Box 377, Sudbury, MA 01776 617-443-4631
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
§† Intersil, 10710 N. Tantau Ave., Cupertino, CA 95014 408-996-5000
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
§ Macrodyne, 1004 Princetown Rd., Schenectady, NY 12301 .... 518 356-3500
† Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854 203-838-5561
† Micro Networks, 324 Clark St., Worcester, MA 01606 .... 617 852 5400
§† Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 408-727-5350
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 .... 617 491-5400
Mitsubishi Elctrns. America, Inc., Semiconductor Div., 777 N. Pastoria Ave., Sunnyvale, CA 94086 408-730-5900
§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
§† Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
Quartic Systems, Inc., 3575 South West Temple , Salt Lake City, UT 84115 801-268-9264
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 415-968-9211
RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 .... 617 481-1684
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
§ Signetics, 811 E. Arques Ave., Sunnyvale, CA 94086 408-739-7700
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
§ Standard Grigsby, Inc., 920 Rathbone Ave., Aurora, IL 60507 312-844-4300
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 415-968-9241
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§† TRW LSI Products, PO Box 2472, La Jolla, CA 92038 619-457-1000
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
§ Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050 408-727-7370
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Converters, Analog to Pulse-2325

Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 1B•1859
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 .... 313-624 1541
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§ Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700

† Measurement Sys., Inc., 121 Water St., Norwalk, CT 06854 203-838-5561
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Power Instrs., Inc., 7352 N. Lawndale Ave., Skokie, IL 60076 312-676-2300
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 415-968-9241
TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000

Converters, ASCII to Baudot-2325

Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500

Converters, ASCII to BCD-2325

Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820

Converters, BCD to ASCII-2325

Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
Innovative Electronics, Inc., 4714 N.W. 165th St., Miami, FL 33014 .305-624-1644

Converters, Binary to BCD-2325

Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311, 818-709-5510 ....3•1148
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 ....3•1170
Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234

Converters, Binary to Decimal-2325

† Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311, 818-709-5510 ....3•1148
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 215-646-8100
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 415-968-9241
Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100

Converters, Card to Tape-2000

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
Standard Logic, 2215 S. Standard Ave., Santa Ana, CA 92707 714-979-4770

Converters, CRT Display-2000

† EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ....3•1560
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 ....213-390-3537/8837
ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 516-921-7300
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
§ Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 .. 201-245-3200;800-526-4048
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 914-667-5050
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
International High Voltage Elctrns., Inc., 98 Mill Plain Rd., Danbury, CT 06810 203-792-7820
Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
† PTK Corporation, 1173 Los Olivos Ave., Los Osos, CA 93402 805-528-5858
† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
† Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 516-293-4100
Vidco, P.O. Box 25452, Portland, OR 97225 503-292-4104

Converters, DC to DC, Less Than 30 VDC Output-4000

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 ....3•1441
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 ....3•1441,1447-1450,1453
§ ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 .... 3•1457
Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 ....3•1468,1469
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ....3•1496-1499
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051, 408-748-1200 ....3•1500
† Bikor, 1504 W. 228th St., Torrance, CA 90501, 213-539-6320 ....3•1508
§ Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086, 408-732-2440 ....3•1511
§ Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ....3•1006,1513
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 ....3•1515
Compower Div., Div. of Computer Prods., Inc., 2220 Lundy Ave., San Jose, CA 95131, 408-942-1600 ....3•1701
§ Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 ....3•1536-1539
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ....3•1545
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 ....3•1547
§ Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705, 714-979-4440 ....3•1554,1559
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ....3•1560
† Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, 607-754-9187 ....1B•1050,1051,3•1561
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ....3•1592
§† Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052, 206-882-3100 ....3•1593-1597
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, 914-EL8-8000 ....3•1598
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§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ....3•1621-1623, 1628
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, 818-798-0786 ....3•1890
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Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404, 213-829-6751 ....3•1666,1667
Power General, 152 Will Dr., Canton, MA 02021, 617-828-6216 ....3•1680,1681
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060, 305-974-2442 ....3•1701¢7450¢7451,1712-1716
Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011, 619-429-7440 ....3•1750
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† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 ....3•1790,1791,1793,1795
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† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 ....3•1359

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† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
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† American Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 ..612-788-9161
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† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
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§ B.H. Inds., Inc., 5784 Venice Blvd., Los Angeles, CA 90019 213-937-4763
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Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
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§† Dressen-Barnes Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 818-967-9521
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Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
Electronic Instr. & Specialty Corp., 42 Pleasant St., Stoneham, MA 02180 617-438-5300
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† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
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ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
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† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
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Magnetran Corp., 5701 Savoy Lane, Houston, TX 77036 713-785-4202
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† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
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§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
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† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
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† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 ....206 881 1700
† PCA Elctrns., 16799 Schoenborn St., Sepulveda, CA 91343 818-892-0761
§ Power Control, 122 Gamma Dr., Pittsburgh. PA 15238 412-782-3120
Power Conversion Prods., 42 East St., Box 380, Crystal Lake, IL 60014 815-459-9100
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Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
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† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
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Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§ Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218 713-492-0550
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 ..516-593-2025;Outside NY 800-645-5900
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
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Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
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§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696
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Converters, DC to DC, 30 to 300 VDC Output-4000

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† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ....3•1496-1499
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† Bikor, 1504 W. 228th St., Torrance, CA 90501, 213-539-6320 .... 3•1508
§ Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 .... 3•1513
CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 .... 3•1515
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Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1545
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Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1592
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Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011, 619-429-7440 .... 3•1750
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† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 .... 3•1790,1791
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 ....3•1359
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 .... 3•1807, 1808
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ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054 619-757-1880

† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
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† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 714-540-1234
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
§ B.H. Inds., Inc., 5784 Venice Blvd., Los Angeles, CA 90019 213-937-4763
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Canyon Elctrns., 2001 W. North Lane, Phoenix, AZ 85021 602-944-4421
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† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 516-582-4422
C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 814-864-4921
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§ Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
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Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
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Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
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† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
Micro Power Intl., Inc., 9420 Activity Rd., San Diego, CA 92126 619-271-0831
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Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
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† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
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Power Conversion Prods., 42 East St., Box 380, Crystal Lake, IL 60014 815-459-9100
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 305-974-2442
Power Systems, 12 Tobey Rd., Bloomfield, CT 06002 203-243-0357
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
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Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
† Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
† RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086 408-744-1450
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087 603-893-2330
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127 617-268-1170
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 312-679-8200
Tecnetics, Box 910, Boulder, CO 80306 303-442-3837
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717 516-231-3366
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
† Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 516-293-4100
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

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† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1441,1450**
† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
† **Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 .... 3•1499**
† **Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 .... 3•1546,1547**
† **EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 .... 3•1560**
† **Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, 607-754-9187 ....1B•1050,3•1561**
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1592
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, 914-EL8-8000 .... 3•1598
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 ....1A•1863
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359
† **Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359**
§† Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 213-997-7222
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† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 ..408-734-8310
§ Carter Motor, 2707 W. George St., Chicago, IL 60618-7898 312-588-7700
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041 415-969-5927
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Crestronics Div., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704 714-556-6570
§ Dale Electronics, Inc., Yankton Div., E. Hwy. 50, Box 180, Yankton, SD 57078 605-665-9301
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 914-667-5050
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .714-546-4731 800-421-7915
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
International High Voltage Elctrns., Inc., 98 Mill Plain Rd., Danbury, CT 06810 203-792-7820
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219 501-568-1995
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 312-679-8200
Tecnetics, Box 910, Boulder, CO 80306 303-442-3837
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
† Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 516-293-4100

Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 919-732-9351
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Converters, DC to DC, Greater Than 1,000 VDC Output-4000

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
† **Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 .... 3•1499**
† **Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 .... 3•1546,1547**
† **EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 .... 3•1560**
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550, 914-667-5050 .... 3•1574
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1592
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, 914-EL8-8000 .... 3•1598
Stantard Energy, Div. WBH Scientific, Inc., Rte. 32, Greenville, NY 12083, 518-966-4197 .... 3•1777,1778
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359
† **Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359**
† **Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735, 516-293-4100 .... 3•1804**
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 ..... 3•1809
§† Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 213-997-7222
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 ..408-734-8310
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041 415-969-5927
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Crestronics Div., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704 714-556-6570
† Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760 607-754-9187
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
International High Voltage Elctrns., Inc., 98 Mill Plain Rd., Danbury, CT 06810 203-792-7820
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
† K & M Elctrns., 123 Interstate Dr., W. Springfield, MA 01089 413-781-1350
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
§ Pacific Atlantic Elctrns., Box 754, El Cerrito, CA 94530 415-237-5837
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219 501-568-1995
† PTK Corporation, 1173 Los Olivos Ave., Los Osos, CA 93402 805-528-5858
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
† Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 312-679-8200
Tecnetics, Box 910, Boulder, CO 80306 303-442-3837
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Converters, DC to Sine/Cosine-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 ....1A•1678,1679**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 213-936-8185
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041 214-271-4531
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 401-885-3600
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
§† E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 213-892-7279
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 .. 201-245-3200;800-526-4048
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 914-667-5050
† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .714-546-4731 800-421-7915
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
§† Powermark, 3855 Ruffin Rd., San Diego, CA 92123 619-565-8363
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
† Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041 214-271-4531
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100

Converters, DC to Synchro-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 .... 3•1930
† **ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161**
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 ....1A•1678,1679**
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Converters, Digital to Analog-2325

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204, 414-671-2000 ....1A•1801
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880, 617-246-0300 .... 3•1141
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1127
† **Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1105,1150**
† **ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1160**
§ **Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111**
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164
Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805, 714-776-6400 .... 3•1169
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726
† Addacon, Inc., 3708 Alliance Dr., Greensboro, NC 27407 919-852-6200
§† Advanced Microcomputers, 3340 Scott Blvd., Santa Clara, CA 95051 408-732-2400
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
† Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 215-646-8100
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Circuit Techn., 160 Smith St., Farmingdale, NY 11735 516-293-8686
CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† CTS Halex, 1202 McGaw Ave., Irvine, CA 92714 714-556-2850
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
† Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
§ Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
§ Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811

§ Fairchild Camera & Instr. Corp., 464 Ellis St., MS15-1035, Mountain View, CA 94042 415-962-5011
Ferranti Elec., 87 Modula Ave., Commack, NY 11725 516-543-0200
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
§ GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754 512-926-8840
§ Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003 201-743-6800
§ Gunther, W., GmbH, Virnsberger Strasse 51, D 8500 Nurnberg 82, West Germany 0911/65521
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† HyComp Inc., 75 Union Ave., Box 377, Sudbury, MA 01776 617-443-4631
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
§† Intersil, 10710 N. Tantau Ave., Cupertino, CA 95014 408-996-5000
§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352 212-461-7000
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
† Micro Networks, 324 Clark St., Worcester, MA 01606 617-852-5400
§† Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 408-727-5350
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
Mitsubishi Elctrns. America, Inc., Semiconductor Div., 777 N. Pastoria Ave., Sunnyvale, CA 94086 408-730-5900
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
§† Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 .. 415-968-9211
RCA Solid State Div., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876 201-685-6000
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
† Rolm Corp., 1 River Oaks Pl., San Jose, CA 95134 408-988-2900
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
§ Signetics, 811 E. Arques Ave., Sunnyvale, CA 94086 408-739-7700
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
§† TRW LSI Products, PO Box 2472, La Jolla, CA 92038 619-457-1000
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Converters, Digital to Paper Tape-2000

A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
§ Data Specialties, Inc., 3455 Commercial Ave., Northbrook, IL 60062 312-564-1800
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 . 513-254-6251
§ Itoh Electronics, Inc. (C.), 5301 Beethoven St., Los Angeles, CA 90066 212-682-0420
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Converters, Digital to Resolver-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
† **Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311, 818-709-5510 .... 3•1148**
† **ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161**
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 .... 1A•1678,1679**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170,1171**
† **Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 1A•2067,1B•1019, 1207**
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
† Clifton Precision, Marple at Broadway, Clifton Hgts., PA 19018 215-622-1000
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Converters, Digital to Synchro-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
† **Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311, 818-709-5510 .... 3•1148**
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 .... 1A•1678,1679**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170,1171**
† **Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 1A•2067,1B•1019, 1207,1883**
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000

Converters, Frequency to Frequency-1900

Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065, 201-388-3500 .... 3•1828,1829
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 .... 3•1844
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1862,1864-1866,1870-1872,1874,1877
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, 818-798-0786 .... 3•1891
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1393
Nova Elec., 263 Hillside Ave., Nutley, NJ 07110, 201-661-3434 .... 3•1895
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897,1898
Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 .... 3•1905
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 ...1A•1616,1617, 3•1016,1018,1019
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
† Comtech Microwave Corp., Comtech Corp., 63 Oser Ave., Hauppauge, NY 11788 516-435-4646
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300

Converters, Frequency to Voltage-2325

Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 201-989-0095
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750 .... 305-339-4356/4355
Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065 201-388-3500
† Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041 214-271-4531
Brooks Instr. Div., Emerson Elec. Co., 407 W. Vine St., Hatfield, PA 19440 215-362-3500
D-B-Developments, 7709 Kilbourne Rd., Rome, NY 13440 315-339-1265
§† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
General Power Sys., 1400 N. Baxter St., Anaheim, CA 92806 714-956-9321
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 .. 415-968-9211
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 415-968-9241
† Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041 214-271-4531

Converters, Frequency, Logarithmic-4050

Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .714-546-4731 800-421-7915
Marathon Flite-Tronics Company, A Marathon Battery Co., 2525 N. Naomi St., Burbank, CA 91504 213-841-3210
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Converters, Frequency Shift Keying-1900

† Alden Elctrns. Inc., Washington St., Westboro, MA 01581 617-366-8851
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 617-653-0355
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
† Frederick Elctrns. Corp., 7630 Hayward Rd., P.O. Box 502, Frederick, MD 21701-0502 301-662-5901
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Converters, Frequency to DC-4000 (Also See Power Supplies, AC Input, DC Output)

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 213-936-8185
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
§ Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
Airpax/NA Philips Controls Corp., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313 305-587-1100
† American Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 ....213-390-3537/8837
§ ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107 612-222-3791
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Brooks Instr. Div., Emerson Elec. Co., 407 W. Vine St., Hatfield, PA 19440 215-362-3500
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dantronics, Inc., 3175 Hafner Ct., St. Paul, MN 55112 612-484-2108
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§ Dormeyer Inds., 3418 N. Milwaukee, Chicago, IL 60641 312-283-4000
† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 818-967-9521
§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 ..201-245-3200;800-526-4048
† Fincor, 3750 E. Market St., York, PA 17402 717-757-4641
† Flow Techn., Box 21346, Phoenix, AZ 85036 602-437-1315
† General Power Sys., 1400 N. Baxter St., Anaheim, CA 92806 714-956-9321
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
§ Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .714-546-4731 800-421-7915
† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ....914-EL8-8000
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 ..415-968-9211
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110 203-625-7300
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ....203-562-2555; 800-243-4570
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
Terado, 1068 Raymond Ave., St. Paul, MN 55108 612-646-2868
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 919-732-9351

Converters, Graphic to Digital-2000

§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ Summagraphics Corp., 35 Brentwood Ave., Fairfield, CT 06430 203-384-1344
Vidco, P.O. Box 25452, Portland, OR 97225 503-292-4104

Converters, Multiplying, Analog to Digital & Digital to Analog-2325

† ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1160
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170
§† Advanced Microcomputers, 3340 Scott Blvd., Santa Clara, CA 95051 408-732-2400
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
§ Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† HyComp Inc., 75 Union Ave., Box 377, Sudbury, MA 01776 617-443-4631
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
§† Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 408-727-5350
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 ..415-968-9211
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684

Converters, Paper Tape to Magnetic Tape-2000

Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663

Converters, Phase-4050

Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ....619-279-8620;800-356-2244;800-821-1634
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 714-879-6021
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
§ Marathon Flite-Tronics Company, A Marathon Battery Co., 2525 N. Naomi St., Burbank, CA 91504 213-841-3210
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 ....714-898-2691;800-854-2433
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Converters, Polar to Rectangular Coordinates-2325

Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1165
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Datacom, Inc., Box 278, Ft. Walton Beach, FL 32548 904-244-6121
† G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
Vidco, P.O. Box 25452, Portland, OR 97225 503-292-4104

Converters, Power Frequency, Electronic-4050

Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876, 201-526-6010 .... 3•1818,1819
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869, 201-989-0095 .... 3•1824,1825

Converters, Power Frequency-4050 (Cont'd)

Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 .... 1A•1686
† **Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041, 214-271-4531 .... 3•1831,1832**
† **CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 .... 3•1844**
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 ... 3•1857,1858
† **Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1394,1862-1866,1870-1872,1874,1877**
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, 818-798-0786 .... 3•1891
Nova Elec., 263 Hillside Ave., Nutley, NJ 07110, 201-661-3434 .... 3•1895
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897,1898
§† **Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 .... 3•1905**
† **Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041, 214-271-4531 .... 3•1831,1832**
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065 201-388-3500
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150 Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
† EG & G Rotron, Custom Div., Hasbrouck La., Woodstock, NY 12498 914-679-5201
† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 206-743-1313
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 805-964-0751
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 .. 201-245-3200;800-526-4048
† Fincor, 3750 E. Market St., York, PA 17402 717-757-4641
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .714-546-4731 800-421-7915
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 .... 914-EL8-8000
§ Liebert Corp., Programmed Power Div., 995 Benicia Ave., Sunnyvale, CA 94086 408-245-8900
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810 201-329-4611
Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
§ Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 412-782-3120
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 .... 203-562-2555; 800-243-4570
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 .... 213-32-Sigma
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400

Converters, Power Frequency, Rotary-4050

Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733, 213-575-0755 .... 3•1826
† **Georator Corp., Box 70, Manassas, VA 22110, 703-368-2101 .... 3•1878,1879**
Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
† American Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
§ Carter Motor, 2707 W. George St., Chicago, IL 60618-7898 312-588-7700
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040

Converters, Pressure to DC, Pressure to Frequency — See Transducers, Pressure (Vol. 1B)

Converters, Rectangular to Polar-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1165**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361

Converters, Resolver to Digital-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
† **Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311, 818-709-5510 .... 3•1146,1147**
† **ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161**
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164**
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 .... 1A•1678,1679**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170,1171**
† **Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 1A•2067,1B•1019, 1207,1883**
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Farrand Controls, Div. of Farrand Inds., 99 Wall St., Valhalla, NY 10595 .... 914-RO1-2600
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
† Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Converters, Rotary — See Motor Generator Sets (Vol. 3)

Converters, Serial to Parallel/Parallel to Serial-2000

NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1088, 1136,1167

Converters, Synchro to Digital-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144,1145**
† **Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311, 818-709-5510 .... 3•1146,1147**
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164**
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 .... 1A•1678,1679**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170,1171**
† **Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 1A•2067,1B•1019, 1207,1883**
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
BBK, Inc., 75 Travis Ave., Binghamton, NY 13904 607-772-8119
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000

Converters, Synchro to Linear DC-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
† **Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 .... 3•1930**
† **ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161**
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164**
† **Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063, 805-581-3950 .... 1A•1678,1679**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
† **Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 1A•2067,1B•1019, 1207,1883**
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311 818-709-5510
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000

Converters, Synchro to Sine/Cosine-2325

† **Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1144**
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161
† **Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164**
† **Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170**
† Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311 818-709-5510

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ...... 213-32-Sigma
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100

Converters, Tape to Card-2000

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200

Converters, Telemetry-1900

† Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 ...... 1A•1686,1687
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
† Base Ten Sys., One Electronics Dr., Box 3151, Trenton, NJ 08619 609-586-7010
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ...... 914-EL8-8000
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880

Converters, UHF to VHF-1900

† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
§ Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§ Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
§ Macom Inds., 8230 Haskell Ave., Van Nuys, CA 91406 ......
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
§† MITEQ Inc., 100 Ricefield La., Hauppauge, NY 11788 516-543-8873

Converters, VLF to HF-1900

§ Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§ Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210

Converters, Voltage to Frequency-2325

Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
† Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041 214-271-4531
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 617-653-0355
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§† Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§ Exar Integrated Sys., P.O.B. 62229, Sunnyvale, CA 94088 408-732-7970
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 415-968-9211
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 415-968-9241
† Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041 214-271-4531

Converters (MIL) DC to DC-3475

† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 ...... 3•1448-1450
Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ...... 3•1496-1499
CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 ...... 3•1515
† EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ...... 3•1560
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 ...... 3•1619
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052 206-882-3100
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ...... 914-EL8-8000
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
§ Tripp-Lite, 500 No. Orleans, Chicago, IL 60610 312-329-1777

Converters (MIL), Frequency-3475

† Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041, 214-271-4531 ...... 3•1831,1832
† Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041, 214-271-4531 ...... 3•1831,1832
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
† California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
† EG & G Rotron, Custom Div., Hasbrouck La., Woodstock, NY 12498 914-679-5201
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400

Coolants, Circuit & Component — See Refrigerants, Spray (Vol. 2)

Cooling Equipment — See Air Conditioners (Vol. 2), Blowers & Fans (Vol. 2), Heat Exchangers & Systems (Vol. 2),

Cooling/Heating Modules, Thermoelectric-5300 — *See Vol. 1B*

Cooling Sprays — See Refrigerants, Spray (Vol. 2)

Cords & Tapes, Lacing-6000 — *See Vol. 2*

Cords, Communication, Control, Microphone, etc. — See Cable, Specific Type (Vol. 2)

Cords, Line & Set, Extension-6000 — *See Vol. 2*

Cords, Line (Lamp) — See Cable, Multiconductor (Vol. 2)

Cords, Line, Resistance-6000 — *See Vol. 2*

Cords, Patch-2100 — *See Vol. 2*

Cords, Power — See Cable, Power (Vol. 2)

Cords, Retractile-6000 — *See Vol. 2*

Cords, Speaker Extension — See Cable, Audio (Vol. 2)

Cords, Telephone, Modular — See Cable, Telephone (Vol. 2)

Cords, Twin Lead — See Cable, Multiconductor (Vol. 2)

Cords & Cable, Dial Drive-2400 — *See Vol. 2*

Cords & Cord Sets, International-6000 — *See Vol. 2*

Cores, Ceramic-2500 — *See Vol. 2*

Cores, Magnetic, Ferrite, L, E, etc.-2500 — *See Vol. 2*

Cores, Magnetic, Ferrite, Pot/Cup-2500 — *See Vol. 2*

Cores, Magnetic, Ferrite, Slug-2500 — *See Vol. 2*

Cores, Magnetic, Ferrite, Toroid-2500 — *See Vol. 2*

Cores, Magnetic, Ferrite, Yoke Section-2500 — *See Vol. 2*

Cores, Magnetic, Metal Alloy (Other Than Silicon & Nickel-Iron)-2500 — *See Vol. 2*

Cores, Magnetic, Nickel-Iron, L, EE, F, & Ring Laminations-2500 — *See Vol. 2*

Cores, Magnetic, Nickel-Iron, Toroid-2500 — *See Vol. 2*

Cores, Magnetic, Powdered Iron, Pot/Cup-2500 — *See Vol. 2*

Cores, Magnetic, Powdered Iron, Slug-2500 — *See Vol. 2*

Cores, Magnetic, Powdered Iron, Toroid-2500 — *See Vol. 2*

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Cores, Magnetic, Silicon C-2500 — *See Vol. 2*

Cores, Magnetic, Silicon EI, EE, & F Laminations-2500 — *See Vol. 2*

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Corners, Waveguide — See Bends & Twists, Microwave (Vol. 1A)

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Countermeasures (CM) Sets (MIL), Airborne-3475

Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050

CM Sets (MIL), Internal-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

CM Sets (MIL), Mobile-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O, Box 7188, Mountain View, CA 94039 415-966-2000

CM Sets (MIL), Conformal plus RWR-3475

Counter/Timers-2900

Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 .... 3•1121
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 .... 3•1074
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1044
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716, 201-291-0500; 800-631-2165 .... 3•1132
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1339
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 .... 3•1343
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 .... 215-337-5500;800-441-8245
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ Banner Engrg. Corp., 9714 - 10th Ave. N., Minneapolis, MN 55441 612-544-3164
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Eldorado Instrs., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 617-890-7440
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§† Intersil, 10710 N. Tantau Ave., Cupertino, CA 95014 408-996-5000
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Phoenix Microsystems, P.O. Box 4206, Huntsville, AL 35802 205-881-2173
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ RCA Solid State Div., Micro Processors, Route 202, Somerville, NJ 08876 201-685-6000
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
Scanning Devices, 108 Elm St., Waltham, MA 02154 617-891-8991
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Counters, Bidirectional-2200

† Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 .... 3•1121
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 .... 3•1074
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1045
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1339
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1274
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
Bausch & Lomb, 820 Linden Ave., Rochester, NY 14625 716-338-6000
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
Interswitch, 770 Airport Blvd., Burlingame, CA 94010 415-347-8217
Itek Measurement Sys., Div. Litton Inds., 27 Christina St., Newton, MA 02161 617-969-7300
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151

§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .....201-291-0500; 800-631-2165
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 408-255-7550
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
§ Nu-Metrics, P.O. Box 800, Connellsville, PA 15425 412-628-0400
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Wide Range Elctrns. Corp., 2119 Schultz Rd., St. Louis, MO 63141 314-567-5366
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Counters, Coil Winding-2200

† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .....201-291-0500; 800-631-2165
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Counters, Decade-2200

§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126**
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ....1B•1045
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Luff Research, Box 449, Jackson Hgts., NY 11372 212-429-5900
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 408-255-7550
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Counters, Directional-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 .... 3•1123
§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126**
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ....1B•1045
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1088, 1136,1167,1339**
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1274
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
§ Berg, W. M., Inc., 499 Ocean Ave., East Rockaway, NY 11518 516-599-5010
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386 612-443-2500
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .....201-291-0500; 800-631-2165
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ...213-452-1336
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Counters, Electromagnetic-2200

† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700
Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410 203-272-0301
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
Electric Tachometer, 68th & Upland Sts., Philadelphia, PA 19142 ..215-SA6-7723
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .....201-291-0500; 800-631-2165
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ...213-452-1336
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
† Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411

Counters, Event-2200

† **Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 .... 3•1121**
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 .... 3•1123
B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 .... 3•1200
§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126**
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ....1B•1044,1045
§ **Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716, 201-291-0500; 800-631-2165 .... 3•1132**
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1088, 1136,1167**
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1274**
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 .... 3•1355
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359
† **Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359**
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Airpax/NA Philips Controls Corp., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313 305-587-1100
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083 215-853-1130
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
§ Data Precision Corporation, Electronics Ave., Danvers, MA 01923 ..617-246-1600
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251

Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Electric Device, PO Box 337, Canfield, OH 44406 216-533-3060
† Electrodynamics, Inc., A Talley Inds. Co., 1200 Hicks Rd., Rolling Meadows, IL 60008 312-259-0740
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ......312-231-3511; 312-932-9380
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
§ Gralex Inds., 155 Marine St., Farmingdale, NY 11735 516-694-3600
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ......Call Local Sls. Off.
Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Interswitch, 770 Airport Blvd., Burlingame, CA 94010 415-347-8217
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
§ Nu-Metrics, P.O. Box 800, Connellsville, PA 15425 412-628-0400
Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
Scanning Devices, 108 Elm St., Waltham, MA 02154 617-891-8991
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Whedco, Inc., 6107 Jackson Rd., Ann Arbor, MI 48103 313-665-5473

Counters, Frequency-2900

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ...... 3•1200
§ DigiMax Instrs. Corp., 5625 Kearny Villa Rd., San Diego, CA 92123, 619-569-6582 ...... 3•1217
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 ...... 3•1259
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ...... 3•1274
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
§ Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§ Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
§ AQ Sys., 1736 Front St., Yorktown Hgts., NY 10598 800-431-2104
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
§† Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
Canberra Ind.. One State St., Meriden, CT 06450 203-238-2351
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621. 415-638-5656
§† EIP Microwave Inc., 2731 North First St., San Jose, CA 95134 408-946-5700
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Eldorado Instrs., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ......Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ......201-291-0500; 800-631-2165
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
§ Luff Research, Box 449, Jackson Hgts., NY 11372 212-429-5900
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
§ Optoelectronics, Inc., 5821 N.E. 14th Ave., Ft. Lauderdale, FL 33334 305-771-2050
§ Paccom, 3928 148th NE, Redmond, WA 98052 ......206-883-9200;800-426-6254
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
§† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
Sivers Lab, Box 90339, Los Angeles, CA 90009 213-390-7477
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ......800-547-1512; Oregon only 800-452-1877
§ Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Wilson Electronics, PO Box 19000, Las Vegas, NV 89119 702-739-1931

Counters, Mechanical-2200

† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
Airpax Corporation, Cheshire Div., , Cheshire Indl Pk., Box E, Cheshire, CT 06410 203-272-0301
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ......215-337-5500;800-441-8245
B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
† Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809 219-747-3121
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
Electric Tachometer, 68th & Upland Sts., Philadelphia, PA 19142 ......215-SA6-7723
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W.. Eatontown, NJ 07724 201-542-5151
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ......201-291-0500; 800-631-2165
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
PIC Design, P.O. Box 1004, Middlebury, CT 06762 203-758-8272
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ......201-797-3313; 800-526-5376
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sterling Instr., Div. Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-3300
† Stock Drive Prods., Div. of Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-0200
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411
Whittaker Corp., Electronic Resources Div., 100 E. Tujunga Ave., Burbank, CA 91502 818-843-5770

Counters, Particle-2900

Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
† Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Counters, Photoelectric-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
§ Banner Engrg. Corp., 9714 - 10th Ave. N., Minneapolis, MN 55441 612-544-3164
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Disc Instrs., 102 E. Baker St., Costa Mesa, CA 92626 714-979-5300
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 201-542-9200
HH Controls Co., Inc., 16 Frost St., Arlington, MA 02174 617-646-2626
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ....201-291-0500; 800-631-2165
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Crystals, Quartz, for Watches-2300 — *See Vol. 1A*

Crystals, Semiconductor(Ingots & Wafers)-2300 — *See Vol. 1A*

Crystals, YIG-2300 — *See Vol. 1A*

Crystals (MIL)-2440 — *See Vol. 1B*

Cups, Encapsulation-1600 — *See Vol. 2*

Current Limiters (MIL)-2440 — *See Vol. 1B*

Current Sensors-2200 (Also See Transducers, Volt, etc.)

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 .... 3•1120
† American Aerospace Controls, 570 Smith St., Farmingdale, NY 11735, 516-694-5100 ....1B•1830,1831
§† Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807, 305-678-6900 .... 3•1197
Flex-Core Div., Morlan & Assocs., Inc., 6625 McVey Blvd., Worthington, OH 43085, 614-889-6152 ....1A•2165
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032, 815-235-6600 ....1B•1720,1852
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 1B•1854,1855,1861-1863
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355, 215-644-1300 ....1A•2009
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
Electric Device, PO Box 337, Canfield, OH 44406 216-533-3060
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electro Natl., Matthews Ave., Canton, MS 39046 601-859-5511
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
Industrial Devices, Inc., Edgewater, NJ 07020 201-224-4700
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
§ Midwest Comps., 1981 Port City Blvd., Muskegon, MI 49443 616-777-2602
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texas Instrs., Matls. & Controls Grp., 34 Forrest St., Attleboro, MA 02703 617-699-3800
† Torwico Elctrns. Inc., Rte. 70, Lakewood, NJ 08701 201-364-1800
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Current Sources-4000

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 .... 3•1006
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111, 619-279-8620;800-356-2244;800-821-1634 .... 3•1840
Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 .... 3•1517
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1224
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 .... 3•1239
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. .... 3•1585
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1250,1252
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1662
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385 212-386-1300
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352 212-461-7000
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 408-942-0810
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
† TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ Voltex, 3460 Great Neck Rd., Amityville, NY 11701 516-842-2772
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Custom Molding Services, Plastics — See Services, Custom Molding, Plastics (Vol. 3)

Cutters, Diagonal — See Cutters, Manual (Vol. 2)

Cutters, Wire, Automatic — See Machines, Wire Measuring & Cutting (Vol. 3)

Cutters, Wire, Manual-5400 — *See Vol. 2*

Dampers, Servo-4900

Airpot, 27 Lois St., Norwalk, CT 06851 203-846-2021
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100

Dampers, Structural, Chassis, Panel, etc. — See Mounts, Shock & Vibration (Vol. 2)

Data Collection Equipment, Hand Held-2000

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Innovative Electronics, Inc., 4714 N.W. 165th St., Miami, FL 33014 .305-624-1644
Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961

Data Collection Equipment, Modular-2000

Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209, 301-296-7000 .... 3•1407
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 516-567-7300
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Cyber Sys., Inc., 2031 E. Cerritos Ave., Anaheim, CA 92806 714-722-2051
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
Elcom Industries, Inc., 10268 Bach Blvd., St. Louis, MO 63132 314-429-3100
§ Electronic Controls Design, 13626 S. Freeman Rd., Mulino, OR 97042 503-829-9108
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Innovative Electronics, Inc., 4714 N.W. 165th St., Miami, FL 33014 .305-624-1644
Measurements Group, Inc., Box 27777, Raleigh, NC 27611 919-365-3800
Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 617-444-7000
Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
Synergetics Intl., Inc., 6565 Odell Pl., P.O. Box E, Boulder, CO 80306-1236 303-530-2020
Xico. Inc., 120 Ocean Way, Santa Monica, CA 90402 213-454-0302

Data Collection Equipment, Portable-2000

Acquis Communications, 17192 Gillette Ave., Irvine, CA 92714 714-545-3732
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
B-G Instruments, P.O. Box 67, Alta Loma, CA 91701 .... 714-989-4802;980-2826
Biospherical Instrs., Inc., 4901 Morena Blvd. 003, San Diego, CA 92117 619-270-1315
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 516-567-7300
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Cyber Sys., Inc., 2031 E. Cerritos Ave., Anaheim, CA 92806 714-722-2051
§ Data-Match Corp., 3810 Oakcliff Ind. Ct., Doraville, GA 30340 404-441-0408
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
Measurements Group, Inc., Box 27777, Raleigh, NC 27611 919-365-3800
Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
§ Terra Technlg. Corp., 3860 148th Ave. N.E., Redmond, WA 98052 .206-883-7300
† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300

Data Acquisition & Reduction Systems-2325 (Also See Modules, Data Acquisition)

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Data Instruments Inc., 4 Hartwell Pl., Lexington, MA 02173, 617-861-7450 .... 1B•1840
Data Precision Corporation, Electronics Ave., Danvers, MA 01923, 617-246-1600 .... 3•1214,1215
† Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1105,1150,1151
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1156,1157
GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754, 512-926-8840 .... 3•1078-1081
† ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1160
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1164
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1168
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518, 415-827-9010 .... 3•1015
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 ...... 3•1016-1020
Tedea USA, 7800 Deering Ave., Canoga Park, CA 91304, 818-884-8818 ..... 3•1172
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1100,1101
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170,1171
Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
§ Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 415-964-3200
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
Advanced Techn. Research Labs., 5645 K General Washington Dr., Alexandria, VA 22312 703-750-2920
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astro Dynamics, Inc., 2 Gill St., Woburn, MA 01801 617-935-4944
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† Automation Dynamics, 77 Brookside Pl., Hillsdale, NJ 07642 201-666-2458
§ AVCO-Elctrns. Div., 4807 Bradford Dr., Huntsville, AL 35805 205-837-6500
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 215-646-8100
† Aydin Vector Div., Box 328, Newtown, PA 18940. 215-968-4271
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Bascom-Turner Instrs., 111 Downey St., Norwood, MA 02062 617-769-9660
† Base Ten Sys., One Electronics Dr., Box 3151, Trenton, NJ 08619 .609-586-7010
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
† Bendix Corp., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605 818-765-1010
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
B-G Instruments, P.O. Box 67, Alta Loma, CA 91701 .... 714-989-4802;980-2826
Biospherical Instrs., Inc., 4901 Morena Blvd. 003, San Diego, CA 92117 619-270-1315
§ Braemar Computer Corp., 11950 Twelfth Ave. S., Burnsville, MN 55337 612-890-5135
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 516-921-7300
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 516-567-7300
CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Computer Design & Applications Inc., 411 Waverly Oaks Rd., Waltham, MA 02154 617-647-1900
Computrol Div. Kidde Automated Sys., Inc., 15 Ethan Allen Hwy., Ridgefield, CT 06877 203-544-9371
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
Continental Data Sys., 131 N. Ludlow St., Dayton, OH 45402 513-222-8626
§ Control Equip. Corp., 171 Lincoln St., Lowell, MA 01851 617-459-0573
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cybersystems, Inc., 7540 South Memorial Pkwy., Huntsville, AL 35802 205-883-4410
† Datacom, Inc., Box 278, Ft. Walton Beach, FL 32548 904-244-6121
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Data Signal Corp., 149 California St., Newton, MA 02158 617-926-5080
Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
§ Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
D-B-Developments, 7709 Kilbourne Rd., Rome, NY 13440 315-339-1265
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
Dianachart Inc., 129 Hibernia Ave., Rockaway, NJ 07866 201-625-2299
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
Electron, Inc., P.O. Box 28640, San Diego, CA 92128 216-681-4700
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
§ Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515

Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 ...216-361-3315
Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 ...408-727-3101
Grant Technology Sys. Corp., 11 Summer St., Chelmsford, MA 01824 ...617-256-8881
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 ...203-866-2573
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 ...714-827-2135
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
Howell Instrs., 3479 W. Vickery Blvd., Ft. Worth, TX 76107 ...817-336-7411
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ...714-752-3800
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 ...617-667-8700
Inconix Corp., 10 Tech Circle, Natick, MA 01760 ...617-655-1170
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 ...818-889-3179
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 ...818-991-1410
Information Transfer Indl., Box 357, Holcomb, NY 14469 ...716-657-7074
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 ...408-988-4930
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 ...412-831-9200
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 ...607-272-7640
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107 ...818-795-2220
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 ...815-838-0005
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 ...415-856-1800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 ...215-643-2000
§ Lion Precision, 60 Bridge St., Newton, MA 02195 ...617-969-4710
§ Macrodyne, 1004 Princetown Rd., Schenectady, NY 12301 ...518-356-3500
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
Measurements Group, Inc., Box 27777, Raleigh, NC 27611 ...919-365-3800
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 ...201-366-1700
Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 ...617-444-7000
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 ...408-297-8530
† Metraplex Corp., Berkshire Indl. Park, Bethel, CT 06801 ...203-748-0606
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 ...904-244-9600
§ Metrosonics, Box 23075, Rochester, NY 14692-3075 ...716-334-7300
† Micro Networks, 324 Clark St., Worcester, MA 01606 ...617-852-5400
§ Monitor Labs, Inc., 10180 Scripps Ranch Blvd., San Diego, CA 92131 ...619-578-5060
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 ...818-357-2281
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ...312-289-8820
† Norland, Norland Dr., Ft. Atkinson, WI 53538 ...414-563-8456
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
§ Opto 22, 15461 Springdale St., Huntington Bch., CA 92649 ...714-891-5861
§† Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 ...602-278-8528
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320 ...818-889-8770
Potter Instr., 10 Main St., Gonic, NH 03867 ...603-332-1991
Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 ...714-776-6400
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 ...805-964-6708
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 ...201-334-3100
§† Rolm Corp., 1 River Oaks Pl., San Jose, CA 95134 ...408-988-2900
† Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 ...513-561-6803
Sea Data Corp., One Bridge St., Newton, MA 02158 ...617-244-3216
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 ...617-481-1684
† Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201 ...818-244-6541
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir., Ste. F, Irvine, CA 92714 ...714-250-1172
SumX Corp., Box 14864, Austin, TX 78761 ...512-835-0330
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 ...213-341-3010
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 ...216-349-0600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ...800-547-1512;
Oregon only 800-452-1877
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 ...214-271-2561
Telesis Laboratory, Box 1972, Chillocothe, OH 45601 ...614-642-5000
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 ...615-483-8405
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 ...201-227-1700
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 ...301-694-6666
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 ...714-549-0391
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 ...203-527-7201
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 ...817-625-2311
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402 ...213-454-0302
Xycom, 750 N. Maple Rd., Saline, MI 48176 ...313-429-4971
Ziatech, 3433 Roberto Ct., San Luis Obispo, CA 93401 ...805-541-0488

Data Compressors, Digital-2000

Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 ...301-730-7442
† Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 ...215-646-8100
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 ...619-744-1002
Electron, Inc., P.O. Box 28640, San Diego, CA 92128 ...216-681-4700
EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 ...813-371-0811
Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 ...617-778-0700
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ...213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ...714-752-3800
Inconix Corp., 10 Tech Circle, Natick, MA 01760 ...617-655-1170
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 ...904-244-9600
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 ...818-357-2281
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ...312-289-8820
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
§† Systron-Donner Inertial Div., 2700 Systron Dr., Concord, CA 94518 ...415-682-6161

Data Display Indicators — See Displays Indicator Lights (Vol. 1B)

Data Display Systems — See Displays, CRT (Vol. 1A), Terminals, Data Display (Vol. 3),

Data Links, Fiber Optic-2475 — *See Vol. 1B*

Data Links, Optical-2000

† MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998, 213-828-7496 1B•1116
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 ...805-967-0423
AT&T, 475 South St., Morristown, NJ 07960 ...201-631-6790
Codenoll Technology Corp., 1086 N. Bwy., Yonkers, NY 10701 ...914-965-6300
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ...613-226-4000
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 ...201-768-8082
§ Scientific Radiation Corp., 1201 San Antonio Rd., Mountain View, CA 94043 ...415-965-0910
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ...CA 415-965-0910;800-221-7060

Data Loggers-2325

C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 ... 3•1127
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ... 3•1157
† Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072, 201-935-5220 ... 3•1368
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ..... 3•1168,1284,1386
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 ... 3•1285
§ Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 ...415-964-3200
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 ...716-334-9649
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 ...301-730-7442
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 ...212-274-1794
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ...617-777-4500;
17-246-0300;800-451-1816
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 ...602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ...313-779-8700
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 ...815-877-0241
B-G Instruments, P.O. Box 67, Alta Loma, CA 91701 .... 714-989-4802;980-2826
§ Braemar Computer Corp., 11950 Twelfth Ave. S., Burnsville, MN 55337 ...612-890-5135
§† Columbus Instruments, 950 N. Hague Ave., Columbus, OH 43204 ..614-488-6176
Computer Terminal Sys., 89 Arkay Drive, Hauppauge, NY 11788 516-435-2916
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 ...203-743-6721
§ Control Equip. Corp., 171 Lincoln St., Lowell, MA 01851 ...617-459-0573
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 ...513-866-3300
Dianachart Inc., 129 Hibernia Ave., Rockaway, NJ 07866 ...201-625-2299
§ Electronic Controls Design, 13626 S. Freeman Rd., Mulino, OR 97042 ...503-829-9108
Esterline Angus, Box 24000, Indianapolis, IN 46224 ...317-244-7611
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ...613-226-4000
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 ...203-866-2573
Henschel, 14 Cedar St., Amesbury, MA 01913 ...617-388-1103
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ...800-321-5111, Ext. 596
Howell Instrs., 3479 W. Vickery Blvd., Ft. Worth, TX 76107 ...817-336-7411
Inconix Corp., 10 Tech Circle, Natick, MA 01760 ...617-655-1170
Information Transfer Indl., Box 357, Holcomb, NY 14469 ...716-657-7074
Instrulab, P.O. B. 98, Dayton, OH 45404 ...513-223-2241
International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067 ...312-358-4622
ITHACO, Inc., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437 ...607-272-7640
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 ...815-838-0005
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 ...415-856-1800
Macro Electronics Corp., 23 Royalston Lane, So. Setauket, NY 11720 ...516-698-3357
Measurements Group, Inc., Box 27777, Raleigh, NC 27611 ...919-365-3800
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 ...201-366-1700
† Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 ...617-444-7000
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 ...408-297-8530
§ Metrosonics, Box 23075, Rochester, NY 14692-3075 ...716-334-7300

Data Loggers-2325 (Cont'd)

§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
§ Monitor Labs, Inc., 10180 Scripps Ranch Blvd., San Diego, CA 92131 619-578-5060
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320 818-889-8770
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 .... 800-525-5554;818-764-5400
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 219-848-5233
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
Sea Data Corp., One Bridge St., Newton, MA 02158 617-244-3216
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir., Ste. F, Irvine, CA 92714 714-250-1172
Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854 201-572-9512
§ Syscon Intl., Inc., 1108 So. High St., So. Bend, IN 46618-1096 .... 219-232-3900; 800-348-2993
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
§ Terra Technlg. Corp., 3860 148th Ave. N.E., Redmond, WA 98052 . 206-883-7300
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Tri-Data Corp., 505 E Middlefield Rd., Mountain View, CA 94043 415-969-3700
Westemp Corp., Box 767, Cardiff, CA 92007 619-942-9800
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 817-625-2311
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Data Switches — See Switches, Data (Vol. 3)

Data Systems (MIL), Naval Tactical-3475

† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700

Decade Boxes, Capacitance-2900

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076, 312-675-2600 ....1A•1917
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 .... 3•1309
§ AEMC, 99 Chauncy, Boston, MA 02111 .... 617-451-0227;800-343-1391
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385 212-386-1300
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

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IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 .... 3•1309
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Coast Coil Co., 5333 W. Washington Blvd., Los Angeles, CA 90016 213-936-6188
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
Microtran Co. Inc., 145 E. Mineola Ave., Valley Stream, NY 11582 ..516-561-6050
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Decade Boxes, Resistance-2900

General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 .... 3•1239
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1251
§ **Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076, 312-675-2600 ....1A•1917**
Shalltronix Corp., Preston St., P.O. Box 235, Selma, NC 27576, 919-965-6346 .... 3•1299
† **Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 .... 1B•1755**
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 .... 3•1309
§ AEMC, 99 Chauncy, Boston, MA 02111 .... 617-451-0227;800-343-1391
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
† Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
§ Clarostat Mfg., Washington St., Dover, NH 03820 603-742-1120
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

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Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Coast Coil Co., 5333 W. Washington Blvd., Los Angeles, CA 90016 213-936-6188
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166

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Decoders, Pulse-1900

§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 703-321-9625
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 516-921-7300
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Supertex, Inc., 1225 Bordeaux Dr., P.O. Box 3607, Sunnyvale, CA 94086 408-744-0100
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 213-341-3010
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300
Voice Identification, Box 714, Somerville, NJ 08876 201-526-3408

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Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830, 617-374-0761 .... 1A•1624
§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Data Signal Corp., 149 California St., Newton, MA 02158 617-926-5080
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
§† Exar Integrated Sys., P.O.B. 62229, Sunnyvale, CA 94088 408-732-7970
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
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† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361

Silicon Systems Inc., 14351 Myford Rd., Tustin, CA 92680 714-979-0941
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ SYT, 1220 Barranca, El Paso, TX 79935 915-593-1234
§ Teltone, 10801-120 Ave. NE, Kirkland, WA 98033 206-827-9626

Decoders, Video-1900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ....3•1154
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 ....3•1154
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§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 827-7144
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 516-921-7300
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
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Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 914-764-4613

Decontaminants — See Cleaners & Solvents (Vol. 2)

Decoys (MIL), Buoy-3475

† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100

Decoys (MIL), IR Flare-3475

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Dehydrators-4100

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† Dielectric Communications, General Signal, Tower Hill Rd., Raymond, ME 04071 ....207-655-4555;800-341-9678
Electro Impulse, Box 870, Red Bank, NJ 07701-0870 201-741-0404
† Gabriel Elctrns., Box 70, Scarborough Indl. Pk., Scarborough, ME 04074 207-883-5161
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Pall Trinity Micro, Rte. 281, Cortland, NY 13045 607-753-6041

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Demodulators-1900

† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 ....3•1145
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518, 415-827-9010 ....3•1015
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 ....3•1170
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
§ Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§ Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
† Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 215-646-8100
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
Cermetek Microelectronics Inc., 1308 Borregas Ave., Sunnyvale, CA 94089 408-734-8150
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 714-879-6021
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§† Exar Integrated Sys., P.O.B. 62229, Sunnyvale, CA 94088 408-732-7970
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
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§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 415-968-9211
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Demodulators, Magnetic-2200

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† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

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§ Sloan Technology, P.O. Box 4608, Santa Barbara, CA 93103 805-963-4431

Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
§ UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 408-738-3301
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Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300

Desiccators — See Dehumidifiers (Vol. 2)

Desks, Data Terminal — See Benches, Consoles, Tables (Vol. 2)

Desoldering Tools & Equipment — See Soldering Accessories (Vol. 2), Soldering Equip. (Vol. 2), Soldering Guns (Vol. 2), etc.

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MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41
† Radiometrics, Inc., 12021 South Memorial Pkwy., Huntsville, AL 35803 205-881-1272
† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 401-847-8000
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050

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† Radiometrics, Inc., 12021 South Memorial Pkwy., Huntsville, AL 35803 205-881-1272
Spiricon Inc., 2600 North Main, Logan, UT 84321 801-753-3729

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GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
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† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
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† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057

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Detectors, Bar Code — See Readers, Bar Code (Vol. 3)

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† Alan Inds., P.O. Box 1203, Columbus, IN 47201 812-372-8869
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Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Detectors, Corona — See Testers, Corona (Vol. 3)

Detectors, Crystal-2300 — *See Vol. 1A*

Detectors, Fiber Optic-3700 (Also See Diodes, PIN) — *See Vol. 1B*

Detectors, Flaw & Defect-2900

TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....3•1100
Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410 203-272-0301
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Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
Photobell, 26 Just Rd., Fairfield, NJ 07006 201-227-3613
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§ UVP, Inc., 5100 Walnut Grove Ave., P.O. Box 1501, San Gabriel, CA 91778 818-285-3123

Detectors, GaAs-3450 — *See Vol. 1A*

Detectors, Ground Fault-4300

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Shalltronix Corp., Preston St., P.O. Box 235, Selma, NC 27576, 919-965-6346 ....3•1299
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Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
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§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
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Trinetics Inc., 55807 Currant Rd., Mishawaka, IN 46545-4899 219-259-8535
§ Wadsworth Elec., 20 W. 11th St., Covington, KY 41011 606-431-0900

Detectors, Impedance — See Meters, Impedance (Vol. 3)

Detectors, Infrared-3700 — *See Vol. 1B*

Detectors, Light Intensity — See Meters, Light, Nonphotographic (Vol. 3)

Detectors, Magnetic — See Meters, Gauss (Vol. 3)

Detectors, Microwave-3400

Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
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† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
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Microwave Development Labs., 10 Michigan Dr., Natick, MA 01760 617-655-0060
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† Norsal Inds., 85 D Hoffman Lane So., Central Islip, NY 11722 516-234-1200
§† Omni Spectra, 21 Continental Blvd., Merrimack, NH 03054 603-424-4111
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
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† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
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† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
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† Vectronics Microwave Corp., 276 Lincoln Blvd., Middlesex, NJ 08846 201-356-2377
§ Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Detectors, Null — See Indicators, Null (Vol. 3)

Detectors, Phase Sensitive-2900

† Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235, 212-769-0200 ..1A-1713, 1714,1752
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† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
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§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
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† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
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† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
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Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Detectors, Photovoltaic — See Cells, Photovoltaic (Vol. 1B)

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§† Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
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§† M/A-COM Omni Spectra, Inc., 21 Continental Blvd., Merrimack, NH 03054 603-424-4111
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§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Detectors, Radiation-2900

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Thomson-CSF Comps. Corp., Special Prods. Div., 301 Rte. 17 North, Rutherford, NJ 07070 201-438-2300
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Detectors, Resistance Temperature (RTDs) — See Thermometers, Resistance (Vol. 3)

Detectors, Standing Wave-2900

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§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Detectors, Synchronous-2900

Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135

Detectors, Tone-1900

Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508

Detectors, Ultraviolet-2900

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 ....3•1004**
† **Applied Solar Energy Corp., Photosensor Div., 15251 E. Don Julian Rd., City of Industry, CA 91749, 818-968-6581 ....1B•1211**
Silonex Inc., 331 Cornelia St., Plattsburgh, NY 12901, 518-561-3160 ....1B•1233
§ American Ultraviolet, 320 Commerce St., Chatham, NJ 07928 201-635-8355
† Artech Corp., 2901 Telestar Ct., Falls Church, VA 22042 703-560-3292
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
† Centronic Inc., 5 Eastmans Rd., Parsippany, NJ 07054 201-233-7200
EG&G, Inc., Electro-Optics Div., 35 Congress St., Salem, MA 01970 617-745-3200
§ EG & G Vactec, 10900 Page Blvd., St. Louis, MO 63132 314-423-4900
Eltec Instrs., P.O. Box 9610, Daytona Bch., FL 32020 904-252-0411
Galileo Electro-Optics Corp., Galileo Pk., Sturbridge, MA 01518 617-347-9191
Gamma Scientific Inc., 3777 Ruffin Rd., San Diego, CA 92123 619-279-8034
Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
Infrared Inds., Inc., P.O. Box 14200, Orlando, FL 32857 305-282-7700
Poulin Associates, Inc., 302 North Rd., Sudbury, MA 01776 617-443-7333
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
† Scientech, Inc., 5649 Arapahoe Ave., Boulder, CO 80303 ....303-444-1361; 800-525-0522
Sensor Techn., 21012 Lassen St., Chatsworth, CA 91311 213-882-4100
Silicon Detector Corp., 855 Lawrence Dr., Newbury Park, CA 91320 805-498-6737
Spiricon Inc., 2600 North Main, Logan, UT 84321 801-753-3729
§ THORN EMI Gencom Inc., 23 Madison Rd., Fairfield, NJ 07006 516-433-5900
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 213-978-0516
§ UVP, Inc., 5100 Walnut Grove Ave., P.O. Box 1501, San Gabriel, CA 91778 818-285-3123

Detectors, Vacuum-4100

Barksdale Controls Div., Transamenca DeLaval, 3211 Fruitland Ave., P.O. Box 58843, Los Angeles, CA 90058 213-589-6181
DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 302-773-3218
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000
† Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Detectors,Vibration — See Transducers, Vibration (Vol. 1B)

Detectors, Video-2900

Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
§ Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
† Metropole Products Inc., P.O. Box 10275, Alexandria, VA 22310 ....703-971-8606; 703-971-7082
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Detectors, Voltage-2900

† **Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ....3•1006**
§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
§† Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
Q-Systems, PO Box 35879, Tucson, AZ 85740 602-293-4923
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200
Western Electro. Mech. Co. Inc., 300 Broadway, Oakland, CA 94607 415-452-1936
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Detectors (MIL), IR-3475

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Centronic Inc., 5 Eastmans Rd., Parsippany, NJ 07054 201-233-7200
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
Laser Precision Corp., 1231 Hart St., Utica, NY 13502 315-797-4449
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Santa Barbara Resch. Ctr., 75 Coromar Dr., Goleta, CA 93117 805-968-3511
Spiricon Inc., 2600 North Main, Logan, UT 84321 801-753-3729
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
† TRW Optoelectronics Div., 1201 Tappan Circle, Carrollton, TX 75006 214-323-2200

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Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
† M/A-COM Millimeter Prods., Inc., South Ave., Burlington, MA 01803 617-272-3000
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41

Diacs-4800 — *See Vol. 1A*

Dials, Instrument, Metal, Plastic, etc.-2400 — *See Vol. 2*

Dials, Turns Counting-2400 — *See Vol. 2*

Dielectric Heating Equipment-4100

§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
Easy Heat-Wirekraft, 555 North Michigan St., Lakeville, IN 46536 219-784-3011
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 .... 516-435-2808;800-DIAL EDL; 800 342-5335
Microdry Corp., Golden Grain Macaroni Co., 3111 Fostoria Way, San Ramon, CA 94583 415-837-9106
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150

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Digital Panel Meters — See Meters, Panel (Digital) (Vol. 3)

Digital Tape Recorders — See Recorders, Computer Data (Vol. 3)

Digitizers, Audio-2000

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Centigram Corp., 155A Moffett Park Dr., Sunnyvale, CA 94086 408-734-3222
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
† MSC Prods./Eaton Corp., 1640 Monrovia St., Costa Mesa, CA 92627 714-642-2427
† Mimic, Inc., P.O. Box 921, Acton, MA 01720 617-263-2101
Summagraphics Corp., 35 Brentwood Ave., Fairfield, CT 06430 203-384-1344

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† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771

§ Chorus Data Systems, P.O. Box 810, 27 Proctor Hill Rd., Hollis, NH 03049 603-465-7100
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Display Interface Corp., 525 Boston Post Rd., P.O. Box 250, Milford, CT 06460 203-877-7661
Eikonix Corp., 23 Crosby Dr., Bedford, MA 01730 617-275-5070
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
LogE/Interpretation Sys. Inc., 420 S. Fairview Ave., Goleta, CA 93117 805-967-2383
LogE/Spatial Data Sys., 508 S. Fairview, Goleta, CA 93017 805-967-2383
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
Summagraphics Corp., 35 Brentwood Ave., Fairfield, CT 06430 203-384-1344
Third Domain, P.O. Box 35400, Tucson, AZ 85740-5400 602-293-6310

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† Auto-trol Tech., 12500 N. Washington St., Denver, CO 80233 303-452-4919
† Calcomp, 2411 W. La Palma Ave., Anaheim, CA 92801 714-821-2011
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Computer Talk, Inc., Box 148, Morrison, CO 80465 303-697-5485
Display Interface Corp., 525 Boston Post Rd., P.O. Box 250, Milford, CT 06460 203-877-7661
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Houston Instrument, Div. Bausch & Lomb, P.O. Box 15720, Austin, TX 78761 512-835-0900
§ Mouse Sys. Corp., 2336H Walsh Ave., Santa Clara, CA 95051 408-988-0211
§ Science Accessories Corp., 970 Kings Hwy. W., Southport, CT 06490 203-255-1526
Summagraphics Corp., 35 Brentwood Ave., Fairfield, CT 06430 203-384-1344
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
§ Sun-Flex Co., Inc., 20 Pimentel Ct., Novato, CA 94947 415-883-1221
Viable Systems Inc., Box 438, Needham, MA 02192 617-449-4570

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CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Test & Measurement Systems, Inc., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086 408-720-8877

Dimmers, Light — See Controls, Lamp Dimming, Flashing (Vol. 3)

Diode Arrays (Incl. Photo)-3700 — *See Vol. 1B*

Diodes, Avalanche-4800 — *See Vol. 1A*

Diodes, Backward-4800 — *See Vol. 1A*

Diodes, Breakdown — See Diodes, Avalanche (Vol. 1A)

Diodes, Chip, Unpackaged-4800 — *See Vol. 1A*

Diodes, Electroluminescent (Radiating)-4800 — *See Vol. 1A*

Diodes, Frequency Multiplier-4800 — *See Vol. 1A*

Diodes, Germanium-4800 — *See Vol. 1A*

Diodes, Gunn-4800 — *See Vol. 1A*

Diodes, High Voltage (1,000 Volts & Over)-4800 — *See Vol. 1A*

Diodes, Hot Carrier-4800 — *See Vol. 1A*

Diodes, Impatt-4800 — *See Vol. 1A*

Diodes, Laser-4800 — *See Vol. 1A*

Diodes, Light Emitting (LEDs)-3700 — *See Vol. 1B*

Diodes, Limiting-4800 — *See Vol. 1A*

Diodes, Liquid Crystal (LCDs)-3700 — *See Vol. 1B*

Diodes, Matched Pairs-4800 — *See Vol. 1A*

Diodes, Matched Quads-4800 — *See Vol. 1A*

Diodes, Microwave Detector-4800 — *See Vol. 1A*

Diodes, Microwave Mixer-4800 — *See Vol. 1A*

Diodes, Noise-4800 — *See Vol. 1A*

Diodes, Photoelectric-3700 — *See Vol. 1B*

Diodes, PIN-4800 — *See Vol. 1A*

Diodes, Schottky-4800 — *See Vol. 1A*

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Diodes, Step Recovery-4800 — *See Vol. 1A*

Diodes, Switching-4800 — *See Vol. 1A*

Diodes, Temperature Compensating-4800 — *See Vol. 1A*

Diodes, Trigger — See Diodes, Avalanche (Vol. 1A)

Diodes, Tunnel-4800 — *See Vol. 1A*

Diodes, Varactor-4800 — *See Vol. 1A*

Diodes, Video Detector — See Diodes, Microwave Detector (Vol. 1A)

Diodes, Zener & Stabistors (Forward Reference Diodes)-4800 — *See Vol. 1A*

Diodes (MIL)-2440 — *See Vol. 1B*

Diplexers, Antenna-1900

Alford Mfg. Co., P.O. Box 2116, 32 Sixth Rd., Woburn, MA 01888 .617-935-8610
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 703-321-9625
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
† Eaton Corp., A.I.L. Div., Comac Rd., Deer Park, NY 11729 516-595-3094
† Eaton Corp., Microwave Comps. Div., 783 Palomar Ave., Sunnyvale, CA 94086 408-245-6810
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3300
† Metropole Products Inc., P.O. Box 10275, Alexandria, VA 22310 ...703-971-8606; 703-971-7082
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
Microwave Development Labs., 10 Michigan Dr., Natick, MA 01760 617-655-0060
§† Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844
† Wavecom, 9036 Winnetka Ave., Northridge, CA 91324 818-882-3010

Direction Finders (MIL), High Frequency-3475

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† Instru-Lec, 520 Homestead Ave., Mt. Vernon, NY 10550 914-668-3754
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
OAR Corp., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121 619-453-4013
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Direction Finders (MIL), Radio-3475

† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
OAR Corp., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121 619-453-4013
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

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† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
OAR Corp., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121 619-453-4013
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050

Discharge Systems, Energy-4000

Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100
Pulsar Products Div., 2700 Merced St., San Leandro, CA 94577 415-577-7236
Simmonds Precision, P.O. Box 310, Norwich, NY 13815 607-335-5000
U.S. Scientific Instrs., 61 North Beacon St., Boston, MA 02134 617-787-2411
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050 408-727-7370

Discriminators-1900

† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 ....1A•1359

† **Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377, 212-424-7500 ....1A•1361**
† **McCoy Electronics Co., Sub. Oak Technology Inc., 100 Watts St., P.O. Box B, Mt. Holly Springs, PA 17065, 717-486-3411 ....1A•1379**
† **Microsonics Inc., 60 Winter St., Weymouth, MA 02188, 617-337-4200 ....1A•1383**
Piezo Technology Inc., 2525 Shader Rd., Orlando, FL 32804, 305-298-2000 ....1A•1406
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013, 717-243-5929 ....1A•1415
Sokol Crystal Prods. Inc., 121 Water St., Mineral Point, WI 53565, 608-987-3363 ....1A•1425
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§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
CTS Knights, 400 Reimann Ave., Sandwich, IL 60548 815-786-8411
Damon/Elctrns. Div., 80 Wilson Way, Westwood, MA 02090 617-449-0800
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
† General Optronics, 3005 Hadley Rd., So. Plainfield, NJ 07080 201-549-9000
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† Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663 714-759-2411
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Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
† Piezo Crystal, 100 "K" St., Box 619, Carlisle, PA 17013 717-249-2151
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Disks, Computer Memory — See Memory Systems, Disk (Vol. 3)

Disks, Magnetic, 5¼" Flexible-2000

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§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 619-566-3911
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 408-988-3472
§ Electric Switches, Inc., 2478 Fletcher Dr., Los Angeles, CA 90039 213-660-1310
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Hitachi America, Ltd., 59 Route 17 South, Allendale, NJ 07401 201-825-8000
§ Micro Peripherals Inc., 9754 Deering Ave., Chatsworth, CA 91311 213-709-4202
Nashua Corp., 44 Franklin St., Nashua, NH 03061 603-880-2889
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 415-962-0224
§ TEAC Corp. of America, Indl. Prod. Div., 7733 Telegraph Rd., Montebello, CA 90640 213-726-0303
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§ Verbatim Corp., 323 Soquel Way, Sunnyvale, CA 94086 408-245-4400

Disks, Magnetic, 8" Flexible-2000

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Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 408-988-3472
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Micro Peripherals Inc., 9754 Deering Ave., Chatsworth, CA 91311 213-709-4202
Nashua Corp., 44 Franklin St., Nashua, NH 03061 603-880-2889
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
§ Verbatim Corp., 323 Soquel Way, Sunnyvale, CA 94086 408-245-4400

Disks, Magnetic, Front-loading Cartridge-2000

§ BASF Sys., Crosby Dr., Bedford, MA 01730 ....617-271-4000;800-343-4600
§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 619-566-3911
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 408-988-3472
§ Electric Switches, Inc., 2478 Fletcher Dr., Los Angeles, CA 90039 213-660-1310
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Nashua Corp., 44 Franklin St., Nashua, NH 03061 603-880-2889
Vermont Resch. Corp., Precision Pk., N. Springfield, VT 05150 802-886-2256

Disks, Magnetic, Pack-2000

§ BASF Sys., Crosby Dr., Bedford, MA 01730 ....617-271-4000;800-343-4600
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 408-988-3472
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Nashua Corp., 44 Franklin St., Nashua, NH 03061 603-880-2889

Disks, Magnetic, Sub-4"-2000

Micro Peripherals Inc., 9754 Deering Ave., Chatsworth, CA 91311 213-709-4202
TEAC Corp. of America, Indl. Prod. Div., 7733 Telegraph Rd., Montebello, CA 90640 213-726-0303

Disks, Magnetic, Top-loading Cartridge-2000

§ BASF Sys., Crosby Dr., Bedford, MA 01730 ....617-271-4000;800-343-4600
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 408-988-3472
§ Electric Switches, Inc., 2478 Fletcher Dr., Los Angeles, CA 90039 213-660-1310
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Nashua Corp., 44 Franklin St., Nashua, NH 03061 603-880-2889

Disks, Magnetic, Winchester Module-2000

Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Computer System Assocs., 7562 Trade St., San Diego, CA 92121 619-566-3911
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 408-988-3472
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Hitachi America, Ltd., 59 Route 17 South, Allendale, NJ 07401 201-825-8000
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 415-962-0224
Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
TEAC Corp. of America, Indl. Prod. Div., 7733 Telegraph Rd., Montebello, CA 90640 213-726-0303
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Disks, Memory, Flexible — See Memory Systems, Disk, Flexible (Vol. 3)

Disks, Optical Encoder — See Encoders, Shaft Angle, Optical (Vol. 1B)

Dispensers, Adhesive-1600 — *See Vol. 2*

Dispensers, DIP & IC — See Machines, Component Handling (Vol. 3)

Dispensers (MIL), Chaff-3475

† Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000

Dispensers (MIL), Drone, Chaff/IR-3475

Dispensers (MIL), IR Flare-3475

Dispensers (MIL), Wing Chaff-3475

Dispenser Sets (MIL)-3475

Dispensing Pods (MIL), Chaff-3475

† Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000

Display Power Supplies — See Converters, DC to DC (Vol. 3), Power Supplies, AC Output (Vol. 3),

Displays, CRT-5700 — *See Vol. 1A*

Displays, Dot Matrix-2450 — *See Vol. 1B*

Displays, Edge Lighted & Back Lighted-2450 — *See Vol. 1B*

Displays, Electroluminescent-2450 — *See Vol. 1B*

Displays, Electromagnetic-2450 — *See Vol. 1B*

Displays, Electromechanical-2450 — *See Vol. 1B*

Displays, Fiber Optic-2450 — *See Vol. 1B*

Displays, Graphic-2450 — *See Vol. 1B*

Displays, Indicator Lights-2450 — *See Vol. 1B*

Displays, Graphic Systems-2000

Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001, 214-233-6631 ....3•1096
Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
§† Aydin Controls, 414 Commerce Dr., Ft. Washington, PA 19034 215-542-7800
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Densitron Corp., 20775 Western Ave., Torrance, CA 90501 213-618-9647
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
† Hallmark Nameplate, Inc./Electropanel Co., 1855 New Highway, Farmingdale, NY 11735 516-454-0700
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.

Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
KMC Systems Inc., 140 Greenwood Ave. (Bldg. 3), Midland Pk., NJ 07432 201-447-0007
Lexidata Corp., 755 Middlesex Tpke., Billerica, MA 01865 ..... 617-663-8550; 800-472-4747
§ LogE/Spatial Data Sys., 508 S. Fairview, Goleta, CA 93017 805-967-2383
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Metra Instrs., 2056 Bering Dr., San Jose, CA 9513† 408-297-8530
New Media Graphics Corp., 279 Cambridge St. , Burlington, MA 01803 617-272-8501
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
§ PlasmaGraphics Corp., 141 Mount Bethel Rd., P.O. Box 4903, Warren, NJ 07060 201-757-5000
§ Ramtek, 2211 Lawson Lane, Santa Clara, CA 95050 408-988-2211
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Show 'N Tell Products, AMG, Inc., 155 Franklin Street, Dayton, OH 45402 513-223-8211
† UCE, Inc., 24 Fitch St., Norwalk, CT 06855 203-838-7509
Vidco, P.O. Box 25452, Portland, OR 97225 503-292-4104

Displays, Laser-2450 — *See Vol. 1B*

Displays, Light-emitting Diode (LED)-2450 — *See Vol. 1B*

Displays, Lighted Segment-2450 — *See Vol. 1B*

Displays, Liquid Crystal (LCD)-2450 — *See Vol. 1B*

Displays, Planar Gas Discharge-2450 — *See Vol. 1B*

Displays, Plasma-2450 — *See Vol. 1B*

Displays, Projection Type (CRT; Electromechanical; ilm; Light Valve)-2450 — *See Vol. 1B*

Displays, Status-2450 — *See Vol. 1B*

Displays, Storage Tube — See Displays, CRT (Vol. 1A)

Displays, Touch Sensitive (Infrared & Membrane)-2450 — *See Vol. 1B*

Displays, Tube — See Tubes, Readout (Vol. 1A)

Displays, Vacuum Fluorescent-2450 — *See Vol. 1B*

Display Sets (MIL), Computer-3475

† Custom Prods. Grp., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301 215-648-2241
Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Show 'N Tell Products, AMG, Inc., 155 Franklin Street, Dayton, OH 45402 513-223-8211
† Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201 818-244-6541

Dissipators, Heat — See Heat Sinks, Semiconductor (Vol. 2), Heat Sinks, Soldering (Vol. 2),

Distortion Analyzers, Indicators — See Analyzers, AF (Vol. 3)

Dividers, Analog-3130 — *See Vol. 1A*

Dividers, Frequency-3450 — *See Vol. 1A*

Dividers, Power (LF, HF, VHF, UHF)-3450 — *See Vol. 1A*

Dividers, Power, Microwave-3450 — *See Vol. 1A*

Dividers, Voltage-2900 (Also See Networks, Resistance; Transformers, Voltage Dividing)

§ Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204, 414-671-2000 ..... 1A•1799,1801
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 ..... 3•1507
Caddock Electronics, Inc., 1717 Chicago Ave., Riverside, CA 92507, 714-788-1700 ..... 1A•1809,1820,1821
EECO Incorporated, 1601 E. Chestnut Ave., P.O. Box 659, Santa Ana, CA 92702-0659, 714-835-6000 ..... 1B•1613
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ..... 3•1298
† HyComp Inc., 75 Union Ave., Box 377, Sudbury, MA 01776, 617-443-4631 ..... 1A•1874
ITT Jennings, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, 408-292-4025 ..... 3•1247
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ..... 3•1250
K & M Elctrns., 123 Interstate Dr., W. Springfield, MA 01089, 413-781-1350 ..... 1A•1883
§ Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076, 312-675-2600 ..... 1A•1916
Ohmtek, Inc., 2160 Liberty Dr., Niagara Falls, NY 14304, 716-283-4025 ..... 1A•1920
† Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008, 408-377-4621 ..... 1B•1472
† Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ..... 3•1298
Stantard Energy, Div. WBH Scientific, Inc., Rte. 32, Greenville, NY 12083, 518-966-4197 ..... 3•1778
Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 ..... 1B•1755
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 ..... 3•1309
TRW Resistive Products Div., TRW Electronic Components Grp., 401 N. Broad St., Philadelphia, PA 19108, 215-922-8900 ..... 1A•1944,1972
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355, 215-644-1300 ..... 1A•2008
§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
§† Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Coast Coil Co., 5333 W. Washington Blvd., Los Angeles, CA 90016 213-936-6188
§ Dale Electronics, Inc., Norfolk Div., 2300 Riverside Blvd., Norfolk, NE 68701 402-371-0080
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§† Digitran Co., 3100 New York Dr., Pasadena, CA 91107 818-791-5600
Electrical Standards Div., E.S.R.S., Inc., 7337 Greenbush, N. Hollywood, CA 91605 818-765-4224
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Gamble, Charles T., Inds., 605 Perkins La., Delanco, NJ 08075 609-461-1900
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
Jordan Elec., 2380 Camino Vida Roble, Carlsbad, CA 92008 619-438-6876
KDI Electronics, Inc., 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-8100
Kelvin, 5919 Noble Ave., Van Nuys, CA 91411 818-782-6662
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
† Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 201-748-5089
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
Pearson Elctrns., 1860 Embarcadero Rd., Palo Alto, CA 94303 415-494-6444
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
Pulsar Products Div., 2700 Merced St., San Leandro, CA 94577 415-577-7236
§† RCD Components, Inc., 330 Bedford St., Manchester, NH 03101 603-669-0054
Shalltronix Corp., Preston St., P.O. Box 235, Selma, NC 27576 919-965-6346
Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280
Thickfilm Int'l., Rt. 1-Box 85-0, Indian Head, MD 20640 301-375-8666
§ THORN EMI Gencom Inc., 23 Madison Rd., Fairfield, NJ 07006 516-433-5900
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Doublers, Frequency — See Multipliers, Frequency (Vol. 1A)

Doublers, Voltage-4800 (Also See Rectifiers, Bridges & Assemblies) — *See Vol. 1A*

Down Converters-3400

§ Dexcel, Div. of Gould, 2285C Martin Ave., Santa Clara, CA 95050 408-727-9833
† Eaton Corp., Microwave Comps. Div., 783 Palomar Ave., Sunnyvale, CA 94086 408-245-6810
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844

Drafting Machines-4200 — *See Vol. 2*

Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Incl. Lettering)-4200 — *See Vol. 2*

Drawers, Sliding-1400 — *See Vol. 2*

Drills & Accessories, Manual & Power-5400 — *See Vol. 2*

Drives, Disc, Flexible and Rigid-2000

Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131, 408-946-6000 ..... 3•1068
Chrislin Inds., 31352 Via Colinas, Westlake Village, CA 91361 213-991-2254
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ Innotronics, Brooks Rd., Lincoln, MA 01773 617-678-8720
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 415-962-0224
Power-One, Inc., Power-One Dr., Camarillo, CA 93010 805-484-2806

POWR-UPS Corp., 50 Orville Drive, Bohemia, NY 11716 516-567-9620
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900

Drivers & Decoders For Readouts-2450 — *See Vol. 1B*

Drivers, Chopper-1100

Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Icon, 156 Sixth St., Cambridge, MA 02142 617-868-5400
Metis, P.O. Box 1499, Bowie, MD 20716 301-249-1702
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 617-843-5000
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257

Drivers, Nut-5400 — *See Vol. 2*

Drivers, Solenoid-4550 — *See Vol. 1B*

Drivers, Speaker-1300

AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
§ ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 201-641-3650
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§† Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443
§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286
MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400
§† Oaktron Inds., 1000 30th St., Monroe, WI 53566 608-328-5560
§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Drivers, Switch-3450 — *See Vol. 1A*

Drivers, Tube — See Drivers & Decoders for Readouts (Vol. 1B)

Drives & Drive Mechanisms (Dial)-2400 — *See Vol. 2*

Drives/Subsystems, Core Disk Emulator-2000

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468

Drives/Subsystems, Disk, 3½ Diskette-2000

Drives/Subsystems, Disk, 5¼″ Diskette-2000

Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131, 408-946-6000 3-1068
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900

Drives/Subsystems, Disk, 5¼″ Winchester-2000

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911
Davong Systems, Inc., 217 Humboldt Ct., Sunnyvale, CA 94089 408-734-4900
DMA Sys., 601 Pine St., Goleta, CA 93117 805-683-3811
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Remex, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714 714-957-0039
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Drives, Subsystems, Disk, 8″ Diskette-2000

Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Drives/Subsystems, Disk, 8″ Winchester-2000

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Computer Dynamics, 105 S. Main St., Greer, SC 29651 803-877-7471
Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Remex, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714 714-957-0039
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
§ Vector Electronic Co., Inc., 12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342 818-365-9661
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

Drives/Subsystems, Disk, 14″ Winchester-2000

Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900

Drives/Subsystems, Disk, Fixed-2000

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
§ Pertec Peripherals Corp., P.O. Box 2198, Chatsworth, CA 91311 818-882-0030
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
Vermont Resch. Corp., Precision Pk., N. Springfield, VT 05150 802-886-2256

Drives/Subsystems, Disk, Fixed/Removable-2000

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Computer System Assocs., 7562 Trade St., San Diego, CA 92121 ..619-566-3911
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Pertec Peripherals Corp., P.O. Box 2198, Chatsworth, CA 91311 818-882-0030
Vermont Resch. Corp., Precision Pk., N. Springfield, VT 05150 802-886-2256

Drives/Subsystems, Magnetic Tape, ¼″ Cartridge-2000

Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
§ Analog & Digital Peripherals, Inc. (ADPI), 815 Diana Dr., Troy, OH 45373 513-339-2241
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Cipher Data Prods., Inc., P.O. Box 85170, San Diego, CA 92138 619-578-9108
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071

§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digi-Data Corp., 8580 Dorsey Run Rd., Jessup, MD 20794 301-498-0200
§ Dylon Data Corp., 9561 Ridgehaven Ct., San Diego, CA 92123 619-292-5584
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 414-673-6800
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900

Drives/Subsystems, Magnetic Tape, Cassette-2000

PHI Technologies, Inc., 4605 North Stiles, Oklahoma City, OK 73105, 405-521-9000 ...... 3•1090
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
§ Analog & Digital Peripherals, Inc. (ADPI), 815 Diana Dr., Troy, OH 45373 513-339-2241
§ Braemar Computer Corp., 11950 Twelfth Ave. S., Burnsville, MN 55337 612-890-5135
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Data Capture Technology, 5436-F South Mingo Rd., Tulsa, OK 74146 918-627-7521
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067 312-358-4622
Kogyosha, 179 Riveredge Rd., Tenafly, NJ 07670 201-569-8769
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
§ TEAC Corp. of America, Indl. Prod. Div., 7733 Telegraph Rd., Montebello, CA 90640 213-726-0303

Drives/Subsystems, Magnetic Tape, Reel-to-Reel-2000

† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518, 219-848-5233 ...... 3•1050,1051
Accardi Laboratories, 66-45 69th St., Middle Village, NY 11379 212-326-0570
Cipher Data Prods., Inc., P.O. Box 85170, San Diego, CA 92138 619-578-9108
Data Capture Technology, 5436-F South Mingo Rd., Tulsa, OK 74146 918-627-7521
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digi-Data Corp., 8580 Dorsey Run Rd., Jessup, MD 20794 301-498-0200
§ Dylon Data Corp., 9561 Ridgehaven Ct., San Diego, CA 92123 619-292-5584
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§ Pertec Peripherals Corp., P.O. Box 2198, Chatsworth, CA 91311 818-882-0030
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Drives/Subsystems, Semiconductor Emulator-2000

Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663

Dry Transfer Letters & Numbers — See Kits, Marking (Vol. 2)

Ducts, Wiring-6000 — *See Vol. 2*

Dummy Loads, Electronic-2900

† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706, 516-231-8400 ...... 1A•1689
† Electro Impulse, Box 870, Red Bank, NJ 07701-0870, 201-741-0404 ...... 3•1220
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ...... 1A•1774
Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 ...... 3•1783
Transistor Devices, 274 S. Salem St., Randolph, NJ 07869, 201-361-6622 ...... 3•1312,1313
† Airtron, 200 E. Hanover Ave., Morris Plains, NJ 07950 201-539-5500
† Alan Inds., P.O. Box 1203, Columbus, IN 47201 812-372-8869
Alford Mfg. Co., P.O. Box 2116, 32 Sixth Rd., Woburn, MA 01888 617-935-8610
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
§ Astrolab, 345 Dalziel Rd., Linden, NJ 07036 201-862-0022
Automatic Connector, Inc., 400 Moreland Rd., Commack, NY 11725 516-543-5000
† Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
Carborundum Co., Electric Prods. Div., Box 339, Niagara Falls, NY 14302 716-278-2383
§ CES Elctrns., 2968 Avenue Z, Brooklyn, NY 11235 ......
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
Compac, 279 Skidmore Rd., Deer Park, NY 11729 516-667-3933
† Connecticut Microwave Corp., 106 Powder Mill Rd., Box 389, Canton, CT 06019 203-693-4247
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
§ Dielectric Communications, General Signal, Tower Hill Rd., Raymond, ME 04071 ...... 207-655-4555;800-341-9678
† Elcom Systems, Inc., 4032 Clint Moore Rd., Boca Raton, FL 33431 305-994-1774
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
§† EMC Technology Inc, 1971 Old Cuthbert Rd., Cherry Hill, NJ 08034 609-429-7800
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
† Ferro Ceramic Grinding, Inc., 247 Water St., Wakefield, MA 01880 617-245-1833
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
M/A-COM Millimeter Prods., Inc., South Ave., Burlington, MA 01803 617-272-3000
§† M/A-COM Omni Spectra, Inc., 21 Continental Blvd., Merrimack, NH 03054 603-424-4111
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
† Micro Mode Prods., 1870 John Towers Ave., El Cajon, CA 92020 619-449-3844
§† Micronetics, 36 Oak St., Norwood, NJ 07648 201-767-1320
§ Microwave Development Labs., 10 Michigan Dr., Natick, MA 01760 617-655-0060
§† Microwave Filter Inc., 6743 Kinne St., East Syracuse, NY 13057 ...... 315-437-4529; 800-448-1666
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
† Norsal Inds., 85 D Hoffman Lane So., Central Islip, NY 11722 516-234-1200
§ Ohmite Mfg. Co., 3601 W. Howard St., Skokie, IL 60076 312-675-2600
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
Quartzite Processing, Inc., 6 Holyoke St., Malden, MA 02148 617-322-1380
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
Sivers Lab, Box 90339, Los Angeles, CA 90009 213-390-7477
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760
† Torotel Prods. Inc., 13402 S. 71 Hwy., Grandview, MO 64030 816-761-6314
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
§† Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Dummy Loads, Microwave-2900

JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844

Dummy Loads, Power-2900

Milwaukee Resistor Corp., 700 W. Virginia St., Milwaukee, WI 53204, 414-271-9900 ...... 1A•1901
Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 ...... 3•1783
JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875

Dummy Loads, Resistive-2900

Milwaukee Resistor Corp., 700 W. Virginia St., Milwaukee, WI 53204, 414-271-9900 ...... 1A•1901
JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Dummy Loads (MIL), RF-2440 — *See Vol. 1B*

Duplexers, Microwave-3400

† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Junction Devices, Inc., 2488-A Townsgate Rd., Westlake Village, CA 91361-2594 ...... 213-889-4030;805-497-4421
K&L Microwave, Inc., 408 Coles Circle, Salisbury, MD 21801 301-749-2424
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
M/A-COM Millimeter Prods., Inc., South Ave., Burlington, MA 01803 617-272-3000
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
§ Microwave Development Labs., 10 Michigan Dr., Natick, MA 01760 617-655-0060
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800
† UTE Microwave, 3500 Sunset Ave., Asbury Park, NJ 07712 201-922-1009
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Duplexers, Nonmicrowave-1900

K&L Microwave, Inc., 408 Coles Circle, Salisbury, MD 21801 301-749-2424
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Duplicators, Magnetic Tape-1300

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ...... 516-435-2808;800-DIAL EDL; 800 342-5335
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 219-848-5233

§ Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 914-965-6906
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 914-764-4613

Dust Covers — See Covers, Protective (Vol. 2)

DVMs — See Meters, Volt, Digital (Vol. 3)

Earphones — See Headphones (Vol. 3)

Earth Stations, TV, Receive Only-1900

Andrew Corp., 10500 W. 153rd St., Orland Pk., IL 60462 312-349-3300
Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
Drake, R. L., Co., 540 Richard St., Miamisburg, OH 45342 513-866-2421
International Crystal Mfg., 10 N. Lee, P.O. Box 26330, Oklahoma City, OK 73126 405-236-3741
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000

Editing Equipment, Tape-1300

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§ Data Specialties, Inc., 3455 Commercial Ave., Northbrook, IL 60062 312-564-1800
§ EECO Incorporated, 1601 E. Chestnut Ave., P.O. Box 659, Santa Ana, CA 92702-0659 714-835-6000
§ Microtran Co. Inc., 145 E. Mineola Ave., Valley Stream, NY 11582 ..516-561-6050
† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300

Ejectors & Extractors, PC Boards — See Pullers, Circuit Board (Vol. 2)

Elastomers, Conductive — See Conductive Elastomers (Vol. 2)

Elastomers, Heat Shrinkable — See Caps, Forms & Tapes, Heat Shrinkable (Vol. 2)

Electret — See Microphones, Condenser (Vol. 3)

Electrical Measurement & Test Services — See Services, Electrical Measurement & Test (Vol. 3)

Electrodes, Electroplating — See Electroplating Equipment & Supplies (Vol. 3)

Electrodes, High Voltage-2900

§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100

Electronic Counter Countermeasures (ECCM) Fixes (MIL)-3475

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Magnavox Advanced Prods. & Sys. Co., Magnavox Govt. Indl. Elctrns. Co., 2829 Maricopa St., Torrance, CA 90503 213-618-1200
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Optical & Conductive Coatings, Meridian Inds., Inc., 428 N. Buchanan Cir., , Pacheco, CA 94553 415-798-6066
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Electronic Countermeasures (ECM) (MIL), Cruise Missiles-3475

† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050

ECMs (MIL), Torpedo Defense-3475

† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

ECM Sets (MIL)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

ECM Sets (MIL), Close Air Support-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050

ECM Sets (MIL), Shipboard-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

ECM Systems (MIL)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

ECM Systems (MIL), Deceptive-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

Electronic Intelligence (Elint) (MIL)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Electronic Loads — See Dummy Loads (Vol. 3)

Electronic Support Measures (ESM) Sets (MIL)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

ESM (MIL), Digitally Controlled-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

ESM (MIL), Ships-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

ESM Suites (MIL)-3475

† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

ESM Systems (MIL), Automated-3475

† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

ESM Systems (MIL), IFM Receiver-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880

Electronic Warfare (EW) Sets (MIL)-3475

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

EW Sets (MIL), Ground Multitarget-3475

Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414

EW Sets (MIL), Portable-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

EW Suites (MIL), Ships-3475

Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000

EW Systems (MIL), Advanced Airborne Multitarget-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

Electroplating Equipment & Supplies-4100

Auric Corp., 470 Frelinghuysen Ave., Newark, NJ 07114 201-242-4100
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 516-654-1197
Corning Glass Works, Corning Elctrns., Houghton Pk., Bldg. A-2, Corning, NY 14830 607-974-9000
† DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 302-773-3218
Dynatronix, Inc., 105 Power St., Amery, WI 54001 ....715-268-8118;800-826-7172
† Engelhard Corp., 70 Wood Ave. S., Iselin, NJ 08830 201-321-5900
Fidelity Chem. Prods. Corp., 472 Frelinghuysen Ave., Newark, NJ 07114 201-242-4110
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
† M & T Chemicals Inc., Woodbridge Rd. & Randolph Ave., Rahway, NJ 07065 201-499-0200
§ Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 301-490-9860
Pennwalt Corp., Three Pkwy., Philadelphia, PA 19102 215-587-7000
Sel-Rex Div., OMI Intl. Corp., 75 River Rd., Nutley, NJ 07110 201-667-5200
Technic, Inc., Box 965, Providence, RI 02901 401-781-6100

Electrostatic Discharge Guns — Also See Generators, ESD-2900

Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 201-753-7988
Compliance Design Inc., 593 Massachusetts Ave., Boxboro, MA 01719 617-264-4668
† Electro-Tech Sys., Inc., 35 E. Glenside Ave., Glenside, PA 19038 215-887-2196
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
§ Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171

Electrostatic Discharge (MIL)-2440 — *See Vol. 1B*

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Emitter Location & Identification System (MIL), Automatic Ground Transportable-3475

† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Emitters, Fiber Optic-2475 (Also See Diodes, Laser) — *See Vol. 1B*

Emulators, RTS-2900

American Automation, 14731 Franklin Avenue, Tustin, CA 92680 714-731-1661
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
Signum Sys., 726 Santa Monica Blvd., Santa Monica, CA 90401 213-451-5382
Thorson Engrg. Co., 6225 76th St. S.E., Snohomish, WA 98290 206-334-4214
§ Zax Corp., 2572 White Rd., Irvine, CA 92714 ....714-474-1170;800-421-0982

Encapsulating Materials — See Compounds, Encapsulating, Molding, Potting (Vol. 2)

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Enclosures, Equipment & Panel Mounting-1400 — *See Vol. 2*

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Enclosures, Nonmetallic-1400 — *See Vol. 2*

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Encoders, Fiber Optic-2475 — *See Vol. 1B*

Encoders, Magnetic Strip-5500 — *See Vol. 1B*

Encoders, Proof-2000

Litton Encoder Div., 20745 Nordhoff St., Chatsworth, CA 91311 818-341-6161

Encoders, Shaft Angle, Contacting-5500 — *See Vol. 1B*

Encoders, Shaft Angle, Magnetic-5500 — *See Vol. 1B*

Encoders, Shaft Angle, Optical-5500 — *See Vol. 1B*

Encoders, Shaft Position — See Encoders, Shaft Angle (Vol. 1B), Resolvers, Synchro (Vol. 3),

Encoders, Tone-1900

Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830, 617-374-0761 ....1A•1624
§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Data Signal Corp., 149 California St., Newton, MA 02158 617-926-5080
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
§† Intersil, 10710 N. Tantau Ave., Cupertino, CA 95014 408-996-5000
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ SYT, 1220 Barranca, El Paso, TX 79935 915-593-1234
§ Teltone, 10801-120 Ave. NE, Kirkland, WA 98033 206-827-9626

Engineering Reference Books — See Technical Books (Vol. 3)

Energy Management Systems-2200

Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 415-964-3200

Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Base Ten Sys., One Electronics Dr., Box 3151, Trenton, NJ 08619 609-586-7010
Consumertronics, 2011 Crescent Dr., Alamogordo, NM 88310 505-434-0234
Data Signal Corp., 149 California St., Newton, MA 02158 617-926-5080
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
§ Delta Prods., Box 1147, Grand Junction, CO 81501 303-242-9000
Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
† Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
§ Industrial Computer Designs, Inc., 31121 Via Colinas .1005, Westlake Village, CA 91362 818-889-3179
§ Lutron Elctrns., Box 205, Suter Rd., Coopersburg, PA 18036 215-282-3800
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 914-693-9001
Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
§ Poly-Scientific, 1213 N. Main St., Blacksburg, VA 24060 703-552-3014
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
§ Solid State Systems, 1990 Delk Industrial Blvd., Marietta, GA 30067 404-952-9401
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403 513-253-1191
TANO Corp., 4301 Poche Ct., New Orleans, LA 70129 504-254-3500
§ Vermont Automation Co., Inc., 18 Morse Dr., Essex Junction, VT 05452 802-879-7571
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200

Environmental Testing Services — See Services, Environmental Testing (Vol. 3)

Epoxies — See Compounds, Enscapsulating, Molding, Potting (Vol. 2), Adhesives (Vol. 2),

Equalizers, Audio-1300

Allen Avionics, 224 E. 2nd St., Mineola, NY 11501 516-248-8080
† Alpha Comps., 1106 E. Simpson Rd., Mechanicsburg, PA 17055 717-697-8595
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
† BG Elctrns., 30 South St., Mt. Vernon, NY 10551 914-664-5591
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
† ESC Elctrns. Corp., 534 Bergen Blvd., Palisades Pk., NJ 07650 201-947-0400
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
† Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
§ Furman Sound, Inc., 30 Rich St., Greenbrae, CA 94904 415-927-1225
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Hisonic, Inc., 249 N. Troost, P.O. Box 1130, Olathe, KS 66061-1130 913-782-0012
International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067 312-358-4622
Kappa Networks, 165 Roosevelt Ave., Carteret, NJ 07008 201-541-1600
§ Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
§ Paccom, 3928 148th NE, Redmond, WA 98052 ....206-883-9200;800-426-6254
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Rockwell Filter Prods., 2990 Airway Ave., Costa Mesa, CA 92626 714-540-7640
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 914-965-6906
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064 213-478-8224
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900

Equalizers, Delay-1900

Allen Avionics, 224 E. 2nd St., Mineola, NY 11501, 516-248-8080 ....1A•1582
† Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377, 212-424-7500 ....1A•1361
KR Electronics, Inc., 91 Avenel St., Avenel, NJ 07001, 201-636-1900 ....1A•1601
† Alpha Comps., 1106 E. Simpson Rd., Mechanicsburg, PA 17055 717-697-8595
† BG Elctrns., 30 South St., Mt. Vernon, NY 10551 914-664-5591
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
Convex Corp., P.O. Box 17225, Dulles Intl. Airport, Washington, DC 20041 703-661-8900
† Data Delay Devices, 385 Lakeview Ave., Clifton, NJ 07011 201-772-1106
† ESC Elctrns. Corp., 534 Bergen Blvd., Palisades Pk., NJ 07650 201-947-0400
† Hisonic, Inc., 249 N. Troost, P.O. Box 1130, Olathe, KS 66061-1130 913-782-0012
† Integrated Microwave, 11526 Sorrento Valley Rd., San Diego, CA 92121 619-457-0277
Kappa Networks, 165 Roosevelt Ave., Carteret, NJ 07008 201-541-1600
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Rockwell Filter Prods., 2990 Airway Ave., Costa Mesa, CA 92626 714-540-7640
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064 213-478-8224
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Equalizers, Phase-1900

† Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377, 212-424-7500 ....1A•1361
† Hisonic, Inc., 249 N. Troost, P.O. Box 1130, Olathe, KS 66061-1130, 913-782-0012 ....1A•2175
KR Electronics, Inc., 91 Avenel St., Avenel, NJ 07001, 201-636-1900 ....1A•1601
Allen Avionics, 224 E. 2nd St., Mineola, NY 11501 516-248-8080
† Alpha Comps., 1106 E. Simpson Rd., Mechanicsburg, PA 17055 717-697-8595
† BG Elctrns., 30 South St., Mt. Vernon, NY 10551 914-664-5591
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
Convex Corp., P.O. Box 17225, Dulles Intl. Airport, Washington, DC 20041 703-661-8900
† Eaton Corp., A.I.L. Div., Comac Rd., Deer Park, NY 11729 516-595-3094
† ESC Elctrns. Corp., 534 Bergen Blvd., Palisades Pk., NJ 07650 201-947-0400
† Integrated Microwave, 11526 Sorrento Valley Rd., San Diego, CA 92121 619-457-0277
Kappa Networks, 165 Roosevelt Ave., Carteret, NJ 07008 201-541-1600
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
† Rockwell Filter Prods., 2990 Airway Ave., Costa Mesa, CA 92626 714-540-7640
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064 213-478-8224
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Erasers, Magnetic Tape (Bulk)-1300

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§† Benjamin electroproducts, inc., Robins Div., 80 Smith St., Farmingdale, NY 11735 516-293-7744
§ Duotone, 6875 S.W. 81st St., S. Miami, FL 33143 305-665-1121
§ Hammond Mfg. Co., 1690 Walden Ave., Buffalo, NY 14225 716-894-5710
§ Microtran Co. Inc., 145 E. Mineola Ave., Valley Stream, NY 11582 516-561-6050
§ Wide Range Elctrns. Corp., 2119 Schultz Rd., St. Louis, MO 63141 314-567-5366

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Etchants, Fluorocarbon-1600 — *See Vol. 2*

Etchants, Printed Circuit-1700 — *See Vol. 2*

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Evaporation Equipment, Electron Beam-4100

§ Alzbear Corp., 15411 Red Hill Ave., Unit F, Tustin, CA 92680 714-557-0910
CHA Industries, 3565 Haven Avenue, Menlo Park, CA 94025 415-363-8011
† Corning Glass Works, Corning Elctrns., Houghton Pk., Bldg. A-2, Corning, NY 14830 607-974-9000
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
Jori Resources, 2128 Knoll Dr., Ventura, CA 93003 805-642-2266
Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923 617-777-5102
KSI, 33 Cherry Hill Dr., Danvers, MA 01923 617-777-5102
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300

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Expanders, Data-3475

§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972

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Eyelets-2825 — *See Vol. 2*

Fabrics, Conductive-4525 — *See Vol. 2*

Facsimile Equipment, Receive Only-1900

† Alden Elctrns., Washington St., Westboro, MA 01581 617-366-8851
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780

Facsmile Equipment, Send Only-1900
† Alden Elctrns. Inc., Washington St., Westboro, MA 01581 617-366-8851
Noble U.S.A., Inc., 151 Stanley St., Elk Grove Vllg., IL 60007 312-364-6038

Facsimile Equipment, Send/Receive-1900
† Magnavox Advanced Prods. & Sys. Co., Magnavox Govt. Indl. Elctrns. Co., 2829 Maricopa St., Torrance, CA 90503 213-618-1200

Fans, Axial-2600 — *See Vol. 2*

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Fasteners, Nonmetallic-2825 — *See Vol. 2*

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Filters, AF-2700 — *See Vol. 1A*

Filters, Air — See Air Cleaners & Filters (Vol. 2)

Filters, Analog — See Filters, Continuously Variable (Vol. 1A)

Filters, Antenna-2700 — *See Vol. 1A*

Filters, Band Elimination-2700 — *See Vol. 1A*

Filters, Bandpass-2700 — *See Vol. 1A*

Filters, Bandpass, SAW (Surface Acoustic Wave)-2700 — *See Vol. 1A*

Filters, Band Reject, Band Stop — See Filters, Band Elimination (Vol. 1A)

Filters, Ceramic-2700 — *See Vol. 1A*

Filters, Coaxial-2700 — *See Vol. 1A*

Filters, Color, Panel Light-2450 — *See Vol. 1B*

Filters, Comb-2700 — *See Vol. 1A*

Filters, Continuously Variable-2700 — *See Vol. 1A*

Filters, Crystal (Incl. Monolithic Devices)-2300 — *See Vol. 1A*

Filters, Digital-2700 — *See Vol. 1A*

Filters, Display-2450 — *See Vol. 1B*

Filters, EMI/RFI-2700 — *See Vol. 1A*

Filters, Equalizer-2700 — *See Vol. 1A*

Filters, Harmonic-2700 — *See Vol. 1A*

Filters, High Pass-2700 — *See Vol. 1A*

Filters, Hybrid-2700 — *See Vol. 1A*

Filters, IF-2700 — *See Vol. 1A*

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Filters, Mechanical-2700 — *See Vol. 1A*

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Filters, Optical-2700 — *See Vol. 1A*

Filters, Programmable — See Filters, Variable (Vol. 1A)

Filters, RF-2700 — *See Vol. 1A*

Filters, Single Sideband-2700 — *See Vol. 1A*

Filters, Synchronous Tracking-2700 — *See Vol. 1A*

Filters, Telemetering-1900
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 ....1A•1327,1588
Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550, 914-664-2333 ....1A•1593
Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385, 212-386-1300 ....1A•2167
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 ....1A•1359
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....1A•1783
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064, 213-478-8224 ....1A•1634
Advanced Filter Devices Inc., 6241 Yarrow Dr., Ste. D, Carlsbad, CA 92008 619-438-2074
† AIE Magnetics, Div. of Vernitron, 701 Murfreesboro Rd., Nashville, TN 37210 615-244-9024
† Alpha Comps., 1106 E. Simpson Rd., Mechanicsburg, PA 17055 717-697-8595
A. P. Circuit Corp., 513 East 86th St., P.O. Box 1350, New York, NY 10028 212-737-1348
† Axel Elctrns., 134-20 Jamaica Ave., Jamaica, NY 11418 212-291-3900
Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
† BG Elctrns., 30 South St., Mt. Vernon, NY 10551 914-664-5591
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
† Cirtech, 15237 Cherry St., Stanley, KS 66223 913-681-2801
Coast Coil Co., 5333 W. Washington Blvd., Los Angeles, CA 90016 213-936-6188
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
§ De Coursey Engrg. Lab., 11828 W. Jefferson, Culver City, CA 90230 ....213-EX7-9668
† Dietz Design, Inc., 100 Electronics Pkwy., Belton, MO 64012 816-331-4911
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
† ESC Elctrns. Corp., 534 Bergen Blvd., Palisades Pk., NJ 07650 201-947-0400
§ EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 ..201-245-3200;800-526-4048
Fogg Sys., 15592 E. Batavia Dr., Aurora, CO 80011 303-344-1883
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
† Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
† Hisonic, Inc., 249 N. Troost, P.O. Box 1130, Olathe, KS 66061-1130 913-782-0012
Junction Devices, Inc., 2488-A Townsgate Rd., Westlake Village, CA 91361-2594 ....213-889-4030;805-497-4421
† K&L Microwave, Inc., 408 Coles Circle, Salisbury, MD 21801 301-749-2424
† KR Electronics, Inc., 91 Avenel St., Avenel, NJ 07001 201-636-1900
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
McCoy Electronics Co., Sub. Oak Technology Inc., 100 Watts St., P.O. Box B, Mt. Holly Springs, PA 17065 717-486-3411
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
† Metropole Products Inc., P.O. Box 10275, Alexandria, VA 22310 ...703-971-8606; 703-971-7082
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Microwave Development Labs., 10 Michigan Dr., Natick, MA 01760 617-655-0060
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 215-355-4443
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
† Piezo Crystal, 100 "K" St., Box 619, Carlisle, PA 17013 717-249-2151
† Polyphase Instr., 175 Commerce Dr., Ft. Washington, PA 19034 215-643-6950
† RFI Corporation, 100 E. Pine Aire Dr., Bay Shore, NY 11706 516-231-6400
† Rockwell Filter Prods., 2990 Airway Ave., Costa Mesa, CA 92626 ...714-540-7640
Sokol Crystal Prods. Inc., 121 Water St., Mineral Point, WI 53565 ..608-987-3363
† Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
† Teledyne Microwave, 1290 Terra Bella Ave., Mountain View, CA 94043 415-968-2211
† Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
† Torotron, 230 E. 7th St., Mt. Vernon, NY 10550 914-664-2050
§† TRW Inductive Products Div., 150 Varick St., New York, NY 10013 .212-255-3500
Vernitron Piezoelectric Div., 232 Forbes Rd., Bedford, OH 44146-5478 216-232-8600
† Wavecom, 9036 Winnetka Ave., Northridge, CA 91324 818-882-3010
Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Filters, Tone, Telegraph-2700 — *See Vol. 1A*

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Filters, Variable-2700 — *See Vol. 1A*

Filters, Vestigial Sideband-2700 — *See Vol. 1A*

Filters, Video-2700 — *See Vol. 1A*

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Flanges, Waveguide-3450 — *See Vol. 1A*

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Flashers-2200

† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 .... 1B•1467
§† Amperite Co., Inc., 600 Palisade Ave., Union City, NJ 07087 201-864-9503
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 ... 203-828-6379
Cole Hersee, 20 Old Colony Ave., Boston, MA 02127-2467 617-268-2100
§ Durakool, 1010 N. Main St., Elkhart, IN 46514 219-264-1116
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Enerco, Inc., 9615 W. Marginal Way S., Seattle, WA 98108 206-762-1422
§ Hughey & Phillips, Inc., 3050 N. California St., Burbank, CA 91504 . 818-849-1104
§ Industrial Devices, Inc., Edgewater, NJ 07020 201-224-4700
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
§ Leecraft Mfg., 21-02 44th Rd., Long Island City, NY 11101 212-392-8800
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 ... 213-452-1336
OAR Corp., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121 619-453-4013
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
Pacific Timer Inc., 21739 N.E. 18th Way, Redmond, WA 98052 206-881-1785
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 .... 201-797-3313; 800-526-5376
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 .... CA 415-965-0910;800-221-7060
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 .... 213-32-Sigma
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Waldom Elctrns., 4301 W. 69th St., Dept. EEM, Chicago, IL 60629 . 312-585-1212
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Flashers (MIL)-2440 — *See Vol. 1B*

Flashlights & Lanterns-4000

§ Rayovac Corporation, 101 E. Washington Ave., Madison, WI 53703, 608-252-7400 .... 3•1423
† Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 602-968-6241
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
§† Union Carbide Corporation, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817 203-794-5300
Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411
§ Wonder Corp of America, 22 Elizabeth St., South Norwalk, CT 06856 203-866-3033

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Furnaces, Electric-4100

† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173
Odell, M. P., Co., 1620 Chesapeake Dr., Hoffman Estates, IL 60195, 312-991-2828 800-633-5526 .... 3•1927
Acme Elec. Heating Corp., 4685 E. 11th, Hialeah, FL 33013 305-685-8326
† Ajax Magnethermic Corp., 1745 Overland Ave., N.E., Warren, OH 44482 216-372-8511
§ Alzbear Corp., 15411 Red Hill Ave., Unit F, Tustin, CA 92680 714-557-0910
Aremco Prods., Box 429, Ossining, NY 10562 914-762-0685
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 . 617-667-4111
§† Casso-Solar, 3 Pearl Ct., Allendale, NJ 07401 201-825-4600
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
§ Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
§† L & L Special Furnace, 166 Kent Rd., Aston, PA 19014 215-459-9216
OAL Assocs., P.O. Box J, Escondido, CA 92025 619-743-7143
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
† Trent, Inc., 201 Leverington Ave., Philadelphia, PA 19127 215-482-5000
§† Wellman Thermal Sys., 1 Progress Rd, Shelbyville, IN 46176 317-398-4411

Furnaces, Gas (Production)-4100

† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 . 617-667-4111
§† Despatch Inds., P.O. Box 1320, Minneapolis, MN 55440 612-331-1873
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 201-867-6500
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 800-628-8862
Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
§† Wellman Thermal Sys., 1 Progress Rd, Shelbyville, IN 46176 317-398-4411

Furnaces, Vacuum-4100

Ceramaseal, Box 25, New Lebanon Center, NY 12126, 518-794-7800 .... 2•1168
† Ajax Magnethermic Corp., 1745 Overland Ave., N.E., Warren, OH 44482 216-372-8511
§ Alzbear Corp., 15411 Red Hill Ave., Unit F, Tustin, CA 92680 714-557-0910
§ Brew, Richard D., & Co., Inc., 90 Airport Rd., Concord, NH 03301 . 603-225-6605
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 201-867-6500
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
§† Wellman Thermal Sys., 1 Progress Rd, Shelbyville, IN 46176 317-398-4411

Furniture, Electronic Lab. — See Benches, Consoles, Stools, Tables (Lab & Shop) (Vol. 2)

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Fuse Elements-4300 — *See Vol. 1B*

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Fuses, Fuseholders, Boxes & Panels (MIL)-2440 — *See Vol. 1B*

Fuses, Thermal-4300 — *See Vol. 1B*

Gauges, Displacement, Linear-5400 — *See Vol. 2*

Gauges, Humidity-2900

Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 .. 215-355-1500

Gauges, Ionization-2900

§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Fredericks Co., Philmont & Anne Sts., Huntingdon Valley, PA 19006 215-947-2500
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 ... 617-272-1313
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300

Gauges, Pressure-2900 (Also See Transducers, Pressure)

EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 ... 3•1331
§ Airmatic-Allied, 185 Park Dr., Wilmington, OH 45177 ... 513-382-1691
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 ... 414-447-8200
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 ... 216-585-5800
§ Bellofram Corp., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803 ... 617-272-2100;800-225-1031
§† Bourns Instrs., Inc., Technical Prods. Grp., 6135 Magnolia Ave., Riverside, CA 92506 ... 714-781-5433
§ Bourns Instrs., Inc., Industrial Div., 1960 Chicago Ave., Unit F, Riverside, CA 92503 ... 714-781-5147
Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 ... 714-987-2511
Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 ... 707-527-5555
§† Electrovert Inc., 399 Executive Blvd., Elmsford, NY 10523 ... 914-592-7322
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 ... 201-227-1002
† Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 ... 203-848-9271
§† Gould Inc., Meas. Sys. Div., 2230 Statham Blvd., Oxnard, CA 93030 ... 805-487-8511
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 ... 203-866-2573
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ... 800-321-5111, Ext. 596
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 ... 914-793-0700
† Kulite Semiconductor Prods. Inc., 1039 Hoyt Ave., Ridgefield, NJ 07657 ... 201-945-3000
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 ... 617-835-1000
§† MKS Instrs., Inc., 22 Third Ave., Burlington, MA 01803 ... 617-272-9255
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
Omega Engrg., Box 4047, Stamford, CT 06907 ... 203-359-1660
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ... 215-355-1500
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 ... 609-662-8000
Sea Data Corp., One Bridge St., Newton, MA 02158 ... 617-244-3216
Setra Systems, Inc., 45 Nagog Park, Acton, MA 01720 ... 617-263-1400
Systonics, Inc., Box 121, Winchester, MA 01890 ... 617-729-4439
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 ... 214-995-6611
† Tro Dyne Corp., 900 Corporate Dr., Mahwah, NJ 07430 ... 201-529-1800
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 ... 818-886-2057
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 ... 516-586-5100
§ Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 ... 513-767-7241

Gauges, Strain-5500 — *See Vol. 1B*

Gauges, Temperature-2900

EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 ... 3•1331
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ... 1B•1735
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 ... 215-828-2490
Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 ... 714-987-2511
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
† Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 ... 203-848-9271
§ Pacific Transducer, 2301 Federal, Los Angeles, CA 90064 ... 213-478-1134
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 ... 216-292-6006
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ... 215-355-1500
Sea Data Corp., One Bridge St., Newton, MA 02158 ... 617-244-3216
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 ... 800-631-3096;201-792-2400
§ Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 ... 707-938-2121

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Gaskets, Shielding, RF-4525 (Also See Shields, RF) — *See Vol. 2*

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Gearheads & Speed Reducers-3500 — *See Vol. 1B*

Gears & Gear Mechanisms (Precision)-2500 — *See Vol. 2*

Generator Groups (MIL), Signal-3475

† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 ... 516-328-1100

Generators, AM-2900

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 ... 3•1258
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 ... 312-889-9087
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 ... 201-584-1077
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 ... 212-255-2940
† Clemens Mfg., 630 So. Berry Rd., St. Louis, MO 63122 ... 314-961-7228
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 ... 516-546-9700
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 ... 214-381-7161
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 ... 516-588-3600
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 ... 516-883-1700
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 ... 617-580-1660
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 ... 516-349-1700
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 ... 516-328-1100
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 ... 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 ... 216-871-7617
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ... 415-676-5000
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 ... 317-787-3332
Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 ... 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 ... 713-729-1183

Generators, AM/FM-2900

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 ... 3•1258
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145, 216-871-7617 ... 3•1291
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 ... 201-584-1077
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 ... 212-255-2940
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 ... 319-395-1000
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 ... 516-546-9700
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 ... 214-381-7161
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 ... 408-263-8100
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 ... 516-588-3600
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 ... 415-856-7600
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 ... 714-635-7210
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 ... 617-580-1660
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 ... 516-349-1700
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 ... 516-328-1100
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 ... 714-833-1234
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 ... 617-938-0900
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 ... 605-339-0100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 ... 714-494-9401
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 ... 317-787-3332
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 ... 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 ... 415-969-6500

Generators, Arbitrary Waveform-2900

Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ... 3•1254
Pacific Micro Sys., Inc., 160 Gate 5 Rd., Sausalito, CA 94965 ... 415-331-2525
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200

Generators, Audio-2900

Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869, 201-584-1077 ... 3•1204
DigiMax Instrs. Corp., 5625 Kearny Villa Rd., San Diego, CA 92123, 619-569-6582 ... 3•1217
Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 ... 3•1029
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ... 3•1252
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 ... 3•1258
A E Corp., 65 Wellesley Ave., Needham, MA 02194 ... 617-449-3142
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 ... 214-620-0021
§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 ... 827-7144
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 ... 617-481-7000
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 ... 516-546-9700
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 ... 408-263-8100
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 ... 415-726-3000
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 ... 516-588-3600
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 ... 312-932-9380
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 ... 617-374-0761

† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 ... 516-794-4500
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ... 312-231-3511; 312-932-9380
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 ... 805-987-9511
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 ... 516-883-1700
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ... 213-515-6432; 800-421-5334
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 ... 617-580-1660
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 ... 516-567-9620
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 ... 516-328-1100
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 ... 914-667-0425
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 ... 216-871-7617
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ... 312-866-2200
Solar Elctrns. Co., 901 N. Highland, Hollywood, CA 90038 ... 213-462-0806
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 ... 714-494-9401
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625 ... 813-855-6611
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 ... 215-844-2626
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 ... 317-787-3332
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 ... 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 ... 713-729-1183
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 ... 415-969-6500

Generators, Bar, Dot & Crosshatch-2900

Quantum Data, Inc., 455 E. Kehoe, Carol Stream, IL 60188, 312-668-3301 ... 3•1289
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 ... 312-889-9087
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 ... 303-444-3972
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 ... 314-243-3147
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 ... 215-343-5900
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 ... 605-339-0100
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Visual Info. Institute, Box 33, Xenia, OH 45385 ... 513-376-4361

Generators, Baud Rate-1900

Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 ... 3•1111
† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 ... 1A•1372
Motorola, Inc., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131, 312-451-1000 ... 1A•1391
Oscillatek Corp., 620 North Lindenwood Dr., Olathe, KS 66062, 913-829-1777 ... 1A•1399
† Q-Tech Corp., 2201 Carmelina Ave., Los Angeles, CA 90064, 213-820-4921 ... 1A•1410
SaRonix, 4010 Transport at San Antonio, Palo Alto, CA 94303, 415-856-6900 ... 1A•1419
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 ... 714-533-6333
§ General Instrument Corp., Microelectronics Div., 600 W. John St., Hicksville, NY 11802 ... 516-733-3107
Monitor Prods. Co., Inc., 502 Via Del Monte, Oceanside, CA 92054 ... 619-433-4510

Generators, Character-2325

§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 ... 3•1074
Quantum Data, Inc., 455 E. Kehoe, Carol Stream, IL 60188, 312-668-3301 ... 3•1289
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 ... 408-732-2400
§ Ann Arbor Terminals, 6175 Jackson Rd., Ann Arbor, MI 48103 ... 313-663-8000
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 ... 415-726-3000
† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 ... 714-533-6333
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 ... 203-438-3731
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 ... 603-742-7363
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
Kode, 2752 Walnut Ave., Tustin, CA 92680 ... 714-730-6901
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada ... 514-735-1182
Nu Data, 32 Fairview Ave., Little Silver, NJ 07739 ... 201-842-5757
Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001 ... 214-233-6631

Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642

Generators, Color Bar-2900

Quantum Data, Inc., 455 E. Kehoe, Carol Stream, IL 60188, 312-668-3301 ... 3•1289
§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 ... 827-7144
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 ... 312-889-9087
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 ... 312-769-6262
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 ... 314-243-3147
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 ... 605-339-0100
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Telemet, 185 Dixon Ave., Amityville, NY 11701 ... 516-842-2300
Visual Info. Institute, Box 33, Xenia, OH 45385 ... 513-376-4361
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 ... 215-844-2626

Generators, Digital Delay — See Generators, Timing, Digital (Vol. 3)

Generators, Electrical Power-4000

† Georator Corp., Box 70, Manassas, VA 22110, 703-368-2101 ... 3•1878,1879
Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 ... 1B•1207
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 ... 201-526-6010
† American Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 ... 714-871-3020
Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733 ... 213-575-0755
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 ... 805-684-8311
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 ... 201-735-8000
† Dresser Inds., 1505 Elm St., Dallas, TX 75201 ... 214-746-6000
† Electro Kinetics Co., Sub. HTL Inds., Inc., 402 E. Gutierrez St., Santa Barbara, CA 93102 ... 805-963-2055
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 ... 805-964-0751
† Giannini Petro Marine, 9474 Chesapeake Dr., San Diego, CA 92123 ... 619-569-1668
† HTL Electro Kinetics, 402 E. Gutierrez St., Santa Barbara, CA 93101 ... 805-963-2055
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 ... 213-452-6000
Q-S Products Co., Inc., 3605 S.W. Snoqualmie St., Seattle, WA 98126 ... 206-937-5505
Simmonds Precision, P.O. Box 310, Norwich, NY 13815 ... 607-335-5000
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 ... 213-325-5040
TRW Motor Div. (Military), 2275 Stanley Ave., Dayton, OH 45404 ... 513-228-3171
† Western Gear Corp., Applied Tech. Div., 14724 E. Proctor, City of Industry, CA 91744 ... 818-968-6525

Generators, Electrostatic Discharge — Also See Electrostatic Discharge Guns-2900

§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 ... 301-826-8651
Brady Co., 574A Somerset St., N. Plainfield, NJ 07060 ... 201-753-7988
Compliance Design Inc., 593 Massachusetts Ave., Boxboro, MA 01719 ... 617-264-4668
S & H Inds., 119 Glen Cove Dr., Glen Head, NY 11545 ... 516-671-5600
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 ... 201-851-0644
§ Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 ... 215-822-2171

Generators, FM-2900

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 ... 3•1258
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 ... 201-584-1077
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 ... 617-653-0355
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 ... 212-255-2940
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 ... 516-546-9700
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 ... 214-381-7161
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† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 ... 408-263-8100
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§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 ... 516-364-0400
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Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 ... 516-883-1700
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 ... 714-635-7210
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 ... 617-580-1660
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 ... 516-349-1700
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 ... 516-328-1100

† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, FM/Stereo-2900

RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145, 216-871-7617 ....3•1291
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Generators, Function-2900

§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ....3•1201,1202**
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406, 805-544-3800 ....1A•1484,1504,1505,1507
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ....3•1254
PCA Elctrns., 16799 Schoenborn St., Sepulveda, CA 91343, 818-892-0761 ....1A•1561
A E Corp., 65 Wellesley Ave., Needham, MA 02194 617-449-3142
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 617-653-0355
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§ Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
E & L Instruments, Inc., 61 First St., Derby, CT 06418 203-735-8774
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
Evans Assocs., Box 5055, Berkeley, CA 94705 415-653-3083
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ....702-883-3400;800-648-7952
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
General Computers, 1624 Veteran Ave., Los Angeles, CA 90024 ....
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§† Harris Circuits Mfg., 2706 Colley Ave., Norfolk, VA. 23517 804-467-1116
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
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Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 805-962-8336
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
§ OK Industries, Inc., 3455 Conner St., Bronx, NY 10475 212-994-6600
† Perkin-Elmer Corp., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856 203-762-4786
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 .914-667-0425
Shapiro Scientific Inst., 3500 E. Coast Hwy., Corona del Mar, CA 92625 714-675-1024
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625 813-855-6611
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, Gating/Timing-2900

Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710, 415-527-1121 ....3•1203
† **TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....3•1097,1101**
California Avionics Labs., Box 701, Palo Alto, CA 94302 415-328-7999
† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ....702-883-3400;800-648-7952
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 805-962-8336
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 ....904-244 9600
§ Pacific Atlantic Elctrns., Box 754, El Cerrito, CA 94530 415-237-5837
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, Hall-5500 — *See Vol. 1B*

Generators, Harmonic-2900

TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....1A•1781
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Micro-Now Instr. Co., Inc., 8260 N. Elmwood St., P.O. Box 856, Skokie, IL 60077 312-677-4700
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411

Generators, Infrared — See Lamps, Infrared (Vol. 1B)

Generators, Low Frequency-2900

Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
A E Corp., 65 Wellesley Ave., Needham, MA 02194 617-449-3142
§ Alltech Assocs. Inc., Applied Science Labs., 2051 Waukegan Rd., Deerfield, IL 60015 312-948-8600
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ....619-279-8620;800-356-2244;800-821-1634
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 617-653-0355
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
† EDO Corp./Elinco Div., 272 Main Ave., Norwalk, CT 06851 203-847-5861
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ....702-883-3400;800-648-7952
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ......213-515-6432; 800-421-5334
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 .914-667-0425
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
† Vectron Labs., 166 Glover Ave., Norwalk, CT 06850 203-853-4433
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, Light Pulse-2900

Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710, 415-527-1121 .... 3•1203

Generators, Marker-2900

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 .... 3•1202
§† Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 .. 201-227-2000
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Generators, Microwave-3400

Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 .... 1A•1686
Colorado Crystal Corp., 2303 W. 8th St., Loveland, CO 80537, 303-667-9248 .... 1A•1364
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1258
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 .... 3•1391
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 1A•1781
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
Central Microwave Co., Alpha Inds., Inc., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 203-327-0003
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Eaton Corp., Microwave Comps. Div., 783 Palomar Ave., Sunnyvale, CA 94086 408-245-6810
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
§ EIP Microwave Inc., 2731 North First St., San Jose, CA 95134 408-946-5700
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 617-329-1500
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
† Frequency West, Inc., 3140 Alfred St., Santa Clara, CA 95050 408-727-8500
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 . 516-694-3600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
† Isotronics, Industrial Park, New Bedford, MA 02745 617-998-2000
Microdry Corp., Golden Grain Macaroni Co., 3111 Fostoria Way, San Ramon, CA 94583 415-837-9106
Micro-Now Instr. Co., Inc., 8260 N. Elmwood St., P.O. Box 856, Skokie, IL 60077 312-677-4700
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England .... 44-(582) 60-14-41
§ Microwave Development Labs., 10 Michigan Dr., Natick, MA 01760 617-655-0060
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
† Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 .... 301-948-3434; 800-638-2048
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Generators, Noise, Random (Electrical)-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
Elgenco, Inc., Box 460, Hurricane, UT 84737, 801-635-4954 .... 3•1228-1233
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1899
† Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840, 201-549-9280 .... 3•1305
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§ Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
§ Micronetics, 36 Oak St., Norwood, NJ 07648 201-767-1320
† Microwave Semiconductor Corp., 100 School House Rd., Somerset, NJ 08873 201-469-3311
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
† Telecommunications Techniques Corp., 444 N. Frederick Ave., Gaithersburg, MD 20877 301-258-5011
§ Tohoku Metal Inds., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan .... Tokyo 03-402-6161
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
§† Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, Phase-2900

Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1252
† Ryan Intl. Corp., 4800 Evanswood Dr., Columbus, OH 43229, 614-885-3303 .... 3•1219
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406 ... 805-544-3800
Evans Assocs., Box 5055, Berkeley, CA 94705 415-653-3083
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400;800-648-7952
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 .914-667-0425
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Universal Ad-Yu Elctrns., Inc., 2517 E. Norwich St., Milwaukee, WI 53207 414-482-4100
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, Programmable, Function-2900

Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869, 201-584-1077 ... 3•1204
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 ... 805-684-8311
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 ... 716-924-9355
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 ... 212-245-2727
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 ... 617-580-1660
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 ... 315-437-9951
Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200

Generators, Programmable, Pulse-2900

Data Delay Devices, 385 Lakeview Ave., Clifton, NJ 07011, 201-772-1106 ... 1A•1472
§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 ... 301-826-8651
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 ... 716-924-9355
§ E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 ... 415-638-5656
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 ... 914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 ... 415-856-1800
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050 ... 408-727-7370
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200

Generators, Programmable, Synthesizers-2900

Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 ... 3•1210
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 ... 201-767-7250
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 ... 315-437-9951
Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 ... 516-328-1100
Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200

Generators, Pulse-2900

§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ... 3•1202**
Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710, 415-527-1121 ... 3•1203
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406, 805-544-3800 ... 1A•1484,1501-1503
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ... 3•1273
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 ... 3•1359
† **Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 ... 3•1359**
A E Corp., 65 Wellesley Ave., Needham, MA 02194 ... 617-449-3142
American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 ... 301-826-8651
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 ... 215-723-8181
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 ... 617-522-8640
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 ... 703-642-4000
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 ... 617-653-0355
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 ... 516-921-7300
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 ... 303-762-1640
Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 ... 203-327-0003
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
† Control Concepts Corp., P.O. Box 1380, Binghamton, NY 13902-1380 ... 607-724-2484
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 ... 415-726-3000
Disc Instrs., 102 E. Baker St., Costa Mesa, CA 92626 ... 714-979-5300
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 ... 312-662-2666
E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 ... 415-638-5656
Eldorado Instrs., 7303 Edgewater Dr., Oakland, CA 94621 ... 415-638-5656
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 ... 617-329-1500
Evans Assocs., Box 5055, Berkeley, CA 94705 ... 415-653-3083
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 ... 312-932-9380
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 ... 415-856-7600
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 ... 203-624-3103
§ Hecon Corp., 31 Park Rd., Tinton Falls, NJ 07724 ... 201-542-9200
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
Hipotronics, P.O. Drawer A, Brewster, NY 10509 ... 914-279-8091
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 ... 805-962-8336
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 ... 714-635-7210
Ion Physics Co., Div. High Voltage Engrg. Corp., P.O. Box 416, So. Bedford St., Burlington, MA 01803 ... 617-272-2800
Kappa Scientific Corp., Box 30585, Santa Barbara, CA 93105 ... 805-687-9648
† Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 ... 201-227-2000
KeyTek Instr. Corp., 12 Cambridge St., Burlington, MA 01803 ... 617-272-5170
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 ... 617-580-1660
§ LEA, Inc., A Dynatech Co., 12516 Lakeland Rd., Santa Fe Springs, CA 90670-9990 ... 818-944-0916
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 ... 314-243-3147
§ M/A-COM Laser Diode, Inc., M/A-COM, Inc., 1130 Somerset St., New Brunswick, NJ 08901 ... 201-249-7000
† Magnetic Technology, 21001 Kittridge St., Canoga Pk., CA 91303 ... 213-887-7700
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 ... 619-279-5100
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 ... 312-354-4350
§ Pacific Atlantic Elctrns., Box 754, El Cerrito, CA 94530 ... 415-237-5837
Panametrics, 221 Cresent St., Waltham, MA 02254 ... 617-899-2740
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 ... 201-529-3800
Power-Science, 7667 Vickers St., San Diego, CA 92111 ... 619-292-4322
Pulsar Products Div., 2700 Merced St., San Leandro, CA 94577 ... 415-577-7236
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 ... 213-548-1327
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 ... 714-833-1234
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 ... 203-792-6666
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 ... 617-938-0900
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 ... 516-249-1414
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 ... 201-851-0644
Sensor Corp., Box 140, Scottdale, PA 15683 ... 412-887-4080
Seven Mountains Sci. Inc., P.O. Box 650, Boalsburg, PA 16827 ... 814-466-6559
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 ... 818-993-8257
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ... 415-676-5000
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ... 800-547-1512; Oregon only 800-452-1877
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 ... 518-272-6300
† Tobe Deutschmann Labs., Inc., 550 Turnpike St., Canton, MA 02021 ... 617-828-3366
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 ... 619-279-2200

Generators, Pulse, Nuclear Instrumentation Module (NIM)-2900

Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710 ... 415-527-1121
Canberra Ind., One State St., Meriden, CT 06450 ... 203-238-2351
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 ... 914-425-2000
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 ... 615-483-8405

Generators, RF-2900

§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ... 3•1201**
† **Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 ... 3•1210**
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ... 3•1155
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ... 3•1254
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 ... 3•1258
† **MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 ... 3•1391**
Programmed Test Sources, Beaver Brook Rd., Littleton, MA 01460, 617-486-3008 ... 3•1288
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145, 216-871-7617 ... 3•1291
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ... 1A•1781
† **Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 ... 3•1318**
† Ajax Magnethermic Corp., 1745 Overland Ave., N.E., Warren, OH 44482 ... 216-372-8511
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 ... 617-935-5150
Applied Research Inc., 160 Dupont St., Plainview, NY 11803 ... 516-349-9200
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 ... 617-522-8640
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 ... 303-443-4844
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 ... 201-584-1077
† Clemens Mfg., 630 So. Berry Rd., St. Louis, MO 63122 ... 314-961-7228
Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 ... 203-327-0003
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 ... 319-395-1000
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 ... 408-263-8100
§ Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 ... 516-273-8600
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 ... 516-588-3600
Ehrhorn Technological Opers., Inc., P.O. Box 888, Canon City, CO 81212 ... 303-275-1613
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 ... 617-329-1500
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
† Frequency West, Inc., 3140 Alfred St., Santa Clara, CA 95050 ... 408-727-8500
§† Harris Circuits Mfg., 2706 Colley Ave., Norfolk, VA. 23517 ... 804-467-1116
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 ... 516-364-0400
§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 ... 714-635-7210

† Isotronics, Industrial Park, New Bedford, MA 02745 617-998-2000
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
† Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 ..201-227-2000
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
† Lepel, 59-21 Queens-Midtown Expwy., Maspeth, NY 11378 212-426-4580
Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
Pacific Meas., Inc., 488 Tasman Drive, Sunnyvale, CA 94086 408-734-5780
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 .914-667-0425
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Vectron Labs., 166 Glover Ave., Norwalk, CT 06850 203-853-4433
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Generators, Sawtooth, Sine — See Generators, Function (Vol. 3)

Generators, Signal-2900 (Also See Generators, Specific Type)

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ....3•1201,1202
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869, 201-584-1077 ....3•1204
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 ....3•1210
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406, 805-544-3800 ....1A•1504,1505,1507
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955, 305-259-7105 ....3•1932
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ....3•1252
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1258
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525, 312-354-4350 .... 3•1391
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145, 216-871-7617 ....3•1291
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 ....3•1318
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
† EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ....702-883-3400;800-648-7952
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
§† Harris Circuits Mfg., 2706 Colley Ave., Norfolk, VA. 23517 804-467-1116
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
Plainview Elctrns., 28 Cain Dr., Plainview, NY 11803 516-249-6677
Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
Programmed Test Sources, Beaver Brook Rd., Littleton, MA 01460 617-486-3008
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
Visual Info. Institute, Box 33, Xenia, OH 45385 513-376-4361
Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Generators, Sine/Cosine Function (Module)-3130 — *See Vol. 1A*

Generators, Spectrum — See Generators, Sweep (Vol. 3)

Generators, Square Wave — See Generators, Function (Vol. 3)

Generators, Sweep-2900

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ....3•1201,1202
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ....3•1254
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 ....3•1318
A E Corp., 65 Wellesley Ave., Needham, MA 02194 617-449-3142
§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 827-7144
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Cal-Tek Engrg., 29 Pemberton Rd., Wayland, MA 01778 617-653-0355
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ....702-883-3400;800-648-7952
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ Instrumentation Prods., 3M Co., 300 S. Lewis Rd., Camarillo, CA 93010 805-482-1911
Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
† Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 ..201-227-2000
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Micro-Now Instr. Co., Inc., 8260 N. Elmwood St., P.O. Box 856, Skokie, IL 60077 312-677-4700
§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
§ Pacific Meas., Inc., 488 Tasman Drive, Sunnyvale, CA 94086 408-734-5780
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 .914-667-0425
Solar Elctrns. Co., 901 N. Highland, Hollywood, CA 90038 213-462-0806
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 ..713-729-1183
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Generators, Time Code-2000

Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, 512-251-2313 ....1A•1315
† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ....3•1154

Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1097-1102
† Base Ten Sys., One Electronics Dr., Box 3151, Trenton, NJ 08619 609-586-7010
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083 215-853-1130
† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
Datachron Inc., 3186 J Airway Ave., Costa Mesa, CA 92626 714-751-2211
§ EECO Incorporated, 1601 E. Chestnut Ave., P.O. Box 659, Santa Ana, CA 92702-0659 714-835-6000
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
K-Systems, Inc., 3902 Lilac, Las Cruces, NM 88005 505-526-3209
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
Wide Range Elctrns. Corp., 2119 Schultz Rd., St. Louis, MO 63141 314-567-5366

Generators, Timing, Digital-2000

Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710, 415-527-1121 .... 3•1203
California Avionics Labs., Box 701, Palo Alto, CA 94302, 415-328-7999 .... 3•1206
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1097-1102
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083 215-853-1130
† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Datachron Inc., 3186 J Airway Ave., Costa Mesa, CA 92626 714-751-2211
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Digital Pathways, Inc., 1060 E. Meadow Cir., Palo Alto, CA 94303 415-493-5544
Disc Instrs., 102 E. Baker St., Costa Mesa, CA 92626 714-979-5300
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406 805-544-3800
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 .... 312-231-3511; 312-932-9380
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 805-962-8336
INTERFACE TECH. DYNATECH, 150 East Arrow Hill Way, San Dimas, CA 91773 714-592-2971
Iveron Pacific, 1152 Morena Blvd., San Diego, CA 92110-3899 619-275-1500
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
† Motorola, Inc., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131 312-451-1000
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Practical Technology, 12 Village Ctr., Box 449, Carmel Valley, CA 93924 408-659-3128
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405

Generators, Tone-2900

A E Corp., 65 Wellesley Ave., Needham, MA 02194 617-449-3142
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 617-531-8886
§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 814-864-4921
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406 805-544-3800
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400; 800-648-7952
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
§† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 408-255-7550
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§† RCA Solid State Div., CMOS IC Mktg., Rte. 202, Somerville, NJ 08876 201-685-6000
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
† Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800; 800-527-4642
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Generators, Tone Burst-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
A E Corp., 65 Wellesley Ave., Needham, MA 02194 617-449-3142
§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400; 800-648-7952
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Real Time Sys., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 914-667-0425
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Generators, UHF/VHF-2900

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1258
Programmed Test Sources, Beaver Brook Rd., Littleton, MA 01460, 617-486-3008 .... 3•1288
Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Kay Elemetrics Corp., 12 Maple Ave., Pine Brook, NJ 07058-9797 201-227-2000
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
Pacific Meas., Inc., 488 Tasman Drive, Sunnyvale, CA 94086 408-734-5780
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
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Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800; 800-527-4642
† Vectron Labs., 166 Glover Ave., Norwalk, CT 06850 203-853-4433
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Generators, Ultrasonic-2900

§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 617-522-8640
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Electronic Navigation Inds., 3000 Winton Rd. S., Rochester, NY 14623 716-473-6900
ENI Power Sys., 3000 Winton Rd. S., Rochester, NY 14623 716-473-7330
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400; 800-648-7952
Heat Systems-Ultrasonics, Inc., 1938 New Highway, Farmingdale, NY 11735 516-694-9555
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 805-962-8336
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
§ Sonobond, 200 E. Rosedale Ave., West Chester, PA 19380 215-696-4710
§ Tohoku Metal Inds., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan .... Tokyo 03-402-6161
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900

Generators, White Noise-2900

† MDF Products Inc., 7 Johnson Dr., Danbury, CT 06810, 203-743-3579 .... 3•1262
† Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280

Generators, Word-2900

† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731

Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
INTERFACE TECH. DYNATECH, 150 East Arrow Hill Way,, San Dimas, CA 91773 714-592-2971
§ International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Pacific Micro Sys., Inc., 160 Gate 5 Rd., Sausalito, CA 94965 415-331-2525
Practical Technology, 12 Village Ctr., Box 449, Carmel Valley, CA 93924 408-659-3128
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
† Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 301-881-7655
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Generators (MIL), Deception-3475

Geophysical Equip. — See Transducers (Vol. 1B)

Germanium — See Crystals, Semiconductor (Vol. 1A)

Glues — See Adhesives (Vol. 2)

Glass Parts-2500 — *See Vol. 2*

Graphic Recording Instruments — See Recorders (Vol. 3)

Graphic Recording Paper & Supplies-3000

§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780

Graphite Parts-2500 — *See Vol. 2*

Grilles & Accessories, Speaker-1300

§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Fourjay Industries, Box 1465 Northridge Br., Dayton, OH 45414 513-278-9416
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443
LaFrance Corp., Entprs & Exec Aves, Philadelphia, PA 19153 215-365-8000
§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286
§ Oaktron Inds., 1000 30th St., Monroe, WI 53566 608-328-5560
§ PacTec Div., LaFrance Corp., Enterprise & Executive Avenues, Philadelphia, PA 19153 215-365-8400
§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637 312-488-5800
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191

Grilles, Metal, Plastic-1400 — *See Vol. 2*

Grommets & Bushings-2800 — *See Vol. 2*

Ground Fault Detectors & Accessories — See Detectors, Ground Fault (Vol. 3)

Guides, Circuit Board-1400 — *See Vol. 2*

Gyros (All Types)-2200

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Condor Pacific Inds., Inc., 8053 Deering Ave., Canoga Park, CA 91304 818-347-8331
† General Optronics, 3005 Hadley Rd., So. Plainfield, NJ 07080 201-549-9000
† Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
† Humphrey, Inc., 9212 Balboa Ave., San Diego, CA 92123 619-565-6631
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
§† Systron-Donner Inertial Div., 2700 Systron Dr., Concord, CA 94518 415-682-6161

Hall Effect Devices — See Generators, Hall (Vol. 1B), Magnetoresistors, Hall (Vol. 1A), Multipliers, Hall (Vol. 1A), Probes, Hall (Vol. 1A), Switches, Hall Effect (Vol. 1B),

Handlers, Integrated Circuit (Automatic)-4100

§ Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
Exatron Automatic Test Equip., 3513 Ryder St., Santa Clara, CA 95051 ....408-737-7111;800-EXA-TRON
† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
Micro Component Technlg., Inc., P.O. Box 64013, St. Paul, MN 55164 612-482-5100
§ Sym-Tek Sys., Inc., 3912 Calle Fortunada, San Diego, CA 92123 619-569-6800

Handles For Cabinets, Circuit Boards, Racks, etc.-1400 — *See Vol. 2*

Handsets, Chestsets, Headsets, etc.-1300

† Adec, 12 Kulick Rd., Fairfield, NJ 07006 201-575-1570
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 203-348-2121
§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 818-889-9304
§† Audiosears, South St., Stamford, NY 12167 607-652-7305
GTE Automatic Elec., 400 N. Wolf Rd., Northlake, IL 60164 312-681-7071
GTE Switching & Telephone Products, 400 N. Wolf Rd., Northlake, IL 60164 312-681-7100
† Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 312-432-7915
† Roanwell, 180 Varick St., New York, NY 10014 212-989-1090
† Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
Stanton Magnetics, Inc., Terminal Dr., Plainview, NY 11803 516-349-0200
§ Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 914-965-6906
SYT, 1220 Barranca, El Paso, TX 79935 915-593-1234
† Telephonics, 770 Park Ave., Huntington, NY 11743 516-549-6000
§† Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
§ Trimm, Inc., Div. of Newton Instr. Co., 400 W. Lake St., Box 489, Libertyville, IL 60048 312-362-3700
Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Hardware — See Fasteners (Vol. 2), Clamps (Vol. 2), Terminals (Vol. 2), etc.

Hardware (MIL), Connector-2440 — *See Vol. 1B*

Harnesses, Wire — See Cable Assemblies & Harnesses (Vol. 2)

Headers, Connector — See Connectors, Cable (Vol. 2), Connectors, Flat Cable (Vol. 2), etc.

Headers, Hermetic — See Seals, Hermetic (Vol. 2), Services, Hermetic Sealing (Vol. 3),

Headers, Relay & Transformer-2500 — *See Vol. 2*

Headers, Shrouded-2500 — *See Vol. 2*

Headers, Transistor & Diode-2500 — *See Vol. 2*

Headphones-1300

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530, 914-681-0700 .... 3•1055
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 203-348-2121
§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 818-889-9304
Audiosears, South St., Stamford, NY 12167 607-652-7305
§ Audiotronics Corp., 7428 Bellaire Ave., N. Hollywood, CA 91605 818-765-2645
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§† R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 312-432-7915
§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 212-392-6442
† Roanwell, 180 Varick St., New York, NY 10014 212-989-1090
† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
† Telephonics, 770 Park Ave., Huntington, NY 11743 516-549-6000
Trimm, Inc., Div. of Newton Instr. Co., 400 W. Lake St., Box 489, Libertyville, IL 60048 312-362-3700

Heads, Magnetic Recording-1300

† **Apollo Magnetics Corp., 2720 W. Beverly Rd., Los Angeles, CA 90057, 213-381-2500 .... 3•1069**
§† **International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067, 312-358-4622 .... 3•1031**
§ American Magnetics, 740 Watson Center Rd., Carson, CA 90745 213-775-8651
Applied Magnetics, 75 Robin Hill Rd., Goleta, CA 93117 805-683-5353
† Brush Magnetic Heads, Forgflo Corp., 3rd & Reagan Sts., P.O. Box 638, Sunbury, PA 17801 ....717-286-5611;800-233-0362
§ Canon U.S.A., Elctrn. Comps. Div., One Canon Plaza, Lake Success, NY 11042 516-488-6700
Field-Fab, 43 School St., N. Springfield, VT 05150 802-886-8278
Magnusonic Devices, 290 Duffy Ave., Hicksville, NY 11801 516-938-4700
§† Michigan Magnetics, 203 W. Third St., Vermontville, MI 49096 517-726-0590
Namiki Precision Jewel Co., Ltd., 15 Essex Rd., Paramus, NJ 07652 201-368-8310
National Micronetics, Route 28, West Hurley, NY 12136 914-338-0333
Norton Assocs., 10 Di Tomas Ct., Copiague, NY 11726 516-842-4666
Pacific Magnetics Corp., 2602 Transportation Ave., Ste. F, National City, CA 92050 619-474-8216

§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 219-848-5233
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
Thomson-CSF Comps. Corp., Passive Comp. Div., 6660 Variel Ave., Canoga Park, CA 91303 818-887-1010
§ Tohoku Metal Inds., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan .... Tokyo 03-402-6161

Heads, Reflective-3700 — *See Vol. 1B*

Headsets (MIL)-2440 — *See Vol. 1B*

Heat Dissipators — See Heat Sinks, Semiconductor (Vol. 2), Heat Sinks, Soldering (Vol. 2),

Heaters, Immersion-4100

Acme Elec. Heating Corp., 4685 E. 11th, Hialeah, FL 33013 305-685-8326
Capitol Temptrol, 5 Coulton Rd., Old Lyme, CT 06371 203-739-4421
Corning Glass Works, Corning Elctrns., Houghton Pk., Bldg. A-2, Corning, NY 14830 607-974-9000
Corning Glass Works, Telecomm Prods Dept., BH-5, Corning, NY 14830 607-974-9000
† Engelhard Corp., 70 Wood Ave. S., Iselin, NJ 08830 201-321-5900
Norton Chemplast, 31-150 Dey Rd., Wayne, NJ 07470 201-696-4700
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 513-228-6011
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Technic, Inc., Box 965, Providence, RI 02901 401-781-6100
Trent, Inc., 201 Leverington Ave., Philadelphia, PA 19127 215-482-5000
§ Wellman Thermal Sys., 1 Progress Rd, Shelbyville, IN 46176 317-398-4411

Heaters & Heating Elements (For Components & Equipment)-5300 (Also See Ovens) — *See Vol. 1B*

Heat Exchangers & Systems-2600 — *See Vol. 2*

Heat Guns, Production-5400 — *See Vol. 2*

Heating Elements, Infrared-5300 — *See Vol. 1B*

Heat Pumps — See Cooling/Heating Modules, Thermoelectric (Vol. 1B)

Heat Shrinkable Elastomers, Plastics — See Caps, Forms & Tapes, Heat Shrinkable (Vol. 2), Tubing, Heat Shrinkable (Vol. 2),

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Heat Sinks, Soldering-4600 — *See Vol. 2*

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High Vacuum Services — See Services, High Vacuum (Vol. 3)

Hinges-2825 — *See Vol. 2*

Holders, Battery — See Retainers, Battery (Vol. 2), Connectors, Battery (Vol. 2),

Holders, Brush — See Brushes & Brush Assemblies (Vol. 1B)

Holders, Circuit Board (Production Type)-4100

§ **Bivar, Inc., 4 Thomas, Irvine, CA 92714, 714-951-8808 .... 2•1018**
§ Accessories for Elctrns., Inc., 800 Merrick Rd., Baldwin, NY 11510 516-546-1751
Amlan, Inc., 97 Thornwood Rd., Stamford, CT 06903 203-322-1913
§ Atlee Inc., One Gill St., Woburn, MA 01801 617-933-3510
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 516-654-1197
§ BICC-Vero Elctrns., Inc., 171 Bridge Rd., Hauppauge, NY 11788 516-234-0400
§† Birtcher Corp., 4501 N. Arden Dr., El Monte, CA 91731 818-575-8144
§ Bud Inds., Inc., 4605 E. 355th St., Willoughby, OH 44094 216-946-3200
§† Bud Radio, 4605 E. 355th St., Willoughby, OH 44094 216-946-3200
§ Calmark Corp., 4915 Walnut Grove Ave., San Gabriel, CA 91776 213-287-0451
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 214-353-9950
† E.P.E. Corp., P.O. Box 5238, Manchester, NH 03108 603-669-9181
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
§ Fancort Industries, Inc., 111 Clinton Rd., Fairfield, NJ 07006 201-575-0610
§ Fastex, 195 Algonquin Rd., Des Plaines, IL 60016 312-299-2222
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ General Hardware Mfg., 80 White St., New York, NY 10013 212-431-6100
Gibson/Egan, 2666 East Huntington Dr., Duarte, CA 91010 818-358-0191
HMW Enterprises Inc., 604 Salem Road, Etters, PA 17319 717-938-4691
§ Hunter Tools, 6721 Baymeadow Dr., Glen Burnie, MD 21061 301-760-2200
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
§† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
† Manufacturing Sys., Div. LeDoux Inds., Inc., 2022-C S. Grand Ave., Santa Ana, CA 92705 714-540-6630
§ Matrix Engineering Corp., 17000 S. Western Ave. 19, Gardena, CA 90247 213-770-0521
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 301-490-9860
§ PanaVise Prods., 2850 E. 29th St., Long Beach, CA 90806 213-569-8108
Parsons Mfg., 1055 O'Brien Dr., Menlo Park, CA 94025 415-324-4726
† Rush/Houston, Inc., 600 Kealrick, Ste C-40, Houston, TX 77060 713-682-5151
Schroff Inc., 170 Commerce Dr., Warwick, RI 02886 401-732-3770
§ Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171
† Stevens Products, Inc., 128 N. Park St., E. Orange, NJ 07019 201-672-2140
§ Technical Devices, 560 Alaska Ave., Torrance, CA 90503 213-618-8437
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
† Titchener, E. H., & Co., 1 Titchener Pl., Binghamton, NY 13902 607-772-1161
UNITRACK Div., Calabro Inds., Inc., Goshen Corp. Pk., P.O. Box 1927, 1372 Enterprise Dr., West Chester, PA 19380 215-692-0800
§ Waldom Elctrns., 4301 W. 69th St., Dept. EEM, Chicago, IL 60629 312-585-1212

Holders, Crystal-2300 — *See Vol. 1A*

Holders, Diode-2500 — *See Vol. 2*

Holders, Fuse — See Clips & Holders, Fuse (Vol. 1B), Panels, Fuse (Vol. 1B),

Holders, Lamp — See Sockets, Lamp & Lamp Assemblies (Vol. 1B)

Holders, Test Lead-2900

§ **ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 .... 2•1441**
§ Hunter Tools, 6721 Baymeadow Dr., Glen Burnie, MD 21061 301-760-2200
§ Kulka Smith, Inc., 1913 Atlantic Ave., Manasquan, NJ 08736 201-223-9400
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990

Holders, Tube — See Retainers, Tube (Vol. 1A)

Holders & Carriers, Chip (Capacitor, IC, LSI)-2100 — *See Vol. 2*

Holders & Carriers, IC, LSI (Packaged)-3130 — *See Vol. 1A*

Honeycomb Sheets, Panels, etc.-2500 — *See Vol. 2*

Hoods, Oscilloscope-2975

Jan Hardware Mfg. Co., 47-27 36th St., Long Island City, NY 11101, 212-361-0800 .... 2•1771
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900

Housings, Circuit Module — See Enclosures, Circuit Board, Module & Relay Mounting (Vol. 2)

Housings, Photomultiplier Tube — See Photomultiplier Tube Housings (Vol. 1A)

Housings, Terminal-1400 — *See Vol. 2*

Hum Eliminators-2700 — *See Vol. 1A*

Hybrid Circuits — See Circuits, Hybrid (Vol. 1A)

Hybrid Voltage Regulators-3130 — *See Vol. 1A*

Identification, Friend or Foe (IFF) ESM (MIL)-3475

† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 516-921-7300
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England .... 44-(582) 60-14-41
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Imagers, Thermal-2900

ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 201-667-2262
† Hughes Aircraft Co., 6155 El Camino Real, Carlsbad, CA 92008 619-438-9191

IEEE 488 (GPIB) Bus — See Controllers, IEEE 488 (GPIB) (Vol. 3)

Impedance Comparators — See Bridges, Impedance (Vol. 3)

Impedance Converters, Microwave-3400

Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Eltec Instrs., P.O. Box 9610, Daytona Bch., FL 32020 904-252-0411
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000
Uniform Tubes, Collegeville, PA 19426 215-539-0700

Incremental Magnetic Recorders — See Recorders, Computer Data (Vol. 3)

Indicator Lights — See Lights, Indicator (Vol. 1B)

Indicators, Angle-5500 (Also See Encoders, Shaft Position) — ***See Vol. 1B***

Indicators, Azimuth-5500 — *See Vol. 1B*

Indicators, Capacitor Leakage — See Testers, Capacitor (Vol. 3)

Indicators, Circuit Condition, On, Off, etc. (Electromechanical)-2450
(Also See Indicators, Instrument, Flag, Pointer, etc.) — ***See Vol. 1B***

Indicators, Computer Type & Data Display — See Lamps, Dial, Panel, Pilot Incandescent & Accessories (Vol. 1B)

Indicators, Distortion — See Analyzers, AF (Vol. 3)

Indicators, Elapsed Time-2200

† Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 .... 3•1121
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 .... 3•1074
Curtis Instrs., Inc., 200 Kisco Ave., Mt. Kisco, NY 10549, 914-666-2971 .... 3•1128
† Electrodynamics, Inc., A Talley Inds. Co., 1200 Hicks Rd., Rolling Meadows, IL 60008, 312-259-0740 .... 3•1129
EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 .... 3•1330
§ J-B-T Instrs., Box 1818, New Haven, CT 06508, 203-776-1111 .... 3•1332
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716, 201-291-0500; 800-631-2165 .... 3•1132,1133
§ Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1336
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1339, 1341
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1101
A & D Elec. Instrs., 73-07 88th St., Glendale NY 11385 212-275-6516
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 .... 215-337-5500;800-441-8245
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
Electric Tachometer, 68th & Upland Sts., Philadelphia, PA 19142 .... 215-SA6-7723
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
† Engler Instrs., Sangamo Weston, Inc., 250 Culver Ave., Jersey City, NJ 07305 201-332-5353
§ Epic, Inc., 150 Nassau St., New York, NY 10038 212-349-2470
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 203-848-9271
Frank, B.H., Co., 3733 W. 139th St., Hawthorne, CA 90250 213-675-9182
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 201-825-9696
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
Mallory Timers, Emhart Elec./Elctrn. Grp., 3029 E. Washington St., Indianapolis, IN 46201 317-636-5353
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§† Pres-Air-Trol Corp., 895 Mamaroneck Ave., Mamaroneck, NY 10543 .... 914-698-2026;800-431-2625 (exc NY)
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 203-688-6205
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
Thermographics Measurements Ltd., 3733 W. 139th St., Hawthorne, CA 90250 213-675-9182
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Indicators, Electromechanical — See Indicators, Circuit Condition, On / Off (Vol. 1B)

Indicators, Frequency — See Meters, Frequency (Vol. 3)

Indicators, Directional-2200

† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
SPEC, Inc., 3014 N. Hayden Rd., Ste. 115, Scottsdale, AZ 85251 602-994-1511

Indicators, Illumination — See Meters, Light (Nonphotographic) (Vol. 3)

Indicators, Instrument, Flag, Pointer, etc.-2450 — *See Vol. 1B*

Indicators, Liquid Level-2200

Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
§ Ametek, 2 Station Square, Paoli, PA 19301 215-355-6900
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
† Automation Prods., Inc., 3030 Max Roy, Houston, TX 77008 713-869-0361
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Bindicator, P.O. Box 9, 1915 Dove St., Port Huron, MI 48060 313-987-2700
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Brooks Instr. Div., Emerson Elec. Co., 407 W. Vine St., Hatfield, PA 19440 215-362-3500
Chessell Corp., Penns Trail, Newtown, PA 18940 215-968-0660
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
Continental Data Sys., 131 N. Ludlow St., Dayton, OH 45402 513-222-8626
§ Curtis Inds., 8000 West Tower Ave., Milwaukee, WI 53223 414-354-1500
† Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 203-848-9271
† Flow Techn., Box 21346, Phoenix, AZ 85036 602-437-1315
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 .... 800-321-5111, Ext. 596
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Keystone Carbon, Thermistor Div., St. Marys, PA 15857 814-781-1591
Midwest Comps., 1981 Port City Blvd., Muskegon, MI 49443 616-777-2602
§† National Sonics/Xertex Corp., 250 Marcus Blvd., Hauppauge, NY 11787 516-273-6600
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 215-355-1500
§† Revere Corp. of Amer., 845 N. Colony Rd., Wallingford, CT 06492 203-269-7701
Robinson-Halpern, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248 215-825-9200
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 .... CA 415-965-0910;800-221-7060
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§† Transamerica Delaval, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990 203-677-1311
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 213-978-0516
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 817-625-2311
§ ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Indicators, Null-2900

Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385, 212-386-1300 .... 3•1236
§ A.C. Interface, 2925 College Ave., Costa Mesa, CA 92626 714-979-9830
API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
§ Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 .... 800-321-5111, Ext. 596
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

† Stock Drive Prods., Div. of Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-0200
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 213-978-0516
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Indicators, Numeric Readout — See Tubes, Readout (Vol. 1A)

Indicators, Positioning-2200

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 ....3•1931
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 . 3•1164, 1165
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 ....3•1119
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 . 1A•2067,1B•1019
§ Ametek, 2 Station Square, Paoli, PA 19301 215-355-6900
§† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
† Clifton Precision, Marple at Broadway, Clifton Hgts., PA 19018 215-622-1000
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
Disc Instrs., 102 E. Baker St., Costa Mesa, CA 92626 714-979-5300
Dupree, Inc., 9835 Dupree St., So. El Monte, CA 91733 818-442-4700
Durakool, 1010 N. Main St., Elkhart, IN 46514 219-264-1116
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
† Electric Tachometer, 68th & Upland Sts., Philadelphia, PA 19142 ..215-SA6-7723
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Farrand Controls, Div. of Farrand Inds., 99 Wall St., Valhalla, NY 10595 ....914-RO1-2600
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
† Humphrey, Inc., 9212 Balboa Ave., San Diego, CA 92123 619-565-6631
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Itek Measurement Sys., Div. Litton Inds., 27 Christina St., Newton, MA 02161 617-969-7300
Magnetoelastic Devices, 326 Springside Ave., Box 625, Pittsfield, MA 01201 413-445-5608
§ Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032 815-235-6600
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Penn Keystone Corp., Unimax Switch Corp., Ives Rd., P.O. Box 152, Wallingford, CT 06492 203-269-8701
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990 215-277-1300
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Robinson-Halpern, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248 215-825-9200
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ....CA 415-965-0910;800-221-7060
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 518-272-6300
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§ Transamerica Delaval, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990 203-677-1311
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Trans-Tek, P.O. Box 338, Rte. 83, Ellington, CT 06029 203-872-8351
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 213-978-0516
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
† Vernitron Corp., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073 619-428-5581
† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300

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Indicators, Servo-4900

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 ....3•1931
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955, 305-259-7105 ....3•1932
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1165
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, 516-582-6500 ....3•1345
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Chessell Corp., Penns Trail, Newtown, PA 18940 215-968-0660
† Clifton Precision, Marple at Broadway, Clifton Hgts., PA 19018 215-622-1000
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
§ Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596
† Howell Instrs., 3479 W. Vickery Blvd., Ft. Worth, TX 76107 817-336-7411
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
McFadden Sys., Inc., 8956 S. Atlantic Ave., South Gate, CA 90280-9990 213-564-5958
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† Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990 215-277-1300
† Precision Mechanisms, 44 Brooklyn Ave., Westbury, NY 11590 ....516-ED3-5955
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Sterling Instr., Div. Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-3300
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100
† Vernitron Corp., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073 619-428-5581

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Indicators, Temperature (Not Meter Type)-5300 — ***See Vol. 1B***

Indicators, VSWR — See Meters, Standing Wave Ratio (Vol. 3)

Indicators (MIL), Fault Locating-3475

† Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 ....3•1121
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
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† Minelco Inc. - A Talley Ind., 135 S. Main St., Thomaston, CT 06787-9985 203-283-8261
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

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Infrared (IF) Equipment (MIL)-3475

§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 ... 805-967-0423
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 ... 716-924-9355
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 ... 201-825-9500
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 ... 513-563-6000
Codenoll Technology Corp., 1086 N. Bwy., Yonkers, NY 10701 ... 914-965-6300
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 ... 201-667-2262
Everest Interscience, P.O. Box 345, Tustin, CA 92680 ... 714-992-4461; 714-730-0747
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 ... 612-870-5186
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 ... 617-894-1720
† Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ... 404-429-9061
† Radiometrics, Inc., 12021 South Memorial Pkwy., Huntsville, AL 35803 ... 205-881-1272
§ Research, Inc., Box 24064, Minneapolis, MN 55424 ... 612-941-3300
† Santa Barbara Resch. Ctr., 75 Coromar Dr., Goleta, CA 93117 ... 805-968-3511
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ... CA 415-965-0910;800-221-7060
§† UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 ... 408-738-3301
§† Xedar Corp., 2500 Central Ave., Boulder, CO 80301 ... 303-443-6441

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Input/Output Equipment, Voice-2000

Centigram Corp., 155A Moffett Park Dr., Sunnyvale, CA 94086 ... 408-734-3222
Crosspoint, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 ... 201-941-4455
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 ... 815-838-0005
† Mimic, Inc., P.O. Box 921, Acton, MA 01720 ... 617-263-2101
Telesensory Speech Sys., Telesensory Sys., Inc., 3408 Hillview Ave., Palo Alto, CA 94304 ... 415-856-8255

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Insertion Loss Measurement Systems-2900

Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 ... 3•1319
Baytron, 344 Salem St., Medford, MA 02155 ... 617-391-1550
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 ... 516-588-3600
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 . 516-694-3600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 ... 714-987-4715
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320 ... 818-889-8770
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Solar Elctrns. Co., 901 N. Highland, Hollywood, CA 90038 ... 213-462-0806
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Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 ... 602-254-1570
§ Wiltron, 805 E. Middlefield Rd., P.O, Box 7290, Mountain View, CA 94042-7290 ... 415-969-6500

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Installation Equipment, Fiber Optic-4100

† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ... 613-226-4000
† Valtec, Sub. of U.S. Philips, 99 Hartwell St., West Boylston, MA 01583 ... 617-835-6082

Instrumentation, Fiber Optic-4100

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Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 ... 215-646-9200
Fiberoptic Fabrications, Inc., 70 Pullman St., Worcester, MA 01606 ... 617-853-6449
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 ... 617-778-0700
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada ... 613-226-4000
Galileo Electro-Optics Corp., Galileo Pk., Sturbridge, MA 01518 ... 617-347-9191
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 . 914-425-2000
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 ... 617-922-5961
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 ... 408-377-4621

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Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 ... 3•1191
Berkeley Nucleonics Corp., 1198 Tenth St., Berkeley, CA 94710, 415-527-1121 ... 3•1203
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 .. 3•1507
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ... 3•1205
California Avionics Labs., Box 701, Palo Alto, CA 94302, 415-328-7999 ... 3•1206
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 ... 3•1210
CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445, 716-381-4740 ... 3•1213
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 ... 3•1007
Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 ... 3•1223
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 ... 3•1859
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Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ... 3•1586,1587
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 ... 3•1161
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 ... 3•1887
Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 ... 3•1163
§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ... 3•1621,1640-1642
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 ... 3•1645
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322, 617-580-1660 ... 3•1254,1255
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302, 213-992-6776 ... 1A•1709
National Instruments, 12109 Technology Blvd., Austin, TX 78759, 512-250-9119 ... 3•1266
Quantum Data, Inc., 455 E. Kehoe, Carol Stream, IL 60188, 312-668-3301 ... 3•1289
§ ROD-L Electronics, Inc., 1098 Hamilton Ct., Menlo Park, CA 94025, 415-322-0711 ... 3•1292-1294
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 ... 3•1306,1307
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652, 714-494-9401 ... 1A•1777
THORN EMI Technology Inc., 8601 Dunwoody Pl., Atlanta, GA 30338, 04-587-0017;800-243-2572 ... 3•1310
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549, 914-241-1300 ... 3•1803
Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 ... 3•1359
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 ... 3•1359
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 ... 3•1318
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 ... 3•1319
§ Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 ... 415-964-3200
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 ... 215-723-8181
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 ... 602-622-8605
§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 ... 827-7144
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 ... 414-447-8200
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 ... 805-684-8311
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 ... 412-746-5500
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 ... 201-584-1077
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 ... 716-924-9355
California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ... 619-279-8620;800-356-2244;800-821-1634
Canberra Ind., One State St., Meriden, CT 06450 ... 203-238-2351
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 ... 303-762-1640
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 ... 212-255-2940
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 .. 617-246-1600
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 ... 513-866-3300
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 ... 914-699-2000
Dolch Logic Instrs., 3052 Orchard Dr., San Jose, CA 95134 ... 408-998-5730
EG&G Gamma Scientific, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123 ... 619-279-8034
§ E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 ... 415-638-5656
§† EIP Microwave Inc., 2731 North First St., San Jose, CA 95134 ... 408-946-5700
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 ... 201-227-1002
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 ... 702-883-3400;800-648-7952
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
† FTS Sys., POB 158, Stone Ridge, NY 12484 ... 914-687-7664
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 ... 408-988-6800
Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'L Pk., E. Greenwich, RI 02818 ... 401-884-6800
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 ... 617-344-7383
INTERFACE TECH. DYNATECH, 150 East Arrow Hill Way,, San Dimas, CA 91773 ... 714-592-2971
Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072 ... 201-935-5220
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 ... 602-968-6241
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 ... 212-245-2727
§ Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 ... 216-248-0400
§ Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 ... 415-361-1012

LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219 313-528-2202
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
MSI Electronics, Inc., 34-32 57th St., Woodside, NY 11377 212-672-6500
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
§† Nicolet Paratronics, 201 Fourier Ave., Fremont, CA 94539 415-490-8300
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 .... 800-525-5554;818-764-5400
Programmed Test Sources, Beaver Brook Rd., Littleton, MA 01460 617-486-3008
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 805-964-6708
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
Sensotec Inc., 1200 Chesapeake Ave., Columbus, OH 43212 614-486-7723
Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401 405-223-4773
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir., Ste. F, Irvine, CA 92714 714-250-1172
Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Tencor Instr., 2400 Charleston Road, Mountain View, CA 94043 415-969-6767
Test & Measurement Systems, Inc., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086 408-720-8877
3D Optics, Box 224, 4 Strathmore Cir., Braintree, MA 02184 617-848-8002
§ United Elec. Controls, 85 School St., Watertown, MA 02172 .... 617-WA6-1000
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 .... 800-631-3096;201-792-2400
UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 ... 408-738-3301
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300
Video Logic Corp., 597 No. Mathilda Ave., Sunnyvale, CA 94086 408-245-8622
§† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300
Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
Wayne Kerr, Inc., W.K.R. Ltd., 400 West Cummings Pk., Woburn, MA 01801 617-938-8390
Western Graphtec, 12 Chrysler St., Irvine, CA 92714 .... 714-770-6010; 800-854-8385
West-Tronics, Inc., 215 Park St., Bensenville, IL 60106 312-860-3560
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Insulation Materials-3100 — *See Vol. 2*

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Insulators, Antenna-3100 — *See Vol. 2*

Insulators, Bushing (Metallized) — See Bushings, etc. (Vol. 2)

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Insulators, Mica-3100 — *See Vol. 2*

Integrated Circuit Handlers — See Handlers, Integrated Circuit (Automatic) (Vol. 3)

Integrated Circuit Interconnect Systems-3200 — *See Vol. 2*

Integrated Circuit Design Aids-4200 — *See Vol. 2*

Integrated Circuits, Custom/Semicustom-3130 — *See Vol. 1A*

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Integrated Circuits, Memory-3130 — *See Vol. 1A*

Integrated Circuits, Microprocessor-3130 — *See Vol. 1A*

Integrated Circuits, Silicon Monolithic, Unpackaged Chips-3130 — *See Vol. 1A*

Integrators, Electronic-2325

Curtis Instrs., Inc., 200 Kisco Ave., Mt. Kisco, NY 10549, 914-666-2971 .... 3•1128
† Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 1B•1866
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Circuit Techn., 160 Smith St., Farmingdale, NY 11735 516-293-8686
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Evans Assocs., Box 5055, Berkeley, CA 94705 415-653-3083
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
Instron Corp., 100 Royall St., Canton, MA 02021 617-828-2500
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226 317-545-2102
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
Optical Electronics, Inc., Box 11140, Tucson, AZ 85734 602-624-8358
† Plessey Electro-Products, 3860 Centinela Ave., Los Angeles, CA 90066 213-390-3585
§† Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
§ Vibra-Metrics, 385 Putnam Ave., Hamden, CT 06517 203-288-6158
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674

Integrators, Mechanical & Electromechanical-2200

Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 1B•1859
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100

Intensifiers, Image-5700 — *See Vol. 1A*

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Interfaces, Computer/Peripheral-2000

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Augat Inc., 33 Perry Ave., Box 779, Attleboro, MA 02703, 617-222-2202 .... 2•1877
Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809, 219-747-3121 .... 1B•1763
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1045
§ GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754, 512-926-8840 .... 3•1080
§ Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003, 201-743-6800 .... 2•1888, 1889
§ Gordos Arkansas, Inc., 1000 N. Second St., Rogers, AR 72756, 501-636-5000 .... 1A•1654-1657
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1161
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .. 3•1165
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241, 317-248-2036 .... 3•1086
National Instruments, 12109 Technology Blvd., Austin, TX 78759, 512-250-9119 .... 3•1266
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1088, 1136,1167,1338,1340
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 1B•1819,3•1089,1137,1168,1347
§ Opto 22, 15461 Springdale St., Huntington Bch., CA 92649, 714-891-5861 .... 1B•1470
Phoenix Contact, 1900 Greenwood St., Harrisburg, PA 17104, 717-232-0500 .... 2•1542
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 .... 3•1119
Vector Electronic Co., Inc., 12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342, 818-365-9661 .... 2•1095
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
Control-O-mation, Inc, 7300 W. Huron River Dr., Dexter, MI 48130 313-426-3935
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Cybersystems, Inc., 7540 South Memorial Pkwy., Huntsville, AL 35802 205-883-4410
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Data I/O Corp., 10525 Willows Rd. N.E., C-46, Redmond, WA 98052 206-881-6444
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 .617-899-6619
§ Dylon Data Corp., 9561 Ridgehaven Ct., San Diego, CA 92123 619-292-5584

Garry Mfg. Co., Div. of Brand-Rex Co., 9 Queen Anne Ct., Laghorne, PA 19047 215-949-2300
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ Giltronix, 3780 Fabian Way, Palo Alto, CA 94303 415-493-1300
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Gunther, W., GmbH, Virnsberger Strasse 51, D 8500 Nurnberg 82, West Germany 0911/65521
ICS Electronics Corp., 2185 Old Oakland Rd., San Jose, CA 95131 408-263-4844
Information Transfer Indl., Box 357, Holcomb, NY 14469 716-657-7074
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
K-Systems, Inc., 3902 Lilac, Las Cruces, NM 88005 505-526-3209
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 714-634-8080
MDB Sys., 1995 N Batavia St., Orange, CA 92665 714-998-6900
Micro/sys, 1011 Grand Central Ave., Glendale, CA 91201-3010 818-244-4600
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
§ New-Tone Electronics, Inc., 44 Farrand St., Bloomfield, NJ 07003 .. 201-748-5089
Nu Data, 32 Fairview Ave., Little Silver, NJ 07739 201-842-5757
Omnibyte Corp., 245 W. Roosevelt Rd., Bldg. 1-5, W. Chicago, IL 60185 312-231-6880
Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
§† RCA Solid State Div., Micro Processors, Route 202, Somerville, NJ 08876 201-685-6000
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Seiko Instrs. U.S.A., Inc., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Zendex Corp., 6700 Sierra La., Dublin, CA 94566 415-828-3000

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Interrupters, Power-4300 — *See Vol. 1B*

Interrupters, Vacuum-4300 — *See Vol. 1B*

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Isolators, Antenna-1900

Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Isolators, Ferrite-3450 — *See Vol. 1A*

Isolators, Line-4050

Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 ... 3•1854,1855
† Georator Corp., Box 70, Manassas, VA 22110, 703-368-2101 .... 3•1878
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1884,1885
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897-1900
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733 213-575-0755
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
† Diamond Magnetics, P.O. Box 4736, San Luis Obispo, CA 93403 805-544-4019
§ Electronic Specialists, 171 South Main St., Natick, MA 01760 .... 617-655-1532; 800-225-4876
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
§ Hammond Mfg. Co., 1690 Walden Ave., Buffalo, NY 14225 716-894-5710
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
Powermark, 3855 Ruffin Rd., San Diego, CA 92123 619-565-8363
§† Topaz Electronics, 9192 Topaz Way, San Diego, CA 92123-1164 619-279-0831
Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069 619-744-3346

Isolators, Microwave (All Types)-3450 — *See Vol. 1A*

Isolators, Optoelectronic-3700 — *See Vol. 1B*

Isolators, Source — See Isolators, Line (Vol. 3)

Jack Adapters (All Types)-2100 — *See Vol. 2*

Jack Covers-2100 — *See Vol. 2*

Jack Panel Assemblies & Access. — See Panels, Jack (Vol. 2)

Jacks (All Types)-2100 — *See Vol. 2*

Jacks (MIL)-2440 — *See Vol. 1B*

Jammers (MIL)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Jammers (MIL), Acoustic-3475

Jammers (MIL), Advanced Self Protection-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446

Jammers (MIL), Chaff, Flares-3475

American Cyanamid Co., Metal Coated Fibers Dept., One Cyanamid Plaza, Wayne, NJ 07470 201-831-3148

Jammers (MIL), Communications (Commjam)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Jammers (MIL), Commjam, Truck Mounted-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Jammers (MIL), Drone Borne-3475

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jammers (MIL), Expendable-3475

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jammers (MIL), Fuze-3475

Jammers (MIL), High Band-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jammers (MIL), Integrated Command-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jammers (MIL), J-band-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jammers (MIL), Low Band-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jammers (MIL), Multipurpose-3475

Jammers (MIL), Portable-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Jammers (MIL), Radar-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666

Jammers (MIL), Shipboard-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

Jammers (MIL), Standoff-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

Jammers (MIL), Tactical-3475

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Jamming Pods (MIL), ECM-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jamming Sets (MIL), Multipurpose-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661

Jamming Systems (MIL)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694

† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Jamming Systems (MIL), Mobile-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Jamming Systems (MIL), Multipurpose-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500

Jamming Systems (MIL), Tactical Communications (TACJAM)-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Jigs And Fixtures, Chassis & Circuit Board-4100

† Anchor Specialty Mfg. Inc., 300 Hollister Rd., Teterboro, NJ 07608 201-288-1939
Augat/ESP, Inc., 12832 Chadron Ave., Hawthorne, CA 90250 213-973-0262
§ Berg, W. M., Inc., 499 Ocean Ave., East Rockaway, NY 11518 516-599-5010
Carbone Lorraine Inds., 400 Myrtle Ave., Boonton, NJ 07005 201-DE4-0700
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
§ Fancort Industries, Inc., 111 Clinton Rd., Fairfield, NJ 07006 201-575-0610
Jan Hardware Mfg. Co., 47-27 36th St., Long Island City, NY 11101 212-361-0800
† Jettron Prods., P.O. Box 337, E. Hanover, NJ 07936 201-887-0571
Mac Panel Co., Box 5027, 216 Pine St., High Point, NC 27262 919-884-8111
§† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
§ Matrix Engineering Corp., 17000 S. Western Ave. 19, Gardena, CA 90247 213-770-0521
§ PanaVise Prods., 2850 E. 29th St., Long Beach, CA 90806 213-569-8108
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Ultra Carbon, Box X-747, Bay City, MI 48707 517-894-2911
"World" Enterprises, Inc., 550 N. Bayard Ave., Waynesboro, VA 22980 703-942-4159

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Joints, Rotary, Microwave-3450 — *See Vol. 1A*

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Keyboards, Capacitive-5150 — *See Vol. 1B*

Keyboards, Ferrite Core-5150 — *See Vol. 1B*

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Keyboards, Pad-5150 — *See Vol. 1B*

Keyboards, Photo-optical-5150 — *See Vol. 1B*

Keyboards, Reed-5150 — *See Vol. 1B*

Keyboards, Solid State-5150 — *See Vol. 1B*

Keyers, Tone-1900

Flex-Key Corp., 18 Sargent St., Gloucester, MA 01930 617-281-2040
Frederick Elctrns. Corp., 7630 Hayward Rd., P.O. Box 502, Frederick, MD 21701-0502 301-662-5901
Rath Microtech Corp., Rath Affiliated Cos., 2505 Foster Ave., Janesville, WI 53545 608-754-2222 800-356-9464
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257

Keypads-5150 — *See Vol. 1B*

Kits, Breadboarding (For Engineers)-4200 — *See Vol. 2*

Kits, Connector-2100 — *See Vol. 2*

Kits, Enclosure Prototyping-1400 — *See Vol. 2*

Kits, Fiber Optic-2475 — *See Vol. 1B*

Kits, Marking (Dial, Instrument, Equipment, etc.)-2400 — *See Vol. 2*

Kits, Potentiometer, Rheostat-4750 — *See Vol. 1A*

Kits, Printed Circuit-1700 — *See Vol. 2*

Kits, Programming Board-4200 — *See Vol. 2*

Kits, Shielding-4525 — *See Vol. 2*

Kits, Terminal-2100 — *See Vol. 2*

Kits, Training Aid-4200 — *See Vol. 2*

Knobs & Dials-2400 — *See Vol. 2*

Knobs, Limit Stop-2400 — *See Vol. 2*

Knobs, Locking, Control Shaft-2400 — *See Vol. 2*

Knobs, Slip Clutch-2400 — *See Vol. 2*

Knobs, Torque, Incremental, Ratio Drive-2400 — *See Vol. 2*

Labels, Pressure Sensitive, Adhesive-2400 — *See Vol. 2*

Labels, Coatings, Crayons, Pellets, etc., Temperature Indicating-5300 — *See Vol. 1B*

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Laminates, Metal Clad (Including Copper)-2500 — *See Vol. 2*

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Laminates, Plastic (With Integral Heating Elements)-5300 — *See Vol. 1B*

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Lamps, Edge Lighting, Panel-2450 — *See Vol. 1B*

Lamps, Electroluminescent-2450 — *See Vol. 1B*

Lamps, Exciter, Photographic-2450 — *See Vol. 1B*

Lamps, Flashtube-2450 — *See Vol. 1B*

Lamps, Fluorescent-2450 — *See Vol. 1B*

Lamps, Glow — See Lamps, Neon (Vol. 1B)

Lamps, Incandescent-2450 — *See Vol. 1B*

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Lamps, LED & LCD — See Diodes, Light Emitting (Vol. 1B), Diodes, Liquid Crystal (Vol. 1B),

Lamps, Magnifying, Inspection-4100

Aristo Grid Lamp Prods., 65 Harbor Rd., Port Washington, NY 11050 516-944-3030
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ General Hardware Mfg., 80 White St., New York, NY 10013 212-431-6100
§† Luxo Lamp, P.O. Box 951, Port Chester, NY 10573 914-937-4433
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200

Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 301-490-9860
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 800-628-8862
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Lamps, Mercury Vapor-2450 — *See Vol. 1B*

Lamps, Miniature & Subminiature-2450 — *See Vol. 1B*

Lamps, Neon-2450 — *See Vol. 1B*

Lamps, Oil Tight-2450 — *See Vol. 1B*

Lamps, Press-to-Test-2450 — *See Vol. 1B*

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Lamps, Solid State — See Diodes, Light Emitting (Vol. 1B), Diodes, Liquid Crystal (Vol. 1B),

Lamps, Stroboscopic Source-2450 — *See Vol. 1B*

Lamps, Tritium (Hydrogen 3) Powered-2450 — *See Vol. 1B*

Lamps, Tungsten Halogen-2450 — *See Vol. 1B*

Lamps, Ultraviolet-2450 — *See Vol. 1B*

Lamps, Xenon-2450 — *See Vol. 1B*

Laser Systems-4100

† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998, 213-828-7496 1B•1116
§ Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 805-967-0423
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
Chicago Laser Systems, Inc., 4034 N. Nashville Ave., Chicago, IL 60634 312-282-2710
Coherent, Inc., 3210 Porter Dr., Palo Alto, CA 94304 415-493-2111
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
† General Optronics, 3005 Hadley Rd., So. Plainfield, NJ 07080 201-549-9000
GTE Sys.-Sylvania Sys. Grp., Western Div., P.O. Box 7188, Mountain View, CA 94039 415-966-2000
Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
§† Hughes Aircraft Co., 6155 El Camino Real, Carlsbad, CA 92008 619-438-9191
§† International Laser Sys., 3404 N. Orange Blossom Trail, Orlando, FL 32804 305-295-4010
Laakmann Electro-Optics, Inc., 33052 Calle Aviador, San Juan Capistrano, CA 92675 714-493-6624
Laser Applications, 91 Carver Ave., Westwood, NJ 07675 201-664-7636
Laser Concepts, Omega Organization Intl., P.O. Box 687, Mercer Island, WA 98040 206-232-6256
Laser Diode Labs, 1130 Somerset St., New Brunswick, NJ 08901 201-249-7000
† Laser Inc., Laser Lane, Box 537, Sturbridge, MA 01566 617-347-7314
† Lenox Laser, 615 Pittsfield Rd., Lenox, MA 01240 413-499-4477
Lincoln Laser Co., 234 East Mohave, Phoenix, AZ 85004 602-257-0407
† Melles Griot, 1770 Kettering St., Irvine, CA 92714 714-556-8200
Ortel Corp., 2015 W. Chestnut St., Alhambra, CA 91803 213-281-3636
† Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
Photon Technlg., 14125 Capri Dr. , Los Gatos, CA 95030 408-866-0566
Quantronix, 225 Engineers Rd., Smithtown, NY 11787 516-273-6900
Raytheon Co., Laser Center, Fourth Ave., Burlington, MA 01803 617-272-6402
RMF Prods., Inc., 1275 Paramount Pkwy., P.O. Box 520, Batavia, IL 60510 312-879-0020
Staffall Inc., 7 Woodland St., Providence, RI 02908 401-351-8282
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
§ Sun Research Inc., Phase-R, Box 210, Old Bay Rd., New Durham, NH 03855 603-859-7110

Laser Components & Laser Accessories-3700 — *See Vol. 1B*

LCDs — See Diodes, Liquid Crystal (Vol. 1B)

Lead Assemblies, High Voltage-6000 (Also See onnectors; Cable Assemblies & Harnesses) — *See Vol. 2*

Leads, Test & Adapters-2900

Concord Elctrns., 30 Great Jones St., Dept. JE, New York, NY 10012, 212-777-6571 .... 2•1176,1211,1222,1237,1242,1243
§† Consolidated Electronic Wire & Cable Corp., 11044 King St., Franklin Park, IL 60131, 312-455-8830 .... 2•2072
Daburn Elctrns. & Cable, 70 Oak St., Norwood, NJ 07648, 201-768-5400 ... 2•2093
§ Interlok, 770 Airport Blvd., Burlingame, CA 94010, 415-348-5625 .... 2•1334
§ ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 ....2•1370,1416-1425,1429-1438,1442,1448-1453,1469
§ Mueller Elec. Co., 1583 E 31st St., Dept. 20, Cleveland, OH 44114, 216-771-5225 .... 3•1264,1265
§ National Tel-Tronics, State Road Hill, Meadville, PA 16335, 814-724-6440 .... 2•1530
§ Kulka Smith, Inc., 1913 Atlantic Ave., Manasquan, NJ 08736, 201-223-9400 .... 2•1565,3•1303
§ Test Probes, Inc., Box 2113, La Jolla, CA 92038, 619-459-4197 .... 3•1379
§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160
Allied Systems Corp., Box 18077, Greensboro, NC 27419 919-299-2294
† Anchor Specialty Mfg. Inc., 300 Hollister Rd., Teterboro, NJ 07608 201-288-1939
§† Brim Elctrns., 120E Home Pl., Lodi, NJ 07644 201-796-2886
California Avionics Labs., Box 701, Palo Alto, CA 94302 415-328-7999
Compac, 279 Skidmore Rd., Deer Park, NY 11729 516-667-3933
Easy Heat-Wirekraft, 555 North Michigan St., Lakeville, IN 46536 219-784-3011
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
§† Excel Specialty Corp., 6335 N. Broadway, Chicago, IL 60660 312-262-4781
§† E-Z-Hook, Div. Tektest Inc., Box 450 - 225 N. Second Ave., Arcadia, CA 91006 818-446-6175
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† General Optronics, 3005 Hadley Rd., So. Plainfield, NJ 07080 201-549-9000
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
† Mac Panel Co., Box 5027, 216 Pine St., High Point, NC 27262 919-884-8111
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183
§ Pylon Co., 452 John Dietsch Blvd., Attleboro Falls, MA 02763 617-699-7646
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
§ Schroff UK Ltd., Maylands Ave., Hemel Hempstead, Herts, HP2 4SG England 0442-40471/6
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015

LEDs — See Diodes, Light Emitting (LEDs) (Vol. 1B)

Lenses, Filters, Windows, Infrared-3700 — *See Vol. 1B*

Lenses, Optical & Camera-3700 — *See Vol. 1B*

Lenses, Readout & Display-2450 — *See Vol. 1B*

Light Choppers-3700 — *See Vol. 1B*

Light Pens-2000

HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386, 612-443-2500 .... 1B•1219
Design Technology, 7760 Vickers St., San Diego, CA 92111-1871 619-268-8194
Femco, Inc., P.O. Box 26710 Parkmoor Sta., San Jose, CA 95159 408-946-1188
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Information Control, Dept. EM7 9610 Bellanca Ave., Los Angeles, CA 90045 213-641-8520
† Information Control Corp., Light Pen Div., Dept. EM7, 9610 Bellanca Ave., Los Angeles, CA 90045 213-641-8520
† Interactive Computer Products, Inc., 23591 El Toro Rd., Ste. 180, El Toro, CA 92630 714-770-5332
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
Opto Technlg., 1674 S. Wolf Rd., Wheeling, IL 60090 312-537-4277
Photobell, 26 Just Rd., Fairfield, NJ 07006 201-227-3613
Poulin Associates, Inc., 302 North Rd., Sudbury, MA 01776 617-443-7333
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 617-922-5961
Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468

Light Sources, Fiber Optic-2475 — *See Vol. 1B*

Light Sources, Photoelectric-3700 — *See Vol. 1B*

Light Sources, Stroboscopic-3700 — *See Vol. 1B*

Light Sources, Ultraviolet-3700 — *See Vol. 1B*

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Limiters, Current-4300 — *See Vol. 1B*

Limiters, Microwave-3450 — *See Vol. 1A*

Limiters, Surge-4300 — *See Vol. 1B*

Line Assemblies (MIL), RF Transmission-2440 — *See Vol. 1B*

Line Conditioners-4050

Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733, 213-575-0755 .... 3•1826
Basic Measuring Insts., 402 Lincoln Centre Dr., Foster City, CA 94404, 415-570-5355 .... 3•1830
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 .... 3•1834,1838,1839

Clary Corp., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, CA 91776, 818-287-6111 .... 3•1842
Controlled Power Co., 1955 Stephenson Hwy., Troy, MI 48084, 313-528-3700 .... 3•1814,1851,1852
§ **Displex, Inc., Alexander Place, Glen Cove, NY 11542, 516-671-4400 .... 3•1860**
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 .... 3•1106
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1394,1862-1866,1870,1872,1875
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897-1900
RTE Deltec Corp., 2727 Kurtz St., San Diego, CA 92110, 619-291-4211 .... 3•1907
SGL Waber, 300 Harvard Ave., Westville, NJ 08093, 609-456-5400;800-257-8384 .... 3•1909
Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 .... 3•1912-1915
§ Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 215-699-9261
§ Electronic Specialists, 171 South Main St., Natick, MA 01760 .... 617-655-1532; 800-225-4876
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
§ Hammond Mfg. Co., 1690 Walden Ave., Buffalo, NY 14225 716-894-5710

Line Controlled Switches — See Switches, Data (Vol. 3)

Line Stretchers, Microwave-3450 — ***See Vol. 1A***

Liners, Tube Shield — See Shields, Tube (Vol. 2)

Loads, Electronic, Variable-2900 (Also See Dummy Loads)

§ **ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 .... 3•1458**
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 .... 3•1507
Electro Impulse, Box 870, Red Bank, NJ 07701-0870, 201-741-0404 .... 3•1220
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1645
Transistor Devices, 274 S. Salem St., Randolph, NJ 07869, 201-361-6622 .... 3•1312,1313
Datapower, Inc., 3328 West First St., Santa Ana, CA 92703 714-775-2000
§† Dielectric Communications, General Signal, Tower Hill Rd., Raymond, ME 04071 .... 207-655-4555;800-341-9678
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
§ Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150
RLC Elctrns., Inc., 83 Radio Cir., Mt. Kisco, NY 10549 914-241-1334
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
§† Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Locators, Open Short-2900

Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200

Locks, Dial & Shaft-2400 — ***See Vol. 2***

Logic Cards (without Components) — See Boards, Plug-in (Vol. 2)

Logic Circuits — See Cards, Logic (Vol. 3), Modules, Logic (Vol. 1A),

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Lugs, Terminal — See Terminals, Lug (Vol. 2)

LVDTs — See Transducers, Displacement (Vol. 1B)

Machines & Accessories, Semiconductor Manufacturing-4100

T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 .... 3•1119
† Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ Apollo Lasers, Inc., 9201 Independence Ave., Chatsworth, CA 91311 213-709-1111
§ Astro Tool Co., Inc., 21615 Southwest Tualatin Valley Hwy., Beaverton, OR 97006 503-642-9853
§† Casso-Solar, 3 Pearl Ct., Allendale, NJ 07401 201-825-4600
§ Excellon Automation, 24215 Garnier St., Torrance, CA 90505 213-325-8000
Fancort Industries, Inc., 111 Clinton Rd., Fairfield, NJ 07006 201-575-0610
GTI/Elctrns. Div., P.O. Box 96, Hadley, PA 16130 412-253-3161
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 201-867-6500
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Micro Component Technlg., Inc., P.O. Box 64013, St. Paul, MN 55164 612-482-5100
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
Plasma-Therm, Inc., Rt. 73, Kresson, NJ 08053 609-767-6120
† PTX-Pentronix Inc., 1737 Cicotte, Lincoln Park, MI 48146 313-388-3100
§† Systonics, Inc., Box 121, Winchester, MA 01890 617-729-4439
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 312-679-8200
Technic, Inc., Box 965, Providence, RI 02901 401-781-6100
§ Temptronic, 55 Chapel St., Newton, MA 02158 617-969-2501
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300

Machines & Tools, Crimping — See Tools, Crimping & Swaging (Vol. 2)

Machines, Cleaning & Degreasing-4100 (Also See Cleaners, Ultrasonic)

Odell, M. P., Co., 1620 Chesapeake Dr., Hoffman Estates, IL 60195, 312-991-2828 800-633-5526 .... 3•1927
API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 516-654-1197
Baron-Blakeslee, Inc., Sub. Purex Inds., Inc., 2001 N. Janice Ave., Melrose Pk., IL 60160 312-450-3900
§ Clean Room Prods., 56 W. Penataquit Ave., Bay Shore, NY 11706 516-968-8282
§† Cobehn, Inc., 226 Passaic Ave., Fairfield, NJ 07006 201-227-6675
§† Cyclo-Tronics, Inc., 1345 N. Old Rand Rd., Wauconda, IL 60084 312-526-0800
Electronic Controls Design, 13626 S. Freeman Rd., Mulino, OR 97042 503-829-9108
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 214-353-9950
§ Gardiner Solder Co., Div. of Gardiner Metal Co., 4820 S. Campbell Ave., Chicago, IL 60632 312-847-0100
Headway Resch., Inc., 3713 Forest La., Garland, TX 75042 214-272-5431
Heat Systems-Ultrasonics, Inc., 1938 New Highway, Farmingdale, NY 11735 516-694-9555
§ Hollis Engrg., Inc., Charron Ave., Box 1189, Nashua, NH 03061 603-889-1121
§ Hollis Engrg./Wire-Wrap, 15 Charron Ave., Nashua, NH 03061 603-889-1121
Impandex, Inc., 203 Brookdale St., Maywood, NJ 07607 201-845-4664
§† Kepro Circuit Sys., 630 Axminister Dr., Fenton, MO 63026 314-343-1630
§† L & R Mfg., 577 Elm St., Kearny, NJ 07032 201-991-5330
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
§† Multicore Solders, Cantiague Rock Rd., Westbury, NY 11590 516-334-7997
Sonicor Instrument Corp., 1365 Marconi Blvd., Copiague, NY 11726 516-842-3344
Technic, Inc., Box 965, Providence, RI 02901 401-781-6100
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
§† Tech Spray, Inc., Box 949, Amarillo, TX 79105 806-372-8523
Zenrad Circuits Co., 529 E. Gutierrez St., Santa Barbara, CA 93103 805-963-3527

Machines, Coil Winding-4100

† Coast Coil Co., 5333 W. Washington Blvd., Los Angeles, CA 90016 213-936-6188
Gorman Machine Corp., 7 Burke Dr., Brockton, MA 02401 617-588-2900
Hilton Industries, Inc., Div. of Core Industries, 1177 Cattlemen Road, Sarasota, FL 33582 813-371-2600
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 201-867-6500
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
Solatron Enterprises, 421 E. Beach Ave., Inglewood, CA 90302 213-678-4981
§ Universal Mfg. Co., Inc., 1168 Grove St., Irvington, NJ 07111 201-374-9800

Machines, Component Handling, Feeding, Insertion & Sorting-4100

† Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
Autosplice, Inc., 59-12, 37th Ave, Woodside, NY 11377 212-429-0500
Berg Elctrns., Du Pont Co., 30 Hunter La., Camp Hill, PA 17011 .... 800-237-BERG
Black & Webster, 281 Winter St., Waltham, MA 02154 617-890-9100
Conforming Matrix, Box 5126, Pt. Pl. Sta., Toledo, OH 43611 419-729-3777
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
Everett/Charles Automation Sys. Inc., 700 E. Harrison Ave., Pomona, CA 91767 714-625-5571
§ Excellon Automation, 24215 Garnier St., Torrance, CA 90505 213-325-8000
Fancort Industries, Inc., 111 Clinton Rd., Fairfield, NJ 07006 201-575-0610
GTI/Elctrns. Div., P.O. Box 96, Hadley, PA 16130 412-253-3161
§ Hollis Engrg., Inc., Charron Ave., Box 1189, Nashua, NH 03061 603-889-1121
† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
Micro Component Technlg., Inc., P.O. Box 64013, St. Paul, MN 55164 612-482-5100
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
Molex, 2222 Wellington Ct., Lisle, IL 60532 312-969-4550
Penn Engrg. & Mfg., P.O. Box 1000, Danboro, PA 18916 215-766-8853
Ragen Corp., Systems Div., 9 Porete Ave., N. Arlington, NJ 07032 201-997-1000
§ Ramsey Engineering, 1853 W. County Rd. C, St. Paul, MN 55113 612-633-5150
Solatron Enterprises, 421 E. Beach Ave., Inglewood, CA 90302 213-678-4981
Trio-Tech Intl., 2040 N. Lincoln St., Burbank, CA 91504 818-846-9200
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 607-775-1102

Machines, Hermetic Sealing-4100

Coherent, Inc., 3210 Porter Dr., Palo Alto, CA 94304 415-493-2111
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 201-867-6500
† Laser Inc., Laser Lane, Box 537, Sturbridge, MA 01566 617-347-7314
† Lepel, 59-21 Queens-Midtown Expwy., Maspeth, NY 11378 212-426-4580
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061

Machines, Induction Heating (Electronic)-4100

† Lepel, 59-21 Queens-Midtown Expwy., Maspeth, NY 11378 212-426-4580
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 312-670-0150

Machines, Lead Cutting & Forming-4100

† Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
AMP Incorporated, Box 3608, Harrisburg, PA 17105 717-564-0100
Burndy Corporation, Richards Ave., Norwalk,, CT 06852 203-838-4444
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 214-353-9950
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
Fancort Industries, Inc., 111 Clinton Rd., Fairfield, NJ 07006 201-575-0610
§ Harwil, 1548 17th St., Santa Monica, CA 90404 213-829-2310
Hollis Engrg., Inc., Charron Ave., Box 1189, Nashua, NH 03061 603-889-1121
§ Hollis Engrg./Wire-Wrap, 15 Charron Ave., Nashua, NH 03061 603-889-1121
† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
† Plessey Electro-Products, 3860 Centinela Ave., Los Angeles, CA 90066 213-390-3585
Technical Devices, 560 Alaska Ave., Torrance, CA 90503 213-618-8437
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 607-775-1102

Machines, Marking & Numbering-4100

† Acromark, 60 Locust/Dept. 397, Berkeley Hgts., NJ 07922 201-464-6474
† Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
† Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500
Allen Avionics, 224 E. 2nd St., Mineola, NY 11501 516-248-8080
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Bell Co., Inc., 106 Morrow Ave., Box 92E, Trussville, AL 35173 205-655-2135
Black & Webster, 281 Winter St., Waltham, MA 02154 617-890-9100
Brady, W. H., Co., Indl. Prods. Div., 2221 W. Camden Rd., Milwaukee, WI 53201 414-351-6630
Burndy Corporation, Richards Ave., Norwalk,, CT 06852 203-838-4444
Coherent, Inc., 3210 Porter Dr., Palo Alto, CA 94304 415-493-2111
Component Marking Sys., 90 Morse St., Norwood, MA 02062 617-762-6908
† Di/An Controls, Inc., 944 Dorchester Ave., Boston, MA 02125 617-288-7700
§ Eastern Marking Machines, 422 S Franklin St., Hempstead, NY 11550 516-483-7070
Electro Stylus, 31 Cheyenne Blvd., Colorado Springs, CO 80906 303-633-5969
GTI/Elctrns. Div., P.O. Box 96, Hadley, PA 16130 412-253-3161
Kensol Wire Marking, Kensol Olsenmark Inc., 40 Melville Park Road, Melville, NY 11747 516-694-7773
Markem Corp., 1000 Congress St., Keene, NH 03431 603-352-1130
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
§† Pioneer Comps., 2352 E. 66th St., Brooklyn, NY 11234 212-444-3880
Quantronix, 225 Engineers Rd., Smithtown, NY 11787 516-273-6900
Solatron Enterprises, 421 E. Beach Ave., Inglewood, CA 90302 213-678-4981
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Telesis Laboratory, Box 1972, Chillocothe, OH 45601 614-642-5000

Machines, Mask Alignment & Exposure-4100

BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
† DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 302-773-3218
Grover Patent Products, 339 W. Arden Ave., Glendale, CA 91203 213-245-4400
§† Kepro Circuit Sys., 630 Axminister Dr., Fenton, MO 63026 314-343-1630
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000

Machines, Metallizing, Vacuum — See Deposition Equipment, Vacuum & Accessories (Vol. 3)

Machines, Plastic Molding-4100

Custom Sci. Instrs., 13 Wing Dr., Cedar Knolls, NJ 07927 201-538-8500
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
Jaco Mfg. Co., 468 Geiger St., Berea, OH 44017 216-234-4000
United Technologies, Terminal Prods., 1230 Sabine St., Huntington, IN 46750 219-356-2700

Machines, Plating-4100

Auric Corp., 470 Frelinghuysen Ave., Newark, NJ 07114 201-242-4100
§ Electronic Trend Prods., 10080 N. Wolfe Rd., Ste. 372, Cupertino, CA 95014 408-996-7401
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 214-353-9950
† Engelhard Corp., 70 Wood Ave. S., Iselin, NJ 08830 201-321-5900
HBS Equipment Div., 3000 Supply Ave., Los Angeles, CA 90040 213-726-3033
PCK Technlg. Div./Kollmorgen Corp., 322 South Service Rd., Melville, NY 11747 516-454-4400
Sel-Rex Div., OMI Intl. Corp., 75 River Rd., Nutley, NJ 07110 201-667-5200
Technic, Inc., Box 965, Providence, RI 02901 401-781-6100
Waldes Kohinoor, 47-16 Austel Pl., Long Island City, NY 11101 212-392-3100

Machines, Printed Circuit Drilling, Etching & Punching-4100

Aremco Prods., Box 429, Ossining, NY 10562 914-762-0685
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 516-654-1197
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Coherent, Inc., 3210 Porter Dr., Palo Alto, CA 94304 415-493-2111
§† Cyclo-Tronics, Inc., 1345 N. Old Rand Rd., Wauconda, IL 60084 312-526-0800
§ Electronic Trend Prods., 10080 N. Wolfe Rd., Ste. 372, Cupertino, CA 95014 408-996-7401
§ Foredom Elec. Co., Blackstone Inds., Route 6, Bethel, CT 06470 203-792-8622
§ Garry Mfg. Co., Div. of Brand-Rex Co., 9 Queen Anne Ct., Laghorne, PA 19047 215-949-2300
§† Kepro Circuit Sys., 630 Axminister Dr., Fenton, MO 63026 314-343-1630
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ LPKF Pacific Inc., LPKF Pacific Gesellschaft fuer internationalen Maschinenhandel m.b.h., 20C Pamaron Way, Novato, CA 94947 415-883-1717
PCK Technlg. Div./Kollmorgen Corp., 322 South Service Rd., Melville, NY 11747 516-454-4400
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061

Machines, Terminal Installing-4100

Panduit Corp., 17301 Ridgeland Ave., Tinley Park, IL 60477-0981, 312-532-1800 ....2•1533
AMP Incorporated, Box 3608, Harrisburg, PA 17105 717-564-0100
Ark-Les, 51 Water St., Watertown, MA 02172 617-924-2330
§ Astro Tool Co., Inc., 21615 Southwest Tualatin Valley Hwy., Beaverton, OR 97006 503-642-9853
Augat Inc., 33 Perry Ave., Box 779, Attleboro, MA 02703 617-222-2202
Autosplice, Inc., 59-12, 37th Ave, Woodside, NY 11377 212-429-0500
§† Berg Elctrns., Du Pont Co., 30 Hunter La., Camp Hill, PA 17011 ....800-237-BERG
Black & Webster, 281 Winter St., Waltham, MA 02154 617-890-9100
Burndy Corporation, Richards Ave., Norwalk,, CT 06852 203-838-4444
† Hollingsworth Solderless Terminal Co., 700 N.W. 57th Pl., Ft. Lauderdale, FL 33309 305-772-7660
§ Malco, Div. Microdot Connector Grp., 12 Progress Dr., Montgomeryville, PA 18936 215-699-5373
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
Nichifu America, Inc., 1494 N. Charlotte St., Pottstown, PA 19464 215-323-7120
Scanbe Div., 3445 Fletcher Ave., El Monte, CA 91731 213-579-2300
Sjoberg, C., & Son, Inc., 415 Station St., Cranston, RI 02910 401-461-8220
United Technologies, Terminal Prods., 1230 Sabine St., Huntington, IN 46750 219-356-2700
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 607-775-1102
§ Waldom Elctrns., 4301 W. 69th St., Dept. EEM, Chicago, IL 60629 312-585-1212
Zierick Mfg. Corp., 44 Radio Circle, Mt. Kisco, NY 10549 914-666-2911

Machines, Ultrasonic Bonding-4100

§ Excellon Automation, 24215 Garnier St., Torrance, CA 90505 213-325-8000
§† Sonobond, 200 E. Rosedale Ave., West Chester, PA 19380 215-696-4710

Machines, Vibration Fatigue Testing — See Testers, Vibration (Vol. 3)

Machines, Wafer Alignment — See Machines, Mask Alignment & Exposure (Vol. 3)

Machines, Wire Marking, Manual & Automatic-4100

† Acromark, 60 Locust/Dept. 397, Berkeley Hgts., NJ 07922 201-464-6474
Autosplice, Inc., 59-12, 37th Ave, Woodside, NY 11377 212-429-0500
Brady, W. H., Co., Indl. Prods. Div., 2221 W. Camden Rd., Milwaukee, WI 53201 414-351-6630
Burndy Corporation, Richards Ave., Norwalk,, CT 06852 203-838-4444
Garry Mfg. Co., Div. of Brand-Rex Co., 9 Queen Anne Ct., Laghorne, PA 19047 215-949-2300
Kensol Wire Marking, Kensol Olsenmark Inc., 40 Melville Park Road, Melville, NY 11747 516-694-7773
§ Kingsley Machine Co., 850 Cahuenga Blvd., Hollywood, CA 90038 213-469-7243
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
§ Zippertubing Co., P.O. Box 61129, Los Angeles, CA 90061 213-321-3901

Machines, Wire Measuring & Cutting-4100

§ Alpha Wire Corp., 711 Lidgerwood Ave., P.O. Box 711, Elizabeth, NJ 07207 201-925-8000
§ Assem-Pro Instrs., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124 408-267-1168
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
Berg Elctrns., Du Pont Co., 30 Hunter La., Camp Hill, PA 17011 ....800-237-BERG
Burndy Corporation, Richards Ave., Norwalk, CT 06852 203-838-4444
Carpenter Mfg. Co., Inc., Fairgrounds Dr., P.O. Box 188, Manlius, NY 13104-0188 315-682-9176
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
Eubanks Engrg., 1307 So. Myrtle Ave., Monrovia, CA 91016 213-357-7011
Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903 201-249-6600
§ Garry Mfg. Co., Div. of Brand-Rex Co., 9 Queen Anne Ct., Laghorne, PA 19047 215-949-2300
Hollis Engrg./Wire-Wrap, 15 Charron Ave., Nashua, NH 03061 603-889-1121
§ Ideal Industries, 4450 Becker Pl., Sycamore, IL 60178 815-895-5181
Kensol Wire Marking, Kensol Olsenmark Inc., 40 Melville Park Road, Melville, NY 11747 516-694-7773
§ Kingsley Machine Co., 850 Cahuenga Blvd., Hollywood, CA 90038 213-469-7243
† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
Molex, 2222 Wellington Ct., Lisle, IL 60532 312-969-4550

§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
† Western Elctrn. Prods., 107 Los Molinos, San Clemente, CA 92672 714-492-4677

Machines, Wire Wrapping — See Tools, Wire Wrapping (Vol. 2)

Magnetic Materials — See Cores, Magnetic (All Types) (Vol. 2), Ferrite Material & Parts (Vol. 2),

Magnetizers-4100

§ Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807, 305-678-6900 ....3•1194
LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, 313-528-2202 ....3•1256
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226, 317-545-2102 ....3•1261
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821
Arnold Engrg., Box "G", Marengo, IL 60152 815-568-2000
Axial Magnetics, 6600 Whitaker Ave., Van Nuys, CA 91406 818-994-3346
Indiana General/Div. Emm Corp., Magnet Prods., 405 Elm St., Valparaiso, IN 46383 219-462-3131
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Magnetran Corp., 5701 Savoy Lane, Houston, TX 77036 713-785-4202
† Magnet Sales & Mfg. Co. Inc., 11250 Playa Court, Culver City, CA 90230-6127 ....213-391-7213;800-421-6692
§ Magnos, Old School House Rd., Harvard, MA 01451 617-456-8880
Permag, 400 Karin La., Hicksville, NY 11801 516-822-3311
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Tohoku Metal Inds., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan ....Tokyo 03-402-6161
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674

Magnetodiodes — See Magnetoresistors, Hall (Vol. 1A)

Magnetometers-2900

† Electro Mechanical Design Services, Inc., 16698 Oakmont Ave., Gaithersburg, MD 20877, 301-840-5710 ....3•1221
LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, 313-528-2202 ....3•1256
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226, 317-545-2102 ....3•1261
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
§ Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807 305-678-6900
DEVELCO, Inc., 404 Tasman Dr., Sunnyvale, CA 94089-1797 408-734-5700
EG&G Geometrics, Div. of EG&G Inc., 395 Java Dr., Sunnyvale, CA 94086 408-734-4616
† E M S Development Corp., 200 Allen Blvd., Farmingdale, NY 11735 516-694-2886
† Humphrey, Inc., 9212 Balboa Ave., San Diego, CA 92123 619-565-6631
† Magnet Sales & Mfg. Co. Inc., 11250 Playa Court, Culver City, CA 90230-6127 ....213-391-7213;800-421-6692
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Schonstedt Instr. Co., 1775 Wiehle Ave., Reston, VA 22090 703-471-1050
Tensor, Box 14843, Austin, TX 78761 512-251-4131
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674

Magnetoresistors, Hall-4800 — *See Vol. 1A*

Magnetrons — See Tubes, Microwave (Vol. 1A)

Magnets, Focusing — See Magnets, Permanent (Vol. 2)

Magnets (Lab. Type)-2500 — *See Vol. 2*

Magnets, Permanent-2500 — *See Vol. 2*

Magnets, Superconducting-2500 — *See Vol. 2*

Magnets (MIL), Permanent-2440 — *See Vol. 1B*

Magnifying Glasses, Inspection-4100

Bishop Graphics, Inc., 5388 Sterling Center, Westlake Village, CA 91359 818-991-2600
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ General Hardware Mfg., 80 White St., New York, NY 10013 212-431-6100
† Keyan Inds., Inc., P.O. Box 1228, Middleboro, MA 02346 617-947-7719
§† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
† Melles Griot, 1770 Kettering St., Irvine, CA 92714 714-556-8200
† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
§ Kulka Smith, Inc., 1913 Atlantic Ave., Manasquan, NJ 08736 201-223-9400
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
3D Optics, Box 224, 4 Strathmore Cir., Braintree, MA 02184 617-848-8002

Mappers (MIL), IR Recon.-3475

Markers, Dry Transfer — See Kits, Marking (Vol. 2)

Markers, Identification — See Labels (Vol. 2), Nameplates (Vol. 1B), Machines, Marking and Numbering (Vol. 3),

Markers, RF — See Generators, Marker (Vol. 3)

Markers, Terminal — See Kits, Marking, etc. (Vol. 2)

Markers, Wire, Tab & Sleeve — See Wire Markers (Vol. 2)

Mark Recognition Equipment, Optical-2000

BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 617-922-5961
3D Optics, Box 224, 4 Strathmore Cir., Braintree, MA 02184 617-848-8002

Mask Alignment & Exposure Systems — See Machines, Mask Alignment & Exposure (Vol. 3)

Materials, Shock, Noise, & Vibration Control-2500 — *See Vol. 2*

Matrices, Switching-2000 (Also See Boards, Programming)

Allied Systems Corp., Box 18077, Greensboro, NC 27419, 919-299-2294 ... 2•1874
Crosspoint, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ....1B•1574
CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445, 716-381-4740 ....3•1213
Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 .... 3•1162, 1163
Mac Panel Co., Box 5027, 216 Pine St., High Point, NC 27262, 919-884-8111 ....2•1891
AMP Incorporated, Box 3608, Harrisburg, PA 17105 717-564-0100
Appleton Elctrns., 2205 12th Ave., So. Milwaukee, WI 53172 414-764-7200
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Atec Sys., 107 N. Washington St., E. Rochester, NY 14445 716-381-4740
§ Bowmar Instrument Corp., Commercial Products Div., 4640 126th Ave. N., Clearwater, FL 33520 813-576-2525
Cherry Electrical Prods. Corp., 3623 Sunset Ave., Waukegan, IL 60087 312-578-3500
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
Enerco, Inc., 9615 W. Marginal Way S., Seattle, WA 98108 206-762-1422
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
LVC Inds., Inc., CO-ORD Switch Div., 23 Hanse Ave., Freeport, NY 11520 516-868-1900
MarLee Switch Co., 933-D N. Central Ave., Upland, CA 91786 714-982-8988
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241 317-248-2036
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302 .213-992-6776
MEC A/S, Industriparken 23, Ballerup, DK-2750 Denmark 452-973366
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
† Virginia Panel, 1400 New Hope Rd., Waynesboro, VA 22980 703-949-8376

Measuring Equipment, Fiber Optic, Attenuation & Bandwidth-2200

§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
Poulin Associates, Inc., 302 North Rd., Sudbury, MA 01776 617-443-7333
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000

Media, Magnetic — See Disks, Magnetic (Vol. 3), Tape, Magnetic (Vol. 3),

Megaphones — See Amplifiers (Vol. 3)

Memory Devices/Controllers, Bipolar, Add-in-2000

Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898

Memory Devices/Controllers, Bipolar, Add-on-2000

Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655

Memory Devices/Controllers, Bubble, Add-in-2000

§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932

Memory Devices/Controllers, Bubble, Add-on-2000

† Bubbl-Tec, 6800 Sierra Ct., Dublin, CA 94566 415-829-8705
† Pacific Cyber/Metrix Inc., 6800 Sierra Ct., Dublin, CA 94568 415-829-8700
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932

Memory Devices/Controllers, CCD, Add-in-2000

Memory Devices/Controllers, CCD, Add-on-2000

Memory Devices/Controllers, Magnetic Core, Add-in-2000

§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ....714-540-9931/9932

Memory Devices/Controllers, Magnetic Core, Add-on-2000

§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ...714-540-9931/9932

Memory Devices/Controllers, MOS, Add-in-2000

Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 ...3•1108,1109
Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 ...404-973-0027
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 ...301-296-7000
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 ...217-359-8010
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 ...609-799-0071
Diversified Technlg., P.O. Box 748, Ridgeland, MS 39157 ...601-856-4121
§ General Robotics Corp., 57 N. Main St., Hartford, WI 53027 ...414-673-6800
Macrolink, 1150 E. Stanford Ct., Anaheim, CA 92805 ...714-634-8080
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 ...602-244-6900
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ...714-540-9931/9932
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 ...201-341-8361
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 ...214-995-6611
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 ...714-557-3550

Memory Devices/Controllers, MOS, Add-on-2000

Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 ...301-296-7000
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 ...217-359-8010
§ Data-Match Corp., 3810 Oakcliff Ind. Ct., Doraville, GA 30340 ...404-441-0408
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 ...609-799-0071
Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 ...602-244-6900
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ...714-540-9931/9932

Memory Systems, Bubble-2000

† Bubbl-Tec, 6800 Sierra Ct., Dublin, CA 94566 ...415-829-8705
Fujitsu America, Inc., 918 Sherwood Dr., Lake Bluff, IL 60044 ...312-295-2610
Hitachi America, 1800 Bering Dr., San Jose, CA 95112 ...408-292-6404
† Pacific Cyber/Metrix Inc., 6800 Sierra Ct., Dublin, CA 94568 ...415-829-8700
PCM-PAC Cyber-Metric, 6800 Sierra Ct., Dublin, CA 94568 ...415-829-8700
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ...714-540-9931/9932
Plessey Microsystems, 451 Hungerford Dr., Rockville, MD 20850 ...301-279-2892
† Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201 ...818-244-6541
† Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 ...914-694-9270

Memory Systems, Core-2000

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 ...415-367-2011
§ Applied Data Communications, 14272 Chambers Rd., Tustin, CA 92680 ...714-731-9000
California Minicomputer Sys., 5534 Westlawn Ave., Los Angeles, CA 90066 ...213-640-2930
† CTS Fabri-Tek, Inc., 6900 Shady Oak Rd., Eden Prairie, MN 55344 ...612-941-9100
Data General, 4400 Computer Dr., Westboro, MA 01581 ...617-366-8911
§† Digital Data Sys., 1551 N.W. 65 Ave., Plantation, FL 33313 ...305-792-3290
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 ...213-998-9090
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ...714-752-3800
Lexidata Corp., 755 Middlesex Tpke., Billerica, MA 01865 ...617-663-8550; 800-472-4747
Memorex Corp., San Thomas at Central Expwy., Santa Clara, CA 95052 ...408-987-1000
Mitronics, 18039 Crenshaw Blvd., Torrance, CA 90504 ...213-323-7934
National Micronetics, Route 28, West Hurley, NY 12136 ...914-338-0333
§† Plessey Microsystems, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714 ...714-540-9931/9932
Plessey Microsystems, 451 Hungerford Dr., Rockville, MD 20850 ...301-279-2892
† Rolm Corp., 1 River Oaks Pl., San Jose, CA 95134 ...408-988-2900
Trendata/Standard Memories, 3400 W. Segerstrom, Santa Ana, CA 92704 ...714-540-3605

Memory Systems, Delay Line-2000

† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725, 516-543-4220 ...1A•1466
Anders, Inc., 77 Wolcott Rd., Simsbury, CT 06070 ...203-658-7666
† Control Elctrns. Co., Inc., 107-B Allen Blvd., Farmingdale, NY 11735 ...516-694-0125
Corning Glass Works, Memory Prods Dept., 3900 Electronic Dr., Raleigh, NC 27604 ...919-876-1100
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ...714-752-3800
† Microsonics Inc., 60 Winter St., Weymouth, MA 02188 ...617-337-4200

Memory Systems, Disk-2000

Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 ...408-946-6000
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 ...415-367-2011
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 ...602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ...313-779-8700
Ball Elctrn., Systems Div., 1950 33rd St., Boulder, CO 80302 ...303-441-5400
§ BASF Sys., Crosby Dr., Bedford, MA 01730 ...617-271-4000;800-343-4600
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 ...217-359-8010
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 ...303-444-3972
Control Data Corp., P.O. Box O, Minneapolis, MN 55440 ...1-800-828-8001 Operator 82;In Minnesota 612-921-4400
§ Data General, 4400 Computer Dr., Westboro, MA 01581 ...617-366-8911
Datapoint Corp., Peripheral Operations Division, 686 West Maude Avenue, Sunnyvale, CA 94086 ...408-732-7330
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 ...609-799-0071
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 ...714-533-6333
† Digital Dev. Corp., 8650 Balboa Ave., San Diego, CA 92123 ...619-278-9920
Digital Equip., One Iron Way, Marlborough, MA 01752 ...
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 ...408-988-3472
§ Eigen Video, P.O. Box 848, Nevada City, CA 95959 ...916-272-3461
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 ...305-974-1700
§ Heath Co., Benton Harbor, MI 49022 ...616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ...Call Local Sls. Off.
§ Innotronics, Brooks Rd., Lincoln, MA 01773 ...617-678-8720
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
§ IQ Systems, Applied Circuit Tech., 2931 La Jolla St., Anaheim, CA 92806 ...714-630-6834
† Memorex Corp., San Thomas at Central Expwy., Santa Clara, CA 95052 ...408-987-1000
Microdata Corp., 17481 Red Hill Ave., Irvine, CA 92705 ...714-540-6730
§ Micro Peripherals Inc., 9754 Deering Ave., Chatsworth, CA 91311 ..213-709-4202
§ Mini Computer Technlg., 696 E. Trimble Rd., San Jose, CA 95131 ..408-942-1616
Mitronics, 18039 Crenshaw Blvd., Torrance, CA 90504 ...213-323-7934
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 ...617-862-3120
Peripherals, 3001 Red Hill, Bldg. 6, Ste. 107, Costa Mesa, CA 92626 ...714-540-4925
Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 ...415-962-0224
§ Pertec Peripherals Corp., P.O. Box 2198, Chatsworth, CA 91311 818-882-0030
Potter Instr., 10 Main St., Gonic, NH 03867 ...603-332-1991
† Rolm Corp., 1 River Oaks Pl., San Jose, CA 95134 ...408-988-2900
† Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201 ...818-244-6541
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 ...714-754-6900
Standard Logic, 2215 S. Standard Ave., Santa Ana, CA 92707 ...714-979-4770
Tri-Data Corp., 505 E Middlefield Rd., Mountain View, CA 94043 ...415-969-3700
Vermont Resch. Corp., Precision Pk., N. Springfield, VT 05150 ...802-886-2256

Memory Systems, Disk, Flexible-2000

Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 ...408-946-6000
§ Applied Data Communications, 14272 Chambers Rd., Tustin, CA 92680 ...714-731-9000
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 ...602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ...313-779-8700
§ BASF Sys., Crosby Dr., Bedford, MA 01730 ...617-271-4000;800-343-4600
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 ...217-359-8010
Chrislin Inds., 31352 Via Colinas, Westlake Village, CA 91361 ...213-991-2254
Control Data Corp., P.O. Box O, Minneapolis, MN 55440 ...1-800-828-8001 Operator 82;In Minnesota 612-921-4400
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 ...415-964-7400
§ Data General, 4400 Computer Dr., Westboro, MA 01581 ...617-366-8911
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 ...609-799-0071
§ Dennison Kube, Div. Dennison Computer Supplies Inc., 132 Calvary St., Waltham, MA 02254-0472 ...617-899-0012
Digital Equip., One Iron Way, Marlborough, MA 01752 ...
Dysan Corp., 5201 Patrick Henry Dr., Santa Clara, CA 95050 ...408-988-3472
§ Eigen Video, P.O. Box 848, Nevada City, CA 95959 ...916-272-3461
§ Heath Co., Benton Harbor, MI 49022 ...616-982-3886
§ Innotronics, Brooks Rd., Lincoln, MA 01773 ...617-678-8720
Memorex Corp., San Thomas at Central Expwy., Santa Clara, CA 95052 ...408-987-1000
§ Micro Peripherals Inc., 9754 Deering Ave., Chatsworth, CA 91311 ..213-709-4202
NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 ...617-862-3120
Personal Micro Computers, 475 Ellis St., Mountain View, CA 94043 ...415-962-0224
§ Qume, 2350 Qume Dr., San Jose, CA 95131 ...408-942-4000
Sony Corp. of America, Component Prods. Div., 15 Essex Road, Paramus, NJ 07652 ...201-368-5000
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 ...714-754-6900
† Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655

Memory Systems, Tape-2000

Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 ...301-730-7442
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 ...212-274-1794
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 ...415-367-2011
Ball Elctrn., Systems Div., 1950 33rd St., Boulder, CO 80302 ...303-441-5400
§ BASF Sys., Crosby Dr., Bedford, MA 01730 ...617-271-4000;800-343-4600
§ Braemar Computer Corp., 11950 Twelfth Ave. S., Burnsville, MN 55337 ...612-890-5135
California Minicomputer Sys., 5534 Westlawn Ave., Los Angeles, CA 90066 ...213-640-2930
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 ...217-359-8010
Control Data Corp., P.O. Box O, Minneapolis, MN 55440 ...1-800-828-8001 Operator 82;In Minnesota 612-921-4400
Data Capture Technology, 5436-F South Mingo Rd., Tulsa, OK 74146 ...918-627-7521
§ Data General, 4400 Computer Dr., Westboro, MA 01581 ...617-366-8911
Datapoint Corp., Peripheral Operations Division, 686 West Maude Avenue, Sunnyvale, CA 94086 ...408-732-7330
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 ...609-799-0071

§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
Digital Dev. Corp., 8650 Balboa Ave., San Diego, CA 92123 619-278-9920
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
Interdyne Co., 157 Topaz St., Milpitas, CA 95035 408-943-9133
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
Memorex Corp., San Thomas at Central Expwy., Santa Clara, CA 95052 408-987-1000
Microdata Corp., 17481 Red Hill Ave., Irvine, CA 92705 714-540-6730
Mitronics, 18039 Crenshaw Blvd., Torrance, CA 90504 213-323-7934
§ Pertec Peripherals Corp., P.O. Box 2198, Chatsworth, CA 91311 818-882-0030
† Raymond Engrg. Inc., Raycorder Prods. Div., 217 Smith St., Middletown, CT 06457 203-632-1000
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
Tri-Data Corp., 505 E Middlefield Rd., Mountain View, CA 94043 415-969-3700

Memory Systems, Semiconductor-2000

Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209, 301-296-7000 .... 3•1407
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 .... 3•1108,1109
Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362, 818-889-3179 .... 3•1111
§ **Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 3•1115,1116**
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Central Data Corp., 1602 Newton Dr., Champaign, IL 61820 217-359-8010
Chrislin Inds., 31352 Via Colinas, Westlake Village, CA 91361 213-991-2254
† Computer Devices Corp., 63 Austin Blvd., Commack, NY 11725 516-543-4220
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Data I/O Corp., 10525 Willows Rd. N.E., C-46, Redmond, WA 98052 206-881-6444
Dataram Corp., Princeton-Highstown Rd., Cranbury, NJ 08512 609-799-0071
† Digital Data Sys., 1551 N.W. 65 Ave., Plantation, FL 33313 305-792-3290
Digital Dev. Corp., 8650 Balboa Ave., San Diego, CA 92123 619-278-9920
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
Digital Pathways, Inc., 1060 E. Meadow Cir., Palo Alto, CA 94303 415-493-5544
Diversified Technlg., P.O. Box 748, Ridgeland, MS 39157 601-856-4121
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ Intel Memory Systems, 1302 N. Mathilda, Sunnyvale, CA 94086 408-734-8102
Lexidata Corp., 755 Middlesex Tpke., Billerica, MA 01865 .... 617-663-8550; 800-472-4747
† Memorex Corp., San Thomas at Central Expwy., Santa Clara, CA 95052 408-987-1000
Monolithic Sys., 84 Inverness Circle E., Englewood, CO 80112 303-790-7400
§† NCR Microelectronics Div., NCR Corp., 8181 Byers Rd., Miamisburg, OH 45342 .... 800-543-5618;513-866-7471
§† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 408-255-7550
Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
Plessey Microsystems, 451 Hungerford Dr., Rockville, MD 20850 301-279-2892
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Rockwell Int'l., 4311 Jamboree Rd., Newport Beach, CA 92660 800-854-8099
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
Standard Engrg., 44800 Girmmer, Fremont, CA 94538 415-657-7555
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
Trendata/Standard Memories, 3400 W. Segerstrom, Santa Ana, CA 92704 714-540-3605

Meter Cases — See Enclosures, Equipment & Panel Mounting (Vol. 2)

Meter Controllers — See Relays, Meter (Vol. 1B)

Meter Expanders — See Multipliers, Meter (Vol. 3)

Meters, Acceleration-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085

Meters, Admittance-2900

Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.

Meters, Ampere, AC-2900

§ **Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807, 305-678-6900 .... 3•1195,1196**
§ **Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1326,1327**
† **Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296**
§ **Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 .... 3•1328,1329**
§ **EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 .... 3•1330,1331**
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
§ **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1335-1337**
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1340**
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1270,1273**
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285
† **Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296**
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1348,1349
§ **Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1356**
A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
§ AEMC, 99 Chauncy, Boston, MA 02111 .... 617-451-0227;800-343-1391
Airpax/NA Philips Controls Corp., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313 305-587-1100
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 .... 516-LY3-5600
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 .... 303-469-5231;800-821-6327
§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
§ Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
§† Columbia Elec. Mfg., 4519 Hamilton Ave. N.W., Cleveland, OH 44114 216-361-8060
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 303-242-8863
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
§ Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
§ Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
† Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
§† International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
§ Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 203-624-1188
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 707-938-2121
Western Electro. Mech. Co. Inc., 300 Broadway, Oakland, CA 94607 415-452-1936
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Ampere, DC-2900

§ Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807, 305-678-6900 ...... 3•1195,1196
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ...... 3•1323
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ...... 3•1326,1327
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ...... 3•1296
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ...... 3•1328,1329
EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 ...... 3•1330,1331
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 ...... 3•1244
Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 ...... 3•1335-1337
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ...... 3•1340
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ...... 3•1270
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 ...... 3•1281
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ...... 3•1296
† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 ...... 3•1348,1349
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 ...... 3•1352
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 ...... 3•1356
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ......303-469-5231;800-821-6327
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
§ Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
§† Columbia Elec. Mfg., 4519 Hamilton Ave. N.W., Cleveland, OH 44114 216-361-8060
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 303-242-8863
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 203-848-9271
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
† Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
§ Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 203-624-1188
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 707-938-2121
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Ampere, RF-2900

Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ...... 3•1296
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ...... 3•1296
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 ...... 3•1350
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ...... Call Local Sls. Off.
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015

Meters, Ampere, True RMS-2900

§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ...... 3•1328
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 ...... 3•1244
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ...... 3•1340
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 ...... 3•1350
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 ...... 3•1352
§ AEMC, 99 Chauncy, Boston, MA 02111 ......617-451-0227;800-343-1391
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ......303-469-5231;800-821-6327
§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
§† Columbia Elec. Mfg., 4519 Hamilton Ave. N.W., Cleveland, OH 44114 216-361-8060
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
§ Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ...... Call Local Sls. Off.
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
§ Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811

§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Ampere Hour-2900

Curtis Instrs., Inc., 200 Kisco Ave., Mt. Kisco, NY 10549, 914-666-2971 .... 3•1128
† **Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 3•1281**
A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
Dynatronix, Inc., 105 Power St,, Amery, WI 54001 ....715-268-8118;800-826-7172
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
† Engelhard Corp., 70 Wood Ave. S., Iselin, NJ 08830 201-321-5900
HBS Equipment Div., 3000 Supply Ave., Los Angeles, CA 90040 213-726-3033
§ IVEK Corp., 43 School St., N. Springfield, VT 05150 802-886-8278
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Technic, Inc., Box 965, Providence, RI 02901 401-781-6100
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 707-938-2121

Meters, Attenuation-2900

Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048

Meters, Audio Level-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
ITT Jennings, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, 408-292-4025 .... 3•1247
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
† **Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1348,1349**
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530, 914-681-0700 .... 3•1055
A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
§† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 303-242-8863
Electro-Dynamics Dev. Co., 475 Mt. Hood Dr. S.W., Issaquah, WA 98027 206-392-2493
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514 516-334-0870
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 203-624-1188
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Bar Graph-2950

Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502, 303-242-8863 .... 3•1325
§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350**
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 .... 3•1352
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§ Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
Sensotec Inc., 1200 Chesapeake Ave., Columbus, OH 43212 614-486-7723
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015

Meters, Capacitance, Inductance-2900

§† **Data Precision Corporation, Electronics Ave., Danvers, MA 01923, 617-246-1600 .... 3•1214,1215**
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244,1245
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1270**
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145, 216-871-7617 .... 3•1291
Alpha Comps., 115 Eucalyptus Dr., El Segundo, CA 90245 213-322-7780
Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ....516-LY3-5600
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
MSI Electronics, Inc., 34-32 57th St., Woodside, NY 11377 212-672-6500
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Wayne Kerr, Inc., W.K.R. Ltd., 400 West Cummings Pk., Woburn, MA 01801 617-938-8390

Meters, Clamp-on-2900

§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1273**
§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ....516-LY3-5600
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
§ Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807 305-678-6900
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
§† Columbia Elec. Mfg., 4519 Hamilton Ave. N.W., Cleveland, OH 44114 216-361-8060
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
§ Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
L-Com Inc., 1755 Osgood St., Unit 11EM, N. Andover, MA 01845 617-682-6936
§† Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
† Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990

TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
Western Electro. Mech. Co. Inc., 300 Broadway, Oakland, CA 94607 415-452-1936
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Conductance-2900

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Wayne Kerr, Inc., W.K.R. Ltd., 400 West Cummings Pk., Woburn, MA 01801 617-938-8390
Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241

Meters, Counting Rate, Nuclear-2900

§ Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514 516-334-0870
§ Gralex Inds., 155 Marine St., Farmingdale, NY 11735 516-694-3600
† Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405

Meters, Decibel Indicating-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320, 818-889-8770 .... 1B•1118
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1348,1349
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1356
A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ AQ Sys., 1736 Front St., Yorktown Hgts., NY 10598 800-431-2104
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 303-242-8863
Electro-Dynamics Dev. Co., 475 Mt. Hood Dr. S.W., Issaquah, WA 98027 206-392-2493
EMICO Inc., Box 368, Dublin, PA 18917 215-249-9330
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Meters, Deviation-2900

§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
† Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Digital ESR-2900

Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711

Meters, Digital, 2-wire, 4-20 mA Current Loop-2950

Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1044
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1340
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 .... 3•1352
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 201-227-1002
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
§ Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057
Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241

Meters, Distortion & Noise-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Krohn-Hite Corp., Avon Indl. Pk., Bodwell St., Avon, MA 02322 617-580-1660
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Meters, Edgewise-2950

Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502, 303-242-8863 .... 3•1325
§ EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 .... 3•1330
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108, 603-669-6400 .... 3•1333
§† Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1335,1337
† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1348
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1320,1357
A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
Airpax/NA Philips Controls Corp., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313 305-587-1100
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
§ Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Curtis Instrs., Inc., 200 Kisco Ave., Mt. Kisco, NY 10549 914-666-2971
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 203-848-9271
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
§ Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
† Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
§† International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
§ Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 203-624-1188
Sigma Instrs., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Elapsed Time — See Indicators, Elapsed Time (Vol. 3)

Meters, Electrometer-2900

Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
§ Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
Chapman Corp., P.O. Box 10700, Portland, ME 04104 207-773-4726

Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Electron-Machine Corp., Box M, Umatilla, FL 32784 904-669-3101
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, EMC — See Meters, RFI (Vol. 3)

Meters, FM Deviation-2900

Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800:800-527-4642

Meters, Field Strength-2900

Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990, 215-723-8181 .... 3•1003
§ **Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807, 305-678-6900 .... 3•1196**
Instruments for Industry, Inc., 151 Toledo St., Farmingdale, NY 11735, 516-694-1414 .... 3•1011
Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
Electric Field Measurements, Box 326, W. Stockbridge, MA 01266 413-637-1929
§† Electro-Metrics, 100 Church St., Amsterdam, NY 12010 518-843-2600
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
Holaday Industries, Inc., 14825 Martin Drive, Eden Prairie, MN 55344 612-934-4920
LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219 313-528-2202
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
Peca, Inc., 4957 Pearson Ave., Philadelphia, PA 19114 215-824-1550
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674

Meters, Fluid Flow-2200

Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
† Astro Dynamics, Inc., 2 Gill St., Woburn, MA 01801 617-935-4944
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Brooks Instr. Div., Emerson Elec. Co., 407 W. Vine St., Hatfield, PA 19440 215-362-3500
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
† Dresser Inds., 1505 Elm St., Dallas, TX 75201 214-746-6000
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 714-879-6021
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 617-890-7440
† Flow Techn., Box 21346, Phoenix, AZ 85036 602-437-1315
§ Harwil, 1548 17th St., Santa Monica, CA 90404 213-829-2310
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
Kontes, Kimble Div. of Owens/IL, 1001 Spruce St., Vineland, NJ 08360 609-692-8500
§† MKS Instrs., Inc., 22 Third Ave., Burlington, MA 01803 617-272-9255
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Ocean Resch. Equip., Inc., Box 709, Falmouth, MA 02541 617-548-5800
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
§ Plant Specialties, Inc., PO Box 1097, Carrollton, TX 75006 214-245-9673
Teledyne Gurley, 514 Fulton St. P.O. Box 88, Troy, NY 12181 518-272-6300
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057

Meters, Flux-2900

LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, 313-528-2202 .... 3•1256
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226, 317-545-2102 .... 3•1261
EG&G Gamma Scientific, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123 619-279-8034
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Electric Field Measurements, Box 326, W. Stockbridge, MA 01266 413-637-1929
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 617-272-1313
§ Magnos, Old School House Rd., Harvard, MA 01451 617-456-8880
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Frequency-2900

§ **Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 .... 3•1328,1329**
EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 .... 3•1330
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
§† **J-B-T Instrs., Box 1818, New Haven, CT 06508, 203-776-1111 .... 3•1332**
§ **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1336,1337**
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1340**
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1348,1349
Alpha Inds., Inc. - TRG Millimeter Comp., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ AQ Sys., 1736 Front St., Yorktown Hgts., NY 10598 800-431-2104
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
D-B-Developments, 7709 Kilbourne Rd., Rome, NY 13440 315-339-1265
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 617-890-7440
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§† Harris Circuits Mfg., 2706 Colley Ave., Norfolk, VA. 23517 804-467-1116
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
International Crystal Mfg., 10 N. Lee, P.O. Box 26330, Oklahoma City, OK 73126 405-236-3741
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
§ Optoelectronics, Inc., 5821 N.E. 14th Ave., Ft. Lauderdale, FL 33334 305-771-2050
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
Sivers Lab, Box 90339, Los Angeles, CA 90009 213-390-7477
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300

§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§† Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
§ Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 707-938-2121
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Meters, Frequency Deviation-2900

§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ......617-777-4500; 17-246-0300;800-451-1816
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 512-929-2051
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642

Meters, Galvanometer-2900

Shalltronix Corp., Preston St., P.O. Box 235, Selma, NC 27576, 919-965-6346 ...... 3•1299
A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
§ AEMC, 99 Chauncy, Boston, MA 02111 ......617-451-0227;800-343-1391
§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
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§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
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Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
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Meters, Gauss-2900

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Electric Field Measurements, Box 326, W. Stockbridge, MA 01266 413-637-1929
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§ Magnos, Old School House Rd., Harvard, MA 01451 617-456-8880
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Varian Assocs., Instr. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

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Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320, 818-889-8770 ......1B•1118
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Meters, Humidity-2900

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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Testoterm, P.O. Box 111509, Nashville, TN 37211 615-834-5082
† Thunder Sci. Corp., 623 Wyoming S.E., Albuquerque, NM 87123 505-265-8701
Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241

Meters, Illuminated Scale-2950

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§ AEMC, 99 Chauncy, Boston, MA 02111 ......617-451-0227;800-343-1391
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§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Impedance-2900

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Meters, Kilovolt-2900

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ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Meters, Laser Energy — See Monitors, Laser Energy (Vol. 3)

Meters, Light (Nonphotographic)-2900

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EG&G Gamma Scientific, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123 619-279-8034
§ EG & G Vactec, 10900 Page Blvd., St. Louis, MO 63132 314-423-4900
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
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† Hoffman Engrg. Corp., 183 Sound Beach Ave., Old Greenwich, CT 06870 203-637-1719
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§† Photo Resch., 3000 N. Hollywood Way, Burbank, CA 91505 213-843-6100
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Meters, Megohm-2900

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Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385, 212-386-1300 .... 3•1236
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§ Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401, 405-223-4773 .... 3•1300
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Eltec Instrs., P.O. Box 9610, Daytona Bch., FL 32020 904-252-0411
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§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
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Meters, Microampere — See Meters, Ampere (Vol. 3)

Meters, Microwave-2900

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† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735, 516-694-3600 .... 3•1238
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1259
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 .... 3•1319
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
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Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
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† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
§ Pacific Meas., Inc., 488 Tasman Drive, Sunnyvale, CA 94086 408-734-5780
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
Sivers Lab, Box 90339, Los Angeles, CA 90009 213-390-7477
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990

§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
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Meters, Modulation-2900

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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Meters, Moving Coil-2950

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EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 .... 3•1330
§ **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1336,1337**
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Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Moving Iron-2950

§ **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1336,1337**
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Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Moving Scale-2950

Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108, 603-669-6400 .... 3•1333
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Multifunction (Analog)-2900

§ **BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020, 303-469-5231; 800-821-6327 .... 3•1192**
† **Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301, 518-355-8300 .... 3•1263**
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1273,1275**
§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1302**
§ **Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1314,1315,1320**
§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ....516-LY3-5600
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
§ Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
SEKAI Elctrns. of Amer., Inc., 14700 E. Firestone Blvd., Suite 122, La Mirada, CA 90638 714-670-1854
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
† Vertox Co., 9252 Garden Grove Blvd. 2, Garden Grove, CA 92644 714-530-4541
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Meters, Multifunction (Digital)-2900

§† **Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191**
§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 .... 3•1198,1199**
§ **BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020, 303-469-5231; 800-821-6327 .... 3•1192,1193**
§† **Data Precision Corporation, Electronics Ave., Danvers, MA 01923, 617-246-1600 .... 3•1214,1215**
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1249
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1267-1269**
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 3•1282
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008, 408-377-4621 .... 1B•1472
§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1302**
§ **Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787, 516-231-7050 .... 3•1304**
§ **Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1315,1320**
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625, 813-855-6611 .... 3•1317
§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ....516-LY3-5600
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
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Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
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Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Hitachi Denshi America Ltd., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797 516-921-7200
§ Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
§ Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
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Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
SEKAI Elctrns. of Amer., Inc., 14700 E. Firestone Blvd., Suite 122, La Mirada, CA 90638 714-670-1854
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir., Ste. F, Irvine, CA 92714 714-250-1172
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000

Meters, Noise & Sound Level-2900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 302-773-3218
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
§ Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
§ Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ... 215-825-4990

§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642

§ Vibro-Meter Corp., 1 Progress Rd., Billerica, MA 01821 ... 617-663-7322

Meters, Null-2950

Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385, 212-386-1380 ... 3•1236

Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 ... 3•1309

§ **Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 ... 3•1356**

A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 ... 212-275-6516

§ AEMC, 99 Chauncy, Boston, MA 02111 ... 617-451-0227;800-343-1391

§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 ... 617-890-2000

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 ... 201-335-0900

§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 ... 319-372-8366

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Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 ... 215-646-9200

Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 ... 714-731-2333

Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 ... 303-242-8863

† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 ... 617-268-9696

Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400

§ Greibach Instrs. Div., 25 Dock St., Mt. Vernon, NY 10550 ... 914-699-9717

Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.

Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 ... 516-883-1700

§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711

§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 ... 603-669-6400

Julie Resch. Labs., 211 West 61st St., New York, NY 10023 ... 212-245-2727

Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 ... 216-248-0400

Larson Instr., Greenbush Rd., Orangeburg, NY 10962 ... 914-359-3800

Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 ... 215-643-2000

§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 ... 617-835-1000

§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 ... 201-767-7250

† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 ... 518-355-8300

§ Modutec, 18 Marshall St., Norwalk, CT 06854 ... 203-853-3636

Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 ... 516-935-3640

† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 ... 516-582-6500

† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 ... 201-673-3996

† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 ... 714-833-1234

Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 ... 914-699-9717

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ... 914-681-0700

Sigma Instrs., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711

§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260

§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600

§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642

ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 ... 415-326-2151

Meters, Ohm-2900

§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ... 3•1198,1199**

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 ... 3•1244

§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ... 3•1340**

RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145, 216-871-7617 ... 3•1291

Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401, 405-223-4773 ... 3•1300,1301

Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 ... 1B•1755

Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 ... 3•1309

§ AEMC, 99 Chauncy, Boston, MA 02111 ... 617-451-0227;800-343-1391

Airpax/NA Philips Controls Corp., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313 ... 305-587-1100

Alpha Comps., 115 Eucalyptus Dr., El Segundo, CA 90245 ... 213-322-7780

† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ... 516-LY3-5600

§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 ... 617-890-2000

§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ... 303-469-5231;800-821-6327

Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 ... 201-239-6200

§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 ... 603-753-6362

Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 ... 215-646-9200

CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 ... 303-762-1640

§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 ... 617-246-1600

Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 ... 714-546-7160

Datel, 11 Cabot Blvd., Mansfield, MA 02048 ... 617-339-9341

Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 ... 305-283-0935

DCI, Inc., 720 E. Dennis, Olathe, KS 66061 ... 913-782-5672

§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 ... 203-438-3731

Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 ... 503-641-4141

Eltec Instrs., P.O. Box 9610, Daytona Bch., FL 32020 ... 904-252-0411

§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 ... 602-887-1970

§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400

§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 ... 914-592-9101

Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.

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§ Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 ... 216-248-0400

§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900

LFE, Process Control Div., 55 Green St., Clinton, MA 01510 ... 617-835-1000

† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 ... 518-355-8300

Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 ... 516-935-3640

§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 ... 619-481-3900

§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ... 800-525-5554;818-764-5400

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§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 ... 203-624-1188

§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260

§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 ... 516-231-7050

§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600

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§ Thomas & Betts, Electronics Group Hdqtrs., 920 Route 202, Raritan, NJ 08869 ... 201-469-4000

TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 ... 305-757-8811

§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 ... 419-358-5015

§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642

United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 ... 800-631-3096;201-792-2400

Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 ... 619-578-8280

§ Vector Electronic Co., Inc., 12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342 ... 818-365-9661

§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000

Meters, Panel (Analog)-2950

Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502, 303-242-8863 ... 3•1325

EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 ... 3•1330,1331

§ **Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108, 603-669-6400 ... 3•1333**

† **Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301, 518-355-8300 ... 3•1263**

§† **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 ... 3•1336,1337**

North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, 516-582-6500 ... 3•1345

Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ... 3•1346

Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 ... 3•1348,1349

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530, 914-681-0700 ... 3•1055

§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 ... 3•1350**

Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 ... 3•1352

§ **Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 ... 3•1320,1356,1357**

Airpax/NA Philips Controls Corp., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313 ... 305-587-1100

§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 ... 617-890-2000

§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 ... 216-585-5800

Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 ... 319-372-8366

§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ... 303-469-5231;800-821-6327

§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 ... 603-753-6362

† Bowmar/ALI, Bowmar Instr. Corp., 531 Main St., Acton, MA 01720 ... 617-263-8365

§ Calibron Instrs., 220 Grove St., Waltham, MA 02154 ... 617-894-6440

Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 ... 714-731-2333

Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107

Curtis Instrs., Inc., 200 Kisco Ave., Mt. Kisco, NY 10549 ... 914-666-2971

§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 ... 717-848-1722

Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 ... 203-848-9271

§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 ... 617-594-7011

Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060

† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 ... 212-383-6904

† Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 ... 813-577-9010

ISL Products Intl. Ltd., 235 P Robbins Lane, Syosset, NY 11791-6093 ... 516-822-9601

§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 ... 617-835-1000

§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 ... 516-935-3640

§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 ... 203-624-1188

Sigma Instrs., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711

§ Square D Co., Executive Plaza, Palatine, IL 60067 ... 312-397-2600

§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600

§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ... 215-825-4990

TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 ... 305-757-8811

§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057

Meters, Panel, Bargraph — See Meters, Bargraph (Vol. 3)

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§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127**
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1323
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
§ **Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1326,1327**
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1044
§ **Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 .... 3•1328,1329**
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1245
Lincoln Instrs., 456 W. Montana St., Pasadena, CA 91103, 818-798-0733 ... 3•1334
§ **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1335**
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 1B•1091, 3•1088,1136,1167,1339,1340**
§ **Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 .... 3•1342**
† **North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, 516-582-6500 .... 3•1345**
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1346
§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350**
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 .... 3•1352-1355
§ **Velonex, Display Prods., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359**
† **Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050, 408-727-7370 .... 3•1359**
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§ Ametek, 2 Station Square, Paoli, PA 19301 215-355-6900
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
† Bowmar/ALI, Bowmar Instr. Corp., 531 Main St., Acton, MA 01720 617-263-8365
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 . 617-667-4111
§ Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
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§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 .. 617-246-1600
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§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§ Electro-Numerics, 1811 Reynolds, Irvine, CA 92714 714-549-8821
Entran Devices, 10 Washington Ave., Fairfield, NJ 07006 201-227-1002
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 . 617-890-7440
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
§ Gralex Inds., 155 Marine St., Farmingdale, NY 11735 516-694-3600
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
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Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ..... 201-291-0500; 800-631-2165
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† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
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§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
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Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
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Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ..... 301-948-3434; 800-638-2048

Meters, PH-2900

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Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
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Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 .. 215-355-1500
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 .... 800-631-3096;201-792-2400

Meters, Phase-2900

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† **Ryan Intl. Corp., 4800 Evanswood Dr., Columbus, OH 43229, 614-885-3303 .... 3•1219**
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Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 201-797-9655
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Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
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† Control Elctrns. Co., Inc., 107-B Allen Blvd., Farmingdale, NY 11735 516-694-0125
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Evans Assocs., Box 5055, Berkeley, CA 94705 415-653-3083
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
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† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
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Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Syntel Div., Tegam, Inc., 7230 North Ridge Rd., Madison, OH 44057 216-428-7505
Tegam, 7230 N. Ridge Rd., Madison, OH 44057 216-428-7505
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
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§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

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§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1340**
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1272**
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Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ... 3•1296,1297

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§ Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100

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ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
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Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
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Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
Sivers Lab, Box 90339, Los Angeles, CA 90009 213-390-7477
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Meters, Taut Band-2950

EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 .... 3•1330
§† Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1336
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1356
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 203-848-9271
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Meters, Temperature (Contacting)-2900

§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923, 617-246-1600 .... 3•1214,1215
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1326,1327
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855, 203-866-2573 .... 3•1131
Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108, 603-669-6400 .... 3•1333
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1339, 1341
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 .... 3•1342
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1270,1271
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ....1B•1735,3•1284, 1345
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 .... 3•1355
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A & D Elec. Instrs., 73-07 88th St., Glendale, NY 11385 212-275-6516
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Alpha Comps., 115 Eucalyptus Dr., El Segundo, CA 90245 213-322-7780
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 .... 516-LY3-5600
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
§ Atkins Tech., 3321 S.W. 40th Blvd., Gainesville, FL 32608 904-378-5555
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
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Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
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§ Electronic Controls Design, 13626 S. Freeman Rd., Mulino, OR 97042 503-829-9108
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§ Fenwal, Inc., 400 Main St., Ashland, MA 01721 ....
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† Instrulab, P.O. B. 98, Dayton, OH 45404 513-223-2241
§ J-B-T Instrs., Box 1818, New Haven, CT 06508 203-776-1111
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 602-968-6241
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§ Kurz Instrs., 20 Village Sq., Carmel Valley, CA 93924 408-659-3421
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
§ Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
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§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
§ Pacific Transducer, 2301 Federal, Los Angeles, CA 90064 213-478-1134
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ..215-355-1500
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
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§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
§ Testoterm, P.O. Box 111509, Nashville, TN 37211 615-834-5082
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
Tracor Paktronics, 2441 Northeast Pkwy., Ft. Worth, TX 76106 817-625-2311
Trans-Met Engrg., 601 S. Palm St., La Habra, CA 90631 213-691-2266
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VirTis Co., Rte. 208, Gardiner, NY 12525 914-255-5000
§ Wahl Instruments, Inc., 5750 Hannum Ave., Culver City, CA 90230 .213-822-6144
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Westemp Corp., Box 767, Cardiff, CA 92007 619-942-9800
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 401-884-6800
§ Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241
§† Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ..404-253-7000

Meters, Temperature, Dial type (Noncontacting) — See Pyrometers (Vol. 3)

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Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660

§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141

Meters, Thermal Transfer-2900

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
Tracor Paktronics, 2441 Northeast Pkwy., Ft. Worth, TX 76106 817-625-2311

Meters, Time Interval — See Timers, Interval (Vol. 3)

Meters, Vacuum Tube Volt (VTVM)-2900

ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
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Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Meters, VAR-2900

§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ....516-LY3-5600
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
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§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514 516-334-0870
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000

Meters, Vibration-2900

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Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, 213-341-3000 .... 3•1208
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Bell & Howell/CEC Div., 360 Sierra Madre Villa, Pasadena, CA 91109 213-796-9381
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
§ Epic, Inc., 150 Nassau St., New York, NY 10038 212-349-2470
§ Metrix Instrument Co., 1711 Townhurst, Houston, TX 77043 713-461-2131
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 716-684-0001
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
§ Vibra-Metrics, 385 Putnam Ave., Hamden, CT 06517 203-288-6158
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
§ Vibro-Meter Corp., 1 Progress Rd., Billerica, MA 01821 617-663-7322

Meters, Volt, AC-2900

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Hipotronics, P.O. Drawer A, Brewster, NY 10509, 914-279-8091 .... 3•1241
IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244,1245
ITT Jennings, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, 408-292-4025 .... 3•1247
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301, 518-355-8300 .... 3•1263
§† Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 .... 3•1335-1337
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§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 .... 3•1356
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§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
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Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
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Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
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Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
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§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 303-242-8863
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ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
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§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
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§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Holub Industries, 1701 W. Bethany Rd., Sycamore, IL 60178 815-895-6501
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§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
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§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
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- RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 ... 201-334-3100
- Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 ... 614-274-7160
- Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ... 914-681-0700
- § Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 ... 203-624-1188
- Sigma Instrs., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711
- § Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260
- § Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 ... 516-231-7050
- § Square D Co., Executive Plaza, Palatine, IL 60067 ... 312-397-2600
- § Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
- TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 ... 305-757-8811
- Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 ... 619-578-8280
- § Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 ... 707-938-2121
- § Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000

Meters, Volt, DC-2900

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- § **Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ... 3•1328,1329**
- † **Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 ... 3•1224**
- **EMICO Inc., Box 368, Dublin, PA 18917, 215-249-9330 ... 3•1330,1331**
- **Hipotronics, P.O. Drawer A, Brewster, NY 10509, 914-279-8091 ... 3•1241**
- **IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 ... 3•1244**
- **Lincoln Instrs., 456 W. Montana St., Pasadena, CA 91103, 818-798-0733 ... 3•1334**
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- §† **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 ... 3•1335-1337**
- **Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008, 408-377-4621 ... 1B•1472**
- † **Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ... 3•1296,1298**
- † **Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 ... 3•1348,1349**
- **Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 ... 3•1352**
- § **Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987, 419-358-5015 ... 3•1356**
- § AEMC, 99 Chauncy, Boston, MA 02111 ... 617-451-0227;800-343-1391
- § Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ... 617-777-4500; 17-246-0300;800-451-1816
- Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 ... 201-335-0900
- Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 ... 319-372-8366
- § BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ... 303-469-5231;800-821-6327
- Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 ... 603-753-6362
- † Bowmar/ALI, Bowmar Instr. Corp., 531 Main St., Acton, MA 01720 ... 617-263-8365
- Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 ... 617-481-7000
- § Calibron Instrs., 220 Grove St., Waltham, MA 02154 ... 617-894-6440
- CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 ... 303-762-1640
- Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 ... 212-255-2940
- §† Columbia Elec. Mfg., 4519 Hamilton Ave. N.W., Cleveland, OH 44114 ... 216-361-8060
- Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 ... 714-731-2333
- Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107
- §† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 ... 617-246-1600
- Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 ... 714-546-7160
- Datel, 11 Cabot Blvd., Mansfield, MA 02048 ... 617-339-9341
- Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 ... 305-283-0935
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- ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 ... 617-964-8360
- § EDL Inc. 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
- § Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 ... 602-887-1970
- Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 ... 617-890-7440
- † Faria, Thomas G., Corp., 19 Faria Lane, Uncasville, CT 06382 ... 203-848-9271
- § Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
- § General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 ... 617-594-7011
- Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 ... 914-592-9101
- § Heath Co., Benton Harbor, MI 49022 ... 616-982-3886
- § Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 ... 216-541-8060
- § Holub Industries, 1701 W. Bethany Rd., Sycamore, IL 60178 ... 815-895-6501
- † Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 ... 212-383-6904
- † Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 ... 813-577-9010
- § Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 ... 602-968-6241
- § Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 ... 603-669-6400
- Julie Resch. Labs., 211 West 61st St., New York, NY 10023 ... 212-245-2727
- § Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 ... 216-248-0400
- § Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
- Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 ... 214-333-3201
- Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 ... 516-935-3640
- § NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
- § Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 ... 714-540-4914
- Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 ... 619-481-3900
- Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 ... 614-486-9561
- Omega Engrg., Box 4047, Stamford, CT 06907 ... 203-359-1660
- § Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 ... 715-723-1141
- § PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ... 800-525-5554;818-764-5400
- † Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 ... 714-833-1234
- Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ... 914-681-0700
- § Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 ... 203-624-1188
- Sigma Instrs., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711
- § Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260
- § Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 ... 516-231-7050
- § Square D Co., Executive Plaza, Palatine, IL 60067 ... 312-397-2600
- § Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
- TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 ... 305-757-8811
- § VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 ... 215-844-2626
- § Westberg Mfg., Inc., 3400 Westach Way, Sonoma, CA 95476 ... 707-938-2121
- Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000

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- § **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ... 3•1198,1199**
- **Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ... 3•1323**
- **DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 ... 3•1324**
- § **Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ... 3•1326,1327**
- § **Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ... 3•1329**
- **IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 ... 3•1244**
- § **Modutec, 18 Marshall St., Norwalk, CT 06854, 203-853-3636 ... 3•1335**
- § **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 ... 3•1350**
- **Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 ... 3•1352**
- **Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625, 813-855-6611 ... 3•1317**
- § AEMC, 99 Chauncy, Boston, MA 02111 ... 617-451-0227;800-343-1391
- † Analog Devices, P.O. Box 280, Norwood, MA 02062 ... 617-329-4700
- § Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ... 617-777-4500; 17-246-0300;800-451-1816
- Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 ... 201-335-0900
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- Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 ... 617-481-7000
- § Calibron Instrs., 220 Grove St., Waltham, MA 02154 ... 617-894-6440
- CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 ... 303-762-1640
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- Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 ... 305-283-0935
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- ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 ... 617-964-8360
- § EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
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† Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
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§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
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Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
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Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
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Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
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§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
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Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296
ITT Jennings, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, 408-292-4025 .... 3•1247
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† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
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Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

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Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
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† **Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301, 518-355-8300 .... 3•1263**
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§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 .... 303-469-5231;800-821-6327
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Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Datron Instrs., Inc., 3401 SW 42nd Ave., Stuart, FL 33497 305-283-0935
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 913-782-5672
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
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Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280

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§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350**
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Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366
§ Beede Electrical Instr. Co., S. Main St., Penacook, NH 03303 603-753-6362
Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Data Check Corp., 10070 Willow Creek Rd., San Diego, CA 92131 619-578-0101
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EMICO Inc., Box 368, Dublin, PA 18917 215-249-9330
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† Ideal Precision Meter, 214 Franklin St., Brooklyn, NY 11222 212-383-6904
† Imtronics Inds., 11930 31st Ct., Clearwater, FL 33520 813-577-9010
§ International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
§ Jewell Electrical Instrs., Grenier Field, Manchester, NH 03108 603-669-6400
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Modutec, 18 Marshall St., Norwalk, CT 06854 203-853-3636
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
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§ Shurite Meters, Inc., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508 203-624-1188
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Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 3•1280,1282,1283
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296,1297
§ **Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120, 312-697-2260 .... 3•1350**
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† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 .... 516-LY3-5600
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Dixson, Inc., Instrument Div., Box 1449, Grand Junction, CO 81502 303-242-8863
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§ General Electric Co., Instrument Prods. Section, 40 Federal St., Lynn, MA 01910 617-594-7011
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Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
§ Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
† Scientech, Inc., 5649 Arapahoe Ave., Boulder, CO 80303 ....303-444-1361; 800-525-0522
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401 405-223-4773
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000

Meters, Watt Hour-2900

§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ....3•1328
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 ....3•1278-1280,1282
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Seacliff Technology, Inc., 320 Judah Street, San Francisco, CA 94122 415-661-4800
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ Watt-Clock Corp., P.O. Box 697, Stratford, CT 06497 203-378-2500
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000

Meters, Watt, RF Directional-2900

† Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100

Meters, Wave-2900

Alpha Inds., Inc. - TRG Millimeter Comp., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
† Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100

Meters, Waveguide — See Meters, Microwave (Vol. 3)

Meters (MIL)-2440 — *See Vol. 1B*

Microcircuit Production Equip.-4100

§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
Fancort Industries, Inc., 111 Clinton Rd., Fairfield, NJ 07006 201-575-0610
§ Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
I.C. Inds., Box 104, Altamonte Springs, FL 32701 305-339-8298
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
Plasma-Therm, Inc., Rt. 73, Kresson, NJ 08053 609-767-6120

Microcircuits — See Integrated Circuits (Specific Types) (Vol. 1A)

Microcircuits, Thick Film — See Circuits, Hybrid, Thick Film (Vol. 1A)

Microcircuits (MIL)-2440 — *See Vol. 1B*

Microcircuits (MIL), Linear-2440 — *See Vol. 1B*

Microcircuits (MIL), Low Power Schottky-2440 — *See Vol. 1B*

Microcircuits (MIL), Memories, CMOS, Hybrids-2440 — *See Vol. 1B*

Microcircuits (MIL), TTL, Schottky, Microprocessor-2440 — *See Vol. 1B*

Microcomputer Boards-3130 — *See Vol. 1A*

Microfilm, Computer Output (COM) Equipment-2000

† Keyan Inds., Inc., P.O. Box 1228, Middleboro, MA 02346 617-947-7719

Micrometers — See Testers, Thickness (All Types) (Vol. 3)

Microphone Accessories (Incl. Stands, Holders, Booms)-1300

† Adec, 12 Kulick Rd., Fairfield, NJ 07006 201-575-1570
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 203-348-2121
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500
§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
† Audiosears, South St., Stamford, NY 12167 607-652-7305
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Microtran Co. Inc., 145 E. Mineola Ave., Valley Stream, NY 11582 ..516-561-6050
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
§† Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan 0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 312-432-7915
† Roanwell, 180 Varick St., New York, NY 10014 212-989-1090
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
Trimm, Inc., Div. of Newton Instr. Co., 400 W. Lake St., Box 489, Libertyville, IL 60048 312-362-3700

Microphones, Bone Conduction-1300

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080

Microphones, Carbon-1300

Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500
† Audiosears, South St., Stamford, NY 12167 607-652-7305
GTE Switching & Telephone Products, 400 N. Wolf Rd., Northlake, IL 60164 312-681-7100
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 312-432-7915
† Roanwell, 180 Varick St., New York, NY 10014 212-989-1090
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
§† Telephonics, 770 Park Ave., Huntington, NY 11743 516-549-6000

Microphones, Cardioid-1300

§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 203-348-2121
§ Audiotronics Corp., 7428 Bellaire Ave., N. Hollywood, CA 91605 818-765-2645

§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ...212-691-9050
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 ...312-584-2300
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 ...312-455-3600
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 ...516-935-3640
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 ...201-348-7000
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 ...914-738-4800
§† Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan ...0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 ...212-392-6442
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 ...212-892-6700
† Roanwell, 180 Varick St., New York, NY 10014 ...212-989-1090
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 ...516-623-6696

Microphones, Ceramic-1300

§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 ...3•1041
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 ...818-985-5500
§ Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ...215-532-9464
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ...212-691-9050
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 ...312-455-3600
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 ...201-348-7000
§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 ...213-325-1290
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
§ Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 ...914-965-6906
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 ...617-890-6107

Microphones, Condenser (Incl. Electret)-1300

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ...3•1205
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 ...3•1041
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 ...203-348-2121
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 ...818-985-5500
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ...212-691-9050
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
† Gentex, Box 315, Carbondale, PA 18407 ...603-434-0311
§ Heath Co., Benton Harbor, MI 49022 ...616-982-3886
ISL Products Intl. Ltd., 235 P Robbins Lane, Syosset, NY 11791-6093 ...516-822-9601
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 ...312-455-3600
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 ...201-348-7000
§† Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan ...0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 ...516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
Ten-Tec, Industrial Park, Sevierville, TN 37862 ...615-453-7172

Microphones, Crystal-1300

Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 ...3•1041
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 ...818-985-5500
† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ...215-532-9464
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ...212-691-9050
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 ...716-684-0001
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 ...516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 ...516-623-6696

Microphones, Dynamic-1300

§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 ...3•1041
† Adec, 12 Kulick Rd., Fairfield, NJ 07006 ...201-575-1570
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 ...203-348-2121
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 ...818-985-5500
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 ...714-632-7117
† Audiosears, South St., Stamford, NY 12167 ...607-652-7305
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ...203-268-4372; 800-243-8160
§ Audiotronics Corp., 7428 Bellaire Ave., N. Hollywood, CA 91605 ...818-765-2645
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ...212-691-9050
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 ...505-865-6700
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
† Gulton Inds., Inc., Servonic Div., 1644 Whittier Ave., Costa Mesa, CA 92627 ...714-642-2400; 800-854-4066
§ Heath Co., Benton Harbor, MI 49022 ...616-982-3886
† Kulite Semiconductor Prods. Inc., 1039 Hoyt Ave., Ridgefield, NJ 07657 ...201-945-3000
§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 ...516-582-3400
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 ...201-348-7000
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 ...914-738-4800
Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 ...213-325-1290
§† Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan ...0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 ...212-392-6442
† Roanwell, 180 Varick St., New York, NY 10014 ...212-989-1090
§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 ...914-698-0080
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 ...516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
§ Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 ...914-965-6906
§† Telephonics, 770 Park Ave., Huntington, NY 11743 ...516-549-6000
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 ...914-763-8893
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 ...516-623-6696
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 ...813-371-4242

Microphones, Lavalier-1300

§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 ...203-348-2121
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 ...818-985-5500
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 ...312-584-2300
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 ...914-738-4800
§ Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan ...0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 ...516-623-6696
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 ...813-371-4242

Microphones, Magnetic-1300

Audiosears, South St., Stamford, NY 12167 ...607-652-7305
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 ...312-455-3600
§ Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan ...0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
† Roanwell, 180 Varick St., New York, NY 10014 ...212-989-1090
§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 ...914-698-0080
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 ...813-371-4242

Microphones, Omnidirectional-1300

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ...3•1205
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 ...3•1041
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 ...203-348-2121
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 ...818-985-5500
§ Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 ...215-532-9464
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ...212-691-9050
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ...815-968-9661
† Gentex, Box 315, Carbondale, PA 18407 ...603-434-0311
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 ...312-455-3600
§ Metrosonics, Box 23075, Rochester, NY 14692-3075 ...716-334-7300
Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 ...201-348-7000
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 ...914-738-4800
§† Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan ...0422-43-3121
§ R-Columbia Prods. Co., Inc., 2008 St. Johns Ave., Highland Park, IL 60035 ...312-432-7915
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 ...212-892-6700
† Roanwell, 180 Varick St., New York, NY 10014 ...212-989-1090
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 ...914-681-0700
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 ...312-866-2200
Trimm, Inc., Div. of Newton Instr. Co., 400 W. Lake St., Box 489, Libertyville, IL 60048 ...312-362-3700
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 ...813-371-4242

Microphones, Subminiature-1300

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 .... 3•1205
§ **Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 .... 3•1041**
§ AKG Acoustics, Inc., 77 Selleck St., Stamford, CT 06902 203-348-2121
Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ... 212-691-9050
† Gentex, Box 315, Carbondale, PA 18407 603-434-0311
Knowles Elctrns., Inc., 3100 N. Mannheim Rd., Franklin Park, IL 60131 312-455-3600
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200

Microphones, Velocity-1300

Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

Microphones, Wireless-1300

Alan Gordon Entprs., Inc., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605 818-985-5500
Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 ... 212-691-9050
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§† Primo, 25-1, 6-Chome, Mure, Mitakashi, Tokyo, Japan 0422-43-3121
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§† TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000

Microphones (MIL)-2440 — *See Vol. 1B*

Microprocessor — See Integrated Circuits, Microprocessor (Vol. 1A)

Microprocessor Development Systems-3130 — *See Vol. 1A*

Microscopes-3700 — *See Vol. 1B*

Microscopes, Measuring-2900

BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 312-298-1420
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Ealing Optics Co., Ealing Corp., 22 Pleasant St., S. Natick, MA 01760 617-655-7000
EG&G Gamma Scientific, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123 619-279-8034
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 201-667-2262
§ Hacker Instrs., Box 657, Fairfield, NJ 07007 201-226-8450
† Keyan Inds., Inc., P.O. Box 1228, Middleboro, MA 02346 617-947-7719
† Lenox Instr., 111 E. Luray St., Philadelphia, PA 19120 .... 215-DA4-4543
3D Optics, Box 224, 4 Strathmore Cir., Braintree, MA 02184 617-848-8002
Vision Engrg. Inc., 570 Danbury Rd., New Milford, CT 06776 203-355-3776

Microwave Comb Generator — See Generators, Microwave (Vol. 3)

Microwave Integrated Circuits (MICs)-3450 — *See Vol. 1A*

Mixers, Audio-1300

§ **RTS Systems, Inc., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, 818-843-7022 .... 3•1066**
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§ Davis, J. W., & Co., P.O. Box 26177, Dallas, TX 75226 214-651-7341
† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§ Furman Sound, Inc., 30 Rich St., Greenbrae, CA 94904 415-927-1225
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Mitronics, 18039 Crenshaw Blvd., Torrance, CA 90504 213-323-7934
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
§ Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 914-965-6906
§ Switchcraft, Inc., 5555 N. Elston, Chicago, IL 60630 312-792-2700
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696

Mixers, Microwave-3450 — *See Vol. 1A*

Mixers, RF-3450 — *See Vol. 1A*

Modems — See Modulator/Demodulators, Data (Vol. 3)

Modems, Communications, Eliminator/Line Driver-1900

Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
American Photonics Inc., 71 Commerce Dr., Brookfield Center, CT 06805 203-775-8950
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
§ Cermetek Microelectronics Inc., 1308 Borregas Ave., Sunnyvale, CA 94089 408-734-8150
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Datec, Inc., 200 Eastowne Dr., Ste. 116, Chapel Hill, NC 27514 919-929-2135
§ Electro Standards Lab., Inc., P.O. Box 9144, Providence, RI 02940 401-943-1164
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
§ Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Inmac, 2465 Augustine Dr., Santa Clara, CA 95051 408-727-1970
Interactive Micro Sys., Inc., 644 Davisville Rd., Willow Grove, PA 19090 ....
§ Kinex Corp., Sub. of the Nokia Corp. - Helsinki, 6950 Bryan Dairy Rd., Largo, FL 33543 813-541-6404
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Telebyte Technology, Inc., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797 516-423-3232
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 . 201-930-4600

Modems, Communications, Line Receivers-1900

BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Datec, Inc., 200 Eastowne Dr., Ste. 116, Chapel Hill, NC 27514 919-929-2135
§ Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Inmac, 2465 Augustine Dr., Santa Clara, CA 95051 408-727-1970
§ Kinex Corp., Sub. of the Nokia Corp. - Helsinki, 6950 Bryan Dairy Rd., Largo, FL 33543 813-541-6404
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
Microplex, Inc., 1977 State College Blvd., Anaheim, CA 92806 ...... 714-979-8833; 714-634-1535
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† Singer Co., Librascope Div., 833 Sonora Ave., Glendale, CA 91201 818-244-6541
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 . 201-930-4600

Modems, Communications, Long Haul-1900

Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
§ Cermetek Microelectronics Inc., 1308 Borregas Ave., Sunnyvale, CA 94089 408-734-8150
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
§ Concord Data Systems, 303 Bear Hill Rd., Waltham, MA 02154 617-890-1394
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
§† Datec, Inc., 200 Eastowne Dr., Ste. 116, Chapel Hill, NC 27514 919-929-2135
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 .. 213-670-8611
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
§ Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Inmac, 2465 Augustine Dr., Santa Clara, CA 95051 408-727-1970
Interactive Micro Sys., Inc., 644 Davisville Rd., Willow Grove, PA 19090 ....
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 415-552-1247
§ Kinex Corp., Sub. of the Nokia Corp. - Helsinki, 6950 Bryan Dairy Rd., Largo, FL 33543 813-541-6404
† Magnavox Advanced Prods. & Sys. Co., Magnavox Govt. Indl. Elctrns. Co., 2829 Maricopa St., Torrance, CA 90503 213-618-1200
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496

§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
§ Multi-Tech Systems, Inc., 82 Second Ave. S.E., New Brighton, MN 55112 612-631-3550
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777
§ Omnitec Data Inc., 2405 S. 20th St., Phoenix, AZ 85034 .... 602-258-8244; 800-528-8423
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Seacliff Technology, Inc., 320 Judah Street, San Francisco, CA 94122 415-661-4800
Stanford Telecommunications, Inc., 2421 Mission College Blvd., Santa Clara, CA 95050 408-748-1010
§ Teltone, 10801-120 Ave. NE, Kirkland, WA 98033 206-827-9626
§ Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 301-881-7655
§ Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 201-930-4600

Modems, Communications, Short Haul (Limited Distance)-1900

Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 617-752-5690
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
§ Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
– Inmac, 2465 Augustine Dr., Santa Clara, CA 95051 408-727-1970
Interactive Micro Sys., Inc., 644 Davisville Rd., Willow Grove, PA 19090 ....
§ Kinex Corp., Sub. of the Nokia Corp. - Helsinki, 6950 Bryan Dairy Rd., Largo, FL 33543 813-541-6404
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
Nu Data, 32 Fairview Ave., Little Silver, NJ 07739 201-842-5757
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ Telebyte Technology, Inc., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797 516-423-3232
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 201-930-4600

Modular Telephone Cords — See Cable, Telephone (Vol. 3)

Modulation Transfer Analyzers — See Analyzers, Transfer Function (Vol. 3)

Modulator/Demodulators, Data-2000

† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731, 516-261-3300 .... 3•1145
† GRIM Corporation, Box 67, Medford, NJ 08055, 609-267-7950 .... 3•1064
A & B Technical Services, 11300 Hartland St., N. Hollywood, CA 91605 213-769-6772
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Canoga Data Sys., 6740 Eton Ave., Canoga Park, CA 91303 213-888-2003
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
Cermetek Microelectronics Inc., 1308 Borregas Ave., Sunnyvale, CA 94089 408-734-8150
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 516-567-7300
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
ComDesign, 751 S. Kellogg Ave., Goleta, CA 93117 805-964-9852
Computrol Div. Kidde Automated Sys., Inc., 15 Ethan Allen Hwy., Ridgefield, CT 06877 203-544-9371
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
Data-Design Labs., P.O, Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
† Dataproducts, 6200 Canoga Ave., Woodland Hills, CA 91365 213-887-8000
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
§† Datec, Inc., 200 Eastowne Dr., Ste. 116, Chapel Hill, NC 27514 919-929-2135
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
Frederick Elctrns. Corp., 7630 Hayward Rd., P.O. Box 502, Frederick, MD 21701-0502 301-662-5901
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
§ Intra-computer, 101 W. 31st St., New York, NY 10001 212-947-5533
§ Kinex Corp., Sub. of the Nokia Corp. - Helsinki, 6950 Bryan Dairy Rd., Largo, FL 33543 813-541-6404
§ Lexicon Corp. of Miami, 1541 N. W. 65th Ave., Ft. Lauderdale, FL 33313 305-792-4400
† Magnavox Advanced Prods. & Sys. Co., Magnavox Govt. Indl. Elctrns. Co., 2829 Maricopa St , Torrance, CA 90503 213-618-1200
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
Microplex, Inc., 1977 State College Blvd., Anaheim, CA 92806 .... 714-979-8833; 714-634-1535
§ Multi-Tech Systems, Inc., 82 Second Ave. S.E., New Brighton, MN 55112 612-631-3550
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Nu Data, 32 Fairview Ave., Little Silver, NJ 07739 201-842-5757
§ Omnitec Data Inc., 2405 S. 20th St., Phoenix, AZ 85034 .... 602-258-8244; 800-528-8423
† Optelecom, 15940 Lauanne Dr., Gaithersburg, MD 20760 301-948-4232
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Penril, 5520 Randolph Rd., Rockville, MD 20852 301-984-8225
Racal-Milgo, 8600 N.W. 41st St., Miami, FL 33166 305-592-8600
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 201-276-0710
† Rockwell Int'l., 4311 Jamboree Rd., Newport Beach, CA 92660 800-854-8099
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 201-930-4600
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Modulator/Demodulators, Laser-3700 — *See Vol. 1B*

Modulators, AM-1900

Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
§ Feedback, 620 Springfield Ave., Berkeley Hghts., NJ 07922 201-464-5181
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
§ General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
† Mini-Circuits Lab., 2625 E. 14th St., Brooklyn, NY 11235 212-769-0200
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Telebyte Technology, Inc., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797 516-423-3232
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 .... 301-948-3434; 800-638-2048

Modulators, FM-1900

† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161

Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880

Modulators, Light-3700 — *See Vol. 1B*

Modulators, Magnetic-2200

† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 213-341-3010
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Modulators, Microwave-3400

† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706, 516-231-8400 ....1A•1689
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735, 516-694-3600 ....1A•1704
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
Alpha Inds., Inc., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843 617-681-8520
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 203-327-0003
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 617-329-1500
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
KDI Electronics, Inc., 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-8100
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Norsal Inds., 85 D Hoffman Lane So., Central Islip, NY 11722 516-234-1200
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Sivers Lab, Box 90339, Los Angeles, CA 90009 213-390-7477
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Vectronics Microwave Corp., 276 Lincoln Blvd., Middlesex, NJ 08846 201-356-2377
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048

Modulators, Phase-1900

† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Daico Inds., Inc., Box 5225, Compton, CA 90224 213-631-1143
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 714-879-6021
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
† Microwave Applications Grp., 3030 Industrial Pkwy., Santa Maria, CA 93455 805-928-5711
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Technology Prods., Inc., 8900 Eton Ave., Canoga Park, CA 91304 213-998-8555
† Vectronics Microwave Corp., 276 Lincoln Blvd., Middlesex, NJ 08846 201-356-2377

Modulators, Pulse-3400

Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 ....1A•1681
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Axel Elctrns., 134-20 Jamaica Ave., Jamaica, NY 11418 212-291-3900
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 408-734-8310
Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 203-327-0003
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
† EPSCO Microwave, 411 Providence Hwy., Westwood, MA 02090 617-329-1500
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 805-962-8336
M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
§ RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
Tasker Systems, 20131 Sunburst St., Chatsworth, CA 91311 213-341-3010
† Tobe Deutschmann Labs., Inc., 550 Turnpike St., Canton, MA 02021 617-828-3366
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Vectronics Microwave Corp., 276 Lincoln Blvd., Middlesex, NJ 08846 201-356-2377

Modulators, RF-1900

Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051, 408-748-1200 ....3•1500
REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854, 305-843-8484 ....3•1065
† Adams-Russell, Anzac Div., 80 Cambridge St., Burlington, MA 01803 671-273-3333
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 408-946-6000
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706 516-231-8400
ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
† Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663 714-759-2411
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
M/A-COM Microwave Circuits, Inc., South Ave., Burlington, MA 01803 617-272-3000
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
Peca, Inc., 4957 Pearson Ave., Philadelphia, PA 19114 215-824-1550
§† Plessey Semiconductors, 1641 Kaiser Ave., Irvine, CA 92714 714-540-9979
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Spectrum Technology, Inc., 300 Lopez Rd., Goleta, CA 93116 805-964-7791
Summit Engineering Corp., Box 938, Bozeman, MT 59715 406-587-4511
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877 ....301-948-3434; 800-638-2048

Modules, Amplifier-3130 (Also See Amplifiers, Specific Types) — *See Vol. 1A*

Modules, Analog Multiplier-3130 — *See Vol. 1A*

Modules, Analog-to-Digital Conversion-3130 — *See Vol. 1A*

Modules, Control & Switching-2200

CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445, 716-381-4740 ....3•1213

§ Gordos Arkansas, Inc., 1000 N. Second St., Rogers, AR 72756, 501-636-5000 .... 1A•1654-1657
Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 .... 3•1342,1343
§ Opto 22, 15461 Springdale St., Huntington Bch., CA 92649, 714-891-5861 .... 1B•1470
Phoenix Contact, 1900 Greenwood St., Harrisburg, PA 17104, 717-232-0500 .... 2•1542
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
§† Appleton Elctrns., 2205 12th Ave., So. Milwaukee, WI 53172 414-764-7200
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 301-296-7000
CATEL Telecommunications, United Scientific Corp., 4800 Patrick Henry Dr., Santa Clara, CA 95054 408-988-7722
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Crosspoint, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
§ Crydom Division, Int'l. Rectifier, 1521 Grand Ave., El Segundo, CA 90245 213-322-4987
Cybersystems, Inc., 7540 South Memorial Pkwy., Huntsville, AL 35802 205-883-4410
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 203-599-2075
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
Electronic Prods. Corp., Interstate Indl. Plaza, R. D., York, PA 17402 717-767-6517
§ Electro Standards Lab., Inc., P.O. Box 9144, Providence, RI 02940 401-943-1164
§ General Electric Co., Power Elctrns. Semiconductor Dept., W. Genesee St., Auburn, NY 13021 315-253-7321
§ GIC Systems, 2324 A Ridgepoint Dr., Austin, TX 78754 512-926-8840
§ Gordos Corp., 250 Glenwood Ave., Bloomfield, NJ 07003 201-743-6800
§ Gunther, W., GmbH, Virnsberger Strasse 51, D 8500 Nurnberg 82, West Germany 0911/65521
Heinemann Elec. Co., Brunswick Pike, Alt. Rte. 1, P.O. Box 6800, Lawrenceville, NJ 08648-0800 609-882-4800
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Information Control Corp., Abacus Div. Dept. EM7, 9610 Bellanca Ave., Los Angeles, CA 90045 213-641-8520
Information Transfer Indl., Box 357, Holcomb, NY 14469 716-657-7074
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
§ International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302 213-992-6776
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Monolithic Sys., 84 Inverness Circle E., Englewood, CO 80112 303-790-7400
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
Preferred Elctrns., Inc., Main Line Dr, P.O. Box 954, Westfield, MA 01086 413-568-2301
Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Rockwell Int'l., 4311 Jamboree Rd., Newport Beach, CA 92660 800-854-8099
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 .... CA 415-965-0910;800-221-7060
§ SemiKron Intl., Inc., 11 Executive Dr., P.O. Box 66, Hudson, NH 03051 603-883-8102
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
§ Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ Westinghouse Elec. Corp., Semiconductor Div., Armbrust Rd., Youngwood, PA 15697 412-925-7272
Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Modules, Data Acquisition-2325

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209, 301-296-7000 .... 3•1407
Data Instruments Inc., 4 Hartwell Pl., Lexington, MA 02173, 617-861-7450 .... 1B•1840
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1152
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716, 516-567-5600 .... 3•1160,1161
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 .... 3•1164
Mizar Inc., 302 Chester St., St. Paul, MN 55107, 612-224-8941 .... 3•1113
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1168
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 .... 3•1119
Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
CmC Instr. Div., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804 203-775-4595
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311 818-709-5510
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Cybersystems, Inc., 7540 South Memorial Pkwy., Huntsville, AL 35802 205-883-4410
§ Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
§ Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
§ Giddings & Lewis Elctrns., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935 414-921-7100
Grant Technology Sys. Corp., 11 Summer St., Chelmsford, MA 01824 617-256-8881
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Information Control Corp., Abacus Div. Dept. EM7, 9610 Bellanca Ave., Los Angeles, CA 90045 213-641-8520
§† Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 914-425-2000
LeCroy Resch. Sys. Corp. (Cal.), 1806 Embarcadero Rd., Palo Alto, CA 94303 415-856-1800
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302 213-992-6776
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
† Micro Networks, 324 Clark St., Worcester, MA 01606 617-852-5400
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Opto 22, 15461 Springdale St., Huntington Bch., CA 92649 714-891-5861
Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 .... 800-525-5554;818-764-5400
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 805-964-6708
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Sea Data Corp., One Bridge St., Newton, MA 02158 617-244-3216
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Standard Engrg., 44800 Girmmer, Fremont, CA 94538 415-657-7555
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402 213-454-0302

Modules, Digital-to-Analog Conversion-3130 — *See Vol. 1A*

Modules, Encoding/Decoding-3130 — *See Vol. 1A*

Modules, Filter-3130 — *See Vol. 1A*

Modules, I/O Relay-3130 — *See Vol. 1A*

Modules, Logic-3130 (Also See Cards; Circuits; Networks) — *See Vol. 1A*

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Modules, Sample & Hold-3130 — *See Vol. 1A*

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Molding Services — See Services, Molding (Vol. 3)

Monitors, Current-2200

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 .... 3•1120
† American Aerospace Controls, 570 Smith St., Farmingdale, NY 11735, 516-694-5100 .... 1B•1830
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 .... 3•1329
§† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 .... 1B•1458,1459

† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ... 1B•1466
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ... 3•1272
Pearson Elctrns., 1860 Embarcadero Rd., Palo Alto, CA 94303, 415-494-6444 ... 1A•2230
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 ... 313-624-1541
§ Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 ... 415-964-3200
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 ... 213-682-3314
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 ... 818-445-5470
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 ... 301-296-7000
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 ... 415-726-3000
Dearborn Wire & Cable Co., 9299 Evenhouse Ave., Rosemont, IL 60018 ... 312-696-1000
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 ... 215-699-9261
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 ... 812-426-2806
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 ... 201-287-3680
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 ... 312-837-4600
EMICO Inc., Box 368, Dublin, PA 18917 ... 215-249-9330
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 ... 216-361-3315
§ Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 ... 401-884-6800
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711
Ion Physics Co., Div. High Voltage Engrg. Corp., P.O. Box 416, So. Bedford St., Burlington, MA 01803 ... 617-272-2800
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 ... 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 ... 619-481-3900
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 ... 516-671-5700
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 ... 614-486-9561
Omega Engrg., Box 4047, Stamford, CT 06907 ... 203-359-1660
Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 ... 812-386-1000
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 ... 201-334-3100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 ... 619-481-7177
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 ... 213-326-6668

Monitors, Data Link-1900

Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ... 3•1346
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 ... 703-642-4000
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 ... 212-594-5377
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 ... 203-438-3731
§ Electro Standards Lab., Inc., P.O. Box 9144, Providence, RI 02940 ... 401-943-1164
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 ... 201-768-8082
§ Telebyte Technology, Inc., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797 ... 516-423-3232
† Telecommunications Techniques Corp., 444 N. Frederick Ave., Gaithersburg, MD 20877 ... 301-258-5011

Monitors, Error Rate-1900

Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 ... 703-642-4000
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 ... 203-438-3731
§ Electro Standards Lab., Inc., P.O. Box 9144, Providence, RI 02940 ... 401-943-1164
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 ... 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 ... 201-768-8082
† Telecommunications Techniques Corp., 444 N. Frederick Ave., Gaithersburg, MD 20877 ... 301-258-5011

Monitors, Frequency-2900

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 ... 3•1120
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ... 3•1328,1329
§† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 ... 1B•1458,1459
† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ... 1B•1466
Acromag, 30765 Wixom Rd., Wixom, MI 48096 ... 313-624-1541
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 ... 213-682-3314
† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761 ... 512-251-2313
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 ... 818-445-5470
Basler Elec., Rte. 143, Highland, IL 62249 ... 618-654-2341
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107
D-B-Developments, 7709 Kilbourne Rd., Rome, NY 13440 ... 315-339-1265
DCI, Inc., 720 E. Dennis, Olathe, KS 66061 ... 913-782-5672
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 ... 513-254-6251
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 ... 812-426-2806
Douglas Randall, 6 Pawcatuck Ave., Pawcatuck, CT 02891 ... 203-599-2075
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 ... 201-287-3680
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 ... 714-494-2012
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 ... 312-837-4600
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 ... 212-458-5811
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 ... 203-795-4711
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 ... 707-528-1230
§ Metrix Instrument Co., 1711 Townhurst, Houston, TX 77043 ... 713-461-2131
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 ... 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 ... 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 ... 619-481-3900
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 ... 516-671-5700
§ Richard-Lee Co., Box 724, New Providence, NJ 07974 ... 201-276-0710
Sensor Corp., Box 140, Scottdale, PA 15683 ... 412-887-4080
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 ... 818-993-8257
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 ... 516-694-4400
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 ... 305-739-4300
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 ... 415-493-4141
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 ... 317-787-3332
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 ... 213-326-6668

Monitors, Laser Energy-2200

Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320, 818-889-8770 ... 1B•1119
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 ... 714-646-7165
§ Apollo Lasers, Inc., 9201 Independence Ave., Chatsworth, CA 91311 ... 213-709-1111
EG&G, Inc., Electro-Optics Div., 35 Congress St., Salem, MA 01970 ... 617-745-3200
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 ... 805-964-6701
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
† Laser Inc., Laser Lane, Box 537, Sturbridge, MA 01566 ... 617-347-7314
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ... 404-429-9061
Photon Technlg., 14125 Capri Dr., Los Gatos, CA 95030 ... 408-866-0566
Quantronix, 225 Engineers Rd., Smithtown, NY 11787 ... 516-273-6900
† Scientech, Inc., 5649 Arapahoe Ave., Boulder, CO 80303 ... 303-444-1361; 800-525-0522
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 ... 213-978-0516

Monitors, Line & Program-1900

Basic Measuring Insts., 402 Lincoln Centre Dr., Foster City, CA 94404, 415-570-5355 ... 3•1830
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818, 201-287-3680 ... 3•1218
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ... 3•1329
† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ... 1B•1466
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 ... 1A•1682
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 ... 305-451-1000
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 ... 215-699-9261
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 ... 714-494-2012
§ Gralex Inds., 155 Marine St., Farmingdale, NY 11735 ... 516-694-3600
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 ... 619-746-2010
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 ... 203-582-9561

Monitors, Modulation-2900

ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 ... 213-682-3314
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ... 213-515-6432; 800-421-5334
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 ... 201-767-7250
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 ... 714-833-1234
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 ... 216-871-7617
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642

Monitors, Phase & Phase Angle-2900

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 ... 3•1120
† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ... 1B•1466
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, 516-582-6500 ... 3•1277
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 ... 213-682-3314
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 ... 702-782-3611
Chesterfield Prods., 37 Midland Ave., Elmwood Park, NJ 07407 ... 201-797-9655
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 ... 312-593-1107
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 ... 812-426-2806
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 ... 201-287-3680

§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642
† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085

Monitors, Phase Sequence & Loss-2200

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 ...... 3•1120
§† **Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 ......1B•1458,1459**
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ......1B•1466**
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
§ Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
§ Syntel Div., Tegam, Inc., 7230 North Ridge Rd., Madison, OH 44057 216-428-7505
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Monitors, Power, AC & DC-2200

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 ...... 3•1120
Basic Measuring Insts., 402 Lincoln Centre Dr., Foster City, CA 94404, 415-570-5355 ...... 3•1830
† **Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ...... 3•1006**
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818, 201-287-3680 ...... 3•1218
§ **Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, 516-334-0870 ...... 3•1328,1329**
§† **Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 ......1B•1458,1459**
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ......1B•1466**
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ...... 3•1272
Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 ...... 3•1283
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 ......1A•1682
† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
§ Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 415-964-3200
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 201-989-0095
† American Aerospace Controls, 570 Smith St., Farmingdale, NY 11735 516-694-5100
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ......617-777-4500; 17-246-0300;800-451-1816
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
ARGA Controls, 35 E. Glenarm St., Pasadena, CA 91105 213-682-3314
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Bermar Corp., 6300 Westgate Rd., Raleigh, NC 27612 919-821-5993
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 301-296-7000
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Dearborn Wire & Cable Co., 9299 Evenhouse Ave., Rosemont, IL 60018 312-696-1000
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 215-699-9261
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§ Electronic Specialists, 171 South Main St., Natick, MA 01760 ......617-655-1532; 800-225-4876
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
§ Gralex Inds., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§ Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 401-884-6800
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
International Instruments, 88 Marsh Hill Rd., Orange, CT 06477 203-795-4711
Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
§ Liebert Corp., Programmed Power Div., 995 Benicia Ave., Sunnyvale, CA 94086 408-245-8900
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
† Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 401-884-6800
† Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Monitors, Power, AF-1300

Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, 305-451-1000 ......3•1120
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ...... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ...... 3•1012
Electro-Dynamics Dev. Co., 475 Mt. Hood Dr. S.W., Issaquah, WA 98027 206-392-2493
§ Electro Industries, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514 516-334-0870
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100

Monitors, Power Failure-2200

Basic Measuring Insts., 402 Lincoln Centre Dr., Foster City, CA 94404, 415-570-5355 ...... 3•1830
Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ...... 3•1006
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ......1B•1466**
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
§ Liebert Corp., Programmed Power Div., 995 Benicia Ave., Sunnyvale, CA 94086 408-245-8900
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Monitors, Power, Microwave-2900

Monitors, Power, RF-2900

REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854, 305-843-8484 ...... 3•1065
Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
† Electro Impulse, Box 870, Red Bank, NJ 07701-0870 201-741-0404
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 .516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
Pacific Meas., Inc., 488 Tasman Drive, Sunnyvale, CA 94086 408-734-5780
§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244

Monitors, Response Time-2900

Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820

Monitors, Temperature-5300 (Also See Controls, Temperature) — *See Vol. 1B*

Monitors, Video-1900

§ A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 827-7144
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 408-748-1200

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771
§ Audiotronics Corp., 7428 Bellaire Ave., N. Hollywood, CA 91605 818-765-2645
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Ball Electronic Display Div, Box 43376, St Paul, MN 55164 612-786-8900
Ball Elctrn., Systems Div., 1950 33rd St., Boulder, CO 80302 303-441-5400
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
§ Conrac Div., Conrac Corp., 600 N. Rimsdale Ave., Covina, CA 91722 213-966-3511
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050
Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
§ Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
Marconi Instrs., 100 Stonehurst Ct.; Northvale, NJ 07647 201-767-7250
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
§ Mitsubishi Elctrns., Industrial Electronics Div., 991 Knox Street, Torrance, CA 90502 213-515-3993
Philips Television Sys., Inc., P.O. Box 618, 900 Corporate Dr., Mahway, NJ 07430 201-529-1550
§ Ramtek, 2211 Lawson Lane, Santa Clara, CA 95050 408-988-2211
RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
SEKAI Elctrns. of Amer., Inc., 14700 E. Firestone Blvd., Suite 122, La Mirada, CA 90638 714-670-1854
Stenning Instrments, Inc., 671 Enchanted Way, Pacific Palisades, CA 90272 213-459-2930
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tektone Sound & Signal, 1331 S. Killian Dr., Lake Park, FL 33403 305-844-2383
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
† Vernitron Piezoelectric Div., 232 Forbes Rd., Bedford, OH 44146-5478 216-232-8600
Video Logic Corp., 597 No. Mathilda Ave., Sunnyvale, CA 94086 408-245-8622
Video Monitors, Inc., 3833 N. White Ave., Eau Claire, WI 54703 715-834-7785
Zenith Components & Sys. Grp., Zenith Radio Corp., 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Monitors, Voltage — See Meters, Volt (Vol. 3)

Monitors, Waveform — See Oscilloscopes (Vol. 3)

Monitors (MIL), Data-3475

§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Motor & Generator Armatures, Rotors, Stators-3500 — *See Vol. 1B*

Motor Generator Sets-4000

† Georator Corp., Box 70, Manassas, VA 22110, 703-368-2101 .... 3•1878
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990, 215-277-1300 .... 1B•1172
Portescap U.S., 1547 Trooper Rd., P.O. Box 666, Worcester, PA 19490, 215-277-0433 .... 1B•1172
Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506, 201-427-3100 .... 1B•1177
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 .... 1B•1883
† Ajax Magnethermic Corp., 1745 Overland Ave., N.E., Warren, OH 44482 216-372-8511
Arc Systems, Inc., 400 Oser Ave., Hauppauge, NY 11788 516-231-9261
Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733 213-575-0755
† Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041 214-271-4531
† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
† Dresser Inds., 1505 Elm St., Dallas, TX 75201 214-746-6000
† EEMCO Div., 4585 Electronics Pl., Los Angeles, CA 90039 213-247-7060
§ Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343 612-931-2700
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
§† Hertner Div., 12690 Elmwood Ave., Cleveland, OH 44111 216-252-4242
† HTL Electro Kinetics, 402 E. Gutierrez St., Santa Barbara, CA 93101 805-963-2055
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
† Magnetic Technology, 21001 Kittridge St., Canoga Pk., CA 91303 213-887-7700
§ Pacific Scientific Co., 4301 Kishwaukee, Rockford, IL 61105 815-966-3600
Power Systems & Controls, Inc., 3206 Lanvale Ave., Richmond, VA 23230 804-355-2803
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040
† Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041 214-271-4531

Motor Speed Drives — See Controls, Motor Speed (Vol. 3)

Motors, Brushless, DC-3500 — *See Vol. 1B*

Motors, Clock & Timing-3500 — *See Vol. 1B*

Motors, Control-3500 — *See Vol. 1B*

Motors, DC Timing-3500 — *See Vol. 1B*

Motors, Drag Cup-3500 — *See Vol. 1B*

Motors, Fractional Horsepower-3500 — *See Vol. 1B*

Motors, Gearhead-3500 — *See Vol. 1B*

Motors, Gyro-3500 — *See Vol. 1B*

Motors, Hysteresis-3500 — *See Vol. 1B*

Motors, Incremental, Stepping — See Motors, Stepping (Vol. 1B)

Motors, Induction-3500 — *See Vol. 1B*

Motors, Linear-3500 — *See Vol. 1B*

Motors, Miniature — See Motors, Fractional HP (Vol. 1B)

Motors, Permanent Magnet-3500 — *See Vol. 1B*

Motors, Selsyn — See Motors, Synchronous (Vol. 1B)

Motors, Servo-4900

Airpax Corporation, Cheshire Div., , Cheshire Indl. Pk., Box E, Cheshire, CT 06410, 203-272-0301 .... 1B•1131
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083, 619-727-7420 .... 1B•1132,1133
§ Bodine Elec. Co., 2500 W. Bradley Pl., Chicago, IL 60618, 312-478-3515 .... 1B•1135
Buehler Prods., P.O. Box A, Hwy. 70 E., Kinston, NC 28501, 919-522-3101 .... 1B•1137
† Clifton Precision, Marple at Broadway, Clifton Hgts., PA 19018, 215-622-1000 .... 1B•1139
§ Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343, 612-931-2700 .... 1B•1143,1144
† IMC Magnetics Corp., Eastern Div., 570 Main St., Westbury, NY 11590, 516-334-7070 .... 1B•1157
§ Japanese Prods. Corp., 31368 Via Colinas, Ste. 103-104, West Lake Village, CA 91362, 818-991-6111 .... 1B•1158
† Magnetic Technology, 21001 Kittridge St., Canoga Pk., CA 91303, 213-887-7700 .... 1B•1161
Maxon Precision Motors, Inc., 838 Mitten Rd., Burlingame, CA 94010, 415-697-9614 .... 1B•1163
† Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701, 813-822-2529 .... 1B•1165,3•1135
Motor-Tronics, Inc., 2142 Industrial Ct., Bldg. F2, Vista, CA 92083, 619-727-7430 .... 1B•1166
Pittman Corp., 343 Godshall Dr., Harleysville, PA 19438, 215-256-6601 .... 1B•1170, 1171
Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990, 215-277-1300 .... 1B•1172,1185
† Portescap U.S., 1547 Trooper Rd., P.O. Box 666, Worcester, PA 19490, 215-277-0433 .... 1B•1172
Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506, 201-427-3100 .... 1B•1177
† Sierracin/Magnedyne, 2258 Rutherford Rd., P.O. Box 458, Carlsbad, CA 92008, 619-438-3321 .... 1B•1179
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 .... 3•1119
† Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 1A•2067,1B•1019, 1207,1883
† Aeroflex Labs., Magnetic Prods. Div.,., So. Service Rd., Plainview, NY 11803 516-694-6700
Anorad Corp., 110 Oser Ave., Hauppauge, NY 11788 516-231-1990
Arc Systems, Inc., 400 Oser Ave., Hauppauge, NY 11788 516-231-9261
† Astro Instrument Corp., 2501 NW 17th Ln., Pompano Beach, FL 33064 305-748-5527
† Autotrol, P.O. Box 557, Crystal Lake, IL 60014 815-459-3080
Axial Magnetics, 6600 Whitaker Ave., Van Nuys, CA 91406 818-994-3346
§ B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
Barber-Colman Co., Motor Div., 14116 Rock St., Rockford, IL 61101 815-877-0241
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
Eastern Air Devices Motor Div., 1 Progress Dr., Dover, NH 03820 603-742-3330
† EDO Corp./Ellnco Div., 272 Main Ave., Norwalk, CT 06851 203-847-5861
EG & G Torque Systems, 36 Arlington St., Watertown, MA 02172 617-924-6000
§† Hertner Div., 12690 Elmwood Ave., Cleveland, OH 44111 216-252-4242
Hitachi America, Ltd., 59 Route 17 South, Allendale, NJ 07401 201-825-8000
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 .... 800-321-5111, Ext. 596
† HTL Electro Kinetics, 402 E. Gutierrez St., Santa Barbara, CA 93101 805-963-2055
§† Inertial Motors, 280 N. Broad St., Doylestown, PA 18901 215-345-1010
† Inland Motor, Specialty Prods. Div., Kollmorgen Corp., 4020 E. Inland Rd., Sierra Vista, AZ 85635 602-459-1150

† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
Kollmorgen Corp., Industrial Drives Div., 201 Rock Rd., Radford, VA 24141 703-639-2495
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Micronel U.S., 2142F Industrial Ct., Sycamore Research Center, Vista, CA 92083 619-727-7400
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
Pacific Scientific Co., 4301 Kishwaukee, Rockford, IL 61105 815-966-3600
Papst Mechatronic Corp., Aquidneck Indl. Pk., Newport, RI 02840 . 401-849-5930
PMI Motors, Kollmorgen Corp., 5 Aerial Way, Syosset, NY 11791 ... 516-938-8000
§ Powertron, Contraves Goerz Corp., 3821 Barranger Dr., Charlotte, NC 28210 704-525-8962
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
Sequential Info. Sys., 249 N. Saw Mill River Rd., Elmsford, NY 10523 914-592-5930
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
† TRW Motor Div. (Military), 2275 Stanley Ave., Dayton, OH 45404 513-228-3171
Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678
† Valley Electromagnetics Corp., P.O. Box 557, Crystal Lake, IL 60014 815-459-3080
† Valley Electromagnetics, P.O. Box 131, Spring Valley, IL 61362 815-664-2348

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Mounts, Antenna-1900

† Aeroflex Labs., Magnetic Prods. Div., ; So. Service Rd., Plainview, NY 11803 516-694-6700
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
† Ametek, Inc, Hunter Spring Division, 1 Spring Ave., Hatfield, PA 19440 215-822-2971
† Barry Controls, Barry Wright Corp., 700 Pleasant St., Watertown, MA 02172 617-923-1150
CGTI, 2 Windward Ave., White Plains, NY 10605 914-949-3719
† Craig Sys., 360 Merrimack St., Lawrence, MA 01842 617-688-6961
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
Gabriel Elctrns., Box 70, Scarborough Indl. Pk., Scarborough, ME 04074 207-883-5161
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
M/A-Com Cable/Home Communication Prodelin Satellite Antenna Systems, M/A-Com, Inc., P.O. Box 468, Newton, NC 28658 . 800-222-1195;704-464-4141
Microflect, 3575 25th S.E., Salem, OR 97302-0985 503-363-9267
§ Premax Prods. Div., Highland & College Aves., Niagara Falls, NY 14305 716-285-9186
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
§† Sitco Antennas, 10330 N.E. Marx St., Portland, OR 97220 503-253-2000
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300

Mounts, CRT & Accessories-2500 — *See Vol. 2*

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Multiplexers, Analog-2325

CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445, 716-381-4740 ...... 3•1213
§ **Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ...... 3•1327**
Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 ..... 3•1163
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241, 317-248-2036 ...... 3•1086
Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ...... 617-777-4500; 17-246-0300;800-451-1816
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 .. 617-752-5690
Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 215-646-8100
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
§ Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
† Consolidated Controls, 15 Durant Ave., Bethel, CT 06801 203-743-6721
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 .. 617-246-1600
Data Tech, Div. of Penril Corp., 3110 W. Segerstrom, Santa Ana, CA 92704 714-546-7160
† Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§ Dynamics, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311 818-998-8281
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 415-594-3000
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 408-727-3101
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 415-552-1247
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730 617-275-0300
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 408-297-8530
§† Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 408-727-5350
MVP Elctrns., 1161 N. Tustin, Orange, CA 92667 714-639-9246
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 215-355-4443
§ Opto 22, 15461 Springdale St., Huntington Bch., CA 92649 714-891-5861
§† Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 .. 415-968-9211
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
§† Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 215-657-8400
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
TANO Corp., 4301 Poche Ct., New Orleans, LA 70129 504-254-3500
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Tustin Elctrns. Co., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705 714-549-0391

Multiplexers, Digital-2325

Atlantic Scientific Corp., 2711 S. Harbour City Blvd., Melbourne, FL 32901, 305-725-8000 ...... 1B•1257
Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 ..... 3•1163
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241, 317-248-2036 ...... 3•1086
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 .... 208-263-1471;800-323-3343
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
§† Advanced Microcomputers, 3340 Scott Blvd., Santa Clara, CA 95051 408-732-2400
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ...... 617-777-4500; 17-246-0300;800-451-1816
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Automation Displays Inc., 3833 N. White Ave., Eau Claire, WI 54701 715-834-9595
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600

Aydin Monitor Sys., 502 Office Center Dr., Ft. Washington, PA 19034 215-646-8100
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
Canoga Data Sys., 6740 Eton Ave., Canoga Park, CA 91303 213-888-2003
§ Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500
Compunetics, Inc., 2000 Eldo Rd., Monroeville, PA 15146 412-373-8110
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
† Dataproducts, 6200 Canoga Ave., Woodland Hills, CA 91365 213-887-8000
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
§ Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§ EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 415-594-3000
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ Giltronix, 3780 Fabian Way, Palo Alto, CA 94303 415-493-1300
Granger Assocs., 3101 Scott Blvd., Santa Clara, CA 95051 408-727-3101
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 415-552-1247
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
Loral TerraCom, Div. of Loral Corp., 9020 Balboa Ave., San Diego, CA 92123 619-278-4100
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 408-297-8530
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
Neff Instr., 700 S. Myrtle Ave., Monrovia, CA 91016 818-357-2281
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 215-355-4443
† Optelecom, 15940 Lauanne Dr., Gaithersburg, MD 20760 301-948-4232
§ Opto 22, 15461 Springdale St., Huntington Bch., CA 92649 714-891-5861
§ Phoenix Data, 3384 W. Osborn Rd., Phoenix, AZ 85017 602-278-8528
Racal-Milgo, 8600 N.W. 41st St., Miami, FL 33166 305-592-8600
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
§† Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 215-657-8400
Standard Engrg., 44800 Girmmer, Fremont, CA 94538 415-657-7555
Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
TANO Corp., 4301 Poche Ct., New Orleans, LA 70129 504-254-3500
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§† Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 .201-930-4600
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000
§ Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Multiplexers, Fiber Optic-2475 — *See Vol. 1B*

Multiplexers, Frequency Division-1900

Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 ....1A-1686,1687
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
† Integrated Microwave, 11526 Sorrento Valley Rd., San Diego, CA 92121 619-457-0277
Junction Devices, Inc., 2488-A Townsgate Rd., Westlake Village, CA 91361-2594 ....213-889-4030;805-497-4421
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 415-552-1247
† Metraplex Corp., Berkshire Indl. Park, Bethel, CT 06801 203-748-0606
† Metropole Products Inc., P.O. Box 10275, Alexandria, VA 22310 ...703-971-8606; 703-971-7082
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
† Sage Laboratories, Inc., 3 Huron Dr., Natick, MA 01778 617-653-0844
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800

Multiplexers, Statistical-1900

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
§ Concord Data Systems, 303 Bear Hill Rd., Waltham, MA 02154 617-890-1394
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
§ Datec, Inc., 200 Eastowne Dr., Ste. 116, Chapel Hill, NC 27514 919-929-2135
Digital Communications Assocs., Inc., 303 Technology Pk., Norcross, GA 30092 404-448-1400
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
§ Multi-Tech Systems, Inc., 82 Second Ave. S.E., New Brighton, MN 55112 612-631-3550
§† Penril, 5520 Randolph Rd., Rockville, MD 20852 301-984-8225
§† Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 .201-930-4600

Multiplexers, Time Division-1900

Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
Coherent Communications Sys. Corp., 60 Commerce Dr., Hauppauge, NY 11788 516-231-1550
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
† Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Karkar Electronics, Inc., 245 Eleventh St., San Francisco, CA 94103 415-552-1247
† Metraplex Corp., Berkshire Indl. Park, Bethel, CT 06801 203-748-0606
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 .201-930-4600

Multiplexers, Transmission-1900

A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 415-594-3000
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561

Multiplexers, Video-1900

Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ..617-752-5690
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
§† RCA Solid State Div., CMOS IC Mktg., Rte. 202, Somerville, NJ 08876 201-685-6000

Multipliers, Analog-2325

† Acromag, 30765 Wixom Rd., Wixom, MI 48096 313-624-1541
Action Instrs., 8601 Aero Dr., San Diego, CA 92123 619-279-5726
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analog Systems, P.O. Box 35879, Tucson, AZ 85740-5879 602-293-4923
† Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383

Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
§† Raytheon Semiconductor, 350 Ellis St., Mountain View, CA 94043 415-968-9211
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
† Techtrol Cyclonetics, Inc., 815 Market St., New Cumberland, PA 17070 717-774-2746
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Multipliers, Channel Electron-2325

Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 ..... 1A•2209
§ Murata Mfg. Co. Ltd., 26-10 2-chome-Temjin, Nagaoka-Kyo-Shi, Kyoto, Japan 075-921-9111

Multipliers, Crystal-1900

† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Techtrol Cyclonetics, Inc., 815 Market St., New Cumberland, PA 17070 717-774-2746
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411

Multipliers, Diode-1900

† Voltage Multipliers, Inc., 8711 W. Roosevelt Ave., Visalia, CA 93291, 209-651-1402 ..... 1A•2113
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
Baytron, 344 Salem St., Medford, MA 02155 617-391-1550
Collmer Semiconductor, Inc., 14368 Proton Rd., Dallas, TX 75234-3335 214-233-1589
§ Elctrn. Devices, 21 Gray Oaks Ave., Yonkers, NY 10710 914-965-4400
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ..... 44-(582) 60-14-41
† Semtech, 652 Mitchell Rd., Newbury Park, CA 91320 213-628-5392
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
§† Varo Semiconductor, Inc., 2800 W. Kingsley Dr., Garland, TX 75046 214-271-8511
Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Multipliers, Frequency-3450 — *See Vol. 1A*

Multipliers, Hall-4800 — *See Vol. 1A*

Multipliers, Magnetic Analog-2200

† American Aerospace Controls, 570 Smith St., Farmingdale, NY 11735 516-694-5100
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Multipliers, Meter-2900

North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ..... 3•1270
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
† Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717

Multipliers, Servo-4900

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
§† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
Techtrol Cyclonetics, Inc., 815 Market St., New Cumberland, PA 17070 717-774-2746
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100

Nameplates-2450 — *See Vol. 1B*

Networks, Computer, Local Area-2000

American Photonics Inc., 71 Commerce Dr., Brookfield Center, CT 06805 203-775-8950
Codenoll Technology Corp., 1086 N. Bwy., Yonkers, NY 10701 914-965-6300
Computrol Div. Kidde Automated Sys., Inc., 15 Ethan Allen Hwy., Ridgefield, CT 06877 203-544-9371
Concord Data Systems, 303 Bear Hill Rd., Waltham, MA 02154 617-890-1394
§ DY-4 Systems Inc., 888 Lady Ellen Pl., Ottawa, ON K1Z 5M1 Canada 613-728-3711
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Sytek, Inc., 1225 Charleston Rd., Mountain View, CA 94043 415-966-7300
† UCE, Inc., 24 Fitch St., Norwalk, CT 06855 203-838-7509

Networks, Crossover, Attenuator (Audio)-1300

§ Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
De Coursey Engrg. Lab., 11828 W. Jefferson, Culver City, CA 90230 ..... 213-EX7-9668
† Dietz Design, Inc., 100 Electronics Pkwy., Belton, MO 64012 816-331-4911
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550 914-664-2333
El-Rad Mfg., 4300 N. California, Chicago, IL 60618 312-478-7300
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
† Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
§ Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
Kelvin, 5919 Noble Ave., Van Nuys, CA 91411 818-782-6662
§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Mills Resistor Co., 3840 Catalina St., Los Alamitos, CA 90720 213-598-2454
§ Shure Bros., 222 Hartrey Ave., Evanston, IL 60204 312-866-2200
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ..... 516-957-8700;800-645-5516
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064 213-478-8224
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355 215-644-1300
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Networks, Directional Antenna Phasing-1900

American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
§† Anaren Microwave, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057 315-432-8909
† Artronic Instr. Co., Inc., 9 Division St., Sidney, NY 13838 607-563-8444
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550 914-664-2333
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Merrimac Inds., 41 Fairfield Pl., West Caldwell, NJ 07006 201-575-1300
† Microwave Applications Grp., 3030 Industrial Pkwy., Santa Maria, CA 93455 805-928-5711
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
† Transco Prods., 4241 Glencoe Ave., Marina del Rey, CA 90291 213-822-0800
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355 215-644-1300

Networks, Hybrid-2000

ACC Electronics, 1300 W. Oak, Independence, KS 67301, 316-331-1000 ..... 1A•1643
† Aeroflex Labs., Microelctrns. Div., 35 S. Service Rd., Plainview, NY 11803, 516-694-6700 ..... 1A•1644
Cal-R, Inc., P.O. Box 1397, Santa Monica, CA 90406, 213-450-1761 ..... 1A•1829
§† Dale Electronics, Inc., El Paso Div., P.O. Box 26950, El Paso, TX 79926, 915-592-3253 ..... 1A•1858
HyComp Inc., 75 Union Ave., Box 377, Sudbury, MA 01776, 617-443-4631 ..... 1A•1874
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818, 402-694-6111 ..... 1A•1661
KDI Electronics, Inc., 60 S. Jefferson Rd., Whippany, NJ 07981, 201-887-8100 ..... 1A•1879
Piconics, Cummings Rd., Tyngsboro, MA 01879, 617-649-7501 ..... 1A•1680
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Alpha Inds., Inc.-Microelectronic Div., 3015 Advance Lane, Colmar, PA 18915 215-822-1311
Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
A. P. Circuit Corp., 513 East 86th St., P.O. Box 1350, New York, NY 10028 212-737-1348
Armtec Industries, Inc., Daven Components Grp., Manchester Airport, Manchester, NH 03103 603-669-0940
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
§† Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
§ Contel Info. Sys., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
CTS Knights, 400 Reimann Ave., Sandwich, IL 60548 815-786-8411
§ Dale Electronics, Inc., Norfolk Div., 2300 Riverside Blvd., Norfolk, NE 68701 402-371-0080
† Electro-Films, Inc., 111 Gilbane St., Warwick Central Indl. Pk., Warwick, RI 02886 401-738-9150
Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Hybrid Svcs. Inc., 38 Main St., North Reading, MA 01864 617-664-5500
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† Hy-Tec Industries, Div. of Topo Industries, Inc., P.O. Box 91, Shoreham, NY 11786 516-744-5062
Hytek Microsystems, 980 University Ave., Los Gatos, CA 95030 408-395-2300
§† Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052 206-882-3100
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715

† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Microplex, Inc., 1977 State College Blvd., Anaheim, CA 92806 ....714-979-8833; 714-634-1535
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
† Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
§† RCD Components, Inc., 330 Bedford St., Manchester, NH 03101 603-669-0054
Solitron/Microwave, Box 278, Port Salerno, FL 33492 305-287-5000
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
Techno-Components Corp., 7803 Lemona, Van Nuys, CA 91405 818-781-1642
Thickfilm Int'l., Rt. 1-Box 85-0, Indian Head, MD 20640 301-375-8666
Victoreen, Inc., Component Div., 10101 Woodland Ave., Cleveland, OH 44104 216-795-8200
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355 215-644-1300
† Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Networks, Hybrid Substrates-3130 — *See Vol. 1A*

Networks, Ladder-4700 — *See Vol. 1A*

Networks, LC-2700 — *See Vol. 1A*

Networks, Matching-1900

§† **Dale Electronics, Inc., El Paso Div., P.O. Box 26950, El Paso, TX 79926, 915-592-3253 ....1A•1858**
† **Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377, 212-424-7500 ....1A•1361**
Mepco/Electra, Inc., North American Philips Corp., Columbia Rd., Morristown, NJ 07960, 201-539-2000 ....1B•1012
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ....1A•2210
RCL Electronics, Inc., 195 McGregor St., Manchester, NH 03102, 603-627-3831 ....1A•1936
Shallcross, Inc., U.S. 70 East, Smithfield, NC 27577, 919-934-5181 ....1A•1936
Ultronix, Inc., P.O. Box 1090, Grand Junction, CO 81502, 303-242-0810 ....1A•1997
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355, 215-644-1300 ....1A•2008
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Armtec Industries, Inc., Daven Components Grp., Manchester Airport, Manchester, NH 03103 603-669-0940
§ Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
† BG Elctrns., 30 South St., Mt. Vernon, NY 10551 914-664-5591
§ Caddock Electronics, Inc., 1717 Chicago Ave., Riverside, CA 92507 714-788-1700
Data Delay Devices, 385 Lakeview Ave., Clifton, NJ 07011 201-772-1106
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550 914-664-2333
† ESC Elctrns. Corp., 534 Bergen Blvd., Palisades Pk., NJ 07650 201-947-0400
§ Gamble, Charles T., Inds., 605 Perkins La., Delanco, NJ 08075 609-461-1900
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
§ KDI Electronics, Inc., 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-8100
Kelvin, 5919 Noble Ave., Van Nuys, CA 91411 818-782-6662
† KRL Elctrns., 160 Bouchard St., Manchester, NH 03103 ....603-668-3210; 800-257-3300
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
Microplex, Inc., 1977 State College Blvd., Anaheim, CA 92806 ....714-979-8833; 714-634-1535
Mills Resistor Co., 3840 Catalina St., Los Alamitos, CA 90720 213-598-2454
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
§† RCD Components, Inc., 330 Bedford St., Manchester, NH 03101 603-669-0054
† Res-Net, 110 Route 10, Whippany, NJ 07981 .... 201-887-2260;out of state 800-526-0704
Solitron/Microwave, Box 278, Port Salerno, FL 33492 305-287-5000
Sprague Elec. Co., 481 Marshall St., No. Adams, MA 01247 413-664-4411
Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
Tel Labs, Inc., 154 Harvey Rd., Londonderry, NH 03053 603-625-8994
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064 213-478-8224
Vishay Angstrohm, 1 Precision Pl., Hagerstown, MD 21740 301-739-8722

Networks, Phase-2700 — *See Vol. 1A*

Networks, Pulse Forming-2700 — *See Vol. 1A*

Networks, Rejection — See Filters (Vol. 1A)

Networks, RC-2000

Cal-R, Inc., P.O. Box 1397, Santa Monica, CA 90406, 213-450-1761 ....1A•1829
§ **Dale Electronics, Inc., El Paso Div., P.O. Box 26950, El Paso, TX 79926, 915-592-3253 ....1A•1851**
† **Electro-Films, Inc., 111 Gilbane St., Warwick Central Indl. Pk., Warwick, RI 02886, 401-738-9150 ....1A•1871**
† **Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550, 914-664-2333 ....1A•1869**
KDI Electronics, Inc., 60 S. Jefferson Rd., Whippany, NJ 07981, 201-887-8100 ....1A•1879
Ohmtek, Inc., 2160 Liberty Dr., Niagara Falls, NY 14304, 716-283-4025 ....1A•1920
TRW Capacitor Div., 301 West "O" St., Ogallala, NE 69153, 308-284-3611 ....1A•1196
ACC Electronics, 1300 W. Oak, Independence, KS 67301 316-331-1000
§ Acushnet Capacitor Co., Inc., 720 Belleville, New Bedford, MA 02741 617-999-3291
§ Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Andrich Sys., Inc., 1699 Roosevelt Ave., Bohemia, NY 11716 516-589-5656
Armtec Industries, Inc., Daven Components Grp., Manchester Airport, Manchester, NH 03103 603-669-0940
§ Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Bourns, Inc., Resistive Components Group, 1200 Columbia Ave., Riverside, CA 92507 714-781-5050
Centralab, Inc., A North American Philips Co., 2566 Northwestern Ave., McClure Pk., West Lafayette, IN 47906 317-463-2536
† Circle Electronics, A Division of F-Dyne Elctrns., 3501 Electronics Way, W. Palm Beach, FL 33407 305-844-1310
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ CTS of Berne, 406 Parr Rd., Berne, IN 46711 219-589-3111
† CTS Microelectronics, Inc., 1201 Cumberland Ave., W. Lafayette, IN 47906 317-463-2565
§ Custom Elctrns., Browne St., Oneonta, NY 13820 607-432-3880
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
Electrocube, 1710 So. Del Mar Ave., San Gabriel, CA 91776 818-573-3300
Engineered Comps. Co., P.O. Box Y, San Luis Obispo, CA 93406 805-544-3800
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
† ESC Elctrns. Corp., 534 Bergen Blvd., Palisades Pk., NJ 07650 201-947-0400
† F-Dyne Elctrns., 449 Howard Ave., Bridgeport, CT 06605 203-367-6431
† Frequency Selective Networks, Inc., 69-20 Garfield Ave., Woodside, NY 11377 212-424-7500
Gamble, Charles T., Inds., 605 Perkins La., Delanco, NJ 08075 609-461-1900
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
Hybrid Svcs. Inc., 38 Main St., North Reading, MA 01864 617-664-5500
† Hy-Tec Industries, Div. of Topo Industries, Inc., P.O. Box 91, Shoreham, NY 11786 516-744-5062
Industrial Midwec Capacitors, 4902 Tollview Dr., Rolling Meadows, IL 60008 312-577-0120
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
Kelvin, 5919 Noble Ave., Van Nuys, CA 91411 818-782-6662
† KRL Elctrns., 160 Bouchard St., Manchester, NH 03103 ....603-668-3210; 800-257-3300
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Mepco/Electra, Inc., North American Philips Corp., Columbia Rd., Morristown, NJ 07960 201-539-2000
Microplex, Inc., 1977 State College Blvd., Anaheim, CA 92806 ....714-979-8833; 714-634-1535
Mills Resistor Co., 3840 Catalina St., Los Alamitos, CA 90720 213-598-2454
§ Murata Mfg. Co. Ltd., 26-10 2-chome-Temjin, Nagaoka-Kyo-Shi, Kyoto, Japan 075-921-9111
† Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
† Piconics, Cummings Rd., Tyngsboro, MA 01879 617-649-7501
§† RCD Components, Inc., 330 Bedford St., Manchester, NH 03101 603-669-0054
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013 717-243-5929
Rtron Corp., 7324 Lawndale, Skokie, IL 60076 312-679-7180
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
† Southern Electronics, F-Dyne, 726 So. Flower St., Burbank, CA 91502 213-845-2458
§ Sprague Elec. Co., 481 Marshall St., No. Adams, MA 01247 413-664-4411
Sprague Products Co., 481 Marshall St., No. Adams, MA 01247 413-664-4481
Tel Labs, Inc., 154 Harvey Rd., Londonderry, NH 03053 603-625-8994
Thickfilm Int'l., Rt. 1-Box 85-0, Indian Head, MD 20640 301-375-8666
† Thinco Div., Hull Corp., Davisville Rd., Hatboro, PA 19040 215-672-7800
TTE, Inc., 2214 S. Barry Ave., Los Angeles, CA 90064 213-478-8224
Ultronix, Inc., P.O. Box 1090, Grand Junction, CO 81502 303-242-0810
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355 215-644-1300
† Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

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Networks, Video-2700 — *See Vol. 1A*

Null Detectors — See Indicators, Null (Vol. 3)

Nuts, Metal-2825 — *See Vol. 2*

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Oils — See Lubricants (Vol. 2)

Optical Component Mounts & Accessories-3700 — *See Vol. 1B*

Optical-Coupler Isolators — See Isolators, Opto (Vol. 1B)

Optical Signal Sources — See Generators, Light Pulse (Vol. 3)

Oscillators, Audio (Module)-2300 — *See Vol. 1A*

Oscillators, Audio (Test) — See Generators, Audio (Vol. 3)

Oscillators, Beat Frequency (BFO)-2300 — *See Vol. 1A*

Oscillators, Bias-2300 — *See Vol. 1A*

Oscillators, Bridge (Test)-2900

Oscillators, Cavity-2300 — *See Vol. 1A*

Oscillators, Clock-2300 — *See Vol. 1A*

Oscillators, Crystal Controlled (Module)-2300 — *See Vol. 1A*

Oscillators, Decade (Test)-2900

Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ....619-279-8620;800-356-2244;800-821-1634
† Connor-Winfield Corp., 109 Turner Ct., POB L, W. Chicago, IL 60185 312-231-5270
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Statek Corp., 512 N. Main St., Orange, CA 92668 714-639-7810

Oscillators, LC-2300 — *See Vol. 1A*

Oscillators, Low Frequency (Module)-2300 — *See Vol. 1A*

Oscillators, Microwave-3450 — *See Vol. 1A*

Oscillators, Oven-2300 — *See Vol. 1A*

Oscillators, Power (Module)-2300 — *See Vol. 1A*

Oscillators, Pulse (Module)-2300 — *See Vol. 1A*

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Oscillators, RC (Module)-2300 — *See Vol. 1A*

Oscillators, Reed-2300 — *See Vol. 1A*

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Oscillators, Sinusoidal (Module)-2300 — *See Vol. 1A*

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Oscillators, Square Wave (Module)-2300 — *See Vol. 1A*

Oscillators, Square Wave (Test) — See Generators, Function (Vol. 3)

Oscillators, Sweep — See Generators, Sweep (Vol. 3)

Oscillators, Telemetry-1900

† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 ....1A•1359
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ....1A•1780,1781,1783
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
† Connor-Winfield Corp., 109 Turner Ct., POB L, W. Chicago, IL 60185 312-231-5270
CTS Knights, 400 Reimann Ave., Sandwich, IL 60548 815-786-8411
† Damon/Elctrns. Div., 80 Wilson Way, Westwood, MA 02090 617-449-0800
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
† Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
† Frequency West, Inc., 3140 Alfred St., Santa Clara, CA 95050 408-727-8500
† Greenray Inds., Inc., 840 W, Church Rd., Mechanicsburg, PA 17055 717-766-0223
Isotemp Research, Inc, Box 3389, Charlottesville, VA 22901 804-295-3101
K&L Microwave, Inc., 408 Coles Circle, Salisbury, MD 21801 301-749-2424
McCoy Electronics Co., Sub. Oak Technology Inc., 100 Watts St., P.O. Box B, Mt. Holly Springs, PA 17065 717-486-3411
Motorola, Inc., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131 312-451-1000
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
§† Omni Spectra, Inc., Microwave Subsystems Div., 2626 So. Hardy Dr., Tempe, AZ 85282 ....602 966-1471
† Omnitek, Inc., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047 215-355-4443
Ovenaire, 706 Forrest St., Charlottesville, VA 22901 804-977-8050
† Q-Tech Corp., 2201 Carmelina Ave., Los Angeles, CA 90064 213-820-4921
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013 717-243-5929
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Syntest Corp., 40 Locke Dr., Marlboro, MA 01752 617-481-7827
† Techtrol Cyclonetics, Inc., 815 Market St., New Cumberland, PA 17070 ....717-774 2746
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Oscillators, Temperature Compensated-2300 — *See Vol. 1A*

Oscillators, Test Equipment — See Generators (Specific Types) (Vol. 3)

Oscillators, Tuning Fork Controlled-2300 — *See Vol. 1A*

Oscillators, UHF/VHF (Module)-2300 — *See Vol. 1A*

Oscillators, UHF/VHF (Test) — See Generators, UHF/VHF (Vol. 3)

Oscillators, Ultrasonic (Module)-2300 — *See Vol. 1A*

Oscillators, Ultrasonic (Test) — See Generators, Ultrasonic (Vol. 3)

Oscillators, Voltage Controlled (Module)-2300 — *See Vol. 1A*

Oscillators (MIL), Crystal & Ovens-2440 — *See Vol. 1B*

Oscillators (MIL), VCO, Solid State, RF-2440 — *See Vol. 1B*

Oscillographs, Direct Writing-3000

Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 ....3•1384
§ Soltec Corp., 11684 Pendelton St., Sun Valley, CA 91352, 818-767-0044; 800-423-2344 ....3•1388,1389
THORN EMI Technology Inc., 8601 Dunwoody Pl., Atlanta, GA 30338, 04-587-0017;800-243-2572 ....3•1310
† Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893 401-828-4000
Bell & Howell/CEC Div., 360 Sierra Madre Villa, Pasadena, CA 91109 213-796-9381
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
† Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 401-884-6800
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
MFE Corp., Instr. Div., Keewaydin Dr., Bldg. , Salem, NH 03079 603-893-1921
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Oscilloscope Plug-ins-2975

Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
† Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072 201-935-5220
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Test & Measurement Systems, Inc., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086 408-720-8877
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Oscilloscopes, Digital-2975

§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020, 303-469-5231; 800-821-6327 ....3•1193
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ....3•1374
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818, 800-525-5554;818-764-5400 ....3•1387
Branden, T. G., Corp., 5565 S.E. Intl. Way, Portland, OR 97222 503-659-9366
† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600

Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
§ Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072 201-935-5220
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 602-968-6241
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 .... 213-515-6432; 800-421-5334
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 914-425-2000
§ Macrodyne, 1004 Princetown Rd., Schenectady, NY 12301 518-356-3500
§ Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 805-964-6708
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Test & Measurement Systems, Inc., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086 408-720-8877

Oscilloscopes, General Purpose-2975

§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 .... 3•1362-1364
§ Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072, 201-935-5220 .... 3•1366,1368
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1370,1371
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1372-1374
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 .... 303-469-5231;800-821-6327
§ Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
† Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§ Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Hitachi Denshi America Ltd., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797 516-921-7200
† Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
§ Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 .... 800-525-5554;818-764-5400
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332

Oscilloscopes, High Frequency (Above 200 MHz)-2975

Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072 201-935-5220
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 914-425-2000
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877

Oscilloscopes, Low Frequency (DC to 3 MHz)-2975

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 .... 303-469-5231;800-821-6327
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
§ Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
† Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 .... 213-515-6432; 800-421-5334
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
§ Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 .... 800-525-5554;818-764-5400
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332

Oscilloscopes, Mid Frequency (DC to 200 MHz)-2975

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 .... 3•1362-1364
† Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072, 201-935-5220 .... 3•1366,1368
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1370,1371
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1372-1374
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787, 516-231-7050 .... 3•1304
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077, 800-547-1512; Oregon only 800-452-1877 .... 3•1376,1377
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
§ Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Hitachi Denshi America Ltd., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797 516-921-7200
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572

Oscilloscopes, Multibeam-2975

Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072, 201-935-5220 .... 3•1366-1368
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1370,1371
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1372-1374
Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787, 516-231-7050 .... 3•1304
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077, 800-547-1512; Oregon only 800-452-1877 .... 3•1376,1377
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107, 317-787-3332 .... 3•1318
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Hitachi Denshi America Ltd., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797 516-921-7200

† Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572

Oscilloscopes, Multiple Channel-2975

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ....3•1362-1364
§ Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072, 201-935-5220 ....3•1366-1368
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 ....3•1370,1371
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077, 800-547-1512; Oregon only 800-452-1877 ....3•1376,1377
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Data Check Corp., 10070 Willow Creek Rd., San Diego, CA 92131 .619-578-0101
† Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
§ Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Hitachi Denshi America Ltd., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797 516-921-7200
† Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
§ Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787 516-231-7050
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Telonic/Berkeley, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-9401
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
Voltex, 3460 Great Neck Rd., Amityville, NY 11701 516-842-2772
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572
† Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332

Oscilloscopes, Portable, Battery Operated-2975

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 ....3•1191
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020, 303-469-5231; 800-821-6327 ....3•1193
§ Iwatsu Instruments, Inc., 430 Commerce Blvd., Carlstadt, NJ 07072, 201-935-5220 ....3•1366,1368
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ....3•1374
§ Sperry, A. W., Instrs., P.O. Box 9300, Smithtown, NY 11787, 516-231-7050 ....3•1304
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077, 800-547-1512; Oregon only 800-452-1877 ....3•1376,1377
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Hitachi Denshi America Ltd., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797 516-921-7200
Infodex, Inc., 395 W. Main St., Waterbury, CT 06702 203-757-9291
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 602-968-6241
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ....213-515-6432; 800-421-5334
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572

Oscilloscopes, Programmable-2975

Branden, T. G., Corp., 5565 S.E. Intl. Way, Portland, OR 97222 503-659-9366
Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ....213-515-6432; 800-421-5334
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818 ....800-525-5554;818-764-5400
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 ...805-964-6708
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
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† Standard Environmental Systems, Inc., 383 Minnisink Rd., Totowa, NJ 07512 ... 201-256-2200
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Appleton Papers Inc., P.O. Box 359, Appleton, WI 54912, 414-734-9841 .... 3•1070

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† EDO Western Corp., EDO Corp., 2645 South 300 W., Salt Lake City, UT 84115 ....801-486-7481/3846

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Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061

Universal Instrs., P.O. Box 825, Binghamton, NY 13902 607-775-1102

Posts, Binding-2100 — *See Vol. 2*

Posts, Harness Board-6000 — *See Vol. 2*

Potentiometer Elements-4750 — *See Vol. 1A*

Potentiometers, Carbon Ceramic-4750 — *See Vol. 1A*

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Potentiometers, Composition, Carbon-4750 — *See Vol. 1A*

Potentiometers, Conductive Plastic-4750 — *See Vol. 1A*

Potentiometers, Hot Molded-4750 — *See Vol. 1A*

Potentiometers, Hybrid-4750 — *See Vol. 1A*

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Potentiometers, Rectilinear-4750 — *See Vol. 1A*

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Potentiometers, Trimmer-4750 — *See Vol. 1A*

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Potentiometers, Trimmer, Metal Film — See Potentiometers, Trimmer (Vol. 1A)

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Power Supplies, AC to DC Adapter-4000

Arstan Products Intl. Ltd., 99 Jericho Tpke., Jericho, NY 11753, 516-333-8100 ....1A•2133

D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706, 516-586-5955 .. 3•1542, 1543

Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ....3•1545

Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 ....3•1582

Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201, 201-353-5700 ....3•1606,1607

Pan-Magnetics Intl., Inc., 455-A Carson Plaza Dr., Carson, CA 90746, 213-532-1790 ....1A•2221

Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 ....1A•2263

§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260

† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 ....213-390-3537/8837

§ ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107 612-222-3791

§ Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430 612-560-9300

Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311

† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454

C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 814-864-4921

§ Coastcom, 2312 Stanwell Dr., Concord, CA 94520 415-825-7500

Conversion Equip. Corp., 1620 So. Sunkist, Anaheim, CA 92806 714-634-9698

Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000

§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 717-848-1722

Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950

Engineering Design & Sls., Rt. 2, Box 305, Danville, VA 24540 804-685-7073

§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663

§ Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351

§ Heath Co., Benton Harbor, MI 49022 616-982-3886

International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614

James Electronics, 4050 N. Rockwell, Chicago, IL 60618 312-463-6500

MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000

† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262

Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183

† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700

Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334

Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484

† Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311 818-882-0004

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500

§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242

§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990

Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716 .516-563-1117

Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Power Supplies, AC Input, Up to 30 VDC Output-4000

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 ....3•1441

† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 ....3•1441-1446,1452-1454

§ ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 ...3•1456-1458

† Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 .... 3•1462-1467,1470-1495

† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ....3•1496-1499

Arstan Products Intl. Ltd., 99 Jericho Tpke., Jericho, NY 11753, 516-333-8100 ....1A•2133

Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051, 408-748-1200 ....3•1500

§ Astron Corp., 2852 Walnut , Tustin, CA 92680, 714-832-7770 ....3•1501

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1189, 1504

§† Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 ....3•1502,1503

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ....3•1509

§ Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086, 408-732-2440 ....3•1511

§† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ....3•1512

California DC, 2150 Anchor Ct., Newbury Park, CA 91320, 805-499-3621; 213-706-8221 ....3•1514

† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 ....3•1515

Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 ....3•1516

Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 ....3•1517

CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 ....3•1845

§ Compower Div., Div. of Computer Prods., Inc., 2220 Lundy Ave., San Jose, CA 95131, 408-942-1600 ....3•1702-1704

Condor, 201 Flynn Rd., Camarillo, CA 93010, 805-484-2851;800-235-5929 ... 3•1520-1529
§ Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 ... 3•1536-1539
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 ... 3•1127
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706, 516-586-5955 ... 3•1542, 1543
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ... 3•1545
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 ... 3•1547
Digital Power Corp., 686 East Gish Rd., San Jose, CA 95112, 408-288-5600 ... 3•1549
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724, 818-967-9521 ... 3•1550,1551
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753, 201-922-9300 ... 3•1552,1553
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 ... 3•1106
Elgenco, Inc., Box 460, Hurricane, UT 84737, 801-635-4954 ... 3•1228
§ Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705, 714-979-4440 ... 3•1554-1559
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ... 3•1560
§ Epsco, 920 Westwood Ave., Addison, IL 60101, 312-543-0410 ... 3•1563
† Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 ... 3•1564,1565
† Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 ... 3•1566,1569
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 ... 3•1395,1570,1571,1876
Frederick Components Intl., 20806 Plummer St., Chatsworth, CA 91311, 18-882-0868;800-354-0660 ... 3•1572,1573
GFC/Hammond Elctrns., Inc., 1690 Walden Ave., Buffalo, NY 14225, 716-894-5710 ... 3•1583
Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 ... 3•1582
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ... 3•1585-1587
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ... 3•1592
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051, 408-733-4045 ... 3•1605
Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201, 201-353-5700 ... 3•1606,1607
KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501, 213-320-3902 ... 3•1613-1616
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 ... 3•1618
Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ... 3•1621-1639
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 ... 3•1645
L-Com Inc., 1755 Osgood St., Unit 11EM, N. Andover, MA 01845, 617-682-6936 ... 3•1649
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680, 714-730-0162 ... 3•1650-1653
Lorain Prods., 1122 F St., Lorain, OH 44052, 216-288-1122 ... 3•1654
LuTechnology, Inc., 3516 Breakwater Ct., Hayward, CA 94545, 415-887-1955 ... 3•1657
Marway Prods. Inc., 311 N. Clara St., Santa Ana, CA 92703, 714-973-1800 ... 3•1892
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 ... 3•1012
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009, 201-239-8183 ... 1A•2206,3•1658
National Power Technlg., Natl. Technlg., 2111 Howell Ave., Anaheim, CA 92806, 714-937-1301 ... 3•1660
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810, 201-329-4611 ... 3•1661
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ... 3•1271
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ... 3•1662
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ... 3•1663
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 ... 3•1046
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865, 201-454-2600 ... 3•1665
Pan-Magnetics Intl., Inc., 455-A Carson Plaza Dr., Carson, CA 90746, 213-532-1790 ... 1A•2221
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404, 213-829-6751 ... 3•1666,1667
Power Comps. Co., Vanguard Elctrns. Co., 1480 W. 178th St., Gardena, CA 90248, 213-323-8120 ... 3•1669
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590, 516-333-6200 ... 3•1672-1675,1677-1679
Power General, 152 Will Dr., Canton, MA 02021, 617-828-6216 ... 3•1682-1691
§ Power-One, Inc., Power-One Dr., Camarillo, CA 93010, 805-484-2806 ... 3•1692-1695
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 ... 3•1696,1697, 1699,1700
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060, 305-974-2442 ... 3•1706-1711
Power Systems, 12 Tobey Rd., Bloomfield, CT 06002, 203-243-0357 ... 3•1726, 1727
† Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311, 818-882-0004 ... 3•1728-1731,1733-1745
Precision Components, Inc., 1110 W. National Ave., Addison, IL 60101, 312-543-6400 ... 3•1747
Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ... 3•1671
Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011, 619-429-7440 ... 3•1748-1750
† RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086, 408-744-1450 ... 3•1758
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087, 603-893-2330 ... 3•1759-1762
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 ... 1A•2263
§ Sierracin/Power Systems, 20500 Plummer St., Chatsworth, CA 91311, 818-998-9873 ... 3•1768-1770
§ Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 ... 3•1772, 1773
§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 ... 3•1780-1782
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127, 617-268-1170 ... 3•1705
† Summit Elctrns., 750 S. Sherman, Richardson, TX 75081, 214-231-1456 ... 3•1784, 1785
Taylor Electronics, 401 West Orion, Tempe, AZ 85283, 602-838-4523 ... 3•1786
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076, 312-679-8200 ... 3•1787
Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103, 603-627-6000 ... 1B•1014
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 ... 1A•1863
† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 ... 3•1790-1794
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 ... 3•1355
TII Electronics, Inc., Div. TII Industries, 226 Terminal Rd., E. Setauket, NY 11733, 516-751-6066 ... 3•1796,1797
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717, 516-231-3366 ... 3•1798-1801
Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716, 516-563-1117 ... 3•1802
Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 ... 3•1805
† Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069, 619-744-3346 ... 3•1810, 1811
Xylog Corp., 150 Tillman St., Westwood, NJ 07675, 201-664-7997 ... 3•1813
AAK Corp, 747 River St., Haverhill, MA 01830 ... 617-373-3769
§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 ... 213-571-6260
§† ACD-Elcor Products, P.O. Box 244, Bethel, CT 06801 ... 203-743-3510
§ Action Instrs., 8601 Aero Dr., San Diego, CA 92123 ... 619-279-5726
§† Adapter/Charger Prdts., Box 3218, Peoria, IL 61614 ... 309-691-0810
ADC Magnetic Controls Co., 4900 W. 78th St., Minneapolis, MN 55435 ... 612-835-6800
§† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 ... 714-634-9211
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 ... 201-989-0095
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 ... 617-531-8886
† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 ... 516-586-4220
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 ... 206-771-4006
† Anadyne, 14830 Valley View Ave., La Mirada, CA 90638 ... 714-522-8924
† Analog Devices, P.O. Box 280, Norwood, MA 02062 ... 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ... 617-777-4500; 17-246-0300;800-451-1816
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 ... 513-335-0031
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada ... 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
§ ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107 ... 612-222-3791
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 ... 818-445-5470
† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 ... 714-540-1234
Basler Elec., Rte. 143, Highland, IL 62249 ... 618-654-2341
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 ... 619-727-7420
§ B.H. Inds., Inc., 5784 Venice Blvd., Los Angeles, CA 90019 ... 213-937-4763
BICC-Vero Elctrns., Inc., 171 Bridge Rd., Hauppauge, NY 11788 ... 516-234-0400
† Bikor, 1504 W. 228th St., Torrance, CA 90501 ... 213-539-6320
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 ... 408-734-8310
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 ... 602-746-1111
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 ... 213-772-2171
† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 ... 516-582-4422
C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 ... 814-864-4921
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 ... 714-979-6491
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 ... 716-538-4421
Chromalox Instrs. & Controls, 100 Heil-Quaker Blvd., Lavergne, TN 37086 ... 615-793-7561
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 ... 305-974-5500
Conver Corp., 10629 Bandley Dr., Cupertino, CA 95014 ... 408-255-0151
Conversion Equip. Corp., 1620 So. Sunkist, Anaheim, CA 92806 ... 714-634-9698
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 ... 408-738-0530
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 ... 412-776-1591
Datadyne, Box 247, King of Prussia, PA 19406 ... 215-666-5751
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 ... 818-989-3840
Datapower, Inc., 3328 West First St., Santa Ana, CA 92703 ... 714-775-2000
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 ... 215-699-9261
Dial Prods. Co., 19-21 Cottage St., Bayonne, NJ 07002 ... 201-HE7-0720
Digital Equip., One Iron Way, Marlborough, MA 01752 ...
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 ... 201-941-4455

§ Dormeyer Inds., 3418 N. Milwaukee, Chicago, IL 60641 312-283-4000
Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
§† Dressen-Barnes Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
§ Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
Dynatronix, Inc., 105 Power St., Amery, WI 54001 ....715-268-8118;800-826-7172
† EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 206-743-1313
Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 805-964-0751
Electro Physics, 1910 West Birchwood Ave., Chicago, IL 60626 312-274-9669
Electrostatics, 7718 Clairemont Mesa Blvd., San Diego, CA 92111 619-279-1414
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 415-494-7303
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
Engineering Design & Sls., Rt. 2, Box 305, Danville, VA 24540 804-685-7073
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§† E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 213-892-7279
§ Facet Enterprises, Inc., Elmira, NY 14903 607-737-8011
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 ..714-546-4731 800-421-7915
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ....914-EL8-8000
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
Intronics, Inc., 57 Chapel St., Newton, MA 02158 617-964-4000
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
James Electronics, 4050 N. Rockwell, Chicago, IL 60618 312-463-6500
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
Keltion Corp., Viking Modules Div., 225 Crescent St., Waltham, MA 02154 617-894-8700
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
MacPower, 9115 26th Ave., Kenosha, WI 53140 414-694-8866
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
Magnetran Corp., 5701 Savoy Lane, Houston, TX 77036 713-785-4202
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
Microcomputer Power, 2272 Calle de Luna, Santa Clara, CA 95050 408-988-0265
Micro Power Intl., Inc., 9420 Activity Rd., San Diego, CA 92126 619-271-0831
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
† Milwaukee Transformer Co., MTE Corporation, 7901 W. Clinton Avenue, Milwaukee, WI 53223 414-438-5300
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262
Monolithic Sys., 84 Inverness Circle E., Englewood, CO 80112 303-790-7400
MPC Sys., Div. of Consulting Systems, RFD Box 441, Fremont, NH 03044 603-642-5913
§ Murata Mfg. Co. Ltd., 26-10 2-chome-Temjin, Nagaoka-Kyo-Shi, Kyoto, Japan 075-921-9111
† Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
§ Paccom, 3928 148th NE, Redmond, WA 98052 ....206-883-9200;800-426-6254
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
§ Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
Powerbox, Inc., 1860 Broadway, New York, NY 10023 212-586-1992
† Powercube Corp., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821 617-667-9500
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§† Power Labs, Inc., 5 Towle Ave., Dover, NH 03820 603-742-4613
§† Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
† Power Ten, Inc., 486 Mercury Dr., Sunnyvale, CA 94086 408-738-5959
§† PTS Electronics Inc., Box 272, Bloomington, IN 47401 812-824-9331
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
Ratelco, 1260 Mercer, Dept. EEM, Seattle, WA 98109 206-624-7770
Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110 203-625-7300
S & H Inds., 119 Glen Cove Dr., Glen Head, NY 11545 516-671-5600
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 .516-593-2025;Outside NY 800-645-5900
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
§ Sinclair Radio Labs., 122 Rayette Rd., Concord, ON Canada 416-669-1244
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Stanley/AC Interface, 2925 College Ave., Unit A 1, Costa Mesa, CA 92626 714-979-9830
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ..212-932-1800
Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242
TECA, ThermoElectric Cooling America Corp., 448 N. Halsted St., Chicago, IL 60622 312-666-1600
Tecnetics, Box 910, Boulder, CO 80306 303-442-3837
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
Telesis Laboratory, Box 1972, Chillocothe, OH 45601 614-642-5000
§ Tenrielec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Ten-Tec, Industrial Park, Sevierville, TN 37862 615-453-7172
§ Terado, 1068 Raymond Ave., St. Paul, MN 55108 612-646-2868
Tidewater Technological, Inc., 611 Industrial Pk. Dr., Newport News, VA 23602 804-874-2800
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
§ TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
§ Tripp-Lite, 500 No. Orleans, Chicago, IL 60610 312-329-1777
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
§ Urban Elctrns., P. O. Box 456, Dover, MA 02030 617-329-4068
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
† Voltampere Corp., 146 Horton Ave., Lynbrook, NY 11563 516-887-9443
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 919-732-9351
† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242
Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Power Supplies, AC Input, 31 to 300 VDC Output-4000

† Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 ....3 s1462,1463,1466,1467,1470-1477,1479-1481,1484-1489,1492,1494,1495
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ....3•1496-1499
§ Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 ....3•1502,1503
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 .. 3•1506
† Bikor, 1504 W. 228th St., Torrance, CA 90501, 213-539-6320 .... 3•1508
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 .... 3•1515
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 .... 3•1516
Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 .... 3•1517
§ Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 ....3•1536-1539
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1545
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 .... 3•1546,1547
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724, 818-967-9521 .... 3•1550,1551
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753, 201-922-9300 .... 3•1552,1553
§ Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705, 714-979-4440 .... 3•1554,1559
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 .... 3•1560
§ Epsco, 920 Westwood Ave., Addison, IL 60101, 312-543-0410 .... 3•1563
† Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 .... 3•1564,1565

† Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 ... 3•1566-1569

Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 ... 3•1582

Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ... 3•1585-1587

Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ... 3•1592

IXYS Corp., 3685 Enochs, Santa Clara, CA 95051, 408-733-4045 ... 3•1605

Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ... 3•1621-1623, 1632,1634-1639

Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 ... 3•1645

NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810, 201-329-4611 ... 3•1661

North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ... 3•1662

† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ... 3•1663

NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ... 3•1663

§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038, 213-934-3566 ... 3•1046

Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404, 213-829-6751 ... 3•1666,1667

Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590, 516-333-6200 ... 3•1672,1673,1675

§ Power-One, Inc., Power-One Dr., Camarillo, CA 93010, 805-484-2806 ... 3•1692, 1693

§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 ... 3•1700

Power Systems, 12 Tobey Rd., Bloomfield, CT 06002, 203-243-0357 ... 3•1726, 1727

Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311, 818-882-0004 ... 3•1728,1733-1736,1741-1743

§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219, 501-568-1995 ... 3•1746

Precision Components, Inc., 1110 W. National Ave., Addison, IL 60101, 312-543-6400 ... 3•1747

Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ... 3•1671

Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011, 619-429-7440 ... 3•1748-1750

BO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086, 408-744-1450 ... 3•1758

§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 ... 3•1782

Taylor Electronics, 401 West Orion, Tempe, AZ 85283, 602-838-4523 ... 3•1786

Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103, 603-627-6000 ... 1B•1014

† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 ... 1A•1863

† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 ... 3•1790,1791

Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 ... 3•1023,1024

† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717, 516-231-3366 ... 3•1798-1801

Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 ... 3•1805

Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069, 619-744-3346 ... 3•1810, 1811

AAK Corp, 747 River St., Haverhill, MA 01830 ... 617-373-3769

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 ... 818-504-0644

† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 ... 213-936-8185

§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 ... 213-571-6260

ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054 ... 619-757-1880

§ ACD-Elcor Products, P.O. Box 244, Bethel, CT 06801 ... 203-743-3510

ADC Magnetic Controls Co., 4900 W. 78th St., Minneapolis, MN 55435 ... 612-835-6800

§† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 ... 714-634-9211

Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 ... 201-989-0095

Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 ... 213-997-7222

Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 ... 206-771-4006

† American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 ... 612-788-9161

Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ... 617-777-4500; 17-246-0300;800-451-1816

† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 ... 513-335-0031

† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada ... 416-628-6371

Associated Specialties, 1751 Main St., Orefield, PA 18069 ... 215-395-9172

Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 ... 408-748-1200

Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 ... 516-328-1600

† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 ... 818-445-5470

† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 ... 714-540-1234

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 ... 312-889-9087

Basler Elec., Rte. 143, Highland, IL 62249 ... 618-654-2341

Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 ... 619-727-7420

§ Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086 ... 408-732-2440

† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 ... 408-734-8310

Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 ... 602-746-1111

Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523 ... 415-932-3911

California DC, 2150 Anchor Ct., Newbury Park, CA 91320 ... 805-499-3621; 213-706-8221

† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 ... 213-772-2171

† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 ... 516-582-4422

C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 ... 814-864-4921

† Chloride Electro Networks, Maple St., Caledonia, NY 14423 ... 716-538-4421

† CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400

Computer Power, 124E W. Main St., High Bridge, NJ 08829 ... 201-735-8000

Condor, 201 Flynn Rd., Camarillo, CA 93010 ... 805-484-2851;800-235-5929

Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850

Conversion Equip. Corp., 1620 So. Sunkist, Anaheim, CA 92806 ... 714-634-9698

CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 ... 408-738-0530

Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 ... 412-776-1591

Datadyne, Box 247, King of Prussia, PA 19406 ... 215-666-5751

† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 ... 818-989-3840

Datapower, Inc., 3328 West First St., Santa Ana, CA 92703 ... 714-775-2000

§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 ... 215-699-9261

Dial Prods. Co., 19-21 Cottage St., Bayonne, NJ 07002 ... 201-HE7-0720

§ Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 ... 516-273-8600

Digital Power Corp., 686 East Gish Rd., San Jose, CA 95112 ... 408-288-5600

Dotronix, 160 First St. SE, New Brighton, MN 55112 ... 612-633-1742

§† Dressen-Barnes Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 ... 714-871-3020

Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 ... 203-289-6831

Dynatronix, Inc., 105 Power St., Amery, WI 54001 ... 715-268-8118;800-826-7172

§† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 ... 206-743-1313

§ Electrol Co., 321 Dewey St., P.O. Box 29, York, PA 17405 ... 717-848-1722

Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 ... 201-997-0950

† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 ... 617-268-9696

Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 ... 805-964-0751

Electro Physics, 1910 West Birchwood Ave., Chicago, IL 60626 ... 312-274-9669

Electrostatics, 7718 Clairemont Mesa Blvd., San Diego, CA 92111 ... 619-279-1414

Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 ... 707-887-2292

Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 ... 415-494-7303

† E M S Development Corp., 200 Allen Blvd., Farmingdale, NY 11735 ... 516-694-2886

Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 ... 716-968-2400

Engineering Design & Sls., Rt. 2, Box 305, Danville, VA 24540 ... 804-685-7073

† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 ... 201-641-3650

§† E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 ... 213-892-7279

EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 ... 201-245-3200;800-526-4048

§ Facet Enterprises, Inc., Elmira, NY 14903 ... 607-737-8011

Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400

† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ... 714-832-0290;800-854-9420

Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385 ... 212-386-1300

Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 ... 212-458-5811

Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 ... 617-374-0761

† Georator Corp., Box 70, Manassas, VA 22110 ... 703-368-2101

GFC/Hammond Elctrns., Inc., 1690 Walden Ave., Buffalo, NY 14225 ... 716-894-5710

§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 ... 213-639-4663

Gow-Mac Instr. Co., P.O. Box 32, Bound Brook, NJ 08805 ... 201-560-0600

§ Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 ... 305-894-3351

Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 ... 614-276-0131

§ Heath Co., Benton Harbor, MI 49022 ... 616-982-3886

† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 ... 714-546-4731 800-421-7915

Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ... 914-EL8-8000

International High Voltage Elctrns., Inc., 98 Mill Plain Rd., Danbury, CT 06810 ... 203-792-7820

International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 ... 213-991-9614

ITT PowerSystems Div., Box 688, Galion, OH 44833 ... 419-468-8100

Julie Resch. Labs., 211 West 61st St., New York, NY 10023 ... 212-245-2727

KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501 ... 213-320-3902

† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 ... 904-651-1210

Keltron Corp., Walden Div., 225 Crescent St., Waltham, MA 02154 ... 617-894-8700

KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 ... 818-798-0786

Kode, 2752 Walnut Ave., Tustin, CA 92680 ... 714-730-6901

§ La Marche Mfg., 106 Bradrock Dr., Des Plaines, IL 60018 ... 312-299-1188

Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 ... 516-694-4200

Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 ... 303-443-6250, 800-525-6478

LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680 ... 714-730-0162

Lorain Prods., 1122 F St., Lorain, OH 44052 ... 216-288-1122

Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 ... 612-633-8820

† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 ... 303-442-6700

† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 ... 516-654-1166

† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 ... 609-298-7300

Microcomputer Power, 2272 Calle de Luna, Santa Clara, CA 95050 ... 408-988-0265
Micro Power Intl., Inc., 9420 Activity Rd., San Diego, CA 92126 ... 619-271-0831
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 ... 617-453-8000
† Milwaukee Transformer Co., MTE Corporation, 7901 W. Clinton Avenue, Milwaukee, WI 53223 ... 414-438-5300
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 ... 516-567-9620
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 ... 512-834-9262
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 ... 201-239-8183
National Power Technlg., Natl. Technlg., 2111 Howell Ave., Anaheim, CA 92806 ... 714-937-1301
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 ... 609-488-1060
§† Northeast Scientific Corp., 30 Wetherbee St., Acton, MA 01720 ... 617-263-2711
Novatronics, Box 878, Pompano Beach, FL 33061 ... 305-942-5200
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 ... 503-238-2440
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 ... 201-454-2600
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 ... 206-881-1700
§ Payne Engrg., Box 70, Scott Depot, WV 25560 ... 304-757-7353
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 ... 201-345-5885
Powerbox, Inc., 1860 Broadway, New York, NY 10023 ... 212-586-1992
Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 ... 412-782-3120
† Powercube Corp., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821 ... 617-667-9500
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 ... 603-332-3334
§† Power Labs, Inc., 5 Towle Ave., Dover, NH 03820 ... 603-742-4613
§† Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 ... 201-440-3100
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 ... 818-885-8223
Power Ten, Inc., 486 Mercury Dr., Sunnyvale, CA 94086 ... 408-738-5959
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 ... 516-234-3800
§ Ratelco, 1260 Mercer, Dept. EEM, Seattle, WA 98109 ... 206-624-7770
Reich Assocs., P.O. Box 73, Plano, TX 75074 ... 214-424-7904
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 ... 617-938-0900
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110 ... 203-625-7300
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 . 516-593-2025;Outside NY 800-645-5900
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 ... 213-442-5981
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ... 203-562-2555; 800-243-4570
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087 ... 603-893-2330
Seven Mountains Sci. Inc., P.O. Box 650, Boalsburg, PA 16827 ... 814-466-6559
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ... 213-32-Sigma
§ Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007 ... 312-439-2800
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 ... 603-668-4500
† Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403 ... 513-253-1191
Stanley/AC Interface, 2925 College Ave., Unit A 1, Costa Mesa, CA 92626 ... 714-979-9830
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 ... 214-231-1456
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ... 212-932-1800
Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ... 415-676-5000
Tecnetics, Box 910, Boulder, CO 80306 ... 303-442-3837
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 ... 615-483-8405
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 ... 312-677-3640
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 ... 201-361-6622
† Trio Labs., 80 Dupont St., Plainview, NY 11803 ... 516-349-0400
§ Tripp-Lite, 500 No. Orleans, Chicago, IL 60610 ... 312-329-1777
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 ... 914-241-1300
Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 ... 813-855-4621
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 ... 215-844-2626
† Voltampere Corp., 146 Horton Ave., Lynbrook, NY 11563 ... 516-887-9443
Walker Scientific, Rockdale St., Worcester, MA 01606 ... 617-852-3674
Wescom, PO Box 1458, Downers Grove, IL 60515 ... 312-985-9000
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 ... 919-732-9351
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 ... 713-729-1183
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 ... 201-664-7997
Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 ... 312-391-7733

Power Supplies, AC Input, 301 to 1,000 VDC Output-4000

† Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 ... 3•1484,1485,1489,1492
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ... 3•1499
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 ... 3•1506
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 ... 3•1516
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 ... 3•1546,1547
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753, 201-922-9300 ... 3•1552,1553
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ... 3•1560
† Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 ... 3•1564,1565
† Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 ... 3•1566-1569
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ... 3•1585-1587
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ... 3•1592
Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ... 3•1621-1623, 1637-1639
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 ... 3•1645
Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 ... 3•1659
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810, 201-329-4611 ... 3•1661
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ... 3•1662
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ... 3•1663
NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ... 3•1663
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590, 516-333-6200 ... 3•1678,1679,1976
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219, 501-568-1995 ... 3•1746
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 ... 1A•1863
Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 ... 3•1805
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 ... 818-504-0644
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 ... 213-936-8185
§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 ... 213-571-6260
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 ... 213-997-7222
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 ... 206-771-4006
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada ... 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 ... 818-445-5470
† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 ... 714-540-1234
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 ... 312-889-9087
Bikor, 1504 W. 228th St., Torrance, CA 90501 ... 213-539-6320
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 ... 408-734-8310
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 ... 716-924-9355
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 ... 213-772-2171
Canberra Ind., One State St., Meriden, CT 06450 ... 203-238-2351
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 ... 805-544-5454
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 ... 716-538-4421
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 ... 212-857-2400
Computer Power, 124E W. Main St., High Bridge, NJ 08829 ... 201-735-8000
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 ... 408-738-0530
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 ... 412-776-1591
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 ... 814-453-7547
Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 ... 215-699-9261
Dial Prods. Co., 19-21 Cottage St., Bayonne, NJ 07002 ... 201-HE7-0720
Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 ... 203-289-6831
EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 ... 818-967-9521
§† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 ... 206-743-1313
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 ... 617-268-9696
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 ... 805-964-0751
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 ... 415-494-7303
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 ... 716-968-2400
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 ... 201-641-3650
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ... 714-832-0290;800-854-9420
† Georator Corp., Box 70, Manassas, VA 22110 ... 703-368-2101
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 ... 305-894-3351
Hipotronics, P.O. Drawer A, Brewster, NY 10509 ... 914-279-8091
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 ... 516-883-1700
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ... 914-EL8-8000
International High Voltage Elctrns., Inc., 98 Mill Plain Rd., Danbury, CT 06810 ... 203-792-7820
ITT PowerSystems Div., Box 688, Galion, OH 44833 ... 419-468-8100
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 ... 212-245-2727
Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923 ... 617-777-5102
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 ... 216-248-0400
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 ... 904-651-1210
Keltron Corp., Walden Div., 225 Crescent St., Waltham, MA 02154 ... 617-894-8700
KSI, 33 Cherry Hill Dr., Danvers, MA 01923 ... 617-777-5102
§ La Marche Mfg., 106 Bradrock Dr., Des Plaines, IL 60018 ... 312-299-1188
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 ... 516-694-4200
Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 ... 303-443-6250; 800-525-6478
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 ... 612-633-8820
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 ... 516-654-1166

† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
§† Micron Inds., 1830 N. 32nd Ave., Stone Park, IL 60165 312-345-0788
† Milwaukee Transformer Co., MTE Corporation, 7901 W. Clinton Avenue, Milwaukee, WI 53223 414-438-5300
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
§† Northeast Scientific Corp., 30 Wetherbee St., Acton, MA 01720 617-263-2711
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
§ Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
§ Plastic Capacitors, Inc., 2623 N. Pulaski Rd., Chicago, IL 60639 312-489-2229
Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 412-782-3120
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484
Power Ten, Inc., 486 Mercury Dr., Sunnyvale, CA 94086 408-738-5959
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ......203-562-2555; 800-243-4570
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ......213-32-Sigma
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 201-664-7636
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
† Torotron, 230 E. 7th St., Mt. Vernon, NY 10550 914-664-2050
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
Vectrol, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557 813-855-4621
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050 408-727-7370
† Voltampere Corp., 146 Horton Ave., Lynbrook, NY 11563 516-887-9443
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 919-732-9351
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997
Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Power Supplies, AC Input, Greater than 1,000 VDC Output-4000

† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ...... 3•1499
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 . 3•1506, 1507
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 ...... 3•1516
§ CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086, 408-738-0530 ...... 3•1540
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 ...... 3•1546,1547
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ...... 3•1560
† Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 ...... 3•1565
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550, 914-667-5050 ...... 3•1574,1575
Glassman High Voltage Inc., P.O. Box 551, Salem Indl. Pk., Whitehouse Sta., NJ 08889, 201-534-9007 ...... 3•1578-1581
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ...... 3•1585
† Hipotronics, P.O. Drawer A, Brewster, NY 10509, 914-279-8091 ...... 3•1590,1591
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ...... 3•1592
International High Voltage Elctrns., Inc., 98 Mill Plain Rd., Danbury, CT 06810, 203-792-7820 ...... 3•1599-1601
Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923, 617-777-5102 ...... 3•1608-1610
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 ...... 3•1619
Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ...... 3•1621-1623, 1638,1639
KSI, 33 Cherry Hill Dr., Danvers, MA 01923, 617-777-5102 ...... 3•1646-1648
Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 ...... 1A•2209,3•1659
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ...... 3•1662
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ...... 3•1663
NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ...... 3•1663
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590, 516-333-6200 ...... 3•1675,1677,1976
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219, 501-568-1995 ...... 3•1746
S & H Inds., 119 Glen Cove Dr., Glen Head, NY 11545, 516-671-5600 ...... 3•1767, 1908,1928
† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803, 516-349-8686 ...... 3•1774-1776
Stantard Energy, Div. WBH Scientific, Inc., Rte. 32, Greenville, NY 12083, 518-966-4197 ...... 3•1778,1779
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549, 914-241-1300 ...... 3•1803
Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 ...... 3•1805
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 ...... 3•1809
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 213-997-7222
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
† Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750 ......305-339-4356/4355
§ Arenberg Sage Inc., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130 617-522-8640
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
† Axel Elctrns., 134-20 Jamaica Ave., Jamaica, NY 11418 212-291-3900
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 408-734-8310
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
† Chapman Corp., P.O. Box 10700, Portland, ME 04104 207-773-4726
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 203-327-0003
Collmer Semiconductor, Inc., 14368 Proton Rd., Dallas, TX 75234-3335 214-233-1589
† Condenser Prods., P.O. Box 997, Brooksville, FL 33512 904-796-3561
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ CSI Capacitors, CSI Technlgs., 810 Rancheros Dr., San Marcos, CA 92069 619-747-4000
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 814-453-7547
§† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 206-743-1313
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753 201-922-9300
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 805-964-0751
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 415-494-7303
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ......714-832-0290;800-854-9420
Instrument Research Co., Box 40207, Santa Barbara, CA 93103 805-962-8336
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ......914-EL8-8000
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
† K & M Elctrns., 123 Interstate Dr., W. Springfield, MA 01089 413-781-1350
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
Keltron Corp., Walden Div., 225 Crescent St., Waltham, MA 02154 617-894-8700
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ......717-386-4156; 215-377-5990
† LogiMetrics, 121-03 Dupont St., Plainview, NY 11803 516-349-1700
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
§† Micron Inds., 1830 N. 32nd Ave., Stone Park, IL 60165 312-345-0788
Micro-Now Instr. Co., Inc., 8260 N. Elmwood St., P.O. Box 856, Skokie, IL 60077 312-677-4700
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
§† Northeast Scientific Corp., 30 Wetherbee St., Acton, MA 01720 617-263-2711
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
† Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
§ Plastic Capacitors, Inc., 2623 N. Pulaski Rd., Chicago, IL 60639 312-489-2229
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484
Power Ten, Inc., 486 Mercury Dr., Sunnyvale, CA 94086 408-738-5959
Products for Resch., 88 Holten St., Danvers, MA 01923 617-774-3250
Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ......213-32-Sigma
† Simco Co., 2257 North Penn Rd., Hatfield, PA 19440 215-822-2171
Standard Wire & Cable Co., 2345 Alaska Ave., El Segundo, CA 90245 213-536-0006
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 201-664-7636
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
† Torotron, 230 E. 7th St., Mt. Vernon, NY 10550 914-664-2050
Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750 219-356-6500
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ......214-348-8800;800-527-4642

Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050 408-727-7370
Wasatch High Voltage, P.O. Box 9027, Salt Lake City, UT 84109 801-466-9561
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997
Zeco, Inc., 2075 H Bering Dr., San Jose, CA 95131 408-286-8856
§ Zambre Co., Inc., 2134 Old Middlefield Way, Mountain View, CA 94043 415-968-9176
Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Power Supplies, AC Output-4050

Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876, 201-526-6010 .... 3•1818-1820
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 .... 3•1822,1823
† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1451**
† **Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869, 201-989-0095 .... 3•1824,1825**
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1189, 1817
Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733, 213-575-0755 .... 3•1826
ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 .... 3•1827
§ **Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 .... 3•1503**
Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065, 201-388-3500 .... 3•1828,1829
† **Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041, 214-271-4531 .... 3•1831,1832**
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 .... 3•1834,1836-1839
† **California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111, 619-279-8620;800-356-2244;800-821-1634 .... 3•1840**
Clary Corp., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, CA 91776, 818-287-6111 .... 3•1842
† **CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 .... 3•1843-1845**
§ **Computer Power, 124E W. Main St., High Bridge, NJ 08829, 201-735-8000 .... 3•1847**
Controlled Power Co., 1955 Stephenson Hwy., Troy, MI 48084, 313-528-3700 .... 3•1849,1851-1853
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706, 516-586-5955 .... 3•1542, 1543
§ **Displex, Inc., Alexander Place, Glen Cove, NY 11542, 516-671-4400 .... 3•1860**
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 .... 3•1855-1858
† **Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, 607-754-9187 .... 1B•1049**
§ **Epsco, 920 Westwood Ave., Addison, IL 60101, 312-543-0410 .... 3•1563**
† **Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 .... 3•1566**
† **Franek, John, Co., Inc., P.O. Box 11752, Santa Ana. CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1394,1862-1866,1868-1877**
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855, 203-866-2573 .... 3•1131
Hipotronics, P.O. Drawer A, Brewster, NY 10509, 914-279-8091 .... 3•1882,1883
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1592,1884,1885
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 .... 3•1886,1888
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, 914-EL8-8000 .... 3•1598
Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201, 201-353-5700 .... 3•1606
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, 818-798-0786 .... 3•1890,1891
Marway Prods. Inc., 311 N. Clara St., Santa Ana, CA 92703, 714-973-1800 .... 3•1893
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009, 201-239-8183 .... 1A•2206
Nova Elec., 263 Hillside Ave., Nutley, NJ 07110, 201-661-3434 .... 3•1895
† **NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663**
NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663
† **Optima Enclosures, 2166 Mountain Indl. Blvd., Tucker, GA 30084, 404-939-6340 .... 2•1047**
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897-1900
§† **Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 .... 3•1904-1906**
† **RTE Deltec Corp., 2727 Kurtz St., San Diego, CA 92110, 619-291-4211 .... 3•1907**
S & H Inds., 119 Glen Cove Dr., Glen Head, NY 11545, 516-671-5600 .... 3•1928
Shape Magnetronics, Inc., 901 DuPage Ave., Lombard, IL 60148, 312-620-8394 .... 3•1910,1911
Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 .... 3•1912-1915
† **Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403, 513-253-1191 .... 1A•2281**
§† **Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 .... 1B•1183**
† **Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, 201-944-2221 .... 1B•1755**
† **Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 .... 1A•1863**
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, 219-294-5571 .... 3•1023,1024
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 .... 3•1309
Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750, 219-356-6500 .... 3•1919
† **Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041, 214-271-4531 .... 3•1831,1832**
Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 .... 3•1805
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 .... 3•1920, 1921
Xylog Corp., 150 Tillman St., Westwood, NJ 07675, 201-664-7997 .... 3•1922
§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 612-788-9161
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 .... 213-390-3537/8837
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
§ Astron Corp., 2852 Walnut , Tustin, CA 92680 714-832-7770
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 215-828-2490
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
§† Bendix Corp., Electric Power Div., Hwy. 35, Eatontown, NJ 07724 201-542-2000
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 814-864-4921
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Crestronics Div., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704 714-556-6570
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
Cuesta Systems, Inc., 3440 Roberta Ct., San Luis Obispo, CA 93401 805-541-4160
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 814-453-7547
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
Dial Prods. Co., 19-21 Cottage St., Bayonne, NJ 07002 .... 201-HE7-0720
Dormeyer Inds., 3418 N. Milwaukee, Chicago, IL 60641 312-283-4000
† EG & G Rotron, Custom Div., Hasbrouck La., Woodstock, NY 12498 914-679-5201
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 415-494-7303
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
Engineering Design & Sls , Rt. 2, Box 305, Danville, VA 24540 804-685-7073
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
§ E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 213-892-7279
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 .... 201-245-3200;800-526-4048
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550 914-667-5050
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§† General Power Sys., 1400 N. Baxter St., Anaheim, CA 92806 714-956-9321
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .... 714-546-4731 800-421-7915
Hisonic, Inc., 249 N. Troost, P.O. Box 1130, Olathe, KS 66061-1130 913-782-0012
Instrumentation & Control Sys., 520 Interstate Rd. Addison, IL 60101 312-543-6200
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
James Electronics, 4050 N. Rockwell, Chicago, IL 60618 312-463-6500
Jefferson Elec., Litton Inds., 840 25th Ave., Bellwood, IL 60104 312-626-7700
§ La Marche Mfg., 106 Bradrock Dr., Des Plaines, IL 60018 312-299-1188
Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 .... 303-443-6250; 800-525-6478
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680 714-730-0162
Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Magnetran Corp., 5701 Savoy Lane, Houston, TX 77036 713-785-4202
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262

† Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810 201-329-4611
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
§ Payne Engrg., Box 70, Scott Depot, WV 25560 304-757-7353
§ Power Control, 122 Gamma Dr., Pittsburgh, PA 15238 412-782-3120
Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219 501-568-1995
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Ratelco, 1260 Mercer, Dept. EEM, Seattle, WA 98109 206-624-7770
Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 .. 516-593-2025;Outside NY 800-645-5900
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 .... 213-32-Sigma
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 .. 212-932-1800
† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 201-664-7636
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040
Telesis Laboratory, Box 1972, Chillocothe, OH 45601 614-642-5000
Terado, 1068 Raymond Ave., St. Paul, MN 55108 612-646-2868
§† Topaz Electronics, 9192 Topaz Way, San Diego, CA 92123-1164 619-279-0831
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 215-256-4611
Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716 . 516-563-1117
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
§† Tripp-Lite, 500 No. Orleans, Chicago, IL 60610 312-329-1777
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
† Voltampere Corp., 146 Horton Ave., Lynbrook, NY 11563 516-887-9443
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 .. 713-729-1183

Power Supplies, Bipolar-4000

† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1448,1449,1452-1454**
§ **ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 .... 3•1456-1458**
Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 .... 3 s1464-1469,1478-1481,1489,1491,1494
† **Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 .... 3•1496-1499**
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1504
§ **Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 .... 3•1503**
§† **Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 .... 3•1512,1513**
California DC, 2150 Anchor Ct., Newbury Park, CA 91320, 805-499-3621; 213-706-8221 .... 3•1514
Compower Div., Div. of Computer Prods., Inc., 2220 Lundy Ave., San Jose, CA 95131, 408-942-1600 .... 3•1702-1704
Condor, 201 Flynn Rd., Camarillo, CA 93010, 805-484-2851;800-235-5929 . 3•1520-1523,1526-1529
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1545
Digital Power Corp., 686 East Gish Rd., San Jose, CA 95112, 408-288-5600 .... 3•1549
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 .... 3•1106
§ **Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705, 714-979-4440 .... 3•1554-1556,1559**
† **Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 .... 3•1565**
GFC/Hammond Elctrns., Inc., 1690 Walden Ave., Buffalo, NY 14225, 716-894-5710 .... 3•1583
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. .... 3•1585-1587
Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052, 206-882-3100 .... 3•1594-1597
Intronics, Inc., 57 Chapel St., Newton, MA 02158, 617-964-4000 .... 3•1602,1603
Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923, 617-777-5102 .... 3•1608-1610
KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501, 213-320-3902 .... 3•1613-1615
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 .... 3•1618
Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 .... 3•1621,1624,1626,1627,1629-1631,1634
KSI, 33 Cherry Hill Dr., Danvers, MA 01923, 617-777-5102 .... 3•1646-1648
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680, 714-730-0162 .. 3•1650-1653
Lorain Prods., 1122 F St., Lorain, OH 44052, 216-288-1122 .... 3•1654
Modular Audio Prods., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1012,1933
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009, 201-239-8183 .... 3•1658
National Power Technlg., Natl. Technlg., 2111 Howell Ave., Anaheim, CA 92806, 714-937-1301 .... 3•1660
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1271
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1662
† **OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865, 201-454-2600 .... 3•1665**
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404, 213-829-6751 .... 3•1666,1667
§ **Power-One, Inc., Power-One Dr., Camarillo, CA 93010, 805-484-2806 .... 3•1692-1695**
§ **Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060, 305-974-2442 .... 3•1706-1709,1712-1716**
Power Systems, 12 Tobey Rd., Bloomfield, CT 06002, 203-243-0357 .... 3•1726,1727
Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311, 818-882-0004 .... 3•1728-1732,1740-1743
Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 .... 3•1671
Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011, 619-429-7440 .... 3•1748-1750
† **RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086, 408-744-1450 .... 3•1758**
§ **Semiconductor Circuits, 49 Range Rd., Windham, NH 03087, 603-893-2330 .... 3•1759-1766**
§ **Sierracin/Power Systems, 20500 Plummer St., Chatsworth, CA 91311, 818-998-9873 .... 3•1768-1770**
Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 .... 3•1772,1773
Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 .... 3•1780,1781
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127, 617-268-1170 .... 3•1705
Taylor Electronics, 401 West Orion, Tempe, AZ 85283, 602-838-4523 .... 3•1786
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076, 312-679-8200 .... 3•1787
Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 .... 3•1790-1795
† **Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717, 516-231-3366 .... 3•1800,1801**
† **Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069, 619-744-3346 .... 3•1810,1811**
§ AAK Corp, 747 River St., Haverhill, MA 01830 617-373-3769
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Anadyne, 14830 Valley View Ave., La Mirada, CA 90638 714-522-8924
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 516-582-4422
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706 516-586-5955
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§† Dressen-Barnes Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
§ Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753 201-922-9300
Electrostatics, 7718 Clairemont Mesa Blvd., San Diego, CA 92111 .. 619-279-1414
† E M S Development Corp., 200 Allen Blvd., Farmingdale, NY 11735 516-694-2886
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§ E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 213-892-7279
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 .... 213-515-6432; 800-421-5334
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Micro Power Intl., Inc., 9420 Activity Rd., San Diego, CA 92126 619-271-0831
Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
MPC Sys., Div. of Consulting Systems, RFD Box 441, Fremont, NH 03044 603-642-5913
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200

Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§ Power Labs, Inc., 5 Towle Ave., Dover, NH 03820 603-742-4613
§ Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
§ Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218 713-492-0550
S & H Inds., 119 Glen Cove Dr., Glen Head, NY 11545 516-671-5600
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 .516-593-2025;Outside NY 800-645-5900
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ..212-932-1800
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
Tecnetics, Box 910, Boulder, CO 80306 303-442-3837
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 617-329-1600
Tidewater Technological, Inc., 611 Industrial Pk. Dr., Newport News, VA 23602 804-874-2800
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Power Supplies, Constant Current-4000

Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 .... 3•1476,1477
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869, 201-989-0095 ....3•1824
§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ....3•1509**
† **California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111, 619-279-8620;800-356-2244;800-821-1634 .... 3•1840**
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ....3•1560
† **Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 .... 3•1566,1568**
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550, 914-667-5050 ....3•1575
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ....3•1585-1587
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ....3•1592
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 ....3•1888
Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ....3•1621-1623, 1632-1634,1636,1637
§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 ....3•1271**
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1662
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590, 516-333-6200 ....3•1672-1674,1678,1679
AAK Corp, 747 River St., Haverhill, MA 01830 617-373-3769
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 213-936-8185
§ Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 213-997-7222
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 ..612-788-9161
† Anadyne, 14830 Valley View Ave., La Mirada, CA 90638 714-522-8924
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 ....213-390-3537/8837
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
AT&T, 475 South St., Morristown, NJ 07960 201-631-6790
† Atlas Engrg. Corp., 10 Cheney St., Dorchester, MA 02121 617-445-7100
ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107 612-222-3791
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065 201-388-3500
† Avtel Div., Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041 214-271-4531
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 ..408-734-8310
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Cardon Corp., P.O. Box 2371, Boston, MA 02107 617-357-5898
CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 516-582-4422
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041 415-969-5927
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501 213-320-0808
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
Condor, 201 Flynn Rd., Camarillo, CA 93010 ....805-484-2851;800-235-5929
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 408-738-0530
Crestronics Div., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704 714-556-6570
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
CSI Capacitors, CSI Technlgs., 810 Rancheros Dr., San Marcos, CA 92069 619-747-4000
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706 516-586-5955
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 814-453-7547
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
Dynatronix, Inc., 105 Power St., Amery, WI 54001 ....715-268-8118;800-826-7172
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 818-967-9521
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753 201-922-9300
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Elma Engrg., 1066 E. Meadow Circle, Palo Alto, CA 94303 415-494-7303
§ Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705 714-979-4440
Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760 607-754-9187
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
§ Epsco, 920 Westwood Ave., Addison, IL 60101 312-543-0410
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
† Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010 212-691-3610
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
Freed Transformer, 1718 Weirfield St., Ridgewood, NY 11385 212-386-1300
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
Glassman High Voltage Inc., P.O. Box 551, Salem Indl. Pk., Whitehouse Sta., NJ 08889 201-534-9007
GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
† Hellonetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .714-546-4731 800-421-7915
ICL Technology, 399 Java Dr., Sunnyvale, CA 94089 408-745-7900
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ....914-EL8-8000
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201 201-353-5700
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
Keltron Corp., Walden Div., 225 Crescent St., Waltham, MA 02154 617-894-8700
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 ....213-515-6432; 800-421-5334
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901
§ La Marche Mfg., 106 Bradrock Dr., Des Plaines, IL 60018 312-299-1188
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 ....303-443-6250; 800-525-6478
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680 714-730-0162
Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
MacPower, 9115 26th Ave., Kenosha, WI 53140 414-694-8866
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
Microcomputer Power, 2272 Calle de Luna, Santa Clara, CA 95050 408-988-0265
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
† Milwaukee Transformer Co., MTE Corporation, 7901 W. Clinton Avenue, Milwaukee, WI 53223 414-438-5300
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262
§ Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810 201-329-4611
§† Northeast Scientific Corp., 30 Wetherbee St., Acton, MA 01720 617-263-2711
† Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966

† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 .... 714-898-2691;800-854-2433
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 716-684-0001
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404 213-829-6751
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
Powerbox, Inc., 1860 Broadway, New York, NY 10023 212-586-1992
† Powercube Corp., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821 617-667-9500
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§† Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 305-974-2442
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219 501-568-1995
Power Ten, Inc., 486 Mercury Dr., Sunnyvale, CA 94086 408-738-5959
† RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086 408-744-1450
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 .516-593-2025;Outside NY 800-645-5900
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
Seven Mountains Sci. Inc., P.O. Box 650, Boalsburg, PA 16827 814-466-6559
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 .... 213-32-Sigma
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705 714-558-8512
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800
Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717 516-231-3366
Torotron, 230 E. 7th St., Mt. Vernon, NY 10550 914-664-2050
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
† Unitron Inc., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041 214-271-4531
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
Venable Industries, Inc., 3555 Lomita Blvd., Torrance, CA 90505 213-539-2522
† Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 516-293-4100
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 919-732-9351
Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069 619-744-3346
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997
§ Zambre Co., Inc., 2134 Old Middlefield Way, Mountain View, CA 94043 415-968-9176

Power Supplies, Constant Voltage — See Power Supplies, Linear (Vol. 3)

Power Supplies, DC Input, AC Output — See Power Supplies, AC Output (Vol. 3)

Power Supplies, DC Input, DC Output — See Converters, DC to DC (Vol. 3)

Power Supplies, Encapsulated-4000

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 .... 3•1441
† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1441,1443-1445,1448,1449**
Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 .... 3•1462-1465,1468,1469
† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
† **Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 .... 3•1496-1499**
Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 .... 3•1512,1513
† **CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 .... 3•1515**
Condor, 201 Flynn Rd., Camarillo, CA 93010, 805-484-2851;800-235-5929 .... 3•1533
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086, 408-738-0530 .... 3•1540
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 .... 3•1560
Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, 607-754-9187 .... 1B•1049,3•1561
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550, 914-667-5050 .... 3•1574
Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052, 206-882-3100 .... 3•1594-1597
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, 914-EL8-8000 .... 3•1598
Intronics, Inc., 57 Chapel St., Newton, MA 02158, 617-964-4000 .... 3•1602,1603
Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201, 201-353-5700 .... 3•1606,1607
Modular Devices, 50 Orville Dr., Bohemia, NY 11716, 516-567-9620 .... 3•1933
§† **Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 .... 3•1659**
Power General, 152 Will Dr., Canton, MA 02021, 617-828-6216 .... 3•1683
§ **Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060, 305-974-2442 .... 3•1706-1708,1710-1716**
Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219, 501-568-1995 .... 3•1746
§ **Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218, 713-492-0550 .... 3•1752-1755**
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110, 203-625-7300 .... 3•1756,1757
§ **Semiconductor Circuits, 49 Range Rd., Windham, NH 03087, 603-893-2330 .... 3•1759-1766**
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076, 312-679-8200 .... 3•1787
† **Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 .... 1A•1863**
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 .... 3•1809
AAK Corp, 747 River St., Haverhill, MA 01830 617-373-3769
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 213-997-7222
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880 617-246-0300
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 408-748-1200
† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 714-540-1234
Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086 408-732-2440
† Brandt Elctrns., Inc., 1220 Alderwood Ave., Sunnyvale, CA 94086 408-734-8310
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 301-296-7000
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Collmer Semiconductor, Inc., 14368 Proton Rd., Dallas, TX 75234-3335 214-233-1589
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
Engineering Design & Sls., Rt. 2, Box 305, Danville, VA 24540 804-685-7073
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010 212-691-3610
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
Hitran Corp., Agex, Rte. 31; RD 5-65, Flemington, NJ 08822 201-782-5525
§ Intech, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050 408-988-4930
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
† K & M Elctrns., 123 Interstate Dr., W. Springfield, MA 01089 413-781-1350
Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 .... 303-443-6250; 800-525-6478
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
MPC Sys., Div. of Consulting Systems, RFD Box 441, Fremont, NH 03044 603-642-5913
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
† Powercube Corp., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821 617-667-9500
Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
† Reich Assocs., P.O. Box 73, Plano, TX 75074 214-424-7904
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 516-349-8686
§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705 714-558-8512
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127 617-268-1170
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800
† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 201-664-7636
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750 219-356-6500
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Wasatch High Voltage, P.O. Box 9027, Salt Lake City, UT 84109 801-466-9561
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Power Supplies, Enclosed-4000

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 .... 3•1441,1822,1823
† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1441-1454**
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Power Systems, 12 Tobey Rd., Bloomfield, CT 06002, 203-243-0357 .... 3•1726, 1727

† Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311, 818-882-0004 .... 3•1728,1740,1744,1745

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§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087, 603-893-2330 .... 3•1759,1762,1763,1765,1766

§ Sierracin/Power Systems, 20500 Plummer St., Chatsworth, CA 91311, 818-998-9873 .... 3•1769,1770

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§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 .... 3•1781,1782

Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127, 617-268-1170 ....3•1705,1721-1724

Summit Elctrns., 750 S. Sherman, Richardson, TX 75081, 214-231-1456 .... 3•1785

Taylor Electronics, 401 West Orion, Tempe, AZ 85283, 602-838-4523 .... 3•1786

TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076, 312-679-8200 .... 3•1787

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Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716, 516-563-1117 .... 3•1802

Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549, 914-241-1300 .... 3•1803

Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 .... 3•1805

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§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 ... 305-974-5500
Conversion Equip. Corp., 1620 So. Sunkist, Anaheim, CA 92806 ... 714-634-9698
CSI Capacitors, CSI Technlgs., 810 Rancheros Dr., San Marcos, CA 92069 ... 619-747-4000
§ CurrenTechnology Corp., 135 Prestige Pk. Circle, E. Hartford, CT 06108 ... 203-289-6831
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Datapower, Inc., 3328 West First St., Santa Ana, CA 92703 ... 714-775-2000
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 ... 215-699-9261
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§ Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 ... 203-289-6831
Dynatronix, Inc., 105 Power St., Amery, WI 54001 ... 715-268-8118;800-826-7172
Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 ... 201-997-0950
Electrostatics, 7718 Clairemont Mesa Blvd., San Diego, CA 92111 ... 619-279-1414
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† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 ... 201-641-3650
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James Electronics, 4050 N. Rockwell, Chicago, IL 60618 ... 312-463-6500
Keltlon Corp., Viking Modules Div., 225 Crescent St., Waltham, MA 02154 ... 617-894-8700
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 ... 516-694-4200
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MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 ... 617-453-8000
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Stanley/AC Interface, 2925 College Ave., Unit A 1, Costa Mesa, CA 92626 ... 714-979-9830
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ... 212-932-1800
† Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 ... 201-664-7636
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Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 ... 619-481-7177
† Trio Labs., 80 Dupont St., Plainview, NY 11803 ... 516-349-0400
Universal Electronics Inc., 3475 A. Victor St., Santa Clara, CA 95050 ... 408-970-0455
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
Wall Inds., 2 Franklin, Lawrence, MA 01840 ... 617-688-1287
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 ... 201-664-7997

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† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 ... 3•1441,1442,1446,1448,1449,1452-1454**
ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 ... 3•1456-1458
† **Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 ... 3 s1461,1464-1469,1478-1483,1486,1487,1489,1491,1494**
† **Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ... 3•1496-1499**
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ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 ... 3•1827
§ **Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 ... 3•1503**
§ **B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635, 312-889-9087 ... 3•1509**
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 ... 3•1506
Bikor, 1504 W. 228th St., Torrance, CA 90501, 213-539-6320 ... 3•1508
§ **Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086, 408-732-2440 ... 3•1511**
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California DC, 2150 Anchor Ct., Newbury Park, CA 91320, 805-499-3621; 213-706-8221 ... 3•1514
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 ... 3•1516
§ **Compower Div., Div. of Computer Prods., Inc., 2220 Lundy Ave., San Jose, CA 95131, 408-942-1600 ... 3•1702-1704**
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Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ... 3•1545
Digital Power Corp., 686 East Gish Rd., San Jose, CA 95112, 408-288-5600 ... 3•1549
† **EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724, 818-967-9521 ... 3•1550,1551**
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 ... 3•1106
§ **Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705, 714-979-4440 ... 3•1554-1559**
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ... 3•1560
Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, 607-754-9187 ... 1B•1049-1051
§ **Epsco, 920 Westwood Ave., Addison, IL 60101, 312-543-0410 ... 3•1563**
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GFC/Hammond Elctrns., Inc., 1690 Walden Ave., Buffalo, NY 14225, 716-894-5710 ... 3•1583
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. ... 3•1585-1587
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 ... 3•1592
Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052, 206-882-3100 ... 3•1594-1597
Intronics, Inc., 57 Chapel St., Newton, MA 02158, 617-964-4000 ... 3•1602,1603
Jerome Industries Corp., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201, 201-353-5700 ... 3•1607
Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923, 617-777-5102 ... 3•1608-1610
KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501, 213-320-3902 ... 3•1613-1615
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 ... 3•1618
§ **Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ... 3•1621,1624, 1626,1627,1629-1631,1634,1636**
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KSI, 33 Cherry Hill Dr., Danvers, MA 01923, 617-777-5102 ... 3•1646-1648
L-Com Inc., 1755 Osgood St., Unit 11EM, N. Andover, MA 01845, 617-682-6936 ... 3•1649
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680, 714-730-0162 ... 3•1650-1653
Lorain Prods., 1122 F St., Lorain, OH 44052, 216-288-1122 ... 3•1654
LuTechnology, Inc., 3516 Breakwater Ct., Hayward, CA 94545, 415-887-1955 ... 3•1657
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009, 201-239-8183 ... 3•1658
§ **Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 ... 3•1659**

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§ **North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060** .... 3•1271
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Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404, 213-829-6751 .... 3•1666,1667
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Power General, 152 Will Dr., Canton, MA 02021, 617-828-6216 .... 3•1683-1691
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Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218, 713-492-0550 .... 3•1752-1755
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† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262
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† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
† Optima Enclosures, 2166 Mountain Indl. Blvd., Tucker, GA 30084 404-939-6340
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† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
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† Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Power Supplies, Open Frame-4000

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§ **Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086, 408-732-2440 .... 3•1510,1511**

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§ **Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705, 714-979-4440 .... 3•1554,1557,1558**

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Glassman High Voltage Inc., P.O. Box 551, Salem Indl. Pk., Whitehouse Sta., NJ 08889, 201-534-9007 .... 3•1580,1581

Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 .... 3•1582

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Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1592

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§ **Power-One, Inc., Power-One Dr., Camarillo, CA 93010, 805-484-2806 .... 3•1692-1695**

§ **Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 .... 3•1696,1697, 1699**

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§ **Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 ...... 3•1502,1503**
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706, 516-586-5955 .. 3•1542, 1543
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Precision Components, Inc., 1110 W. National Ave., Addison, IL 60101, 312-543-6400 ...... 3•1747
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Power General, 152 Will Dr., Canton, MA 02021, 617-828-6216 ...... 3•1683-1690
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ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
EWC, Inc., 725 Federal Ave., Kenilworth, NJ 07033 .. 201-245-3200;800-526-4048
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ...... 714-832-0290;800-854-9420
Frequency Devices, Inc., 25 Locust St., Haverhill, MA 01830 617-374-0761
Glassman High Voltage Inc., P.O. Box 551, Salem Indl. Pk., Whitehouse Sta., NJ 08889 201-534-9007
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ...... 914-EL8-8000
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501 213-320-3902
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 ...... 303-443-6250; 800-525-6478
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680 714-730-0162
MacPower, 9115 26th Ave., Kenosha, WI 53140 414-694-8866
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166

† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
MPC Sys., Div. of Consulting Systems, RFD Box 441, Fremont, NH 03044 603-642-5913
Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
† OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§ Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 305-974-2442
Power Systems, 12 Tobey Rd., Bloomfield, CT 06002 203-243-0357
Q-Systems, PO Box 35879, Tucson, AZ 85740 602-293-4923
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110 203-625-7300
† RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086 408-744-1450
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087 603-893-2330
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127 617-268-1170
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
Tecnetics, Box 910, Boulder, CO 80306 303-442-3837
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
Universal Electronics Inc., 3475 A. Victor St., Santa Clara, CA 95050 408-970-0455
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069 619-744-3346
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Power Supplies, Programmable-4000

Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 .... 3•1441
† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1441,1443,1444**
Acopian Corp., Box 638, Easton, PA 18042, 215-258-5441 .... 3•1461,1476,1477,1488, 1489
† **Analog Modules, Inc., 126 Baywood Avenue, Longwood, FL 32750, 305-339-4356/4355 .... 3•1004**
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1189, 1504,1817
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 .... 3•1834,1836,1837
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 .... 3•1506
† **California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111, 619-279-8620;800-356-2244;800-821-1634 .... 3•1840**
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 .... 3•1516
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086, 408-738-0530 .... 3•1540
† **Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 .... 3•1547**
† **Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 .... 3•1567,1568**
Gamma High Voltage Resch. Inc., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550, 914-667-5050 .... 3•1575
Glassman High Voltage Inc., P.O. Box 551, Salem Indl. Pk., Whitehouse Sta., NJ 08889, 201-534-9007 .... 3•1581
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. .... 3•1585-1587
§ **Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 .... 3•1621-1623, 1632-1639**
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1645
LuTechnology, Inc., 3516 Breakwater Ct., Hayward, CA 94545, 415-887-1955 .... 3•1657
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1662
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404, 213-829-6751 .... 3•1666,1667
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590, 516-333-6200 .... 3•1675,1679
† **Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803, 516-349-8686 .... 3•1776**
Stantard Energy, Div. WBH Scientific, Inc., Rte. 32, Greenville, NY 12083, 518-966-4197 .... 3•1779
AAK Corp, 747 River St., Haverhill, MA 01830 617-373-3769
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 201-989-0095
Advanced High Voltage Co., Inc., P.O. Box 2136, Lancaster, CA 93539-2136 213-997-7222
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 617-531-8886
† Anadyne, 14830 Valley View Ave., La Mirada, CA 90638 714-522-8924
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 .... 213-390-3537/8837
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
AT&T, 475 South St., Morristown, NJ 07960 201-631-6790
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 714-540-1234
Basler Elec., Rte. 143, Highland, IL 62249 618-654-2341
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 516-582-4422
Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501 213-320-0808
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
Condor, 201 Flynn Rd., Camarillo, CA 93010 .... 805-484-2851;800-235-5929
Crestronics Div., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704 714-556-6570
CSI Capacitors, CSI Technlgs., 810 Rancheros Dr., San Marcos, CA 92069 619-747-4000
§ CurrenTechnology Corp., 135 Prestige Pk. Circle, E. Hartford, CT 06108 203-289-6831
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
§ Dressen-Barnes Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 714-871-3020
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 818-967-9521
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753 201-922-9300
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089 408-734-9123
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§ E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 213-892-7279
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 .... 914-EL8-8000
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923 617-777-5102
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
KSI, 33 Cherry Hill Dr., Danvers, MA 01923 617-777-5102
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 .914-425-2000
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
Microcomputer Power, 2272 Calle de Luna, Santa Clara, CA 95050 408-988-0265
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262
§ Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067 404-952-9777
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Oeco Corp., 712 S.E. Hawthorne Blvd., Portland, OR 97214 503-238-2440
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 415-827-9010
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§ Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 203-866-4484
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110 203-625-7300
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705 714-558-8512
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 201-664-7636
§ THORN EMI Gencom Inc., 23 Madison Rd., Fairfield, NJ 07006 516-433-5900
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717 516-231-3366
§† Topaz Electronics, 9192 Topaz Way, San Diego, CA 92123-1164 619-279-0831
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300

Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
† Velonex, Instr. Div., 560 Robert Ave., Santa Clara, CA 95050 408-727-7370
† Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 516-293-4100
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625 813-855-6611
Voltex, 3460 Great Neck Rd., Amityville, NY 11701 516-842-2772
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
Xylog Corp., 150 Tillman St., Westwood, NJ 07675 201-664-7997

Power Supplies, Standby (Emergency)-4000

Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733, 213-575-0755 ...... 3•1826
§ ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 ...... 3•1827
§ Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 ...... 3•1536
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 ...... 3•1897
§† Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 ...... 3•1906
Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 ...... 3•1700
Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 ...... 3•1914, 1915
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ...... 3•1102
Xylog Corp., 150 Tillman St., Westwood, NJ 07675, 201-664-7997 ...... 3•1922
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260
Acopian Corp., Box 638, Easton, PA 18042 215-258-5441
§† Adapter/Charger Prdts., Box 3218, Peoria, IL 61614 309-691-0810
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 201-989-0095
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 ..612-788-9161
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 ...... 213-390-3537/8837
§ Arrow Hart Div., Cooper Inds., 103 Hawthorn St., Hartford, CT 06101 203-249-8471
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761 512-251-2313
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 301-296-7000
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
Clary Corp., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, CA 91776 818-287-6111
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
Cuesta Systems, Inc., 3440 Roberta Ct., San Luis Obispo, CA 93401 805-541-4160
§ CurrenTechnology Corp., 135 Prestige Pk. Circle, E. Hartford, CT 06108 203-289-6831
† D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706 516-586-5955
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 818-967-9521
† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 206-743-1313
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
† Exide Elctrns., P.O. Box 58189, Raleigh, NC 27658 919-872-3020
Fincor, 3750 E. Market St., York, PA 17402 717-757-4641
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ......714-832-0290;800-854-9420
§† Gates Energy Prods., 1050 S. Broadway, Denver, CO 80217 303-744-4806
GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ GNB Batteries Inc., Ind'l. Battery Div., 2010 Cabot Blvd. W., Langhorne, PA 19047 215-752-0555
† Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680 714-730-0162
Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
National Power Technlg., Natl. Technlg., 2111 Howell Ave., Anaheim, CA 92806 714-937-1301
† N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420 612-890-1360
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810 201-329-4611
Nova Elec., 263 Hillside Ave., Nutley, NJ 07110 201-661-3434
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Power Group International, 1137 Cliff Rd., Burnsville, MN 55337 612-890-1360
Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 305-974-2442
Ratelco, 1260 Mercer, Dept. EEM, Seattle, WA 98109 206-624-7770
† RTE Deltec Corp., 2727 Kurtz St., San Diego, CA 92110 619-291-4211
Sanford-Miller Corp., 8 John St., Lynbrook, NY 11563 .516-593-2025;Outside NY 800-645-5900
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087 603-893-2330
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085 203-677-5846
Spectra Lux Corp., 12840 N.E. 21 St. Pl., Bellevue, WA 98005 206-747-0560
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127 617-268-1170
§ Strategic Sys. Div. Power Sys. Operations, GTE Prods. Corp. Sylvania Sys. Grp., 520 Winter St., Waltham, MA 02254 617-466-3000
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
§ Sun Research Inc., Phase-R, Box 210, Old Bay Rd., New Durham, NH 03855 603-859-7110
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 ..212-932-1800
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242
† Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650 ..201-944-2221
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675 201-664-7636
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040
§† Terado, 1068 Raymond Ave., St. Paul, MN 55108 612-646-2868
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717 516-231-3366
§† Topaz Electronics, 9192 Topaz Way, San Diego, CA 92123-1164 619-279-0831
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
§ Tripp-Lite, 500 No. Orleans, Chicago, IL 60610 312-329-1777
Tungstone Batteries, Inc., 18 Billings St., Sharon, MA 02067 617-784-2000
UPSystems, Inc., 15737 Garfield Ave. Bldg. 8, Paramount, CA 90723 213-634-0621
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278 919-732-9351

Power Supplies, Submodular-4000

† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ......3•1496-1499
§† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 ...... 3•1512,1513
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 ...... 3•1515
Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 ...... 3•1545
† EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 ...... 3•1560
Endicott Resch. Grp., Inc., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, 607-754-9187 ...... 1B•1049-1051,3•1561
† Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 ...... 3•1564,1565
Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052, 206-882-3100 ......3•1594-1597
Intronics, Inc., 57 Chapel St., Newton, MA 02158, 617-964-4000 ...... 3•1602,1603
Marway Prods. Inc., 311 N. Clara St., Santa Ana, CA 92703, 714-973-1800 ...... 3•1892
§ Power Technology, Inc., P.O. Box 9769, Little Rock, AR 72219, 501-568-1995 ...... 3•1746
§ Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218, 713-492-0550 ......3•1752-1755
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110, 203-625-7300 ...... 3•1756,1757
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 ...... 3•1809
AAK Corp, 747 River St., Haverhill, MA 01830 617-373-3769
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 213-936-8185
§ ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054 619-757-1880
Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869 201-989-0095
† Anadyne, 14830 Valley View Ave., La Mirada, CA 90638 714-522-8924
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ......617-777-4500; 17-246-0300;800-451-1816
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 714-540-1234
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 814-864-4921
† Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
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CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 408-738-0530
Crestronics Div., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704 714-556-6570
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706 516-586-5955
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000

§† Dressen-Barnes Elctrns., 1600 E. Valencia Dr., Fullerton, CA 92631 ... 714-871-3020
§ Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 ... 203-289-6831
§† EG & G Rotron, Commercial Div., Shokan, NY 12481 ... 914-657-6661
† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 ... 206-743-1313
Electronic Measurements, 405 Essex Rd., Neptune, NJ 07753 ... 201-922-9300
Electro-Pacific, 5782 Thornwood Dr., Goleta, CA 93017 ... 805-964-0751
Electrostatics, 7718 Clairemont Mesa Blvd., San Diego, CA 92111 .. 619-279-1414
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 ... 619-565-1155
§ Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705 714-979-4440
Endicott Coil, 22 E. Chatlotte St., Binghamton, NY 13905 ... 607-797-1263
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 ... 716-968-2400
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 ... 201-641-3650
§† E-Tronics, 16774 Schoenborn, Sepulveda, CA 91343 ... 213-892-7279
† Fincor, 3750 E. Market St., York, PA 17402 ... 717-757-4641
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ... 714-832-0290;800-854-9420
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Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 ... 203-866-2573
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Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 ... 617-667-8700
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920 ... 914-EL8-8000
ITT PowerSystems Div., Box 688, Galion, OH 44833 ... 419-468-8100
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 ... 408-733-4045
KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501 ... 213-320-3902
§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352 ... 212-461-7000
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 ... 818-798-0786
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 ... 516-694-4200
LH Research, Inc., 14402 Franklin Ave., Tustin, CA 92680 ... 714-730-0162
Lorain Prods., 1122 F St., Lorain, OH 44052 ... 216-288-1122
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 ... 516-654-1166
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 ... 516-567-9620
MPC Sys., Div. of Consulting Systems, RFD Box 441, Fremont, NH 03044 ... 603-642-5913
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810 ... 201-329-4611
† Novatronics, Box 878, Pompano Beach, FL 33061 ... 305-942-5200
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 ... 609-298-7300
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 ... 609-298-7300
§ Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 ... 213-934-3566
Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518 ... 415-827-9010
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649 ... 714-898-2691;800-854-2433
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404 ... 213-829-6751
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 ... 201-345-5885
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 ... 516-333-6200
§ Power Labs, Inc., 5 Towle Ave., Dover, NH 03820 ... 603-742-4613
§ Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 ... 201-440-3100
§ Power-One, Inc., Power-One Dr., Camarillo, CA 93010 ... 805-484-2806
§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856 ... 203-866-4484
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 ... 305-974-2442
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 ... 818-885-8223
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§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 ... 516-234-3800
† RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086 408-744-1450
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† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 ... 213-442-5981
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087 ... 603-893-2330
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ... 213-32-Sigma
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 ... 301-948-0202
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† Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803 ... 516-349-8686
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§ Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705 .. 714-558-8512
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Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 ... 214-231-1456
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 .. 212-932-1800
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 ... 203-748-7001
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Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ... 800-547-1512; Oregon only 800-452-1877
Teledyne Philbrick, Allied Dr. Rte 128, Dedham, MA 02026 ... 617-329-1600
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 ... 615-483-8405
§ THORN EMI Gencom Inc., 23 Madison Rd., Fairfield, NJ 07006 ... 516-433-5900
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717 ... 516-231-3366
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 ... 201-361-6622
Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750 ... 219-356-6500
† Trio Labs., 80 Dupont St., Plainview, NY 11803 ... 516-349-0400
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 ... 914-241-1300
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
† Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 ... 516-293-4100
Wall Inds., 2 Franklin, Lawrence, MA 01840 ... 617-688-1287
† Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069 ... 619-744-3346

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† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1441,1443-1445,1447-1449,1452,1453
ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 ... 3•1456-1458
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 ... 3•1496-1499
ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 ... 3•1827
§ Ault, Incorporated, 1600 Freeway Blvd., Minneapolis, MN 55430, 612-560-9300 ... 3•1502
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 .. 3•1506
Bikor, 1504 W. 228th St., Torrance, CA 90501, 213-539-6320 ... 3•1508
§ Boschert Inc., 384 Santa Trinita Ave., Sunnyvale, CA 94086, 408-732-2440 ... 3•1510,1511
California DC, 2150 Anchor Ct., Newbury Park, CA 91320, 805-499-3621; 213-706-8221 ... 3•1514
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 ... 3•1515
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 ... 3•1516
§ Compower Div., Div. of Computer Prods., Inc., 2220 Lundy Ave., San Jose, CA 95131, 408-942-1600 ... 3•1701-1704
Condor, 201 Flynn Rd., Camarillo, CA 93010, 805-484-2851;800-235-5929 . 3•1519-1522
§ Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 ... 3•1536-1539
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, 914-699-2000 ... 3•1547
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ... 1B•1045
† EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724, 818-967-9521 ... 3•1550,1551
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Frederick Components Intl., 20806 Plummer St., Chatsworth, CA 91311, 18-882-0868;800-354-0660 ... 3•1572,1573
GFC/Hammond Elctrns., Inc., 1690 Walden Ave., Buffalo, NY 14225, 716-894-5710 ... 3•1583
Integrated Circuits, Inc., 10301 Willows Road, Redmond, WA 98052, 206-882-3100 ... 3•1596,1597
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Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923, 617-777-5102 ... 3•1608-1610
KEC Elctrns., Inc., 20817 Western Ave., Torrance, CA 90501, 213-320-3902 ... 3•1613-1616
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 ..... 3•1618
§ Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ... 3•1621-1631
KSI, 33 Cherry Hill Dr., Danvers, MA 01923, 617-777-5102 ... 3•1646-1648
L-Com Inc., 1755 Osgood St., Unit 11EM, N. Andover, MA 01845, 617-682-6936 ... 3•1649
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Murata Erie North America, Inc., 1148 Franklin Rd., S.E., Marietta, GA 30067, 404-952-9777 ... 1A•2209
National Power Technlg., Natl. Technlg., 2111 Howell Ave., Anaheim, CA 92806, 714-937-1301 ... 3•1660
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Power General, 152 Will Dr., Canton, MA 02021, 617-828-6216 ... 3•1682-1690
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§ Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 ... 3•1696
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060, 305-974-2442 ... 3•1701¢7450¢7451,1708-1711
† Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311, 818-882-0004 ... 3•1728-1736,1741-1743
Precision Components, Inc., 1110 W. National Ave., Addison, IL 60101, 312-543-6400 ... 3•1747
Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ... 3•1671
Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011, 619-429-7440 ... 3•1748-1750
RIFA Inc., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110, 203-625-7300 ... 3•1756,1757
† RO Assocs., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086, 408-744-1450 ... 3•1758

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§ **Sierracin/Power Systems, 20500 Plummer St., Chatsworth, CA 91311, 818-998-9873 ...... 3•1768**
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Stantard Energy, Div. WBH Scientific, Inc., Rte. 32, Greenville, NY 12083, 518-966-4197 ...... 3•1777,1778
§ **Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 ...... 3•1780**
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127, 617-268-1170 ...... 3•1717-1720
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081, 214-231-1456 ... 3•1784, 1785
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 ...... 1A•1863
† **Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 ...... 3•1790-1795**
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† **Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717, 516-231-3366 ...... 3•1798-1801**
Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716, 516-563-1117 ...... 3•1802
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Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 ...... 3•1809
Xylog Corp., 150 Tillman St., Westwood, NJ 07675, 201-664-7997 ...... 3•1813
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§† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 408-748-1200
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
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† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 714-540-1234
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BICC-Vero Elctrns., Inc., 171 Bridge Rd., Hauppauge, NY 11788 516-234-0400
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Data Ray Corp., 8401 Baseline Rd., Boulder, CO 80303 303-494-4444
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Delta Electronic Ind. USA, Delta Elctrn. Ind. Co. Ltd., 3401 Investment Blvd., Ste. 5, Hayward, CA 94545 ...... 415-785-5231;415-785-5235
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Digital Power Corp., 686 East Gish Rd., San Jose, CA 95112 408-288-5600
Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
Dynage, Inc., Control Prods Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
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Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
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† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ...... 714-832-0290;800-854-9420
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§ Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 305-894-3351
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
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James Electronics, 4050 N. Rockwell, Chicago, IL 60618 312-463-6500
† K & M Elctrns., 123 Interstate Dr., W. Springfield, MA 01089 413-781-1350
Keltion Corp., Viking Modules Div., 225 Crescent St., Waltham, MA 02154 617-894-8700
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
Lestronics, Inc., 1840 Industrial Circle, Longmont, CO 80501 ...... 303-443-6250, 800-525-6478
MacPower, 9115 26th Ave., Kenosha, WI 53140 414-694-8866
† Magnetico Inc., 182 Morris Ave., Holtsville, NY 11742 516-654-1166
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
Microcomputer Power, 2272 Calle de Luna, Santa Clara, CA 95050 408-988-0265
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262
MPC Sys., Div. of Consulting Systems, RFD Box 441, Fremont, NH 03044 603-642-5913
† Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Opamp Labs, Inc., 1033 N. Sycamore Ave., Los Angeles, CA 90038 213-934-3566
† Optima Enclosures, 2166 Mountain Indl. Blvd., Tucker, GA 30084 .. 404-939-6340
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
† Powercube Corp., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821 617-667-9500
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§† Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
Power Systems, 12 Tobey Rd., Bloomfield, CT 06002 203-243-0357
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
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§ Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218 713-492-0550
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
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† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ...... 213-32-Sigma
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† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 .. 212-932-1800
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TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076 312-679-8200
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
§ Tohoku Metal Inds., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan ...... Tokyo 03-402-6161
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Universal Electronics Inc., 3475 A. Victor St., Santa Clara, CA 95050 408-970-0455
Urban Elctrns., P. O. Box 456, Dover, MA 02030 617-329-4068
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Wall Inds., 2 Franklin, Lawrence, MA 01840 617-688-1287
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000
§ Zambre Co., Inc., 2134 Old Middlefield Way, Mountain View, CA 94043 415-968-9176
Zenith Components & Sys. Grp., Zenith Radio Corp., 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733
† Zenith CRT & Components Operations, 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Power Supplies, Switching, Battery Backup-4000

ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 ...... 3•1827
Ceta Corp., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, 415-969-5927 ...... 3•1516
§ **Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 ...... 3•1536**
Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 ...... 3•1582
OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865, 201-454-2600 ...... 3•1665
Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 ...... 3•1700
TII Electronics, Inc., Div. TII Industries, 226 Terminal Rd., E. Setauket, NY 11733, 516-751-6066 ...... 3•1796,1797
§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260
† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
AT&T, 475 South St., Morristown, NJ 07960 201-631-6790
Chloride Electro Networks, Maple St., Caledonia, NY 14423 716-538-4421
§ CurrenTechnology Corp., 135 Prestige Pk. Circle, E. Hartford, CT 06108 203-289-6831
Datapower, Inc., 3328 West First St., Santa Ana, CA 92703 714-775-2000
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
Power Comps. Co., Vanguard Elctrns. Co., 1480 W. 178th St., Gardena, CA 90248 213-323-8120

Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
Qualidyne Sys., 2256 Main St., Chula Vista, CA 92011 619-429-7440
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085 203-677-5846
§ Sun Research Inc., Phase-R, Box 210, Old Bay Rd., New Durham, NH 03855 603-859-7110
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Universal Electronics Inc., 3475 A. Victor St., Santa Clara, CA 95050 408-970-0455

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Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876, 201-526-6010 .... 3•1818,1820
† **Advance Conversion Devices Co., 274 S. Salem St., Randolph, NJ 07869, 201-989-0095 .... 3•1824,1825**
Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733, 213-575-0755 .... 3•1826
§ **ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 .... 3•1827**
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 .... 3•1838,1839
Bikor, 1504 W. 228th St., Torrance, CA 90501, 213-539-6320 .... 3•1508
§† **Clary Corp., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, CA 91776, 818-287-6111 .... 3•1842**
§ **Computer Power, 124E W. Main St., High Bridge, NJ 08829, 201-735-8000 .... 3•1847**
§ **Converter Concepts, Inc., Industrial Pkwy., Pardeeville, WI 53954, 608-429-2144 .... 3•1536**
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 .... 3•1856,1857
† **Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 .... 3•1566,1567**
§ **Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1884**
Lorain Prods., 1122 F St., Lorain, OH 44052, 216-288-1122 .... 3•1654
Nova Elec., 263 Hillside Ave., Nutley, NJ 07110, 201-661-3434 .... 3•1895
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897-1899
Power Pac, 32 Meadow St., S. Norwalk, CT 06856, 203-866-4484 .... 3•1700
† **RTE Deltec Corp., 2727 Kurtz St., San Diego, CA 92110, 619-291-4211 .... 3•1907**
§ **Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 .... 3•1912, 1913**
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 .... 1A•1863
† **Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 .... 3•1790-1792,1795**
TII Electronics, Inc., Div. TII Industries, 226 Terminal Rd., E. Setauket, NY 11733, 516-751-6066 .... 3•1796,1797
TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1102
Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750, 219-356-6500 .... 3•1919
Wilmore Elctrns. Co., Box 1329, Hillsborough, NC 27278, 919-732-9351 .... 3•1921
Xylog Corp., 150 Tillman St., Westwood, NJ 07675, 201-664-7997 .... 3•1922
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
§ Able Power and Engineering Inc., 419 S. Alhambra Ave., Monterey Park, CA 91754 213-571-6260
Albar, Inc., 19013 36th Ave. W., Lynnwood, WA 98036 206-771-4006
American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421 612-788-9161
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 .... 213-390-3537/8837
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065 201-388-3500
Beaver Labs, P.O. 1290, Framingham, MA 01701 617-653-2025
Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 301-296-7000
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
Cuesta Systems, Inc., 3440 Roberta Ct., San Luis Obispo, CA 93401 805-541-4160
§ Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
Digital Pathways, Inc., 1060 E. Meadow Cir., Palo Alto, CA 94303 415-493-5544
§ Displex, Inc., Alexander Place, Glen Cove, NY 11542 516-671-4400
Dynage, Power Supp. Grp., 135 Prestige Park Circle, E. Hartford, CT 06108 203-289-6831
EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724 818-967-9521
† Eldec Corp., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036 206-743-1313
Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
§ Elpac Power Sys., 3131 S. Standard Ave., Santa Ana, CA 92705 714-979-4440
§ Emerson, Indl. Controls Div., 3300 Standard St., Santa Ana, CA 92702 714-545-5581
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
† Exide Elctrns., P.O. Box 58189, Raleigh, NC 27658 919-872-3020
† Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 .... 714-832-0290;800-854-9420
§† General Power Sys., 1400 N. Baxter St., Anaheim, CA 92806 714-956-9321
§ GNB Batteries Inc., Ind'l. Battery Div., 2010 Cabot Blvd. W., Langhorne, PA 19047 215-752-0555
§ HDR Power Sys., Inc., 600 Oakland Park Ave., Columbus, OH 43214 614-262-6832
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 .... 714-546-4731 800-421-7915
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
International Power Machines, 11534 Pagemill Rd., Dallas, TX 75243 214-343-6076
ISOREG Corp., 410 Great Rd., P.O. Box 486, Littleton, MA 01460 617-486-9483
ITT PowerSystems Div., Box 688, Galion, OH 44833 419-468-8100
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Jefferson Elec., Litton Inds., 840 25th Ave., Bellwood, IL 60104 312-626-7700
† Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103 818-798-0786
§ La Marche Mfg., 106 Bradrock Dr., Des Plaines, IL 60018 312-299-1188
§ LEA, Inc., A Dynatech Co., 12516 Lakeland Rd., Santa Fe Springs, CA 90670-9990 818-944-0916
§ Liebert Corp., Programmed Power Div., 995 Benicia Ave., Sunnyvale, CA 94086 408-245-8900
† Lortec Power Sys., Inc., 5214 Mills Indl. Pkwy., N. Ridgeville, OH 44035 216-327-5050
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810 201-329-4611
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404 213-829-6751
Power Elctrns., 96 Milton Rd., Rochester, NH 03867 603-332-3334
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 305-974-2442
Power Systems & Controls, Inc., 3206 Lanvale Ave., Richmond, VA 23230 804-355-2803
Preferred Elctrns., Inc., Main Line Dr, P.O. Box 954, Westfield, MA 01086 413-568-2301
Prime Power, Inc., Prime Technology Co., Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
§ Ratelco, 1260 Mercer, Dept. EEM, Seattle, WA 98109 206-624-7770
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
§ Semiconductor Circuits, 49 Range Rd., Windham, NH 03087 603-893-2330
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
Sonnenschein Batteries Inc., ebm Inds., 525 New Britain Ave., Unionville, CT 06085 203-677-5846
Stevens-Arnold Div., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127 617-268-1170
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081 214-231-1456
§ Sun Research Inc., Phase-R, Box 210, Old Bay Rd., New Durham, NH 03855 603-859-7110
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800
§† Tauber Elctrns. Inc., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117 619-274-7242
Tech Labs., Inc., Bergen & Edsall Blvds., Palisades Pk., NJ 07650 201-944-2221
Teledyne Inet, 2750 W. Lomita Blvd., Torrance, CA 90509 213-325-5040
§† Terado, 1068 Raymond Ave., St. Paul, MN 55108 612-646-2868
§† Topaz Electronics, 9192 Topaz Way, San Diego, CA 92123-1164 619-279-0831
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869 201-361-6622
Triad Power Systems, 10362 Miller Road, Dallas, TX 75238 214-341-8700
§ Tripp-Lite, 500 No. Orleans, Chicago, IL 60610 312-329-1777
Tungstone Batteries, Inc., 18 Billings St., Sharon, MA 02067 617-784-2000
UPSystems, Inc., 15737 Garfield Ave. Bldg. 8, Paramount, CA 90723 213-634-0621
Urban Elctrns., P. O. Box 456, Dover, MA 02030 617-329-4068
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200

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Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352, 818-504-0644 .... 3•1441
† **Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016, 213-936-8185 .... 3•1441,1443-1445,1447-1450**
† **Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230, 213-390-3537/8837 .... 3•1496-1499**
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1504
CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401, 805-544-5454 .... 3•1515
Christie Elec. Corp., 20665 Manhattan Pl., Torrance, CA 90501, 213-320-0808 .... 3•1517
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 .... 3•1845
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086, 408-738-0530 .... 3•1540
D & B Power, Inc., 204 N. Fehr Way, Bayshore, NY 11706, 516-586-5955 .... 3•1543
† **EG & G Almond Instruments, 1330 E. Cypress St., Covina, CA 91724, 818-967-9521 .... 3•1550,1551**
EMCO High Voltage Co., 556 Weddell Dr., Sunnyvale, CA 94089, 408-734-9123 .... 3•1560
Ferrotran Elctrns. Co., Inc., 11 W. 25th St., New York, NY 10010, 212-691-3610 .... 3•1564
Fincor, 3750 E. Market St., York, PA 17402, 717-757-4641 .... 3•1566
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1395,1570,1571
Interelectronics Corp., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, 914-EL8-8000 .... 3•1598

Power-One, Inc., Power-One Dr., Camarillo, CA 93010, 805-484-2806 .... 3•1692, 1693
Spellman High Voltage Elctrns. Corp., 7 Fairchild Ave., Plainview, NY 11803, 516-349-8686 .... 3•1776
Summit Elctrns., 750 S. Sherman, Richardson, TX 75081, 214-231-1456 .... 3•1785
Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 .... 1A•1863
† **Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 .... 3•1790-1793**
† **Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735, 516-293-4100 .... 3•1804**
† Acopian Corp., Box 638, Easton, PA 18042 215-258-5441
† Adtech Power Inc., 1620 S. Sunkist St., Anaheim, CA 92806 714-634-9211
Avionic Instrs., 943 E. Hazelwood Ave., Rahway, NJ 07065 201-388-3500
† Cal-Power Corp., 140 Kansas St., El Segundo, CA 90245 213-772-2171
† CEAG Elec. Corp., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788 516-582-4422
† Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
Digital Power Corp., 686 East Gish Rd., San Jose, CA 95112 408-288-5600
† Electro Vector, Inc., 6555 Covey Rd., Forestville, CA 95436 707-887-2292
† E M S Development Corp., 200 Allen Blvd., Farmingdale, NY 11735 516-694-2886
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
† Helionetics, Inc., DECC Div., 17312 Eastman St., Irvine, CA 92714 . 714-546-4731 800-421-7915
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549 904-651-1210
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Modular Power Sys. Inc., P.O. Box 180579, Austin, TX 78718-0579 512-834-9262
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
† NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865 201-454-2600
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
† Powercube Corp., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821 617-667-9500
† Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
Powertec, Inc., 20550 Nordhoff St., Chatsworth, CA 91311 818-882-0004
† PTK Corporation, 1173 Los Olivos Ave., Los Osos, CA 93402 805-528-5858
† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 401-847-8000
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 .. 212-932-1800
Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 .. 603-627-6000
† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

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§ **ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054, 619-757-1880 .... 3•1458**
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204, 414-671-2000 .... 1A•2089
Bertan Assocs., 121 New South Rd., Hicksville, NY 11801, 516-433-3110 .. 3•1507
Condor, 201 Flynn Rd., Camarillo, CA 93010, 805-484-2851;800-235-5929 .. 3•1534
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1045
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 .... 3•1859
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 .... 3•1867,1868
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. .... 3•1585
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050, 516-883-1700 .... 3•1887
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051, 408-733-4045 .... 1A•1663
Keltec Florida, P.O. Box 2917, Ft. Walton Bch., FL 32549, 904-651-1210 ..... 3•1619
§ **Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 .... 3•1621,1640-1642**
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1645
LuTechnology, Inc., 3516 Breakwater Ct., Hayward, CA 94545, 415-887-1955 .... 3•1657
Marway Prods. Inc., 311 N. Clara St., Santa Ana, CA 92703, 714-973-1800 .... 3•1892,1893
§† **MCG Elctrns., 12 Burt Dr., Deer Park, NY 11729, 516-586-5125 .... 1B•1277-1279**
NJE Corporation, Box 50, Culver Rd., Dayton, NJ 08810, 201-329-4611 ...... 3•1661
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1901
Perma Power Elctrns., 5615 W. Howard Ave., Chicago, IL 60648, 312-647-9414 .... 1B•1284
Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 .... 3•1906
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 .... 3•1917
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 .... 1A•1682
AAK Corp, 747 River St., Haverhill, MA 01830 617-373-3769
Abbott Transistor Labs., Industrial Products Div., 8203 Vineland Ave., Sun Valley, CA 91352 818-504-0644
† Abbott Transistor Labs., Power Supply Div., 5200 W. Jefferson Blvd., Los Angeles, CA 90016 213-936-8185
Acopian Corp., Box 638, Easton, PA 18042 215-258-5441
Advanced Kinetics, 1231 Victoria St., Costa Mesa, CA 92627 714-646-7165
† Arnold Magnetics, 11520 W. Jefferson Blvd., Culver City, CA 90230 .... 213-390-3537/8837
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Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
§ Brooks Mfg. Co., 2016/24 Amber St., Philadelphia, PA 19125 .... 215-425-3395; 800-523-0130
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150 Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634
† CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 805-544-5454
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
§ Compower Div., Div. of Computer Prods., Inc., 2220 Lundy Ave., San Jose, CA 95131 408-942-1600
§ Computer Prods. Inc., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803 305-974-5500
§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 215-699-9261
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123 619-292-0242
Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
† Fincor, 3750 E. Market St., York, PA 17402 717-757-4641
§† General Power Sys., 1400 N. Baxter St., Anaheim, CA 92806 714-956-9321
Industrial Midwec Capacitors, 4902 Tollview Dr., Rolling Meadows, IL 60008 312-577-0120
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 .. 914-373-9003
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 .... 213 991-9614
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
Lorain Prods., 1122 F St., Lorain, OH 44052 216-288-1122
MIL Electronics, Inc., 1 Mill st., Dracut, MA 01826 617-453-8000
Novatronics, Box 878, Pompano Beach, FL 33061 305-942-5200
† NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505 609-298-7300
Oram Elctrns., Rte. 22, Brewster, NY 10509 914-279-2966
† Perry Amplifier, 138 Fuller St., Brookline, MA 02146 617-734-0844
Polytron Devices, Box 398 - River St. Sta., Paterson, NJ 07544 201-345-5885
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
§ Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
§ Power Products Div., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060 305-974-2442
§† Solarex Corp., 1335 Piccard Dr., Rockville, MD 20850 301-948-0202
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531
Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 .. 415-676-5000
† Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810 203-748-7001
§† Topaz Electronics, 9192 Topaz Way, San Diego, CA 92123-1164 619-279-0831
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Prescalers-2900

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Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
§ ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766 714-623-3463
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 ... 518-355-8300
§ National Tel-Tronics, State Road Hill, Meadville, PA 16335 814-724-6440
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Pearson Elctrns., 1860 Embarcadero Rd., Palo Alto, CA 94303 415-494-6444
§ Probe Master, Inc., 4898 Ronson Ct., San Diego, CA 92111 .... 619-560-9676; 00-854-1519;800-772-1519
Pulsar Products Div., 2700 Merced St., San Leandro, CA 94577 415-577-7236
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Probes, Logic Test-2900

§ Probe Master, Inc., 4898 Ronson Ct., San Diego, CA 92111, 619-560-9676; 00-854-1519;800-772-1519 .... 3•1287
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160

§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 818-889-9304
Augat Inc., 33 Perry Ave., Box 779, Attleboro, MA 02703 617-222-2202
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
E & L Instruments, Inc., 61 First St., Derby, CT 06418 203-735-8774
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
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§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
§ OK Industries, Inc., 3455 Conner St., Bronx, NY 10475 212-994-6600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990

Probes, Microwave-3450 — *See Vol. 1A*

Probes, Oscilloscopes-2975

§ **ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 .... 2•1438**
KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, 818-798-0786 .... 3•1890,1891
§ **Mueller Elec. Co., 1583 E 31st St., Dept. 20, Cleveland, OH 44114, 216-771-5225 .... 3•1264,1265**
§ **Probe Master, Inc., 4898 Ronson Ct., San Diego, CA 92111, 619-560-9676; 00-854-1519;800-772-1519 .... 3•1287**
§ **Test Probes, Inc., Box 2113, La Jolla, CA 92038, 619-459-4197 .... 3•1379**
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160
Avex Elctrns., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020 215-638-3300
§ Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
† Dumont Oscilloscope Labs., 40 Fairfield Pl., W. Caldwell, NJ 07006 201-575-8666
GGB Industries, Inc., Picoprobe Division, P.O. Box 125, Gillette, NJ 07933 201-464-1749
Hameg, Inc., 88-90 Harbor Rd., Port Washington, NY 11050 516-883-3837
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
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Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248 .... 213-515-6432; 800-421-5334
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
SMK Elctrns. Corp., U.S.A., 1901 Nancita Cir., Placentia, CA 92670 714-996-0960
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
§ Vu-Data, 7122 Convoy Ct., San Diego, CA 92111 619-279-6572

Probes, RF-2900

RCD Components, Inc., 330 Bedford St., Manchester, NH 03101, 603-669-0054 .... 1A•1929
§ **Test Probes, Inc., Box 2113, La Jolla, CA 92038, 619-459-4197 .... 3•1379**
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160
Alford Mfg. Co., P.O. Box 2116, 32 Sixth Rd., Woburn, MA 01888 617-935-8610
Amplifier Research, 160 School House Rd., Souderton, PA 18964-9990 215-723-8181
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
Boonton Elctrns. Corp., 791 Route 10, Randolph, NJ 07869 201-584-1077
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
§† Dielectric Communications, General Signal, Tower Hill Rd., Raymond, ME 04071 .... 207-655-4555;800-341-9678
§ Electro-Metrics, 100 Church St., Amsterdam, NY 12010 518-843-2600
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
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† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
† Millivac Instrs., Box 997, Curry Rd. Ext., Schenectady, NY 12301 518-355-8300
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
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Probe-Rite, Inc., 2725 Lafayette St., Santa Clara, CA 95050 408-727-0100
§ Pylon Co., 452 John Dietsch Blvd., Attleboro Falls, MA 02763 617-699-7646
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
§ Kulka Smith, Inc., 1913 Atlantic Ave., Manasquan, NJ 08736 201-223-9400
Solar Elctrns. Co., 901 N. Highland, Hollywood, CA 90038 213-462-0806
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015

Probes, Temperature-2900

Cal-R, Inc., P.O. Box 1397, Santa Monica, CA 90406, 213-450-1761 .... 1B•1795
Keystone Carbon, Thermistor Div., St. Marys, PA 15857, 814-781-1591 .... 1B•1805, 1807
Micro Technical Inds., Micro-Ohm Corp., 23666 Birtcher Dr.; B, Lake Forest, CA 92630, 714-855-4326 .... 3•1176,1177
§ **Midwest Comps., 1981 Port City Blvd., Muskegon, MI 49443, 616-777-2602 .... 1B•1811,1813,1817**
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 1B•1735,1818,1819
Piezo Elec. Prods., Inc., 212 Durham Ave., CN-15, Metuchen, NJ 08840, 201-548-2800 .... 1B•1820
RCD Components, Inc., 330 Bedford St., Manchester, NH 03101, 603-669-0054 .... 1A•1929
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075, 619-481-7177 .... 3•1355
† **Thermometrics, Inc., 808 U.S. Hwy. , Edison, NJ 08817-4695, 201-287-2870 .... 1B•1825**
Advanced Techn. Research Labs., 5645 K General Washington Dr., Alexandria, VA 22312 703-750-2920
§† Ametek/Rodan Div., 2905 Blue Star St., Anaheim, CA 92806 714-630-0081
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 .... 516-LY3-5600
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000
§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 215-828-2490
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
§ Bayley Instr. Co., Box 357, Kenwood, CA 95452 707-833-6014
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 .... 303-469-5231;800-821-6327
† Climatronics, 140 Wilbur Pl., Bohemia, NY 11716 516-567-7300
Dale Electronics, Inc., Norfolk Div., 2300 Riverside Blvd., Norfolk, NE 68701 402-371-0080
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
Degussa, Rte. 46 & Hollister, Teterboro, NJ 07608 201-288-6500
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 .... 516-435-2808;800-DIAL EDL; 800 342-5335
† Engelhard Corp., 70 Wood Ave. S., Iselin, NJ 08830 201-321-5900
§ E Technology Corp., 1545 Morse Ave., Ventura, CA 93003 805-644-9544
§ Fenwal, Inc., 400 Main St., Ashland, MA 01721 ....
Fenwal Elctrns., 63 Fountain St., Framingham, MA 01701 617-872-8841
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
† GIC Thermodynamics, 2611 Parmenter, Royal Oak, MI 48073 313-280-1648
Gordon, Claud S., Co., 5710 Kenosha St., Richmond, IL 60071 815-678-2211
§ Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 401-884-6800
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
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§ Kurz Instrs., 20 Village Sq., Carmel Valley, CA 93924 408-659-3421
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 914-359-3800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
Minco Prods., 7300 Commerce La., Minneapolis, MN 55432 612-571-3121
† NANMAC Corp., 9 Mayhew St., Framingham, MA 01701 617-872-4811
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Oven Inds., 191 Hempt Rd., P.O. Box 290, Mechanicsburg, PA 17055 717-766-0721
Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 301-490-9860
§ Pacific Transducer, 2301 Federal, Los Angeles, CA 90064 213-478-1134
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006

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† Relco Prods., 5594 E. Jefferson Ave., Denver, CO 80237 303-756-1143
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Simmonds Precision, P.O. Box 310, Norwich, NY 13815 607-335-5000
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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Syscon Intl., Inc., 1108 So. High St., So. Bend, IN 46618-1096 ....219-232-3900; 800-348-2993
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
§ Testoterm, P.O. Box 111509, Nashville, TN 37211 615-834-5082
† Thermo Elec., 109 Fifth St., Saddle Brook, NJ 07662 201-843-5800
Trans-Met Engrg., 601 S. Palm St., La Habra, CA 90631 213-691-2266
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ United Elec. Controls, 85 School St., Watertown, MA 02172 ....617-WA6-1000
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 ....800-631-3096;201-792-2400
§ Vibro-Meter Corp., 1 Progress Rd., Billerica, MA 01821 617-663-7322
§ Victory Engrg. Corp., Victory Rd., Springfield, NJ 07081 201-379-5900
VirTis Co., Rte. 208, Gardiner, NY 12525 914-255-5000
† Weed Instr. Co., Inc., 707 Jeffrey Way, P.O. Box 300, Round Rock, TX 78664-0300 512-255-7043
§ Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241

Probes, Test Lead-2900

§ A P PRODUCTS INCORPORATED, 9450 Pineneedle Dr., Box 540, Mentor, OH 44060, 216-354-2101 .... 2•1900
Concord Elctrns., 30 Great Jones St., Dept. JE, New York, NY 10012, 212-777-6571 .... 2•1176
§ ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 .... 2•1380,1431-1437
§ Mueller Elec. Co., 1583 E 31st St., Dept. 20, Cleveland, OH 44114, 216-771-5225 .... 3•1264,1265
§ Kulka Smith, Inc., 1913 Atlantic Ave., Manasquan, NJ 08736, 201-223-9400 .... 3•1303
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 .... 2•1577
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§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
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§† Brim Elctrns., 120E Home Pl., Lodi, NJ 07644 201-796-2886
§† Consolidated Electronic Wire & Cable Corp., 11044 King St., Franklin Park, IL 60131 312-455-8830
Control Inds. Inc., 530 Burnside Ave., Inwood, NY 11696 212-471-9800
§† Daburn Elctrns. & Cable, 70 Oak St., Norwood, NJ 07648 201-768-5400
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Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
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§ Interconnect Devices, Inc., 5101 Richland Ave., Kansas City, KS 66106 913-342-5544
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§† Keystone Elctrns. Corp., 49 Bleecker St., New York, NY 10012 212-475-4600
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
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Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212 614-486-9561
Ostby & Barton, 487 Jefferson Blvd., Warwick, RI 02886 401-739-7310
† Polarad Elctrns., Inc., 5 Delaware Dr., Lake Success, NY 11042 516-328-1100
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§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
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§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626
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Process Control Systems-2200

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Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855, 203-866-2573 .... 3•1131
InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362, 818-991-1410 .... 3•1085
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730, 617-275-0300 .... 3•1166
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
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Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 ...206-363-0217
† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
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Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
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Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238 412-963-0515
BLH Elctrns., 42 Fourth Ave., Waltham, MA 02254 617-890-6700
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Control-O-mation, Inc, 7300 W. Huron River Dr., Dexter, MI 48130 313-426-3935
Controls Unlimited, Inc., 1895 Blase-Nemeth Rd., Painesville, OH 44077 216-354-4111
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Dataprofits Corp., 2260 Distributors Dr., Indianapolis, IN 46241 ....
Data Signal Corp., 149 California St., Newton, MA 02158 617-926-5080
§ Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
Elnik Instrs., 410 Garibaldi Ave., Lodi, NJ 07644 201-779-7388
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
§ Gimix, Inc., 1337 W. 37th Place, Chicago, IL 60609 312-927-5510
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Inconix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Information Transfer Indl., Box 357, Holcomb, NY 14469 716-657-7074
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241 317-248-2036
Matrix Corp., 1639 Green St., Raleigh, NC 27603 919-833-2837
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Omnibyte Corp., 245 W. Roosevelt Rd., Bldg. 1-5, W. Chicago, IL 60185 312-231-6880
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 914-693-9001
Phoenix Microsystems, P.O. Box 4206, Huntsville, AL 35802 205-881-2173
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ..215-355-1500
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
RMS Techn., 706 Industry Dr., Hampton, VA 23661 804-838-2458
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
§ Schulz Controls, Inc., P.O. Box 9555, New Haven, CT 06511 ....203-562-2555; 800-243-4570
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
Standard Engrg., 44800 Girmmer, Fremont, CA 94538 415-657-7555
Standard Logic, 2215 S. Standard Ave., Santa Ana, CA 92707 714-979-4770
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Systonics, Inc., Box 121, Winchester, MA 01890 617-729-4439
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600

VersaLogic, 87070 Dukhobar Rd., Eugene, OR 97402 503-485-8575
Viable Systems Inc., Box 438, Needham, MA 02192 617-449-4570
Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Processors, Array — See Array Processors (Vol. 3)

Processors, Communications, Front End-1900

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777
Stanford Telecommunications, Inc., 2421 Mission College Blvd., Santa Clara, CA 95050 408-748-1010

Processors, Communications, Message Switching-1900

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
† Custom Prods. Grp., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301 215-648-2241
Data Plus, Inc., 7205E Lockport Pl., Lorton, VA 22079 800-368-3747
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777
Stanford Telecommunications, Inc., 2421 Mission College Blvd., Santa Clara, CA 95050 408-748-1010
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550

Processors, Communications, Network Node-1900

Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§ Data-Match Corp., 3810 Oakcliff Ind. Ct., Doraville, GA 30340 404-441-0408
ICCI, 196 Broadway, Cambridge, MA 02139 617-864-3270
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
Modular Computer Systems, P.O. Box 6099, Ft. Lauderdale, FL 33310 305-974-1380
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777
Stanford Telecommunications, Inc., 2421 Mission College Blvd., Santa Clara, CA 95050 408-748-1010
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 201-930-4600
§ Western Digital Corp., 2445 McCabe Way, Irvine, CA 92714 714-557-3550

Processors, Communications, Standalone-1900

Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Micom Systems, Inc., 20151 Nordhoff Street, Chatsworth, CA 91311 818-998-8844
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777

Processors, Image-2000

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Computer Design & Applications Inc., 411 Waverly Oaks Rd., Waltham, MA 02154 617-647-1900
Digital Graphic Sys., 935 Industrial Ave., Palo Alto, CA 94303 415-856-2500
§ Eigen Video, P.O. Box 848, Nevada City, CA 95959 916-272-3461
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 201-667-2262
Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
Lexidata Corp., 755 Middlesex Tpke., Billerica, MA 01865 ....617-663-8550; 800-472-4747
LogE/Interpretation Sys. Inc., 420 S. Fairview Ave., Goleta, CA 93117 805-967-2383
Mathematical Systems Design, Inc., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405 213-450-9851
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
SEKAI Elctrns. of Amer., Inc., 14700 E. Firestone Blvd., Suite 122, La Mirada, CA 90638 714-670-1854
Third Domain, P.O. Box 35400, Tucson, AZ 85740-5400 602-293-6310
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
Vidco, P.O. Box 25452, Portland, OR 97225 503-292-4104

Processors, Remittance-2000

Program Board Connectors — See Connectors, Plug-in, Program Board (Vol. 2)

Programmers, Cam & Drum-2200

Datametrics Dresser Inds., Inc., 340 Fordham Road, Wilmington, MA 01887, 617-658-5410 ....1B•1841

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406 312-385-9000
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
† Cole Instr., 2650 S. Croddy Way, Santa Ana, CA 92704 714-556-3100
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
§ Delta Design, 5775 Kearny Villa Rd., San Diego, CA 92123 619-292-5000
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
Elnik Instrs., 410 Garibaldi Ave., Lodi, NJ 07644 201-779-7388
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sequential Info. Sys., 249 N. Saw Mill River Rd., Elmsford, NY 10523 914-592-5930
Techniques, Inc., 235 Jackson St., Englewood, NJ 07631 201-569-5900
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800

Programmers, Matrix Boards — See Boards, Programming (Vol. 2)

Programmers, PROM & Logic Array-3130 — *See Vol. 1A*

Programmers, Punched Card-2000

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
† Taurus Corp., Academy Hill, P.O. Box 278, Lambertville, NJ 08530 609-397-2390

Programmers, Tape-2000

PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 ....3•1285

Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
Elnik Instrs., 410 Garibaldi Ave., Lodi, NJ 07644 201-779-7388
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
§ Inmac, 2465 Augustine Dr., Santa Clara, CA 95051 408-727-1970

PROM Programmers — See Programmers, PROM & Logic Array (Vol. 1A)

Protectors, Brownout-4300 — *See Vol. 1B*

Protectors, Surge-4300 (Also See Suppressors, Transient Voltage) — *See Vol. 1B*

Public Address Systems-1300

CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, 212-857-2400 ....3•1845

§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§ Argos Prods., 600 S. Sycamore St., Genoa, IL 60135 815-784-5118
Audio Equip., Div. W. Kidde & Co., Inc., 706 Forrest St., Charlottesville, VA 22901 804-977-8050
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
§ Audiotronics Corp., 7428 Bellaire Ave., N. Hollywood, CA 91605 818-765-2645
§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
Enerco, Inc., 9615 W. Marginal Way S., Seattle, WA 98108 206-762-1422
§ Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Perma Power Elctrns., 5615 W. Howard Ave., Chicago, IL 60648 312-647-9414
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
§ Spectra Sonics, 3750 Airport Rd., Ogden, UT 84403 801-392-7531

Pullers, Circuit Board-5400 — *See Vol. 2*

Pullers, Tube-5400 — *See Vol. 2*

Pulleys-2500 — *See Vol. 2*

Pulsers, Diode — See Power Supplies, AC Input, Greater than 1,000 VDC Output (Vol. 3)

Pulsers, Logic Test-2900

§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Kode, 2752 Walnut Ave., Tustin, CA 92680 714-730-6901

Pumps, Vacuum-4100

† Air-Vac Engrg., 100 Gulf St., Milford, CT 06460	203-874-2541
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763	516-654-1197
Brailsford & Co., 670 Milton Rd., Rye, NY 10580	914-967-1820
CTI-Cryogenics, 266 Second Ave, Waltham, MA 02254	617-890-9400
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603	716-458-2550
† Dresser Inds., 1505 Elm St., Dallas, TX 75201	214-746-6000
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767	714-621-9511
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803	617-272-1313
§ Hull Corp., Davisville Rd., Hatboro, PA 19040	215-672-7800
§ Kurz Instrs., 20 Village Sq., Carmel Valley, CA 93924	408-659-3421
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406	213-452-6000
Materials Resch., Route 303, Orangeburg, NY 10962	914-359-4200
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462	215-825-4990
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043	207-985-7169
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731	516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303	415-493-4000

Punches, Chassis-5400 — *See Vol. 2*

Pyrometers, Infrared-2900

Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132	815-877-0241
† Barnes Engrg., 44 Commerce Rd., P.O. Box 53, Stamford, CT 06904	203-348-5381
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446	201-825-9500
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105	805-964-6701
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110	201-667-2262
§ Epic, Inc., 150 Nassau St., New York, NY 10038	212-349-2470
§ E Technology Corp., 1545 Morse Ave., Ventura, CA 93003	805-644-9544
§ Everest Interscience, P.O. Box 345, Tustin, CA 92680	714-992-4461; 714-730-0747
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855	203-866-2573
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009	213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715	714-752-3800
Mikron Instr., Box 211, Ridgewood, NJ 07451	201-891-7330
Omega Engrg., Box 4047, Stamford, CT 06907	203-359-1660
§ Testoterm, P.O. Box 111509, Nashville, TN 37211	615-834-5082
§ Wahl Instruments, Inc., 5750 Hannum Ave., Culver City, CA 90230	213-822-6144

Pyrometers, Optical, Noninfrared-5300 — *See Vol. 1B*

Pyrometers, Recording-2900

§ Atkins Tech., 3321 S.W. 40th Blvd., Gainesville, FL 32608	904-378-5555
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132	815-877-0241
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708	203-575-3000
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446	201-825-9500
Chessell Corp., Penns Trail, Newtown, PA 18940	215-968-0660
§ Everest Interscience, P.O. Box 345, Tustin, CA 92680	714-992-4461; 714-730-0747
Gordon, Claud S., Co., 5710 Kenosha St., Richmond, IL 60071	815-678-2211
Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818	401-884-6800
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855	203-866-2573
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034	800-321-5111, Ext. 596
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730	617-275-0300
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454	215-643-2000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090	312-541-3232
Mikron Instr., Box 211, Ridgewood, NJ 07451	201-891-7330
Modutec, 18 Marshall St., Norwalk, CT 06854	203-853-3636
† NANMAC Corp., 9 Mayhew St., Framingham, MA 01701	617-872-4811
Omega Engrg., Box 4047, Stamford, CT 06907	203-359-1660
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404	513-228-6011
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120	312-697-2260
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115	215-673-5600
Syscon Intl., Inc., 1108 So. High St., So. Bend, IN 46618-1096	219-232-3900; 800-348-2993
§ Testoterm, P.O. Box 111509, Nashville, TN 37211	615-834-5082
† Thermo Elec., 109 Fifth St., Saddle Brook, NJ 07662	201-843-5800
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310	305-739-4300
§ Wahl Instruments, Inc., 5750 Hannum Ave., Culver City, CA 90230	213-822-6144
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818	401-884-6800
§ Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265	404-253-7000

Q Bus — See Board Computers & Subassemblies (Vol. 3)

Quartz, Fused-2500 — *See Vol. 2*

Quartz, Raw — See Crystals, Quartz (Vol. 1A)

Racks, Aging — See Ovens, Aging, Burn-in, Life Test (Vol. 3)

Racks, Cabinet — See Enclosures, Equipment & Panel Mounting (Vol. 2)

Racks, Circuit Board — See Enclosures, Circuit Board, Module & Relay Mounting (Vol. 2)

Racks, Desk & Console — See Enclosures, Equipment & Panel Mounting (Vol. 2)

Racks, Module — See Enclosures, Circuit Board, Module & Relay Mounting (Vol. 2)

Racks, Relay & Mounting — See Enclosures, Circuit Board, Module & Relay Mounting (Vol. 2)

Radar Homing & Warning (RHAW) Systems (MIL)-3475

† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802	516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478	408-773-0777

Radar Forward-Looking Infrared (FLIR) Sets (MIL)-3475

Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408	612-870-5186
Teledyne Camera Sys., 131 N. Fifth Ave., Arcadia, CA 91006	213-359-6691
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769	214-995-6611

Radar Intercept (MIL)-3475

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241	513-563-6000
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802	516-733-3000

Radar (MIL), Tail Warning-3475

Radar Systems (MIL), Elint-3475

† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401	214-457-4694
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802	516-733-3000
† ITT Gilfillan, 7821 Orion Ave., Van Nuys, CA 91409	818-988-2600
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478	408-773-0777
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295	203-792-6666

Radar System Components-3450 — *See Vol. 1A*

Radio Communications Systems — See Communications Systems (Vol. 3)

Radiographic Equip. — See X-ray Inspection Equip. (Vol. 3)

Radiometers-2900

General Microwave Corp., 155 Marine St., Farmingdale, NY 11735, 516-694-3600	**3•1238**
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320, 818-889-8770	**1B•1118,1119**
Alpha Inds., Inc. - TRG Millimeter Comp., 20 Sylvan Rd., Woburn, MA 01801	617-935-5150
§ American Ultraviolet, 320 Commerce St., Chatham, NJ 07928	201-635-8355
† Barnes Engrg., 44 Commerce Rd., P.O. Box 53, Stamford, CT 06904	203-348-5381
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016	312-298-1420
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634	714-871-4848
Biospherical Instrs., Inc., 4901 Morena Blvd. 003, San Diego, CA 92117	619-270-1315
† Eaton Corp., A.I.L. Div., Comac Rd., Deer Park, NY 11729	516-595-3094
EG&G, Inc., Electro-Optics Div., 35 Congress St., Salem, MA 01970	617-745-3200
EG&G Gamma Scientific, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123	619-279-8034
Electron-Machine Corp., Box M, Umatilla, FL 32784	904-669-3101
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105	805-964-6701
§ Everest Interscience, P.O. Box 345, Tustin, CA 92680	714-992-4461; 714-730-0747
Gamma Scientific Inc., 3777 Ruffin Rd., San Diego, CA 92123	619-279-8034
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509	213-517-6000
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731	213-444-4000
KLC/Karl Lambrecht Corp., 4204 N. Lincoln Ave., Chicago, IL 60618	312-472-5442
Laser Precision Corp., 1231 Hart St., Utica, NY 13502	315-797-4449
Mathematical Systems Design, Inc., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405	213-450-9851
Mikron Instr., Box 211, Ridgewood, NJ 07451	201-891-7330
§† Photo Resch., 3000 N. Hollywood Way, Burbank, CA 91505	213-843-6100
† Radiometrics, Inc., 12021 South Memorial Pkwy., Huntsville, AL 35803	205-881-1272
† Santa Barbara Resch. Ctr., 75 Coromar Dr., Goleta, CA 93117	805-968-3511
Scientech, Inc., 5649 Arapahoe Ave., Boulder, CO 80303	303-444-1361; 800-525-0522
Spectrolab, Inc., 12500 Gladstone Ave., Sylmar, CA 91342	213-365-4611
§ Spectronics Corp., 956 Brush Hollow Rd., Westbury, NY 11590	516-333-4840
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041	214-271-2561
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250	213-978-0516
Yellow Springs Instr., Box 279, Yellow Springs, OH 45387	513-767-7241

Radomes & Windows, Microwave-3450 — *See Vol. 1A*

Reactors, Charging-5600 — *See Vol. 1A*

Reactors, Epitaxial — See Machines & Accessories, Semiconductor Manufacturing (Vol. 3)

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Reactors, Loading-5600 — *See Vol. 1A*

Reactors, Saturable-1800 — *See Vol. 1A*

Reactors (MIL)-2440 — *See Vol. 1B*

Readers, Badge-2000

† Taurus Corp., Academy Hill, P.O. Box 278, Lambertville, NJ 08530, 609-397-2390 .... 3•1095
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402, 213-454-0302 .... 3•1104
§ American Magnetics, 740 Watson Center Rd., Carson, CA 90745 ...213-775-8651
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§ Corby Inds. Inc., P. O. Box 2838, Allentown, PA 18001 215-433-1412
Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
True Data, 17092 Pullman St. , Irvine, CA 92714 714-979-4842

Readers, Bar Code-2000

§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362, 818-991-1410 .... 3•1085
Comtec Infor. Sys., Inc., 53 John St., Cumberland, RI 02864 401-724-8500
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961

Readers, Character-2000

Comtec Infor. Sys., Inc., 53 John St., Cumberland, RI 02864 401-724-8500
§† Dest Corp., 2380 Bering Dr., San Jose, CA 95131 408-946-7100
§ Key Tronic, P.O. Box 14687, Spokane, WA 99214 509-928-8000
KLC Corp., 2234 East Colorado, Pasadena, CA 91107 818-796-0525
Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sensor Techn., 21012 Lassen St., Chatsworth, CA 91311 213-882-4100
United Detector Tech., 12525 Chadron Ave., Hawthorne, CA 90250 213-978-0516

Readers, Magnetic Card-2000

Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402, 213-454-0302 .... 3•1104
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Honeywell Inc., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408 612-870-5346
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
Thomson-CSF Comps. Corp., Passive Comp. Div., 6660 Variel Ave., Canoga Park, CA 91303 818-887-1010
Vertel Inc., P.O. Box 535, 125 Ellsworth St., Clifton, NJ 07012 201-472-1331

Readers, Magnetic Stripe Card-2000

Michigan Magnetics, 203 W. Third St., Vermontville, MI 49096, 517-726-0590 .... 3•1039
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402, 213-454-0302 .... 3•1104

Readers, Punched Card-2000

HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386, 612-443-2500 ....1B•1219
† Taurus Corp., Academy Hill, P.O. Box 278, Lambertville, NJ 08530, 609-397-2390 .... 3•1095
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
Documation, Box 1240, Melbourne, FL 32901 305-725-5500
Opto Technlg., 1674 S. Wolf Rd., Wheeling, IL 60090 312-537-4277
True Data, 17092 Pullman St. , Irvine, CA 92714 714-979-4842

Readers, Punched Tape-2000

Addmaster Corp., 416 Junipero Serra Dr., San Gabriel, CA 91776 ..213-285-1121
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§ Chalco Engrg., 15126 S. Broadway, Gardena, CA 90248 .... 213-FA1-0121
Data I/O Corp., 10525 Willows Rd. N.E., C-46, Redmond, WA 98052 206-881-6444
§† Data Specialties, Inc., 3455 Commercial Ave., Northbrook, IL 60062 312-564-1800
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
Facit, Inc., 66 Field Point Rd., Greenwich, CT 06830 203-622-9150
§ GNT Automatic, 1560 Trapelo Rd., Waltham, MA 02154 617-890-3305
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Opto Technlg., 1674 S. Wolf Rd., Wheeling, IL 60090 312-537-4277
§ Remex, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714 714-957-0039
Sensor Techn., 21012 Lassen St., Chatsworth, CA 91311 213-882-4100
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
Taurus Corp., Academy Hill, P.O. Box 278, Lambertville, NJ 08530 609-397-2390
Teleterminal Corp., Greenland, NH 03840 603-431-1200
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

§† Westrex, 1140 Bloomfield Ave., W. Caldwell, NJ 07006 201-227-7290
Wire Graphics, 215 B. Central Ave., Farmingdale, NY 11735 516-293-1525

Readers, Static Card-2000

Taurus Corp., Academy Hill, P.O. Box 278, Lambertville, NJ 08530, 609-397-2390 .... 3•1095

Readers, Time Code-2000

§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 ...... 3•1074
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1101
Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761 512-251-2313
Datachron Inc., 3186 J Airway Ave., Costa Mesa, CA 92626 714-751-2211
† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
§ EECO Incorporated, 1601 E. Chestnut Ave., P.O. Box 659, Santa Ana, CA 92702-0659 714-835-6000
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
K-Systems, Inc., 3902 Lilac, Las Cruces, NM 88005 505-526-3209
Wide Range Elctrns. Corp., 2119 Schultz Rd., St. Louis, MO 63141 314-567-5366

Readouts — See Tubes, Readout (Vol. 1A)

Reamers-5400 — *See Vol. 2*

Receivers, AM/FM (Incl. Precision Test)-2900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1155
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
§ Cetec Raymer, 7315 Fulton Ave., No. Hollywood, CA 91605 213-875-0423
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Receivers, Communication-1900

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998, 213-828-7496 1B•1116
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
† Allied Corp. Aerospace Sector, Bendix Communications Div., East Joppa Rd., Towson, MD 21204 301-583-4000
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
§ Brelonix, 106 No. 36th St., Seattle, WA 98103 206-633-1964
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Collins Avionics Divisions; Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
† Dexcel, Div. of Gould, 2285C Martin Ave., Santa Clara, CA 95050 ..408-727-9833
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ Drake, R. L., Co., 540 Richard St., Miamisburg, OH 45342 513-866-2421
† Eaton Corp., A.I.L. Div., Comac Rd., Deer Park, NY 11729 516-595-3094
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 914-235-9400
† Hazeltine Corp., 500 Commack Rd., Commack, NY 11725 516-462-5100
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
La Pointe Industries, Inc., Electronics Products Div., 155 W. Main St., Rockville, CT 06066 203-872-8581
Loral TerraCom, Div. of Loral Corp., 9020 Balboa Ave., San Diego, CA 92123 619-278-4100
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282

Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320 818-889-8770
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers, Fiber Optic-2475 — *See Vol. 1B*

Receivers, Field Intensity, Microwave — See Receivers, Microwave (Vol. 3)

Receivers, Fixed Frequency-2900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1155
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
§ Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§ Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761 512-251-2313
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 703-321-9625
§ Brelonix, 106 No. 36th St., Seattle, WA 98103 206-633-1964
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 516-546-9700
† EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 914-235-9400
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers, Frequency Shift-1900

† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
Wescom, PO Box 1458, Downers Grove, IL 60515 312-985-9000

Receivers, Headphone — See Handsets, etc. (Vol. 3)

Receivers, Loran & Omega-1900

† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, 512-251-2313 ....1A•1315
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 703-321-9625
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 512-929-2051
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411

Receivers, Microwave-3400

Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 ....1A•1687
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1155
Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663, 714-759-2411 ....1A•1365
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 .... 3•1393
Alpha Inds., Inc.-MSD Div., 20 Sylvan Rd., Woburn, MA 01801 617-935-5150
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051 408-496-6710
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
† Eaton Corp., A.I.L. Div., Comac Rd., Deer Park, NY 11729 516-595-3094
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 714-879-6021
§† Electro-Metrics, 100 Church St., Amsterdam, NY 12010 518-843-2600
§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 415-594-3000
FG Engrg., Box 476, Fredonia, AZ 86022 602-643-7375
General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
M/A-Com Cable/Home Communication Prodelin Satellite Antenna Systems, M/A-Com, Inc., P.O. Box 468, Newton, NC 28658 .800-222-1195;704-464-4141
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Micro-Now Instr. Co., Inc., 8260 N. Elmwood St., P.O. Box 856, Skokie, IL 60077 312-677-4700
Microphase, 587 Connecticut Ave., Norwalk, CT 06856 203-866-8000
Microwave Assocs. Ltd., Humphrey Rd., Dunstable, Bedfordshire, LU5 4SX England ....44-(582) 60-14-41
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
† Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700
† Premier Microwave, 35 New Broad St., Port Chester, NY 10573 914-939-8900
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 ..603-627-6000
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Receivers, Monitoring, Communications-1900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1154
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
§ Brelonix, 106 No. 36th St., Seattle, WA 98103 206-633-1964
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
† Cushman Elctrns., 2450 N. 1st St., San Jose, CA 95131 408-263-8100
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
§ Drake, R. L., Co., 540 Richard St., Miamisburg, OH 45342 513-866-2421
Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
† Electrac, Inc., 1614 Orangethrope Way, Anaheim, CA 92801 714-879-6021
§† E-Systems, Garland Div., Box 226118, Dallas, TX 75266 214-272-0515
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150

Hughes Aircraft Co. Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
† Lorch Elctrns., 105 Cedar La., Englewood, NJ 07631 201-569-8282
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
Photodyne 1175 Tourmaline Dr., Newbury Park, CA 91320 818-889-8770
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
Rockwell Intl., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
† Scientific Communications, Inc., 3425 Kingsley Rd., Garland, TX 75041 214-271-3685
Spectron Corp., 344 New Albany Rd., Moorestown, NJ 08057 609-234-5700
Sprague Elec. Co., 481 Marshall St., No. Adams, MA 01247 413-664-4411
Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Receivers, NBS-2900

§ EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715 714-752-2891
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107 818-795-2220
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 512-929-2051
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers, Telemetry-1900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ....3•1155
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ....3•1159
† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
HMW Enterprises Inc., 604 Salem Road, Etters, PA 17319 717-938-4691
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107 818-795-2220
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257

Receivers, Tone-1900

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ....3•1205
§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
† Aptek Microsystems, Inc., Hillsboro Plaza, 700 N.W. 12th Ave., Deerfield Beach, FL 33441 305-421-8450
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Beckman Instrs., Electro-Prods. Grp., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
GTE Automatic Elec., 400 N Wolf Rd., Northlake, IL 60164 312-681-7071
GTE Switching & Telephone Products, 400 N. Wolf Rd., Northlake, IL 60164 312-681-7100
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Silicon Systems Inc., 14351 Myford Rd., Tustin, CA 92680 714-979-0941
† Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
§ Teltone, 10801-120 Ave. NE, Kirkland, WA 98033 206-827-9626

Receivers, TV — See Monitors, Video (Vol. 3)

Receivers (MIL)-3475

Hughes Solid State Products, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663, 714-759-2411 ....1A•1365
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086 408-732-4000
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915 617-927-8220
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050

Receivers (MIL), Acoustic Intercept-3475

† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000

Receivers (MIL), Compass Sail/Clockwise-3475

Receivers (MIL), Digital Warning-3475

Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951

Receivers, (MIL), ECM-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Elint-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), ESM-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Handoff-3475

† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), IFM-3475

† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880

Receivers (MIL), IR Warning-3475

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777

Receivers (MIL), Missile Launch Warning-3475

† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777

Receivers (MIL), Radar Warning-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Radio-3475

† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† Gorman-Redlich Mfg. Co., 6 Curtis St., Athens, OH 45701 614-593-3150
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Rodale Elctrns. Corp., 603 Chestnut St., Garden City, NY 11530 516-222-0050
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Recon-3475

† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Receivers (MIL), Search-3475
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Shipboard-3475
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Submarine-3475
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Surveillance-3475
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receivers (MIL), Warning-3475
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Receptacles — See Connectors (Vol. 2), Jacks; Sockets

Recognition Equipment, Speech-2000
† Mimic, Inc., P.O. Box 921, Acton, MA 01720 617-263-2101
Voice Machine Comms., Inc., KTI, 1000 S. Grand Ave., Santa Ana, CA 92705 714-541-0454
† Votan, 4487 Technology Dr., Fremont, CA 94538 415-490-7600

Recorders, Computer Data-2000
Chessell Corp., Penns Trail, Newtown, PA 18940, 215-968-0660 .... 3•1383
† Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 .... 3•1235
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 .... 3•1384
Linseis, Inc., P.O. Box 666, Princeton Junction, NJ 08550, 609-799-6282 .... 3•1385
THORN EMI Technology Inc., 8601 Dunwoody Pl., Atlanta, GA 30338, 04-587-0017;800-243-2572 .... 3•1310
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Bascom-Turner Instrs., 111 Downey St., Norwood, MA 02062 617-769-9660
BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
B-G Instruments, P.O. Box 67, Alta Loma, CA 91701 .... 714-989-4802;980-2826
§ Braemar Computer Corp., 11950 Twelfth Ave. S., Burnsville, MN 55337 612-890-5135
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Data Capture Technology, 5436-F South Mingo Rd., Tulsa, OK 74146 918-627-7521
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digi-Data Corp., 8580 Dorsey Run Rd., Jessup, MD 20794 301-498-0200
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 .....516-435-2808;800-DIAL EDL; 800 342-5335
§ Eigen Video, P.O. Box 848, Nevada City, CA 95959 916-272-3461
Electron, Inc., P.O. Box 28640, San Diego, CA 92128 216-681-4700
§† Engler Instrs., Sangamo Weston, Inc., 250 Culver Ave., Jersey City, NJ 07305 201-332-5353
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
† Genisco Memory Prods. Corp., 10874 Hope St., Cypress, CA 90630 ....213-537-4750;714-220-0720
Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 401-884-6800
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§ Houston Instrument, Div. Bausch & Lomb, P.O. Box 15720, Austin, TX 78761 512-835-0900
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Image Graphics, Inc., 107 Ardmore Street, Fairfield, CT 06430 203-259-1394
§ Instrumentation Prods., 3M Co., 300 S. Lewis Rd., Camarillo, CA 93010 805-482-1911
Interdyne Co., 157 Topaz St., Milpitas, CA 95035 408-943-9133
§ International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 617-444-7000
MPH Elctrns., 2660 Loma Ave., S. El Monte, CA 91733 213-442-7818
PHI Technologies, Inc., 4605 North Stiles, Oklahoma City, OK 73105 405-521-9000
Potter Instr., 10 Main St., Gonic, NH 03867 603-332-1991
§ Practical Automation, Trap Falls Rd., Shelton, CT 06484 203-929-5381
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 219-848-5233
Tri-Data Corp., 505 E Middlefield Rd., Mountain View, CA 94043 415-969-3700
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Recorders, Electrostatic-3000
§ Adtek, Geophysical Survey Sys., Inc., 15 Flagstone Dr., Hudson, NH 03051 603-889-4841
Bell & Howell/CEC Div., 360 Sierra Madre Villa, Pasadena, CA 91109 213-796-9381
† Calcomp, 2411 W. La Palma Ave., Anaheim, CA 92801 714-821-2011
Chessell Corp., Penns Trail, Newtown, PA 18940 215-968-0660
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114 216-361-3315
§ Houston Instrument, Div. Bausch & Lomb, P.O. Box 15720, Austin, TX 78761 512-835-0900
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780

Recorders, Event/Multievent-3000
§† Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893, 401-828-4000 .... 3•1382
Chessell Corp., Penns Trail, Newtown, PA 18940, 215-968-0660 .... 3•1383
† Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 .... 3•1235
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 .... 3•1384
Linseis, Inc., P.O. Box 666, Princeton Junction, NJ 08550, 609-799-6282 .... 3•1385
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1386
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818, 800-525-5554;818-764-5400 .... 3•1387
§ Soltec Corp., 11684 Pendelton St., Sun Valley, CA 91352, 818-767-0044; 800-423-2344 .... 3•1388,1389
§ Adtek, Geophysical Survey Sys., Inc., 15 Flagstone Dr., Hudson, NH 03051 603-889-4841
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 .... 516-LY3-5600
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311 213-341-3000
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Data, Inc., 7702 Emerald Ave., Box 2071, Ft. Collins, CO 80525 303-493-1222
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 201-287-3680
Electric Tachometer, 68th & Upland Sts., Philadelphia, PA 19142 ....215-SA6-7723
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
§ Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§ Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 401-884-6800
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§ Instrumentation Prods., 3M Co., 300 S. Lewis Rd., Camarillo, CA 93010 805-482-1911
International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067 312-358-4622
Larson Instr.; Greenbush Rd., Orangeburg, NY 10962 914-359-3800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ Linear Instrs., 500 Edison Way, Reno, NV 89502 702-786-3636
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 813-574-8788
Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 617-444-7000
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§† Raytheon Ocean Sys. Co., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914 401-438-1780
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 219-848-5233
Rochester Instr. Sys., 255 N. Union St., Rochester, NY 14605 716-263-7700
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 513-228-6011
Sea Data Corp., One Bridge St., Newton, MA 02158 617-244-3216

§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
† Stoelting Co., 1350 S. Kostner Ave., Chicago, IL 60623 312-522-4500
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
§† Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 817-625-2311
Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Recorders, FM — See Recorders, Magnetic Tape (Vol. 3)

Recorders, Graphic — See Recorders, Specific Types (Vol. 3)

Recorders, Magnetic Tape-2000

Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 .... 3•1156,1157
† Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 .... 3•1235
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 .... 3•1384
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518, 219-848-5233 .... 3•1050,1051
THORN EMI Technology Inc., 8601 Dunwoody Pl., Atlanta, GA 30338, 04-587-0017;800-243-2572 .... 3•1310
§ Adtek, Geophysical Survey Sys., Inc., 15 Flagstone Dr., Hudson, NH 03051 603-889-4841
Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§ Audiotronics Corp., 7428 Bellaire Ave., N. Hollywood, CA 91605 818-765-2645
§ Braemar Computer Corp., 11950 Twelfth Ave. S., Burnsville, MN 55337 612-890-5135
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
California Minicomputer Sys., 5534 Westlawn Ave., Los Angeles, CA 90066 213-640-2930
Cipher Data Prods., Inc., P.O. Box 85170, San Diego, CA 92138 619-578-9108
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Data, Inc., 7702 Emerald Ave., Box 2071, Ft. Collins, CO 80525 303-493-1222
Data Capture Technology, 5436-F South Mingo Rd., Tulsa, OK 74146 918-627-7521
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
§ Datum, Storage Prods. Div., 1363 State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digi-Data Corp., 8580 Dorsey Run Rd., Jessup, MD 20794 301-498-0200
§ Emerson, Indl. Controls Div., 3300 Standard St., Santa Ana, CA 92702 714-545-5581
† EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311 213-998-9090
EMR Data Systems, Div. Sangamo- Weston, Box 3041, Sarasota, FL 33578 813-371-0811
† Genisco Memory Prods. Corp., 10874 Hope St., Cypress, CA 90630 ....213-537-4750;714-220-0720
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 303-773-4700
§ Instrumentation Prods., 3M Co., 300 S. Lewis Rd., Camarillo, CA 93010 805-482-1911
International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067 312-358-4622
Mega Logic, 9659 Natl. Rd., Brookville, OH 45309 513-833-5222
† Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 617-444-7000
MPH Elctrns., 2660 Loma Ave., S. El Monte, CA 91733 213-442-7818
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183
PHI Technologies, Inc., 4605 North Stiles, Oklahoma City, OK 73105 405-521-9000
Potter Instr., 10 Main St., Gonic, NH 03867 603-332-1991
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
† Raymond Engrg. Inc., Raycorder Prods. Div., 217 Smith St., Middletown, CT 06457 203-632-1000
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ....215-EL5-1361
Sea Data Corp., One Bridge St., Newton, MA 02158 617-244-3216
Telebyte Technology, Inc., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797 516-423-3232
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
Tri-Com, Inc., 7304 Grove Rd., Frederick, MD 21701 301-694-6666
Tri-Data Corp., 505 E Middlefield Rd., Mountain View, CA 94043 415-969-3700

Recorders, Polar-3000

Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893, 401-828-4000 .... 3•1382
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
Venable Industries, Inc., 3555 Lomita Blvd., Torrance, CA 90505 213-539-2522

Recorders, Program Loading-2000

† Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 .... 3•1235
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 .... 3•1384
§ Alltech Assocs. Inc., Applied Science Labs., 2051 Waukegan Rd., Deerfield, IL 60015 312-948-8600
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
Digital Labs. Inc., 600 Pleasant St., Watertown, MA 02172 617-924-1680
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335

Recorders, Pyrometer — See Pyrometers, Recording (Vol. 3)

Recorders, Sound Level-1300

† Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 .... 3•1235
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 .... 3•1384
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
§ Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Emerson, Indl. Controls Div., 3300 Standard St., Santa Ana, CA 92702 714-545-5581
Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Metrosonics, Box 23075, Rochester, NY 14692-3075 716-334-7300
§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 203-348-2121
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 219-848-5233
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 817-625-2311

Recorders, Strip Chart-3000

§† Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893, 401-828-4000 .... 3•1382
Chessell Corp., Penns Trail, Newtown, PA 18940, 215-968-0660 .... 3•1383
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 .... 3•1384
Linseis, Inc., P.O. Box 666, Princeton Junction, NJ 08550, 609-799-6282 .... 3•1385
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1168,1284,1386
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818, 800-525-5554;818-764-5400 .... 3•1387
§ Soltec Corp., 11684 Pendelton St., Sun Valley, CA 91352, 818-767-0044; 800-423-2344 .... 3•1388,1389
THORN EMI Technology Inc., 8601 Dunwoody Pl., Atlanta, GA 30338, 04-587-0017;800-243-2572 .... 3•1310
Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 415-964-3200
§ Adtek, Geophysical Survey Sys., Inc., 15 Flagstone Dr., Hudson, NH 03051 603-889-4841
§ AEMC, 99 Chauncy, Boston, MA 02111 ....617-451-0227;800-343-1391
Allen Datagraph, Inc., 24 Keewaydin Dr., Salem, NH 03079 603-893-1983
§ Alltech Assocs. Inc., Applied Science Labs., 2051 Waukegan Rd., Deerfield, IL 60015 312-948-8600
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ....516-LY3-5600
§† Analytical Meas., 31 Willow St., Chatham, NJ 07928 201-273-7500
§† Bailey Controls Co., 29801 Euclid Ave., Wickliffe, OH 44092 216-585-5800
Barber-Colman Co., Indl. Instrs. Div., P.O. Box 2940, 1354 Clifford Ave., Loves Park, IL 61132 815-877-0241
Bascom-Turner Instrs., 111 Downey St., Norwood, MA 02062 617-769-9660
† Bausch & Lomb, 820 Linden Ave., Rochester, NY 14625 716-338-6314
BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
B-G Instruments, P.O. Box 67, Alta Loma, CA 91701 ....714-989-4802;980-2826
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311 213-341-3000
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
§ Control Prods., Devar Inc., P.O. Box 589, Bridgeport, CT 06601 203-368-6751
Dianachart Inc., 129 Hibernia Ave., Rockaway, NJ 07866 201-625-2299
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335
Electric Tachometer, 68th & Upland Sts., Philadelphia, PA 19142 ....215-SA6-7723
Elnik Instrs., 410 Garibaldi Ave., Lodi, NJ 07644 201-779-7388
§ Esterline Angus, Box 24000, Indianapolis, IN 46224 317-244-7611
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 617-890-7440
General Scanning, 500 Arsenal St., Watertown, MA 02172 617-924-1010
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Gow-Mac Instr. Co., P.O. Box 32, Bound Brook, NJ 08805 201-560-0600
§ Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 401-884-6800
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ....800-321-5111, Ext. 596

Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 ... 303-773-4700
§ Houston Instrument, Div. Bausch & Lomb, P.O. Box 15720, Austin, TX 78761 ... 512-835-0900
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Kipp & Zonen, 390 Central Ave., Bohemia, NY 11716 ... 516-589-2885
Larson Instr., Greenbush Rd., Orangeburg, NY 10962 ... 914-359-3800
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 ... 215-643-2000
§ Linear Instrs., 500 Edison Way, Reno, NV 89502 ... 702-786-3636
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 ... 312-541-3232
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 ... 813-574-8788
MFE Corp., Instr. Div., Keewaydin Dr., Bldg. , Salem, NH 03079 ... 603-893-1921
§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 ... 203-348-2121
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 ... 609-488-1060
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 ... 216-292-6006
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 ... 216-871-7617
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 ... 617-938-0900
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 ... 513-228-6011
† Sensortek, Inc., 154 Huron Ave., Clifton, NJ 07013 ... 201-779-5577
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 ... 312-697-2260
† Stoelting Co., 1350 S. Kostner Ave., Chicago, IL 60623 ... 312-522-4500
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Tegal Scientific, Inc., Box 5905, Concord, CA 94524 ... 415-827-1054
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 ... 214-995-6611
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 ... 512-929-2051
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ... 214-348-8800;800-527-4642
Varian Assocs., Instr. Grp., 611 Hansen Way, Palo Alto, CA 94303 ... 415-493-4000
VirTis Co., Rte. 208, Gardiner, NY 12525 ... 914-255-5000
Western Graphtec, 12 Chrysler St., Irvine, CA 92714 ... 714-770-6010; 800-854-8385
§ West Instrs, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818 ... 401-884-6800
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 ... 817-625-2311
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000

Recorders, Transient-3000

† **Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893, 401-828-4000 ... 3•1382**
§ **BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020, 303-469-5231; 800-821-6327 ... 3•1193**
Chessell Corp., Penns Trail, Newtown, PA 18940, 215-968-0660 ... 3•1383
† **Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 ... 3•1235**
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 ... 3•1384
§ **PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818, 800-525-5554;818-764-5400 ... 3•1387**
Soltec Corp., 11684 Pendelton St., Sun Valley, CA 91352, 818-767-0044; 800-423-2344 ... 3•1388,1389
THORN EMI Technology Inc., 8601 Dunwoody Pl., Atlanta, GA 30338, 04-587-0017;800-243-2572 ... 3•1310
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 ... 201-335-0900
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 ... 617-481-7000
Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520 ... 516-546-9700
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 ... 617-275-0850
Dianachart Inc., 129 Hibernia Ave., Rockaway, NJ 07866 ... 201-625-2299
Dranetz Technologies, Inc., 1000 New Durham Rd., CN-91, Edison, NJ 08818 ... 201-287-3680
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 ... 714-493-8181
Esterline Angus, Box 24000, Indianapolis, IN 46224 ... 317-244-7611
Gulton Inds., Inc., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818 ... 401-884-6800
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
LeCroy Resch. Sys. Corp., 700 S. Main St., Spring Vly., NY 10977 ... 914-425-2000
§ Macrodyne, 1004 Princetown Rd., Schenectady, NY 12301 ... 518-356-3500
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 ... 619-746-2010
§ Neutrik Products, 77 Selleck St., Stamford, CT 06902 ... 203-348-2121
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 ... 608-271-3333
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 ... 805-964-6708
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 ... 617-938-0900
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 ... 513-228-6011
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 ... 215-673-5600
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 ... 817-625-2311

Recorders, Vibration-3000

§ **Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893, 401-828-4000 ... 3•1382**
Chatsworth Data Corp, Cablemaster Div., 20710 Lassen St., Chatsworth, CA 91311, 818-341-9200 ... 3•1208
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, 213-341-3000 ... 3•1208
† **Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 ... 3•1235**
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 ... 3•1384
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 ... 617-481-7000
Chessell Corp., Penns Trail, Newtown, PA 18940 ... 215-968-0660
§ Epic, Inc., 150 Nassau St., New York, NY 10038 ... 212-349-2470
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107 ... 818-795-2220
§ Macrodyne, 1004 Princetown Rd., Schenectady, NY 12301 ... 518-356-3500
Marel Instr. Co., 907 South East 13th Pl., Cape Coral, FL 33904 ... 813-574-8788
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 ... 608-271-3333
† R. C. Elctrns. Inc., 5386 Hollister Ave., Santa Barbara, CA 93111 ... 805-964-6708
Westronics Inc. of Texas, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106 ... 817-625-2311

Recorders, Video-1900

† **Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 ... 3•1235**
Gould Inc., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, 216-361-3315 ... 3•1384
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 ... 415-367-2011
§ Eigen Video, P.O. Box 848, Nevada City, CA 95959 ... 916-272-3461
Honeywell, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217 ... 303-773-4700
RCA Solid State Div., Route 202, Somerville, NJ 08876 ... 201-685-6000
SEKAI Elctrns. of Amer., Inc., 14700 E. Firestone Blvd., Suite 122, La Mirada, CA 90638 ... 714-670-1854
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 ... 212-651-8900
Teledyne Camera Sys., 131 N. Fifth Ave., Arcadia, CA 91006 ... 213-359-6691
Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 ... 914-764-4613
Video Logic Corp., 597 No. Mathilda Ave., Sunnyvale, CA 94086 ... 408-245-8622

Recorders, X-Y — See Plotters X-Y (Vol. 3)

Recorders (MIL), Infrared-3475

Recorders (MIL), Magnetic Tape-3475

† **Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 ... 3•1235**
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 ... 617-481-7000
† Genisco Memory Prods. Corp., 10874 Hope St., Cypress, CA 90630 ... 213-537-4750,714-220-0720
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 ... 219-848-5233

Recorders (MIL), RHAW-3475

† **Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518, 219-848-5233 ... 3•1051**
† Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578 ... 813-371-0811

Recording Systems (MIL)-3475

† **Fairchild Weston, Data Recorders, P.O. Box 3041, Sarasota, FL 33578, 813-371-0811 ... 3•1235**
† Astro-Med, Inc., Atlan-Tol Indl. Pk., W. Warwick, RI 02893 ... 401-828-4000
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518 ... 219-848-5233

Rectifiers, Bridges & Assemblies-4800 — *See Vol. 1A*

Rectifiers, Copper Oxide-4800 — *See Vol. 1A*

Rectifiers, Copper Sulfide-4800 — *See Vol. 1A*

Rectifiers, Electron Tube — See Tubes, Rectifying (Vol. 1A)

Rectifiers, Germanium-4800 — *See Vol. 1A*

Rectifiers, Selenium-4800 — *See Vol. 1A*

Rectifiers, Silicon-4800 — *See Vol. 1A*

Rectifiers, Silicon Controlled — See Thyristors (Vol. 1A)

Rectifiers (MIL), Semiconductor-2440 — *See Vol. 1B*

Reducers, Speed-3500 (Also See Gears & Gear Mechanisms) — *See Vol. 1B*

Reels, Tape — See Tape Recording Accessories (Vol. 3)

Reference Books — See Technical Books (Vol. 3)

References, DC Voltage-2900

Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ... 3•1297
† **Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 ... 3•1223-1225**
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ... 3•1239
HyComp Inc., 75 Union Ave., Box 377, Sudbury, MA 01776, 617-443-4631 ... 1A•1658
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ... 3•1250
§† **Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 ... 1A•2099,2102**
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 ... 3•1297
AMF/Electro Comps. Div., AMF, 2713 Gateway Dr., Pompano Beach, FL 33060 ... 305-973-8620
† Analog Devices, P.O. Box 280, Norwood, MA 02062 ... 617-329-4700
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ... 617-777-4500; 17-246-0300;800-451-1816
CELCO, 70 Constantine Dr., Mahwah, NJ 07430 ... 201-327-1123

References, DC Voltage-2900 (Cont'd)

Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Dynamic Measurements, 8 Lowell Ave., Winchester, MA 01890 617-729-7870
Ferranti Elec., 87 Modula Ave., Commack, NY 11725 516-543-0200
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
† Hybrid Systems Corp., 22 Linnell Circle, Billerica, MA 01821 617-667-8700
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
† Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 408-727-5350
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 408-727-9222
† Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Refrigerants, Spray-1600 — *See Vol. 2*

Refrigerated Cooling Equipment — See Air Conditioners (Vol. 2)

Refrigerators, Environmental Test-2550

† **Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173**
† **Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206, 513-751-8810 .... 3•1175**
† **Tenney Engrg., 109 Springfield Rd., Union, NJ 07083, 201-686-7870 .... 3•1181**
† Associated Environmental Systems, 10 Industrial Way, Amesbury, MA 01913-4848 617-388-5662
Forma Scientific, Div. of Mallinckrodt Inc., Box 649, Marietta, OH 45750 614-373-4763
† FTS Sys., POB 158, Stone Ridge, NY 12484 914-687-7664
Hotpack Corp., Heinicke Instrs., 10940 Dutton Rd., Philadelphia, PA 19154 215-824-1700,800-523-3608
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
Ransco Inds., 2201 Statham Blvd., Oxnard, CA 93033 805-487-7777
§ Temptronic, 55 Chapel St., Newton, MA 02158 617-969-2501
† Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660

Regulators, Current-4000

§ **Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ....3•1621-1623, 1632-1634,1636,1637**
† **NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663**
† **NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663**
Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 .... 3•1917
Amperite Co., Inc., 600 Palisade Ave., Union City, NJ 07087 201-864-9503
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013 805-684-8311
§† Bendix Corp., Electric Power Div., Hwy. 35, Eatontown, NJ 07724 201-542-2000
Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Cross Elctrns., 100 Commonwealth Dr., Warrendale, PA 15086 412-776-1591
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711 812-426-2806
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
Fincor, 3750 E. Market St., York, PA 17402 717-757-4641
† General Magnetics, 211 Grove St., Bloomfield, NJ 07003 201-743-2700
Halmar Electronics, Inc., 900 N. Hague Ave., Columbus, OH 43204 614-276-0131
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822 201-782-5525
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 408-733-4045
Lambda Electronics, 515 Broad Hollow Rd., Melville, NY 11747 516-694-4200
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Mag-Con, 1626 Terrace Dr., St. Paul, MN 55113 612-633-8820
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
† Megatran Electronic Power, Rising Sun Rd., Bordentown, NJ 08505 609-298-7300
§ Micron Inds., 1830 N. 32nd Ave., Stone Park, IL 60165 312-345-0788
Micropac Inds., Inc., General Sensors Div., 905 E. Walnut St., Garland, TX 75040 214-272-3571
§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
§† Sorensen Co., 676 E. Island Pond Rd., Manchester, NH 03103 603-668-4500
Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403 513-253-1191
Staco Transpower, 301 Gaddis Blvd., Dayton, OH 45403 513-253-1191
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Todd Prods. Corp., 50 Emjay Blvd., Brentwood, NY 11717 516-231-3366

† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400

Regulators, Frequency-4050

Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897,1899,1900
§† **Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 .... 3•1905**
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
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† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Nova Elec., 263 Hillside Ave., Nutley, NJ 07110 201-661-3434
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200

Regulators & References, Silicon-4800 (Also See Diodes, Zener & Stabistors) — *See Vol. 1A*

Regulators & Stabilizers, Voltage-4000 (Also See Transformers, Voltage Regulating; Hybrid Voltage Regulators)

Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733, 213-575-0755 .... 3•1826
Behlman Engineering Corporation, 1142 Mark Ave., Carpinteria, CA 93013, 805-684-8311 .... 3•1834,1838,1839
† **California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111, 619-279-8620;800-356-2244;800-821-1634 .... 3•1841**
Clary Corp., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, CA 91776, 818-287-6111 .... 3•1842
Controlled Power Co., 1955 Stephenson Hwy., Troy, MI 48084, 313-528-3700 .... 3•1814,1849,1852,1853
§ **Displex, Inc., Alexander Place, Glen Cove, NY 11542, 516-671-4400 .... 3•1860**
Electronic Solutions, 9255 Chesapeake Drive, San Diego, CA 92123, 619-292-0242 .... 3•1106
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111, 619-565-1155 .... 3•1855,1856
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752, 14-832-0290;800-854-9420 ....3•1394,1862-1866,1870,1872,1875
† **Georator Corp., Box 70, Manassas, VA 22110, 703-368-2101 .... 3•1878**
Hipotronics, P.O. Drawer A, Brewster, NY 10509, 914-279-8091 .... 3•1882,1883
§ **Hitran Corp., Agex, Rte. 31, RD 5-65, Flemington, NJ 08822, 201-782-5525 .... 3•1885**
§ **Kepco, 131-38 Sanford Ave., Flushing, NY 11352, 212-461-7000 ....3•1621-1623, 1628,1630-1632,1635-1637,1639**
Marway Prods. Inc., 311 N. Clara St., Santa Ana, CA 92703, 714-973-1800 .... 3•1892
§ **Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 1A•1674-1676**
† **NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663**
† **NWL Transformers, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 .... 3•1663**
Pacific Power Source Corp., 15122 Bolsa Chica St., Huntington Bch., CA 92649, 14-898-2691;800-854-2433 .... 3•1897,1899,1900
§† **Powermark, 3855 Ruffin Rd., San Diego, CA 92123, 619-565-8363 .... 3•1904,1905**
† **RTE Deltec Corp., 2727 Kurtz St., San Diego, CA 92110, 619-291-4211 .... 3•1907**
Shape Magnetronics, Inc., 901 DuPage Ave., Lombard, IL 60148, 312-620-8394 .... 3•1910,1911
§ **Sola Elec., 1717 Busse Rd., Elk Grove Village, IL 60007, 312-439-2800 .... 3•1912-1915**
§† **Superior Elec. Co., 383 Middle St., Bristol, CT 06010, 203-582-9561 .... 3•1917**
§† **Technipower, A Penril Co., P.O. Box 222, Commerce Pk., Danbury, CT 06810, 203-748-7001 .... 1A•2301**
Technology Dynamics, 91 E. Carver Ave., Westwood, NJ 07675, 201-664-7636 .... 3•1795
§ **Triad-Utrad, 1124 E. Franklin St., Huntington, IN 46750, 219-356-6500 .... 3•1918**
Unitrode Corp., 5 Forbes Rd., Lexington, MA 02173, 617-861-6540 .... 1A•1682, 1683
Voltex, 3460 Great Neck Rd., Amityville, NY 11701, 516-842-2772 .... 3•1805
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† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
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Bikor, 1504 W. 228th St., Torrance, CA 90501 213-539-6320
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§ Deltron, Inc., P.O. Box 1369, Wissahickon Ave., N. Wales, PA 19454-9990 215-699-9261
§ Electronic Specialists, 171 South Main St., Natick, MA 01760 ....617-655-1532; 800-225-4876
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Engd. Prod., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727 716-968-2400
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§† Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403 513-253-1191
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† Xentek, Inc., 279 S. Pacific St., San Marcos, CA 92069 619-744-3346

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Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
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§ Banner Engrg. Corp., 9714 - 10th Ave. N., Minneapolis, MN 55441 612-544-3164
† Barnes Engrg., 44 Commerce Rd., P.O. Box 53, Stamford, CT 06904 203-348-5381
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
† Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
Photobell, 26 Just Rd., Fairfield, NJ 07006 201-227-3613
† Santa Barbara Resch. Ctr., 75 Coromar Dr., Goleta, CA 93117 805-968-3511
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Xedar Corp., 2500 Central Ave., Boulder, CO 80301 303-443-6441

Scanners, Instrument, Input/Output-2900

Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ....3•1157
Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 ....3•1163
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ....3•1251
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241, 317-248-2036 ....3•1086
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ....3•1168
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 ....3•1285
Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 ....3•1016,1018, 1019
§ PrimeLine-Soltec Distbn., Soltec Corp., P.O. Box 818, Sun Valley, CA 91353-0818, 800-525-5554;818-764-5400 ....3•1387
§ Acurex-Autodata, 555 Clyde, Mountain View, CA 94039 415-964-3200
A.D. Data Sys., 200 Commerce Dr., Rochester, NY 14623 716-334-9649
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445 716-381-4740
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 ..617-246-1600
§† Dest Corp., 2380 Bering Dr., San Jose, CA 95131 408-946-7100
Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 .....516-435-2808;800-DIAL EDL; 800 342-5335
§ Epoch Entpr., 3541 N. Olive Rd., Tucson, AZ 85719 602-887-1970
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Hottinger Baldwin Measurements, 139 Newberry St., Framingham, MA 01701 617-875-8282
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
Incohix Corp., 10 Tech Circle, Natick, MA 01760 617-655-1170
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730 617-275-0300
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Lincoln Laser Co., 234 East Mohave, Phoenix, AZ 85004 602-257-0407
Metra Instrs., 2056 Bering Dr., San Jose, CA 95131 408-297-8530
§ Monitor Labs, Inc., 10180 Scripps Ranch Blvd., San Diego, CA 92131 619-578-5060
Photon Technlg., 14125 Capri Dr. , Los Gatos, CA 95030 408-866-0566
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
§ Syscon Intl., Inc., 1108 So. High St., So. Bend, IN 46618-1096 ....219-232-3900; 800-348-2993
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300

Scanners, Optical-2900

HEI, Inc., 1495 Steiger Lake La., Victoria, MN 55386, 612-443-2500 ....1B•1219
Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032, 815-235-6600 ....1B•1720
Optek, Crown Semi, 345 Industrial Blvd., McKinney, TX 75069, 214-542-9461 ....1B•1232
Adcotech, 1980 Tarob St., Milpitas, CA 95035 408-943-9430
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
§ Banner Engrg. Corp., 9714 - 10th Ave. N., Minneapolis, MN 55441 612-544-3164
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
† CELCO, 70 Constantine Dr., Mahwah, NJ 07430 201-327-1123
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Datacopy Corp., 1215 Terra Bella Ave., Mountain View, CA 94043 ..415-965-7900
§† Dest Corp., 2380 Bering Dr., San Jose, CA 95131 408-946-7100
§ Dolan-Jenner Inds., Box 1020, Woburn, MA 01801 617-935-7444
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
† General Optronics, 3005 Hadley Rd., So. Plainfield, NJ 07080 201-549-9000
† General Scanning, 500 Arsenal St., Watertown, MA 02172 617-924-1010
Gould Inc., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157 301-876-2214
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Key Tronic, P.O. Box 14687, Spokane, WA 99214 509-928-8000
Kontes, Kimble Div. of Owens/IL, 1001 Spruce St., Vineland, NJ 08360 609-692-8500
† Lenox Laser, 615 Pittsfield Rd., Lenox, MA 01240 413-499-4477
Lincoln Laser Co., 234 East Mohave, Phoenix, AZ 85004 602-257-0407
§† LogE/Spatial Data Sys., 508 S. Fairview, Goleta, CA 93017 805-967-2383
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
Penn Video Inc., 929 Sweitzer Ave., Akron, OH 44311 216-762-4840
Photon Technlg., 14125 Capri Dr. , Los Gatos, CA 95030 408-866-0566
† Photo Resch., 3000 N. Hollywood Way, Burbank, CA 91505 213-843-6100
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 617-922-5961
Scanning Devices, 108 Elm St., Waltham, MA 02154 617-891-8991
Skan-A-Matic, Box S, Elbridge, NY 13060 315-689-3961
Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453

Scanners, Reed-2900

Atec Sys., 107 N. Washington St., E. Rochester, NY 14445 716-381-4740
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445 716-381-4740
Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Information Transfer Indl., Box 357, Holcomb, NY 14469 716-657-7074
Matrix Corp., 2260 Distributors Dr., Indianapolis, IN 46241 317-248-2036
Matrix Sys. Corp., 5177 N. Douglas Fir Rd., Calabasas, CA 91302 .213-992-6776
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
Omega Engrg., Box 4047, Stamford, CT 06907 203-359-1660
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Precision Filters, 240 Cherry St., Ithaca, NY 14850 607-277-3550
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234

Scissors-5400 — *See Vol. 2*

Scope Dollies — See Carts & Dollies, Instrument & Equipment (Vol. 2)

SCRs — See Thyristors (Vol. 1A)

SCR Firing Controls — See Controls, SCR (Vol. 3)

Scramblers, Data-2325

Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
† Datotek, Inc., 13740 Midway Rd., Dallas, TX 75234 214-233-1030
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082

Hughes Aircraft Co. Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
† Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ... 301-881-7655

Scramblers, Speech-1900

† Datotek, Inc., 13740 Midway Rd., Dallas, TX 75234 ... 214-233-1030
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 ... 213-452-6000

Screens, Printed Circuit-1700 — *See Vol. 2*

Screwdrivers-5400 — *See Vol. 2*

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Screws, Fastening-2825 — *See Vol. 2*

Scribers-5400 — *See Vol. 2*

Scribers, Wafer-4100 (Also See Machines & Accessories, Semiconductor Manufacturing)

Materials Resch., Route 303, Orangeburg, NY 10962 ... 914-359-4200
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ... 404-429-9061

Sealers — See Coatings (Vol. 2)

Sealing Equipment, Metal to Glass/Ceramic-4100

Carpenter Techn., Box 662, Reading, PA 19603 ... 215-371-2000
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ... 815-968-9661
Gra-Mar Inc., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803 ... 305-894-3351
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 ... 619-279-5100
Norton, One New Bond St., Worcester, MA 01606 ... 617-853-1000
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ... 404-429-9061

Seals & Feedthrus, Environmental — See Feedthrus & Seals, Environmental (Vol. 2)

Seals, Ceramic To Metal-2500 — *See Vol. 2*

Seals, Glass To Metal-2500 — *See Vol. 2*

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Search, Interceptor Set (MIL)-3475

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Security Systems, Data-2325

Analytics Communications Sys., 1820 Michael Faraday Dr., Reston, VA 22090 ... 703-471-0892

Seizers-5400 — *See Vol. 2*

Selsyns — See Motors, Synchronous (Vol. 1B)

Semiconductor Material — See Crystals, Semiconductor (Vol. 1A)

Semiconductor Wafer Fabrication, Assembling (Packaging)-4100

§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 ... 408-732-2400
Gould-AMI, Sub. Gould Inc., 3800 Homestead Rd., Santa Clara, CA 95051 ... 408-554-2150
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada ... 416-632-2996
† LSI Computer Sys., 1235 Walt Whitman Rd., Melville, NY 11747 ... 516-271-0400
† Micrel, Inc., 1235 Midas Way, Sunnyvale, CA 94086 ... 408-245-2500
§† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 ... 408-727-9222
† Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 ... 215-657-8400
Standard Microsystems, 35 Marcus Blvd., Hauppauge, NY 11787 ... 516-273-3100
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 ... 312-677-3640

Semiconductor Wafer Fabrication, Designing (Topological)-4100

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† Holt Inc., 8 Chrysler Ave., Irvine, CA 92714 ... 714-859-8800
Integrated Circuit Engrg. Corp. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260 ... 602-998-9780
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 ... 408-733-4045
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada ... 416-632-2996
§ LSI Computer Sys., 1235 Walt Whitman Rd., Melville, NY 11747 ... 516-271-0400
§ Micro Power Sys. Inc., 3100 Alfred St., Santa Clara, CA 95050 ... 408-727-5350
† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 ... 408-255-7550
Polycore Elctrns., 1107 Tourmaline Dr., Newbury Pk., CA 91320 ... 213-991-1061
Silicon Systems Inc., 14351 Myford Rd., Tustin, CA 92680 ... 714-979-0941
† Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 ... 215-657-8400
Standard Microsystems, 35 Marcus Blvd., Hauppauge, NY 11787 ... 516-273-3100
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 ... 415-968-9241
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 ... 312-677-3640

Semiconductor Wafer Fabrication, Maskmaking (Tooling)-4100

Corning Glass Works, Main Plant, MS 2136, Corning, NY 14831 ... 607-974-4102
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† LSI Computer Sys., 1235 Walt Whitman Rd., Melville, NY 11747 ... 516-271-0400
† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 ... 408-255-7550
Quantronix, 225 Engineers Rd., Smithtown, NY 11787 ... 516-273-6900
† Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 ... 215-657-8400
Standard Microsystems, 35 Marcus Blvd., Hauppauge, NY 11787 ... 516-273-3100
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 ... 312-677-3640

Semiconductor Wafer Fabrication, Processing-4100

§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 ... 408-732-2400
Analog Devices, P.O. Box 280, Norwood, MA 02062 ... 617-329-4700
API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 ... 617-890-2000
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 ... 617-667-4111
Cherry Semiconductor Corp, 2000 S. County Trail, East Greenwich, RI 02818 ... 401-885-3600
† Dionics, 65 Rushmore St., Westbury, NY 11590 ... 516-997-7474
DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 ... 302-773-3218
§ Frequency Sources, KSW Semiconductor Div., 16 Maple Rd., Chelmsford, MA 01824 ... 617-256-8101
Gould-AMI, Sub. Gould Inc., 3800 Homestead Rd., Santa Clara, CA 95051 ... 408-554-2150
§ GTE Microcircuits, 2000 West 14th St., Tempe, AZ 85281 ... 602-968-4431
Headway Resch., Inc., 3713 Forest La., Garland, TX 75042 ... 214-272-5431
IXYS Corp., 3685 Enochs, Santa Clara, CA 95051 ... 408-733-4045
LFE, Process Control Div., 55 Green St., Clinton, MA 01510 ... 617-835-1000
§† Linear Technology Corp., 1630 McCarthy Blvd., Milpitas, CA 95035 ... 408-942-0810
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada ... 416-632-2996
§ LSI Computer Sys., 1235 Walt Whitman Rd., Melville, NY 11747 ... 516-271-0400
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Materials Resch., Route 303, Orangeburg, NY 10962 ... 914-359-4200
† Micrel, Inc., 1235 Midas Way, Sunnyvale, CA 94086 ... 408-245-2500
§† MKS Instrs., Inc., 22 Third Ave., Burlington, MA 01803 ... 617-272-9255
MSI Electronics, Inc., 34-32 57th St., Woodside, NY 11377 ... 212-672-6500
† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 ... 408-255-7550
Plasma-Therm, Inc., Rt. 73, Kresson, NJ 08053 ... 609-767-6120
Polycore Elctrns., 1107 Tourmaline Dr., Newbury Pk., CA 91320 ... 213-991-1061
† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 ... 408-727-9222
§ Research, Inc., Box 24064, Minneapolis, MN 55424 ... 612-941-3300
Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 ... 215-657-8400
Standard Microsystems, 35 Marcus Blvd., Hauppauge, NY 11787 ... 516-273-3100
Supertex, Inc., 1225 Bordeaux Dr., P.O. Box 3607, Sunnyvale, CA 94086 ... 408-744-0100
§† Teledyne Semiconductor, 1300 Terra Bella Ave., Mountain View, CA 94040 ... 415-968-9241
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 ... 312-677-3640
† Union Carbide Corporation, Elctrns. Div., Crystal Prods. Dept., 9320 Chesapeake Dr., Ste. 104, San Diego, CA 92123 ... 619-279-4500
Veeco Instrs. Inc., 370 San Aleso Ave., Sunnyvale, CA 94086 ... 408-733-3700
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 ... 516-349-8300
Xenon Corp., 66 Industrial Way, Wilmington, MA 01887 ... 617-658-8940

Semiconductor Wafer Fabrication, Testing-4100

§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 ... 408-732-2400
Alessi Inds., Inc., 3195-C Airport Loop Dr., Costa Mesa, CA 92626 ... 714-979-8912
Baytron, 344 Salem St., Medford, MA 02155 ... 617-391-1550
Bermar Corp., 6300 Westgate Rd., Raleigh, NC 27612 ... 919-821-5993
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 ... 201-667-2262
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 ... 815-968-9661
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 ... 818-889-3179
Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ... 717-386-4156; 215-377-5990
Linear Technlg., P.O. Box 489, Sta. "A", Burlington, ON L7R 3Y3 Canada ... 416-632-2996
† LSI Computer Sys., 1235 Walt Whitman Rd., Melville, NY 11747 ... 516-271-0400
† Micrel, Inc., 1235 Midas Way, Sunnyvale, CA 94086 ... 408-245-2500
MSI Electronics, Inc., 34-32 57th St., Woodside, NY 11377 ... 212-672-6500
Polycore Elctrns., 1107 Tourmaline Dr., Newbury Pk., CA 91320 ... 213-991-1061
† Precision Monolithics, 1500 Space Dr., Santa Clara, CA 95050 ... 408-727-9222
Probe-Rite, Inc., 2725 Lafayette St., Santa Clara, CA 95050 ... 408-727-0100
Silicon Systems Inc., 14351 Myford Rd., Tustin, CA 92680 ... 714-979-0941
Solid State Scientific, 3900 Welsh Rd., Willow Grove, PA 19090 ... 215-657-8400
Standard Microsystems, 35 Marcus Blvd., Hauppauge, NY 11787 ... 516-273-3100
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ... 800-547-1512; Oregon only 800-452-1877
§ Temptronic, 55 Chapel St., Newton, MA 02158 ... 617-969-2501

Tencor Instr., 2400 Charleston Road, Mountain View, CA 94043 ... 415-969-6767
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 ... 312-677-3640
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 ... 516-349-8300

Semiconductors — See Diodes (Vol. 1A), Rectifiers (Vol. 1A), Transistors (Vol. 1A),

Sensors — See Transducer Listings (Vol. 1B)

Sensors, Acoustic-2200

Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752, 617-481-7000 ... 1B•1837
† Gulton Inds., Inc., Servonic Div., 1644 Whittier Ave., Costa Mesa, CA 92627 ... 714-642-2400;800-854-4066
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 ... 914-693-9001
† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 ... 401-847-8000

Sensors, Chemical-2200

Sensors, Fiber Optic-2475 — *See Vol. 1B*

Sensors, Light-3700 — *See Vol. 1B*

Sensors, Proximity-2200

Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803, 516-694-6700 ... 1B•1829
Hamlin, Lake & Grove Sts., Lake Mills, WI 53551, 414-648-2361 ... 1B•1844
Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716, 201-291-0500; 800-631-2165 ... 3•1132
§† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 ... 1B•1458,1459
Transducers and Systems Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ... 1B•1880
§† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 ... 714-556-6570
† Bourns Instrs., Inc., Technical Prods. Grp., 6135 Magnolia Ave., Riverside, CA 92506 ... 714-781-5433
§ Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083 ... 201-964-4400
§ Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 ... 203-388-3574
† Custom Prods. Grp., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301 ... 215-648-2241
Dale Electronics, Inc., Norfolk Div., 2300 Riverside Blvd., Norfolk, NE 68701 ... 402-371-0080
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 ... 414-261-4070
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 ... 203-934-7961
Epsilon-Lambda Elctrns. Corp., 427 Stevens St., Geneva, IL 60134 ... 312-232-9611
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ... 312-231-3511; 312-932-9380
† GIC Thermodynamics, 2611 Parmenter, Royal Oak, MI 48073 ... 313-280-1648
§ Gordon Prods., 67 Del Mar Dr., Brookfield, CT 06804 ... 203-775-4501
Kontes, Kimble Div. of Owens/IL, 1001 Spruce St., Vineland, NJ 08360 ... 609-692-8500
§ Lion Precision, 60 Bridge St., Newton, MA 02195 ... 617-969-4710
Metrix Instrument Co., 1711 Townhurst, Houston, TX 77043 ... 713-461-2131
NTK Technical Ceramics, NGK Spark Plugs (U.S.A.), Inc., 1701 N. Greenville Ave. 05, Richardson, TX 75081 ... 214-235-8332
Princo Instrs., Inc., 1020 Industrial Hwy., Southampton, PA 18966 ... 215-355-1500
§ Redington Counters, 130 Addison Rd., Windsor, CT 06095 ... 203-688-6205
Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 ... 617-922-5961
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 ... 609-662-8000
§ Scientific Technlg., 1201 San Antonio Rd., Mountain View, CA 94043 ... CA 415-965-0910;800-221-7060
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 ... 805-466-3209
Skan-A-Matic, Box S, Elbridge, NY 13060 ... 315-689-3961
Transducer Systems, Inc., 1510 Delp Dr., Kulpsville, PA 19443 ... 215-256-4611
§ Vibro-Meter Corp., 1 Progress Rd., Billerica, MA 01821 ... 617-663-7322

Sensors, Temperature — See Bolometers (Vol. 3), Thermistors (Vol. 1B), Transducers (Vol. 1A),

Sensors (MIL), Tactical Electronic Reconnaissance-3475

Epsilon-Lambda Elctrns. Corp., 427 Stevens St., Geneva, IL 60134 ... 312-232-9611

Sequence Controllers — See Controllers, Programmable (Vol. 3)

Services, Assembly & Fabrication (Incl. R&D)-4100

ACC Electronics, 1300 W. Oak, Independence, KS 67301, 316-331-1000 ... 1A•1643
Aeroflex Labs., Microelctrns. Div., 35 S. Service Rd., Plainview, NY 11803, 516-694-6700 ... 1A•1644
Automatic Coil Corp., Sub. Designatronics, Inc., 455 E. 10th Ave., Hialeah, FL 33010, 305-883-5311 ... 1A•1221
Birtcher Corp., 4501 N. Arden Dr., El Monte, CA 91731, 818-575-8144 ... 2•1016
Blatek Inds., Box 574, Bellefonte, PA 16823, 814-355-4910 ... 1B•1835
Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646, 312-539-3108 ... 2•1244,1245
Electro Mechanical Design Services, Inc., 16698 Oakmont Ave., Gaithersburg, MD 20877, 301-840-5710 ... 3•1221
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818, 402-694-6111 ... 1A•1661
Kalmus & Assocs., Inc., 2424 S. 25th Ave., Box 525, Broadview, IL 60153, 312-343-7004 ... 2•1093
† Mechanized Electronic Assembly Div., Universal Instrs. Corp., P.O. Box 825, Binghamton, NY 13902, 607-772-7522 ... 3•1926
Mueller Elec. Co., 1583 E 31st St., Dept. 20, Cleveland, OH 44114, 216-771-5225 ... 3•1265
OPT Inds. Inc., 300 Red School La., Phillipsburg, NJ 08865, 201-454-2600 ... 1A•1398
Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990, 215-277-1300 ... 1B•1185
Transformation Elctrns. Corp., 170 Wilbur Pl., Bohemia, NY 11716, 516-563-1117 ... 3•1802
† Aaba Components Corp., P.O. Box 171, Baldwin Place, NY 10505 ... 914-628-6952
† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 ... 813-541-6681
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 ... 517-332-6405
† Accurassembly, 9525 Cozycroft Ave., Chatsworth, CA 91311 ... 818-700-0708
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 ... 216-365-1211
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 ... 617-583-0160
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† Amco Engrg., 3801 N. Rose St., Schiller Pk., IL 60176 ... 312-671-6670
§ Amerex, P.O. Box 2815, Riverside, CA 92516 ... 714-686-1400
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American Electronic Labs., Box 552, Lansdale, PA 19446 ... 215-822-2929
Amuneal Mfg., 4737 Darrah St., Philadelphia, PA 19124 ... 215-535-3000
Apahouser-Elcom, Inc., 101 Walnut St., Watertown, MA 02172 ... 617-924-1500
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† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 ... 303-443-4844
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 ... 513-335-0031
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada ... 416-628-6371
Assem-Pro Instrs., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124 ... 408-267-1168
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 ... 617-263-9100
§† Associated Spring, Barnes Grp., 18 Main St., Bristol, CT 06010 ... 203-583-1331
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A-Systems Inc., Box 13, Ivy, VA 22945 ... 804-295-7200
Atlantic Magnetics, Inc., P.O. Box 4127, Margate, FL 33063 ... 305-492-5196
Automatic Connector, Inc., 400 Moreland Rd., Commack, NY 11725 ... 516-543-5000
Autosplice, Inc., 59-12, 37th Ave, Woodside, NY 11377 ... 212-429-0500
AVCO-Elctrns. Div., 4807 Bradford Dr., Huntsville, AL 35805 ... 205-837-6500
Ball Elctrn., Systems Div., 1950 33rd St., Boulder, CO 80302 ... 303-441-5400
B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 ... 203-673-7151
B & G Precision Elctrns., 538 Maple Ave., Doylestown, PA 18901 ... 215-348-4413
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 ... 312-640-7200
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§† Bud Radio, 4605 E. 355th St., Willoughby, OH 44094 ... 216-946-3200
Bulova Sys. & Instr., Green Acres Rd., W., Valley Stream, NY 11582 ... 516-561-2600
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CEA Division of Berkleonics, Inc., 1 Aerovista Pk., San Luis Obispo, CA 93401 ... 805-544-5454
C-E Elgin Elctrns., 5533 New Perry Hwy., Erie, PA 16509-3570 ... 814-864-4921
Cherry Electrical Prods. Corp., 3623 Sunset Ave., Waukegan, IL 60087 ... 312-578-3500
† Chomerics, Inc., 77 Dragon Ct., Woburn, MA 01888 ... 617-935-4850
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 ... 212-594-5377
Contours, Inc., P.O. Box 1041, Middletown, CT 06457 ... 203-347-5694
Corby Inds. Inc., P. O. Box 2838, Allentown, PA 18001 ... 215-433-1412
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† Danmar Inds., 9705 Lurline Ave., Chatsworth, CA 91311 ... 818-882-7979/5280
† Datacom, Inc., Box 278, Ft. Walton Beach, FL 32548 ... 904-244-6121
† DataCon, Inc., 60 Blanchard Rd., Burlington, MA 01803 ... 617-273-5800
Datatex Corp., 10935 S. Wilcrest Dr., Houston, TX 77099 ... 713-495-3100
Da-Tech Corp., 92 Steamwhistle Dr., Ivyland, PA 18974 ... 215-322-9410
Dattilo Electronics, 11621 Electron Dr., Louisville, KY 40299 ... 502-267-4446
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 ... 814-453-7547
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 ... 617-862-8998
Dielectric Instr. Corp., 761 Franklin Ave., Pittsburgh, PA 15221 ... 412-731-6566
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Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ... 213-670-8611
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 ... 505-865-6700
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Easy Heat-Wirekraft, 555 North Michigan St., Lakeville, IN 46536 ... 219-784-3011
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Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 ... 717-767-6517
Electro-Prep, 30 Cayuga Ave., E. Falmouth, MA 02536 ... 617-477-1791
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 ... 603-742-7363
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 ... 714-557-7800
Epsilon-Lambda Elctrns. Corp., 427 Stevens St., Geneva, IL 60134 ... 312-232-9611
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GECO, 145 Penn St., Millheim, PA 16854 814-349-5555
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† GSI Corp., 1917 Greenspring Dr., Timonium, MD 21093 301-252-1768
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† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
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MoldCon Corp., 221 Interstate Dr., W. Springfield, MA 01089 413-736-0371
Monolithic Sys., 84 Inverness Circle E., Englewood, CO 80112 303-790-7400
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Photo Chem. Prods. Cal., 18031 Susana Rd., Compton, CA 90224 213-603-0400
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
† Reactel, Inc., 687-D Lofstrand La., Rockville, MD 20850 301-279-5535
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Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
Seiko Instrs. U.S.A., Inc., 2990 W. Lomita Blvd., Torrance, CA 90505 213-530-8777
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Siltronics Ltd., P.O. Box 456, Dover, MA 02030 617-329-4068
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† SRS Industries, Inc., 903 S. Alta Vista Ave., Monrovia, CA 91016 213-357-3287
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Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
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Technitrol, 1952 E. Allegheny, Philadelphia, PA 19134 215-426-9105
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United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 214-350-4978
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† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
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Dattilo Electronics, 11621 Electron Dr., Louisville, KY 40299 502-267-4446
Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
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Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ..... 800-321-5111, Ext. 596
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Services, Coating (All Types)-4100

Alpha Metals, 600 Rte 440, Jersey City, NJ 07304 201-434-6778
Altek Co., P.O. Box 1128, Torrington, CT 06790 203-482-7626
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
† Dresser Inds., 1505 Elm St., Dallas, TX 75201 214-746-6000
Electrostatic Consltg. Assocs., 556 Lowell Rd., Groton, MA 01450 617-448-5485
E/M Lubricants, Inc., Div. of Great Lakes Chemical Corp., Highway 52 NW, W. Lafayette, IN 47906 317-463-2511
† Evaporated Coatings, 798 Welsh Rd., Huntingdon Valley, PA 19006 215-947-1465
Gasket Intl. Inc., 49 Ackerman St., Bloomfield, NJ 07003 201-338-6814
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 617-272-1313
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Intl. Elctrn. Resch., 135 W. Magnolia Blvd., Burbank, CA 91502 213-849-2481
Keene Laminates, Keene Corp., 199 Amaral St., E. Providence, RI 02914 800-556-7683
KLC/Karl Lambrecht Corp., 4204 N. Lincoln Ave., Chicago, IL 60618 312-472-5442
Lebow Co., 38 Gerald Cass Pl., Goleta, CA 93117 805-964-7117
§ Magnetic Systems Inc., 95 Saginaw Dr., Rochester, NY 14623 716-244-2940
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
† Melles Griot, 1770 Kettering St., Irvine, CA 92714 714-556-8200
Metavac, Inc., 45-68 162nd St., Flushing, NY 11358 ..... 212-HI5-0400
Micro-Circuits Co., Inc., Route 1 - Box 518, New Buffalo, MI 49117 616-469-2727
† Norton Chemplast, 31-150 Dey Rd., Wayne, NJ 07470 201-696-4700
Panelgraphic Corp., 10 Henderson Dr., W. Caldwell, NJ 07006 201-227-1500
† Phoenix Wire, Inc., 100 Teflon Ave., S. Hero, VT 05486 802-372-4561
† Photo Chem. Prods. Cal., 18031 Susana Rd., Compton, CA 90224 213-603-0400
† Plumer Precision Optics, 601 Montgomery Ave., Pennsburg, PA 18073 215-679-6272
SermeTel, 155 Limerick Rd., Limerick, PA 19468 215-948-5100
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
† Union Carbide Corporation, Elctrns. Div., Crystal Prods. Dept., 9320 Chesapeake Dr., Ste. 104, San Diego, CA 92123 619-279-4500

Wescorp Antistatic Prods., 144 S. Whisman Rd., Mountain View, CA 94041 415-969-7717
† Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191

Services, Computer-Aided Design (CAD)—Also See Computers, CAD, CAM, & CAD/CAM-4200

Electro Mechanical Design Services, Inc., 16698 Oakmont Ave., Gaithersburg, MD 20877, 301-840-5710 ..... 3•1221
Wintek Corp., 1801 South St., Lafayette, IN 47904-2993, 317-742-8428 ..... 3•1118
Array Technology, 992 S. Saratoga-Sunnyvale Rd., San Jose, CA 95129 408-252-9900
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
† Auto-trol Tech., 12500 N. Washington St., Denver, CO 80233 303-452-4919
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
† Calcomp, 2411 W. La Palma Ave., Anaheim, CA 92801 714-821-2011
Catronix Corp., 120 Ralph McGill Blvd. N.E., Ste. 800, Atlanta, GA 30308 404-872-2300
CGIS, A COMSAT Co., 7701 N. Lamar Blvd., Austin, TX 78752 512-451-7938
Compact Software, Inc., Comsat Corp., 1131 San Antonia Rd., Palo Alto, CA 94303 415-966-8440
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204 301-828-0788
Computervision Corp., 201 Burlington Rd., Bedford, MA 01730 617-275-1800
DataCon, Inc., 60 Blanchard Rd., Burlington, MA 01803 617-273-5800
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Electro-Mechanisms, 2745 E. Huntington Dr., Duarte, CA 91010 818-359-2535
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ..... 800-321-5111, Ext. 596
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Hybricon Corp., 410 Great Rd., Littleton, MA 01460 617-486-3174
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045 213-417-8888
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
† Multiwire Div., Kollmorgen Corp., Andrews Rd., Hicksville, NY 11801 516-938-2000
Proto Systems of Atlanta, 11510 N. Fulton Industrial Blvd., Alpharetta, GA 30201 404-475-1330
Silicon Systems Inc., 14351 Myford Rd., Tustin, CA 92680 714-979-0941
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
§ Summagraphics Corp., 35 Brentwood Ave., Fairfield, CT 06430 203-384-1344
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 214-350-4978
University Computing Co., UCC Tower Exchange Park, Dallas, TX 75235 214-688-7100
VLSI Technology, Inc., 1101 McKay Dr., San Jose, CA 95131 408-942-1810
† Wire Graphics, 215 B. Central Ave., Farmingdale, NY 11735 516-293-1525

Services, Computer Programming-2050

Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 206-363-0217
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204 301-828-0788
Computervision Corp., 201 Burlington Rd., Bedford, MA 01730 617-275-1800
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 714-832-0290,800-854-9420
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
† Hybricon Corp., 410 Great Rd., Littleton, MA 01460 617-486-3174
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045 213-417-8888
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
SPEC, Inc., 3014 N. Hayden Rd., Ste. 115, Scottsdale, AZ 85251 602-994-1511
§ Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Services, Computer Systems, Builders-2050

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 ..... 3•1112
Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
† Custom Prods. Grp., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301 215-648-2241
† Datacom, Inc., Box 278, Ft. Walton Beach, FL 32548 904-244-6121
Da-Tech Corp., 92 Steamwhistle Dr., Ivyland, PA 18974 215-322-9410
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600

Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Services, Computer Systems, Consulting-2050

Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204 301-828-0788
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Digital Data Sys., 1551 N.W. 65 Ave., Plantation, FL 33313 305-792-3290
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Integrated Circuit Engrg. Corp. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260 602-998-9780
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045 213-417-8888
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Services, Computer Systems, Integrators-2050

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
Advanced Automation Concepts, Inc., 3760 Lower Roswell Rd., Marietta, GA 30067 404-973-0027
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204 301-828-0788
Computervision Corp., 201 Burlington Rd., Bedford, MA 01730 617-275-1800
† Datacom, Inc., Box 278, Ft. Walton Beach, FL 32548 904-244-6121
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Services, Computer Systems, Turnkey-2050

Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 206-363-0217
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Computervision Corp., 201 Burlington Rd., Bedford, MA 01730 617-275-1800
† Datacom, Inc., Box 278, Ft. Walton Beach, FL 32548 904-244-6121
Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730 714-987-2511
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Services, Crimping-4100

† Accurassembly, 9525 Cozycroft Ave., Chatsworth, CA 91311 818-700-0708
Almor Co., Inc., PO Box 1790, 155 Crescent St., Brockton, MA 02403 617-586-5406
Altek Co., P.O. Box 1128, Torrington, CT 06790 203-482-7626
American Electric Cable Co., 181 Appleton St., Holyoke, MA 01040 413-539-9893
Assem-Pro Instrs., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124 408-267-1168
Autosplice, Inc., 59-12, 37th Ave, Woodside, NY 11377 212-429-0500
B & G Precision Elctrns., 538 Maple Ave., Doylestown, PA 18901 215-348-4413
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646 312-539-3108
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 814-453-7547
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
† Electro-Prep, 30 Cayuga Ave., E. Falmouth, MA 02536 617-477-1791
† GSI Corp., 1917 Greenspring Dr., Timonium, MD 21093 301-252-1768
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
† IEC Elctrns., 105 Norton St., Newark, NY 14513 315-331-7742
Kantz Elctrn. Ind., 1804 Wall Church Rd., Wall Township, NJ 07719 201-974-0090
Malco, Div. Microdot Connector Grp., 12 Progress Dr., Montgomeryville, PA 18936 215-699-5373
† Manger Elec. Co., Inc., W. Henry St., Stamford, CT 06902 203-348-7761
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Reactel, Inc., 687-D Lofstrand La., Rockville, MD 20850 301-279-5535
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
§ Support Systems Intl. Corp., 150 South Second St., Richmond, CA 94804 415-234-9090
† V.I.P. Inds. Inc., 246 Knickerbocker Ave., Paterson, NJ 07503 201-345-5800
V-Tron Elctrns. Corp., 84 Fountain St., Pawtucket, RI 02860 401-728-6140
Zierick Mfg. Corp., 44 Radio Circle, Mt. Kisco, NY 10549 914-666-2911

Services, Custom Molding, Plastics-4100

Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403, 617-583-0160 .... 2•1116
Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646, 312-539-3108 .... 2•1245
Accessories for Elctrns., Inc., 800 Merrick Rd., Baldwin, NY 11510 516-546-1751
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
† AME Corp., 101 E. Main St., Little Falls, NJ 07424 201-256-3939
Amerex, P.O. Box 2815, Riverside, CA 92516 714-686-1400
American Electric Cable Co., 181 Appleton St., Holyoke, MA 01040 413-539-9893
† American Plasticraft Co., 814 N. Sacramento Blvd., Chicago, IL 60622 312-722-7727
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Component Mfg. Svc., Inc., 1 Component Park, W. Bridgewater, MA 02379 617-580-0111
† Danmar Inds., 9705 Lurline Ave., Chatsworth, CA 91311 .... 818-882-7979/5280
§ Dayco Corp., 333 W. First St., Dayton, OH 45402 513-226-5927
dek, inc., 3480 Swenson Ave., St. Charles, IL 60174 312-377-2575
Delbert Blinn Co., Box 2007, Pomona, CA 91766 714-629-3900
§ E-A-R Div., Cabot Corp., 7911 Zionsville Rd., Indianapolis, IN 46268 317-872-1111
Easy Heat-Wirekraft, 555 North Michigan St., Lakeville, IN 46536 219-784-3011
Eby Co., 2751 Southampton Rd., Philadelphia, PA 19154 215-969-4200
Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
Enerco, Inc., 9615 W. Marginal Way S., Seattle, WA 98108 206-762-1422
† Environmental Container Sys., Inc., 3560 Rogue River Hwy., Box 188, Grants Pass, OR 97526 503-476-8871
Gasket Intl. Inc., 49 Ackerman St., Bloomfield, NJ 07003 201-338-6814
General Inds., Taylor & Olive St., Elyria, OH 44035 216-323-3136
Globe Plastics, 1342 S. Signal Dr., Pomona, CA 91766 714-623-2747
§ Gries/Dynacast, Div. Coats & Clark Inc., 162 Beechwood Ave., New Rochelle, NY 10801 914-633-8600
Harbison Indl. Prods., Sub. of Polymer Corp., 7205 Hibbs La., Levittown, PA 19057 215-943-9000
Hardigg Inds., Inc., North Main St., South Deerfield, MA 01373 413-665-2163
§ Hobson Bros., 4940 W. Lawrence Ave., Chicago, IL 60630-3884 312-283-3600
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Industrial Elctrn. Engrs., Inc., 7740 Lemona Ave., Van Nuys, CA 91405 818-787-0311
ITT Thermotech, Div. IT & T, 1203 S. 5th St., Hopkins, MN 55343 612-933-9400
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
Kurz-Kasch, Knob Div., 711 Hunter Dr., Wilmington, OH 45177 513-382-0966
LaFrance Corp., Entprs & Exec Aves, Philadelphia, PA 19153 215-365-8000
Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Malco, Div. Microdot Connector Grp., 12 Progress Dr., Montgomeryville, PA 18936 215-699-5373
Manger Elec. Co., Inc., W. Henry St., Stamford, CT 06902 203-348-7761
† Mercury Plastics, A Unit of Zero Corp., 672 Fuller Rd., Chicopee, MA 01020 ....413-592-5118;413-267-5561
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Moldtronics, Inc., 707 Roger St., Downers Grove, IL 60515 312-968-7000
† Norton Chemplast, 31-150 Dey Rd., Wayne, NJ 07470 201-696-4700
§ PacTec Div., LaFrance Corp., Enterprise & Executive Avenues, Philadelphia, PA 19153 215-365-8400
† Parabam, Inc., 3017 E. Las Hermanas St., Rancho Dominguez, CA 90221 213-537-1771
Parsons Mfg., 1055 O'Brien Dr., Menlo Park, CA 94025 415-324-4726
Plastic Forming Co., Inc., 5 Lunar Dr., P.O. Box N, Woodbridge, CT 06525 203-397-1338
† Plastiglide Mfg., 2701 W. El Segundo Blvd., Hawthorne, CA 90250 213-777-8108
† Quantum, Barnes Indl. Pk., Wallingford, CT 06492 203-265-2811
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
Richco Plastic Co., 5825 N. Tripp Ave., Chicago, IL 60646 312-539-4060
† Risk, George, Inds., GRI Plaza, Kimball, NE 69145 308-235-4645
† Ronor Systems, 145 N. Plains Ind. Pk. Rd., Wallingford, CT 06492 203-265-2110

Rostone Corp., P.O. Box 7497, Lafayette, IN 47903 317-474-2421
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
§ SAMTEC, 810 Progress Blvd., P.O. Box 1147, New Albany, IN 47150 812-944-6733
Security Plastics Inc., 14427 N.W. 60th Ave., Miami Lakes, FL 33014 305-823-5440
§† SGL Plastics, Route 248, Nazareth, PA 18064 215-759-0280
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sinclair & Rush, 6900 S. Broadway, St. Louis, MO 63111 314-481-2450
Skydyne Division, AAR/Brooks & Perkins, River Rd., Port Jervis, NY 12771 914-856-6655
Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
† Teledyne Aerospace Sys., 1007 E. 10th St., Fairmont, MN 56031 ....507-235-3355; 07-235-9712;507-238-9494
§ Teledyne Mecca, Box 36393, Houston, TX 77036 713-772-2811
† Unit Inds., 1140 E. Valencia Dr., Fullerton, CA 92631 714-871-4161
Veeco Instrs. Inc., 370 San Aleso Ave., Sunnyvale, CA 94086 408-733-3700
Vernay Laboratories, Inc., S. College St., Yellow Springs, OH 45387 513-767-7261
V-Tron Elctrns. Corp., 84 Fountain St., Pawtucket, RI 02860 401-728-6140
Wells Elctrns., 1701 S. Main St., South Bend, IN 46613 219-287-5941
Wescorp Antistatic Prods., 144 S. Whisman Rd., Mountain View, CA 94041 415-969-7717
Whitso, 9326 Byron St., Schiller Pk., IL 60176 312-678-5200
Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191

Services, Data Processing, Consulting-2050

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204 301-828-0788
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Electrostatic Consltg. Assocs., 556 Lowell Rd., Groton, MA 01450 617-448-5485
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045 213-417-8888
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Services, Decapsulation-4100

Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Integrated Circuit Engrg. Corp. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260 602-998-9780
Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Sigma Plastronics, 14531-33 Tireman Ave, Dearborn, MI 48126 313-846-4410

Services, Electrical Measurement & Test-4100

† Mechanized Electronic Assembly Div., Universal Instrs. Corp., P.O. Box 825, Binghamton, NY 13902, 607-772-7522 .... 3•1926
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
Aetna Engrg., P.O. Box 7749, Van Nuys, CA 91409-7749 818-341-9409
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
† Ark Elctrns. Corp., 1325 Industrial Hwy., Southampton, PA 18966 215-322-6510
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
† Associated Testing Labs., Div. of Kidde, Inc., 53 Second Ave., Burlington, MA 01803 617-272-9050
† Astrolab, 345 Dalziel Rd., Linden, NJ 07036 201-862-0022
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Dash, Straus & Goodhue, Inc., 593 Massachusetts Ave., Boxboro, MA 01719 617-263-2662
† DataCon, Inc., 60 Blanchard Rd., Burlington, MA 01803 617-273-5800
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Dielectric Instr. Corp., 761 Franklin Ave., Pittsburgh, PA 15221 412-731-6566
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Electrostatic Consltg. Assocs., 556 Lowell Rd., Groton, MA 01450 617-448-5485
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
Gabriel Elctrns., Box 70, Scarborough Indl. Pk., Scarborough, ME 04074 207-883-5161
† Genisco Technlg. Corp., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221 213-537-4750
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§† High Rel Burn-In, Riverside Assoc. Inc., 2326 Kruse Dr., San Jose, CA 95131 408-946-1300
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
† Hopkins Engrg., 12900 Foothill Blvd., San Fernando, CA 91342 213-361-8691
† IEC Elctrns., 105 Norton St., Newark, NY 14513 315-331-7742
Instrumentation Measurements Lab., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061 201-757-3730
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
Integrated Circuit Engrg. Corp. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260 602-998-9780
† Intergalactic Corp., Box 7025, Salt Lake City, UT 84107 801-262-0094
† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
† Micrel, Inc., 1235 Midas Way, Sunnyvale, CA 94086 408-245-2500
N.Y. Testing Labs., Inc., 81 Urban Ave., Westbury, NY 11590 516-334-7770
Photon Technlg., 14125 Capri Dr. , Los Gatos, CA 95030 408-866-0566
Proto Systems of Atlanta, 11510 N. Fulton Industrial Blvd., Alpharetta, GA 30201 404-475-1330
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
Siltronics Ltd., P.O. Box 456, Dover, MA 02030 617-329-4068
† Solid State Testing, Inc., 56 Middlesex Tpke., Burlington, MA 01803 617-272-0972
† Spectrum Control, Inc., 2185 W. 8th St., Erie, PA 16505 814-455-0966
Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280
Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
† Technical Research & Mfg., Inc., R.F.D. 0, Manchester, NH 03103 603-627-6000
Transmet Corp., 4290 Perimeter Dr., Columbus, OH 43228 ....614-276-5522; 800-245-5253
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 ....800-631-3096;201-792-2400
U.S. Instr. Rentals, 2988 Campus Dr., San Mateo, CA 94403 415-572-6600
Viking Labs., Inc., 440 Bernardo Ave., Mountain View, CA 94043 415-969-5500

Services, EMI/RFI Testing-4100

Instrument Specialties Co., P.O. Box A, Delaware Water Gap, PA 18327, 717-424-8510 .... 2•1908

Services, Encapsulation-4100

† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818, 402-694-6111 ....1A•1661
Altek Co., P.O. Box 1128, Torrington, CT 06790 203-482-7626
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
Aura Mfg., 50 McDermott Rd., New Haven, CT 06473 203-777-2541
† Bacon Inds., 192 Pleasant St., Watertown, MA 02172-2399 617-926-2550
§† Cable Sys & Assembly, 210 Broadway, Everett, MA 02149 617-389-7080
† Danmar Inds., 9705 Lurline Ave., Chatsworth, CA 91311 .... 818-882-7979/5280
Eastern Delta Corp., 29-09 S. Broadway, Fair Lawn, NJ 07410 201-797-4200
Electrical Plastics Corp., 500 Long Branch Ave., Long Branch, NJ 07740 201-870-9500
Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
Endicott Coil, 22 E. Charlotte St., Binghamton, NY 13905 607-797-1263
† Estes Engrg. Co., 930 Marine Dr., Port Angeles, WA 98362 206-457-0904
Glenmarc Mfg., 330 Melvin Dr., Northbrook, IL 60062 312-272-9030
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
Hightemp Resins, Inc., 225 Greenwich Ave., Stamford, CT 06902 203-357-7401
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Magnetek, 7315 Red Deer Dr., Boulder, CO 80301-4696 303-442-6700
Manger Elec. Co., Inc., W. Henry St., Stamford, CT 06902 203-348-7761
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Nova Tran, 100 Deposition Dr., Clear Lake, WI 54005 715-263-2333
Robison Elctrns., P.O. Box Y, San Luis Obispo, CA 93406 805-544-8000
† Ronor Systems, 145 N. Plains Ind. Pk. Rd., Wallingford, CT 06492 203-265-2110
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
† Sigma Plastronics, 14531-33 Tireman Ave, Dearborn, MI 48126 313-846-4410
§ Techcon Systems Inc., 1059 E. Bedmar St., Carson, CA 90746 213-603-8888
† Teledyne Aerospace Sys., 1007 E. 10th St., Fairmont, MN 56031 ....507-235-3355; 07-235-9712;507-238-9494

Services, Environmental Testing-4100

Delevan Div., American Precision Inds. Inc., 270 Quaker Rd., E. Aurora, NY 14052, 716-652-3600 ....1A•1243
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Elctrn. Labs., Inc., Special Prods. Div., P.O. Box 552, Lansdale, PA 19446 ....
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Ashman Industries (1966) Ltd., 66 Brock Rd., Greensville Dundas, ON Canada 416-628-6371
† Associated Testing Labs., Div. of Kidde, Inc., 53 Second Ave., Burlington, MA 01803 617-272-9050
Atmosphere Controls Prods., 295 Polaris, Mountain View, CA 94043 415-969-2640

Services, Environmental Testing-4100 (Cont'd)

Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
Beckman Instrs., Cedar Grove Opers., 89 Commerce Rd., Cedar Grove, NJ 07009 201-239-6200
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
† Catalyst Research, 1421 Clarkview Rd., Baltimore, MD 21209 301-296-7000
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
DuPont de Nemours, E. I., & Co., 1007 Market St., Wilmington, DE 19898 302-773-3218
Eagle-Picher Inds., Inc., Elctrns. Div., Box 47, Joplin, MO 64801 417-623-8000
§† High Rel Burn-In, Riverside Assoc. Inc., 2326 Kruse Dr., San Jose, CA 95131 408-946-1300
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
† IEC Elctrns., 105 Norton St., Newark, NY 14513 315-331-7742
Instrumentation Measurements Lab., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061 201-757-3730
† Intergalactic Corp., Box 7025, Salt Lake City, UT 84107 801-262-0094
Micrel, Inc., 1235 Midas Way, Sunnyvale, CA 94086 408-245-2500
N.Y. Testing Labs., Inc., 81 Urban Ave., Westbury, NY 11590 516-334-7770
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218 713-492-0550
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
Siltronics Ltd., P.O. Box 456, Dover, MA 02030 617-329-4068
§† Solid State Testing, Inc., 56 Middlesex Tpke., Burlington, MA 01803 617-272-0972
SPEC, Inc., 3014 N. Hayden Rd., Ste. 115, Scottsdale, AZ 85251 602-994-1511
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
† Torwico Elctrns. Inc., Rte. 70, Lakewood, NJ 08701 201-364-1800
† Trio-Tech Intl., 2040 N. Lincoln St., Burbank, CA 91504 818-846-9200
United States Testing Co., Inc., 1415 Park Ave., Hoboken, NJ 07030 ....800-631-3096;201-792-2400
§† UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 408-738-3301
Viking Labs., Inc., 440 Bernardo Ave., Mountain View, CA 94043 415-969-5500
Yardney Battery Div., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891 203-599-1100

Services, Hermetic Sealing-4100

Alberox, New Bedford Ind'l. Pk., New Bedford, MA 02745, 617-995-1725 ... 2•1787
Mini-Systems, Inc., Electronic Package Div., 168 E. Bacon St., P.O. Box 1597, Plainville, MA 02762, 617-695-2000 .... 1A•1666
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
† Centerflex Techn. Corp., 221 Seventh Ave., P.O. Box 21, Hawthorne, NJ 07507 201-423-0505
Ceramaseal, Box 25, New Lebanon Center, NY 12126 518-794-7800
† Connector Inds. of Amer., 639 N. Wayne, Cincinnati, OH 45215 513-733-3680
§† Electrical Inds., 691 Central Ave., Murray Hill, NJ 07974 201-464-3200
† Environmental Comm., 3150 Pullman St., Costa Mesa, CA 92627 714-557-7800
Hermetic Seal, 4232 Temple City Blvd., Rosemead, CA 91770 818-283-0411
§† High Rel Burn-In, Riverside Assoc. Inc., 2326 Kruse Dr., San Jose, CA 95131 408-946-1300
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Laser Inc., Laser Lane, Box 537, Sturbridge, MA 01566 617-347-7314
† Line Elec. Prods., G. General Electro-Components, Inc., 122 Naubuc Ave., Glastonbury, CT 06033 203-659-3573
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013 717-243-5929
Siltronics Ltd., P.O. Box 456, Dover, MA 02030 617-329-4068
† Solid State Testing, Inc., 56 Middlesex Tpke., Burlington, MA 01803 617-272-0972
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
Wilbrecht Elctrns., 240 Plato Blvd., St. Paul, MN 55107 612-222-2791

Services, High Vacuum-4100

Alberox, New Bedford Ind'l. Pk., New Bedford, MA 02745, 617-995-1725 ... 2•1787
† Associated Testing Labs., Div. of Kidde, Inc., 53 Second Ave., Burlington, MA 01803 617-272-9050
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
† Evaporated Coatings, 798 Welsh Rd., Huntingdon Valley, PA 19006 215-947-1465
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 617-272-1313
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Lebow Co., 38 Gerald Cass Pl., Goleta, CA 93117 805-964-7117
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
Metavac, Inc., 45-68 162nd St., Flushing, NY 11358 ....212-HI5-0400
N.Y. Testing Labs., Inc., 81 Urban Ave., Westbury, NY 11590 516-334-7770
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720

Services, Instrument Design (Industrial)-4100

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
Active Control Instrmn., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037 305-451-1000
Aetna Engrg., P.O. Box 7749, Van Nuys, CA 91409-7749 818-341-9409
Altek Co., P.O. Box 1128, Torrington, CT 06790 203-482-7626
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 206-363-0217
Astro-Geo-Marine, Inc., 202 E. Cota St., Santa Barbara, CA 93101 805-965-7005
A-Systems Inc., Box 13, Ivy, VA 22945 804-295-7200
Automation Assocs., 1212 Westheimer 20, Austin, TX 78752 512-458-4412
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
B & G Precision Elctrns., 538 Maple Ave., Doylestown, PA 18901 215-348-4413
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
Beechwood Mfg., 310 S. Ohmer, Indianapolis, IN 46219 317-356-2493
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
Crestron Elec., 101 Broadway, Cresskill, NJ 07626 201-894-0660
Da-Tech Corp., 92 Steamwhistle Dr., Ivyland, PA 18974 215-322-9410
Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 814-453-7547
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Dielectric Instr. Corp., 761 Franklin Ave., Pittsburgh, PA 15221 412-731-6566
Electronic Wattmeter Co., 2275 Sixth St., Sarasota, FL 33577 813-953-5355
Electrostatic Consltg. Assocs., 556 Lowell Rd., Groton, MA 01450 617-448-5485
Epsilon-Lambda Elctrns. Corp., 427 Stevens St., Geneva, IL 60134 312-232-9611
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
† Intergalactic Corp., Box 7025, Salt Lake City, UT 84107 801-262-0094
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
§ Macrodyne, 1004 Princetown Rd., Schenectady, NY 12301 518-356-3500
Matrix Corp., 1639 Green St., Raleigh, NC 27603 919-833-2837
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
Micrologic, Inc., 123 Water St., Watertown, MA 02172 617-923-1700
Optimum Applied Systems, 145 Palisade St., Dobbs Ferry, NY 10522-1696 914-693-9001
§ PacTec Div., LaFrance Corp., Enterprise & Executive Avenues, Philadelphia, PA 19153 215-365-8400
Photon Technlg., 14125 Capri Dr. , Los Gatos, CA 95030 408-866-0566
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
RMS Techn., 706 Industry Dr., Hampton, VA 23661 804-838-2458
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Sensor Electronics, Inc., 105 Fairway Terrace, Mt. Laurel, NJ 08054 609-778-0850
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
West-Tronics, Inc., 215 Park St., Bensenville, IL 60106 312-860-3560
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 713-729-1183

Services, Metal Etching, Engraving-4100

American Etching & Mfg., 13730 Desmond St., Pacoima,, CA 91331 213-896-1187
Apahouser-Elcom, Inc., 101 Walnut St., Watertown, MA 02172 617-924-1500
Bell Co., Inc., 106 Morrow Ave., Box 92E, Trussville, AL 35173 205-655-2135
§† Berg, W. M., Inc., 499 Ocean Ave., East Rockaway, NY 11518 516-599-5010
§† Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903 201-249-6600
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
† JRW Inds., Inc., 2312 N Second St., Harrisburg, PA 17110 717-236-1418
† Mechanical Engraving, 4500 Bullard Ave, Bronx, NY 10470 212-324-4455
§† Miller Dial Corp., 4400 N. Temple City Blvd., El Monte, CA 91734 818-283-5111
† Photo Chem. Prods. Cal., 18031 Susana Rd., Compton, CA 90224 .213-603-0400
Risk, George, Inds., GRI Plaza, Kimball, NE 69145 308-235-4645
† Tech-Etch Inc., 45 Aldrin Rd., Plymouth, MA 02360 617-747-0300
Technar Inc., 205 N. 2nd Ave., Arcadia, CA 91006 818-445-1143
Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191

Services, Metal Parts Fabrication-4100

Auto-Swage Prods., 726 River Rd., Shelton, CT 06484, 203-929-1401 .... 2•1860
Birtcher Corp., 4501 N. Arden Dr., El Monte, CA 91731, 818-575-8144 .... 2•1016
Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646, 312-539-3108 .... 2•1244
Mueller Elec. Co., 1583 E 31st St., Dept. 20, Cleveland, OH 44114, 216-771-5225 .... 3•1265
Techmar Corp., 2232 S. Cotner Ave., Los Angeles, CA 90064, 213-478-0046; 800-TECHMAR .... 2•1063
† Aaba Components Corp., P.O. Box 171, Baldwin Place, NY 10505 914-628-6952
§† Abalon Precision Mfg., 540 Casanova St., Bronx, NY 10474 212-589-5682
Accessories for Elctrns., Inc., 800 Merrick Rd., Baldwin, NY 11510 .516-546-1751
† Accumet Engrg., 518 Main St., Hudson, MA 01749 617-568-8311
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
Acme Model Engrg. Co., 654 Bergen Blvd., Ridgefield, NJ 07657 201-943-7650
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160

† American Aluminum, 230 Sheffield St., Dept. EEM, Mountainside, NJ 07092 201-233-3500
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
American Etching & Mfg., 13730 Desmond St., Pacoima, CA 91331 213-896-1187
Apahouser-Elcom, Inc., 101 Walnut St., Watertown, MA 02172 617-924-1500
Art Wire/Doduco, 9 Wing Dr., Cedar Knolls, NJ 07927 201-267-2000
Assem-Pro Instrs., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124 408-267-1168
§† Associated Spring, Barnes Grp., 18 Main St., Bristol, CT 06010 203-583-1331
† Astro Dynamics, Inc., 2 Gill St., Woburn, MA 01801 617-935-4944
Beechwood Mfg., 310 S. Ohmer, Indianapolis, IN 46219 317-356-2493
§† Berg, W. M., Inc., 499 Ocean Ave., East Rockaway, NY 11518 516-599-5010
BICC-Vero Elctrns., Inc., 171 Bridge Rd., Hauppauge, NY 11788 516-234-0400
Boker's, Inc., 3104 Snelling Ave., Minneapolis, MN 55406 612-729-9365
† Braxton Mfg., Echo Lake Rd. N., Watertown, CT 06795 203-274-6781
§ Brooks Mfg. Co., 2016/24 Amber St., Philadelphia, PA 19125 ....215-425-3395; 800-523-0130
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 617-667-4111
§ Bud Inds., Inc., 4605 E. 355th St., Willoughby, OH 44094 216-946-3200
§† Bud Radio, 4605 E. 355th St., Willoughby, OH 44094 216-946-3200
Cabot Berylco, Div. Cabot Corp., PO Box 1296, Reading, PA 19603 215-921-5000
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
Compac, 279 Skidmore Rd., Deer Park, NY 11729 516-667-3933
§ Dayco Corp., 333 W. First St., Dayton, OH 45402 513-226-5927
Delbert Blinn Co., Box 2007, Pomona, CA 91766 714-629-3900
Dielectric Instr. Corp., 761 Franklin Ave., Pittsburgh, PA 15221 412-731-6566
Drawn Metal Products, 6143 W. Howard St., Niles, IL 60648 312-647-8941
§† Electronic Enclosures, Div. Wyle Labs, 225 South Aviation Blvd., El Segundo, CA 90245 213-643-8181
Electronics Stamping Corp., Sub. of Buckbee-Mears Co., 19920 S. Alameda St., Rancho Dominguez, CA 90220 213-639-2120
§† Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903 201-249-6600
Framar Metal Prods., 124 W. Main St., Dept. 1201, High Bridge, NJ 08829 201-638-6688
Gabriel Elctrns., Box 70, Scarborough Indl. Pk., Scarborough, ME 04074 207-883-5161
General Electric Co., Lamp Comps. & Technical Prods. Div. Sls. Oper., 21800 Tungsten Rd., Cleveland, OH 44117 216-266-2451
† GTI/Elctrns. Div., P.O. Box 96, Hadley, PA 16130 412-253-3161
† Handy & Harman Elctrn. Matls. Corp., 72 Elm St. N., Atteboro, MA 02760 617-695-1401
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hobson Bros., 4940 W. Lawrence Ave., Chicago, IL 60630-3884 312-283-3600
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
IMEC Corp., 2434 Southport Way, National City, CA 92050 619-474-8991
Intl. Elctrn. Resch., 135 W. Magnolia Blvd., Burbank, CA 91502 213-849-2481
Jettron Prods., P.O. Box 337, E. Hanover, NJ 07936 201-887-0571
JMJ Technical Prods., P.O. Box 26, Kendall Park, NJ 08824 201-589-4257
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
Ken-Tron Mfg., Inc., 1204 Industrial Dr., Owensboro, KY 42301 502-684-0431
LaFrance Corp., Entprs & Exec Aves, Philadelphia, PA 19153 215-365-8000
Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
Matrix Engineering Corp., 17000 S. Western Ave. 19, Gardena, CA 90247 213-770-0521
Maxwell Labs., 8835 Balboa Ave., San Diego, CA 92123 619-279-5100
† Mechanical Engraving, 4500 Bullard Ave, Bronx, NY 10470 212-324-4455
§† Miller Dial Corp., 4400 N. Temple City Blvd., El Monte, CA 91734 818-283-5111
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
NKR Precision Mfg., Rte. 17M, Box 333, Harriman, NY 10926 914-782-8562
§ Norelcom Inds., 63 Marine St., Farmingdale, NY 11735 516-249-7245
§† Philips Elmet, 1560 Lisbon Rd., Lewiston, ME 04240 207-784-3591
† Photo Chem. Prods. Cal., 18031 Susana Rd., Compton, CA 90224 213-603-0400
Plastiglide Mfg., 2701 W. El Segundo Blvd., Hawthorne, CA 90250 213-777-8108
Precision Extrusions, Inc., Box 120, Bensenville, IL 60106 312-766-0340
§† PTS Electronics Inc., Box 272, Bloomington, IN 47401 812-824-9331
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
§ Schroff UK Ltd., Maylands Ave., Hemel Hempstead, Herts, HP2 4SG England 0442-40471/6
Sjoberg, C., & Son, Inc., 415 Station St., Cranston, RI 02910 401-461-8220
South Shore Metal Prods., 88 E Allen Blvd., Farmingdale, NY 11735 516-249-3322
† SRS Industries, Inc., 903 S. Alta Vista Ave., Monrovia, CA 91016 213-357-3287
Staver Co., Inc., 47 Saxon Ave., Bay Shore, NY 11706 516-666-8000
Suckle Corp., 733 Davis St., Dept. EM, Scranton, PA 18505 717-346-3871
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
Ten-Tec, Industrial Park, Sevierville, TN 37862 615-453-7172
T-F Elctrns., 9415 Neils Thompson Dr., Austin, TX 78759 512-836-7323
† Titchener, E. H., & Co., 1 Titchener Pl., Binghamton, NY 13902 607-772-1161
† Wilkinson, P.O. Box 4558, Westlake Village, CA 91359 ....818-889-0050; 800-822-4653
§† Zenrad Circuits Co., 529 E. Gutierrez St., Santa Barbara, CA 93103 805-963-3527
† Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191
Zierick Mfg. Corp., 44 Radio Circle, Mt. Kisco, NY 10549 914-666-2911

Services, Metallizing (Incl. Electroforming)-4100

Alberox, New Bedford Ind'l. Pk., New Bedford, MA 02745, 617-995-1725 ... 2•1787
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818, 402-694-6111 .... 1A•1661
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
Ceramaseal, Box 25, New Lebanon Center, NY 12126 518-794-7800
† Craig Sys., 360 Merrimack St., Lawrence, MA 01842 617-688-6961
E/M Lubricants, Inc., Div. of Great Lakes Chemical Corp., Highway 52 NW, W. Lafayette, IN 47906 317-463-2511
Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 516-794-4500
Fresnel Optics, Div. of Alliance Tool Corp., 1300 Mt. Read Blvd., Rochester, NY 14606 716-647-1140
† Hermetic Seal, 4232 Temple City Blvd., Rosemead, CA 91770 818-283-0411
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hybrid Svcs. Inc., 38 Main St., North Reading, MA 01864 617-664-5500
Keene Laminates, Keene Corp., 199 Amaral St., E. Providence, RI 02914 800-556-7683
Lebow Co., 38 Gerald Cass Pl., Goleta, CA 93117 805-964-7117
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761 617-695-0203
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013 717-243-5929
† Servometer Corp., 501 Little Falls Rd., Cedar Grove, NJ 07009 201-785-4630
Thickfilm Int'l., Rt. 1-Box 85-0, Indian Head, MD 20640 301-375-8666

Services, Microprocessor-4100

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
Wintek Corp., 1801 South St., Lafayette, IN 47904-2993, 317-742-8428 .... 3•1118
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 206-363-0217
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
A-Systems Inc., Box 13, Ivy, VA 22945 804-295-7200
Automation Assocs., 1212 Westheimer 20, Austin, TX 78752 512-458-4412
AVCO-Elctrns. Div., 4807 Bradford Dr., Huntsville, AL 35805 205-837-6500
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
§ Boston Systems Office, 469 Moody St., Waltham, MA 02154 617-894-7800
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204 301-828-0788
Computer Maintenance Corp., 111-117 Enterprise Ave. S., Secaucus, NJ 07094 201-866-6400
Corby Inds. Inc., P. O. Box 2838, Allentown, PA 18001 215-433-1412
Crestron Elec., 101 Broadway, Cresskill, NJ 07626 201-894-0660
Design Automation, 809 Massachusetts Ave., Lexington, MA 02173-3992 617-862-8998
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 213-670-8611
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
Innovative Electronics, Inc., 4714 N.W. 165th St., Miami, FL 33014 305-624-1644
Instrumentation Measurements Lab., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061 201-757-3730
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045 213-417-8888
Matrix Corp., 1639 Green St., Raleigh, NC 27603 919-833-2837
Micro Computer Rentals, 742D Hampshire Rd., Westlake Village, CA 91361 213-991-1704
Micrologic, Inc., 123 Water St., Watertown, MA 02172 617-923-1700
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
§ Midland Standard, Inc., 603 E. Chicago St., Box 38, Elgin, IL 60120 312-741-6600
Monolithic Sys., 84 Inverness Circle E., Englewood, CO 80112 303-790-7400
Qwint Systems, 3693 Commercial Ave., Northbrook, IL 60062 312-498-5060
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
RMS Techn., 706 Industry Dr., Hampton, VA 23661 804-838-2458
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 805-466-3209
Summit CAD Corp., 5222 FM 1960 W100, Houston, TX 77069 713-440-1468
† Sylvania Sys. Grp., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194 617-449-2000
TechniServ Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0032
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600

Services, Molding-4100

† AME Corp., 101 E. Main St., Little Falls, NJ 07424, 201-256-3939 .... 1B•1515
Robison Elctrns., P.O. Box Y, San Luis Obispo, CA 93406, 805-544-8000 ... 2•1887
Accessories for Elctrns., Inc., 800 Merrick Rd., Baldwin, NY 11510 516-546-1751
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
Alden Products Co., P.O. Box 860, 117 N. Main St., Brockton, MA 02403 617-583-0160

Almor Co., Inc., PO Box 1790, 155 Crescent St., Brockton, MA 02403 617-586-5406
Amerex, P.O. Box 2815, Riverside, CA 92516 714-686-1400
American Electric Cable Co., 181 Appleton St., Holyoke, MA 01040 413-539-9893
† Atlantic Optical Moulding, Ellis St., P.O. Box 309, Dudley, MA 01570 617-943-1746
Aura Mfg., 50 McDermott Rd., New Haven, CT 06473 203-777-2541
Beman Mfg., P.O. Box 370, New Cumberland, PA 17070 717-938-1451
§† Cable Sys & Assembly, 210 Broadway, Everett, MA 02149 617-389-7080
Communications Technology Corp., 2237 Colby Ave., Los Angeles, CA 90064 213-478-5061
Component Mfg. Svc., Inc., 1 Component Park, W. Bridgewater, MA 02379 617-580-0111
† Danmar Inds., 9705 Lurline Ave., Chatsworth, CA 91311 ....818-882-7979/5280
Delbert Blinn Co., Box 2007, Pomona, CA 91766 714-629-3900
Dixon Inds., 386 Metacom Ave., Bristol, RI 02809 401-253-2000
Easy Heat-Wirekraft, 555 North Michigan St., Lakeville, IN 46536 ..219-784-3011
Electrical Plastics Corp., 500 Long Branch Ave., Long Branch, NJ 07740 201-870-9500
† Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
Gasket Intl. Inc., 49 Ackerman St., Bloomfield, NJ 07003 201-338-6814
Globe Plastics, 1342 S. Signal Dr., Pomona, CA 91766 714-623-2747
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
ITT Thermotech, Div. IT & T, 1203 S. 5th St., Hopkins, MN 55343 ..612-933-9400
† Jettron Prods., P.O. Box 337, E. Hanover, NJ 07936 201-887-0571
LaFrance Corp., Entprs & Exec Aves, Philadelphia, PA 19153 215-365-8000
Loranger Mfg., Box 948, Warren, PA 16365 814-723-2250
Malco, Div. Microdot Connector Grp., 12 Progress Dr., Montgomeryville, PA 18936 215-699-5373
Midway Mfr. Co., 10750 W. Grand Ave., Franklin Park, IL 60131 312-451-1360
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
MoldCon Corp., 221 Interstate Dr., W. Springfield, MA 01089 413-736-0371
† Moldtronics, Inc., 707 Roger St., Downers Grove, IL 60515 312-968-7000
National Wire & Cable Corp., 136 San Fernando Rd., Los Angeles, CA 90031-1780 213-225-5611
† Norton Chemplast, 31-150 Dey Rd., Wayne, NJ 07470 201-696-4700
§ PacTec Div., LaFrance Corp., Enterprise & Executive Avenues, Philadelphia, PA 19153 215-365-8400
† Plastiglide Mfg., 2701 W. El Segundo Blvd., Hawthorne, CA 90250 .213-777-8108
Polymer Corp., P.O. Box 422, Reading, PA 19603 215-320-6600
† Quantum, Barnes Indl. Pk., Wallingford, CT 06492 203-265-2811
† Q.V.S., Inc., 20 North 15th St., East Orange, NJ 07017 201-673-3996
Republic Packaging Corp., 9160 S. Green St., Chicago, IL 60620 ...312-233-6530
§ Risk, George, Inds., GRI Plaza, Kimball, NE 69145 308-235-4645
† Ronor Systems, 145 N. Plains Ind. Pk. Rd., Wallingford, CT 06492 .203-265-2110
§† Rose Enclosures Sys., Inc., 12140 Parklawn Dr., Rockville, MD 20852 301-984-1783
Rostone Corp., P.O. Box 7497, Lafayette, IN 47903 317-474-2421
† Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612 419-729-9761
§ SAMTEC, 810 Progress Blvd., P.O. Box 1147, New Albany, IN 47150 812-944-6733
Security Plastics Inc., 14427 N.W. 60th Ave., Miami Lakes, FL 33014 305-823-5440
§† SGL Plastics, Route 248, Nazareth, PA 18064 215-759-0280
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
† Skydyne Division, AAR/Brooks & Perkins, River Rd., Port Jervis, NY 12771 914-856-6655
§ Support Systems Intl. Corp., 150 South Second St., Richmond, CA 94804 415-234-9090
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
† Teledyne Aerospace Sys., 1007 E. 10th St., Fairmont, MN 56031 ..507-235-3355; 07-235-9712;507-238-9494
Useco Div., Litton Inds, 13536 Saticoy St, Van Nuys, CA 91409 213-786-9388
V-Tron Elctrns. Corp., 84 Fountain St., Pawtucket, RI 02860 401-728-6140
Wells Elctrns., 1701 S. Main St., South Bend, IN 46613 219-287-5941
§ Wescorp Antistatic Prods., 144 S. Whisman Rd., Mountain View, CA 94041 415-969-7717

Services, Packaging-4100

† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818, 402-694-6111 ....1A•1661
Mini-Systems, Inc., Electronic Package Div., 168 E. Bacon St., P.O. Box 1597, Plainville, MA 02762, 617-695-2000 ....1A•1666
§ Augat Inc., 33 Perry Ave., Box 779, Attleboro, MA 02703 617-222-2202
Aura Mfg., 50 McDermott Rd., New Haven, CT 06473 203-777-2541
Barnes & Reinecke, Inc., 2375 Estes Ave., Elk Grove Village, IL 60007 312-640-7200
Datatex Corp., 10935 S. Wilcrest Dr., Houston, TX 77099 713-495-3100
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
† Gordon, L., Packaging, 1050 S. Paca St., Baltimore, MD 21230 301-539-6537
Gries/Dynacast, Div. Coats & Clark Inc., 162 Beechwood Ave., New Rochelle, NY 10801 914-633-8600
Hardigg Inds., Inc., North Main St., South Deerfield, MA 01373 413-665-2163
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
† Hughes Aircraft Co. Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
† IEC Elctrns., 105 Norton St., Newark, NY 14513 315-331-7742
Integrated Circuit Engrg. Corp. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260 602-998-9780
† Isotronics, Industrial Park, New Bedford, MA 02745 617-998-2000
† Mel Tec, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090 617-329-1508
† Mercury Plastics, A Unit of Zero Corp., 672 Fuller Rd., Chicopee, MA 01020 ....413-592-5118;413-267-5561
Micro-Mounting Devices, 4092 Keith Dr., Campbell, CA 95008 408-866-4626
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
Parsons Mfg., 1055 O'Brien Dr., Menlo Park, CA 94025 415-324-4726
Precicontact, Inc., Ultra Precision, 1150 Wheeler Way, Langhorne, PA 19047 215-757-1202
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013 717-243-5929
Republic Packaging Corp., 9160 S. Green St., Chicago, IL 60620 ...312-233-6530
Siltronics Ltd., P.O. Box 456, Dover, MA 02030 617-329-4068
Skydyne Division, AAR/Brooks & Perkins, River Rd., Port Jervis, NY 12771 914-856-6655
Sylvania Electronic, Box 360, Muncy, PA 17756 717-546-3191
§ Tra-Con, Inc., 55 North St., Medford, MA 02155 617-391-5550
United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 214-350-4978
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 607-775-1102
Wescorp Antistatic Prods., 144 S. Whisman Rd., Mountain View, CA 94041 415-969-7717
† Zero Corp., 777 Front St., Burbank, CA 91503 213-846-4191

Services, Photographic-4100

Electro Mechanical Design Services, Inc., 16698 Oakmont Ave., Gaithersburg, MD 20877, 301-840-5710 ....3•1221
ESSCO Inds., P.O. Box 515, Sierra Madre, CA 91024-0515 818-355-8315
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
Photronic Labs., Secor Rd., Brookfield Ctr., CT 06805 203-775-0465
Precision Micro Images, Box 1330, Altamonte Springs, FL 32701 305-830-7244

Services, Plastics Fabrication-4100

Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646, 312-539-3108 ....2•1244
† Aaba Components Corp., P.O. Box 171, Baldwin Place, NY 10505 ..914-628-6952
Accessories for Elctrns., Inc., 800 Merrick Rd., Baldwin, NY 11510 .516-546-1751
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036 216-365-1211
Amerex, P.O. Box 2815, Riverside, CA 92516 714-686-1400
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
† Anchor Specialty Mfg. Inc., 300 Hollister Rd., Teterboro, NJ 07608 201-288-1939
Apahouser-Elcom, Inc., 101 Walnut St., Watertown, MA 02172 617-924-1500
Assem-Pro Instrs., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124 408-267-1168
Atmosphere Controls Prods., 295 Polaris, Mountain View, CA 94043 415-969-2640
Bell Co., Inc., 106 Morrow Ave., Box 92E, Trussville, AL 35173 205-655-2135
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
† Cadillac Plastic & Chem., 1221 Bowers St., P.O. Box P-2020, Birmingham, MI 48012 313-646-5100
Communications Technology Corp., 2237 Colby Ave., Los Angeles, CA 90064 213-478-5061
† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006 ....201-CA8-0321
Dixon Inds., 386 Metacom Ave., Bristol, RI 02809 401-253-2000
§ E-A-R Div., Cabot Corp., 7911 Zionsville Rd., Indianapolis, IN 46268 317-872-1111
Ericson Mfg. Co., 4215 Hamann Pkwy., Willoughby, OH 44094 216-951-8000
† Estes Engrg. Co., 930 Marine Dr., Port Angeles, WA 98362 206-457-0904
Gasket Intl. Inc., 49 Ackerman St., Bloomfield, NJ 07003 201-338-6814
Globe Plastics, 1342 S. Signal Dr., Pomona, CA 91766 714-623-2747
Harbison Indl. Prods., Sub. of Polymer Corp., 7205 Hibbs La., Levittown, PA 19057 215-943-9000
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
ITT Thermotech, Div. IT & T, 1203 S. 5th St., Hopkins, MN 55343 ..612-933-9400
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
§† Keystone Elctrns. Corp., 49 Bleecker St., New York, NY 10012 212-475-4600
LaFrance Corp., Entprs & Exec Aves; Philadelphia, PA 19153 215-365-8000
Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Mantex Corp., 1800 Metamora Rd., P.O. Box 15E, Oxford, MI 48051 313-628-9711
§† Mechanical Engraving, 4500 Bullard Ave, Bronx, NY 10470 212-324-4455
† Mercury Plastics, A Unit of Zero Corp., 672 Fuller Rd., Chicopee, MA 01020 ....413-592-5118;413-267-5561
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† Moldtronics, Inc., 707 Roger St., Downers Grove, IL 60515 312-968-7000
§ Norelcom Inds., 63 Marine St., Farmingdale, NY 11735 516-249-7245
† Norton Chemplast, 31-150 Dey Rd., Wayne, NJ 07470 201-696-4700
† Parabam, Inc., 3017 E. Las Hermanas St., Rancho Dominguez, CA 90221 213-537-1771
Parsons Mfg., 1055 O'Brien Dr., Menlo Park, CA 94025 415-324-4726
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
† Penntube Plastics, Madison Ave. & Holly St., Clifton Heights, PA 19018 215-622-2300
† Photo Chem. Prods. Cal., 18031 Susana Rd., Compton, CA 90224 .213-603-0400
Polymer Corp., P.O. Box 422, Reading, PA 19603 215-320-6600

§† PTS Electronics Inc., Box 272, Bloomington, IN 47401	812-824-9331
† Quantum, Barnes Indl. Pk., Wallingford, CT 06492	203-265-2811
Quartzite Processing, Inc., 6 Holyoke St., Malden, MA 02148	617-322-1380
Republic Packaging Corp., 9160 S. Green St., Chicago, IL 60620	312-233-6530
Rogers Corp., One Technology Dr., Rogers, CT 06263	203-774-9605
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070	201-933-2091
§ SAMTEC, 810 Progress Blvd., P.O. Box 1147, New Albany, IN 47150	812-944-6733
Security Plastics Inc., 14427 N.W. 60th Ave., Miami Lakes, FL 33014	305-823-5440
SGL Homalite, Div. of SGL Inds., 11 Brookside Dr., Wilmington, DE 19804	302-652-3686
§† SGL Plastics, Route 248, Nazareth, PA 18064	215-759-0280
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021	516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530	914-681-0700
Sjoberg, C., & Son, Inc., 415 Station St., Cranston, RI 02910	401-461-8220
† Skydyne Division, AAR/Brooks & Perkins, River Rd., Port Jervis, NY 12771	914-856-6655
Spruce Pine Mica Co., Mtn. Laurel Dr., Spruce Pine, NC 28777	704-765-4241
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462	215-825-4990
§ Teledyne Mecca, Box 36393, Houston, TX 77036	713-772-2811
Wescorp Antistatic Prods., 144 S. Whisman Rd., Mountain View, CA 94041	415-969-7717
Zero Corp., 777 Front St., Burbank, CA 91503	213-846-4191

Services, Plating-4100

† **Auto-Swage Prods., 726 River Rd., Shelton, CT 06484, 203-929-1401**	**2•1860**
Additive Products Div., Kollmorgen Corp., P.O. Box 700, West La., Aquebogue, NY 11931	516-722-4100
American Electronic Labs., Box 552, Lansdale, PA 19446	215-822-2929
§† Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903	201-249-6600
Gries/Dynacast, Div. Coats & Clark Inc., 162 Beechwood Ave., New Rochelle, NY 10801	914-633-8600
† Handy & Harman Elctrn. Matls. Corp., 72 Elm St. N., Atteboro, MA 02760	617-695-1401
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009	213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715	714-752-3800
† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235	717-386-4156; 215-377-5990
Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966	215-355-0200
Reeves-Hoffman Div., 400 W. North St., Carlisle, PA 17013	717-243-5929
Waldes Kohinoor, 47-16 Austel Pl., Long Island City, NY 11101	212-392-3100
§ Zenrad Circuits Co., 529 E. Gutierrez St., Santa Barbara, CA 93103	805-963-3527

Services, Precious Metal Refining-4100

Eastern Smelting & Refining Corp., 37-39 Bubier St., Lynn, MA 01901	617-599-9000
† ERM, 27 Water St., Wakefield, MA 01880	617-246-3550
Handy & Harman, 850 Third Ave., New York, NY 10022	212-752-3400
† Technic, Inc., Box 965, Providence, RI 02901	401-781-6100

Services, Precious Metal Resmelting-4100

Eastern Smelting & Refining Corp., 37-39 Bubier St., Lynn, MA 01901	617-599-9000
† ERM, 27 Water St., Wakefield, MA 01880	617-246-3550
† Technic, Inc., Box 965, Providence, RI 02901	401-781-6100

Services, PROM & Array Programming-4100

Eastern Electronics Mfg. Corp., 180 Roberts St., East Hartford, CT 06108	203-528-9821

Services, Qualification — See Services, Environmental Testing (Vol. 3)

Services, RFI Measuring — See Services, Electrical Measurement & Test (Vol. 3)

Services, Silk Screening-4100

† **International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818, 402-694-6111**	**1A•1661**
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909	517-332-6405
Accurate Elctrns., 169 S. Abbe Rd., P.O. Box 1287, Elyria, OH 44036	216-365-1211
Allied Systems Corp., Box 18077, Greensboro, NC 27419	919-299-2294
American Electronic Labs., Box 552, Lansdale, PA 19446	215-822-2929
Apahouser-Elcom, Inc., 101 Walnut St., Watertown, MA 02172	617-924-1500
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720	617-263-9100
Beechwood Mfg., 310 S. Ohmer, Indianapolis, IN 46219	317-356-2493
Bell Co., Inc., 106 Morrow Ave., Box 92E, Trussville, AL 35173	205-655-2135
Birtcher Corp., 4501 N. Arden Dr., El Monte, CA 91731	818-575-8144
Component General, Inc., 13620 Wright Cir., Tampa, FL 33625	813-855-6655
† Devco Engrg., Control Sys. Div., 36 Pier Lane West, Fairfield, NJ 07006	201-CA8-0321
E/M Lubricants, Inc., Div. of Great Lakes Chemical Corp., Highway 52 NW, W. Lafayette, IN 47906	317-463-2511
GECO, 145 Penn St., Millheim, PA 16854	814-349-5555
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882	201-689-0110
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009	213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715	714-752-3800
Hybrid Svcs. Inc., 38 Main St., North Reading, MA 01864	617-664-5500
JMJ Technical Prods., P.O. Box 26, Kendall Park, NJ 08824	201-589-4257

† Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235	717-386-4156; 215-377-5990
Mac Panel Co., Box 5027, 216 Pine St., High Point, NC 27262	919-884-8111
§† Mechanical Engraving, 4500 Bullard Ave, Bronx, NY 10470	212-324-4455
§† Miller Dial Corp., 4400 N. Temple City Blvd., El Monte, CA 91734	818-283-5111
† Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966	215-355-0200
Mini-Systems, Inc., 20 David Rd., North Attleboro, MA 02761	617-695-0203
Pannier Corp., Graphics Div., John Fitch Industrial Park, Warminster, PA 18974	215-672-3600
† Photo Chem. Prods. Cal., 18031 Susana Rd., Compton, CA 90224	213-603-0400
Photronic Labs., Secor Rd., Brookfield Ctr., CT 06805	203-775-0465
Precision Micro Images, Box 1330, Altamonte Springs, FL 32701	305-830-7244
† PSG Inds., 1225 Tunnel Road, Perkasie, PA 18944	215-257-3621
§† Rose Enclosures Sys., Inc., 12140 Parklawn Dr., Rockville, MD 20852	301-984-1783
Thickfilm Int'l., Rt. 1-Box 85-0, Indian Head, MD 20640	301-375-8666
† Virginia Panel, 1400 New Hope Rd., Waynesboro, VA 22980	703-949-8376
§ Zenrad Circuits Co., 529 E. Gutierrez St., Santa Barbara, CA 93103	805-963-3527
† Zero Corp., 777 Front St., Burbank, CA 91503	213-846-4191

Services, Computer Systems Integration-2025

Comp-U-Staff, 1 Investment Pl., Towson, MD 21204	301-828-0788
Computer Maintenance Corp., 111-117 Enterprise Ave. S., Secaucus, NJ 07094	201-866-6400
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630	714-827-2135
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362	818-889-3179
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201	503-226-3515
Instrumentation Measurements Lab., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061	201-757-3730
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441	815-838-0005

Services, Training/Education-4100

B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013	203-673-7151
Comp-U-Staff, 1 Investment Pl., Towson, MD 21204	301-828-0788
Dash, Straus & Goodhue, Inc., 593 Massachusetts Ave., Boxboro, MA 01719	617-263-2662
Data-Design Labs., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730	714-987-2511
Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada	613-226-4000
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362	818-889-3179
Instrumentation Measurements Lab., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061	201-757-3730
Integrated Circuit Engrg. Corp. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260	602-998-9780
§ Integrated Computer Systems, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045	213-417-8888
† Microwave Filter Inc., 6743 Kinne St., East Syracuse, NY 13057	315-437-4529; 800-448-1666
Pro-Log, 2411 Garden Rd., Monterey, CA 93940	408-372-4593
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422	805-466-3209
SPEC, Inc., 3014 N. Hayden Rd., Ste. 115, Scottsdale, AZ 85251	602-994-1511
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440	513-426-6000

Services, Vibration Surveys-4100

American Electronic Labs., Box 552, Lansdale, PA 19446	215-822-2929
† Associated Testing Labs., Div. of Kidde, Inc., 53 Second Ave., Burlington, MA 01803	617-272-9050
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423	702-782-3611
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009	213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715	714-752-3800
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431	513-426-2405
† Intergalactic Corp., Box 7025, Salt Lake City, UT 84107	801-262-0094
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107	818-795-2220
N.Y. Testing Labs., Inc., 81 Urban Ave., Westbury, NY 11590	516-334-7770
Rowe Industries, Inc., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612	419-729-9761
† Torwico Elctrns. Inc., Rte. 70, Lakewood, NJ 08701	201-364-1800
Viking Labs., Inc., 440 Bernardo Ave., Mountain View, CA 94043	415-969-5500

Services, Wire Cutting & Stripping-4100

† **GSI Corp., 1917 Greenspring Dr., Timonium, MD 21093, 301-252-1768**	**2•2102**
† Accurassembly, 9525 Cozycroft Ave., Chatsworth, CA 91311	818-700-0708
Acme Model Engrg. Co., 654 Bergen Blvd., Ridgefield, NJ 07657	201-943-7650
Allied Systems Corp., Box 18077, Greensboro, NC 27419	919-299-2294
Almor Co., Inc., PO Box 1790, 155 Crescent St., Brockton, MA 02403	617-586-5406
Altek Co., P.O. Box 1128, Torrington, CT 06790	203-482-7626
American Electric Cable Co., 181 Appleton St., Holyoke, MA 01040	413-539-9893
† American Monarch, 2801-37th Ave., N.E., Minneapolis, MN 55421	612-788-9161
† Art Wire/Doduco, 9 Wing Dr., Cedar Knolls, NJ 07927	201-267-2000
Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720	617-263-9100
B & G Precision Elctrns., 538 Maple Ave., Doylestown, PA 18901	215-348-4413
§† Brim Elctrns., 120E Home Pl., Lodi, NJ 07644	201-796-2886
† Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037	203-828-6379
Connector Corp., 6025 N. Keystone Ave., Chicago, IL 60646	312-539-3108
§† Daburn Elctrns. & Cable, 70 Oak St., Norwood, NJ 07648	201-768-5400
† DataCon, Inc., 60 Blanchard Rd., Burlington, MA 01803	617-273-5800
Datatex Corp., 10935 S. Wilcrest Dr., Houston, TX 77099	713-495-3100

Davidson Elctrn. Dev. Co., 113 E. 13th St., Erie, PA 16512 814-453-7547
Dearborn Wire & Cable Co., 9299 Evenhouse Ave., Rosemont, IL 60018 312-696-1000
Easy Heat-Wirekraft, 555 North Michigan St., Lakeville, IN 46536 219-784-3011
§† Electronic Coil Corp., 347 New Britain Ave., Plainville, CT 06062 203-747-1213
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Electro-Prep, 30 Cayuga Ave., E. Falmouth, MA 02536 617-477-1791
† Electro Weave, 38 Harlow St., Worcester, MA 01605 617-752-8932
† Estes Engrg. Co., 930 Marine Dr., Port Angeles, WA 98362 206-457-0904
Eubanks Engrg., 1307 So. Myrtle Ave., Monrovia, CA 91016 213-357-7011
§† Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903 201-249-6600
§† Excel Specialty Corp., 6335 N. Broadway, Chicago, IL 60660 312-262-4781
† Fema Elctrns. Corp., 12-6 Edgeboro Rd., E. Brunswick, NJ 08816 201-238-1223
Field-Fab, 43 School St., N. Springfield, VT 05150 802-886-8278
Framar Metal Prods., 124 W. Main St., Dept. 1201, High Bridge, NJ 08829 201-638-6688
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
§ Hobson Bros., 4940 W. Lawrence Ave., Chicago, IL 60630-3884 312-283-3600
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Hybricon Corp., 410 Great Rd., Littleton, MA 01460 617-486-3174
† IEC Elctrns., 105 Norton St., Newark, NY 14513 315-331-7742
Kantz Elctrn. Ind., 1804 Wall Church Rd., Wall Township, NJ 07719 201-974-0090
Leecraft Mfg., 21-02 44th Rd., Long Island City, NY 11101 212-392-8800
† Line Elec. Prods., G. General Electro-Components, Inc., 122 Naubuc Ave., Glastonbury, CT 06033 203-659-3573
† Manger Elec. Co., Inc., W. Henry St., Stamford, CT 06902 203-348-7761
† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
Midway Mfr. Co., 10750 W. Grand Ave., Franklin Park, IL 60131 312-451-1360
MWS Wire Inds., 31200 Cedar Valley Dr., Westlake Village, CA 91362 818-991-8553
† National Telephone & Elctrns. Inc., 7561 N.W. 77th Terr., Miami, FL 33166 305-885-9423
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 404-429-9061
† Reactel, Inc., 687-D Lofstrand La., Rockville, MD 20850 301-279-5535
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 203-635-2200
§ Spectra-Strip, 7100 Lampson Ave., Garden Grove, CA 92642-0415 714-892-3361
Storm Products Co., 116 Shore Drive, Hinsdale, IL 60521 312-323-9121
§ Support Systems Intl. Corp., 150 South Second St., Richmond, CA 94804 415-234-9090
Tegam, 7230 N. Ridge Rd., Madison, OH 44057 216-428-7505
† Teledyne Aerospace Sys., 1007 E. 10th St., Fairmont, MN 56031 ....507-235-3355; 07-235-9712;507-238-9494
United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 214-350-4978
† United Wire & Cable, 425 Shrewsbury St., Worcester, MA 01604 617-757-3872
V.I.P. Inds. Inc., 246 Knickerbocker Ave., Paterson, NJ 07503 201-345-5800
§† Whitmor Wire & Cable, 13161 Sherman Way, Bldg. B, N. Hollywood, CA 91605 818-764-6296

Services, Wirewrapping-4100 (Also See Services, Backplane Wiring)

† DataCon, Inc., 60 Blanchard Rd., Burlington, MA 01803, 617-273-5800 .... 3•1923
† Mechanized Electronic Assembly Div., Universal Instrs. Corp., P.O. Box 825, Binghamton, NY 13902, 607-772-7522 .... 3•1926
Altek Co., P.O. Box 1128, Torrington, CT 06790 203-482-7626
† Assembly Specialists, 914 Main St., Box 965, Acton, MA 01720 617-263-9100
Augat Inc., 33 Perry Ave., Box 779, Attleboro, MA 02703 617-222-2202
B & G Precision Elctrns., 538 Maple Ave., Doylestown, PA 18901 215-348-4413
BEC Inc., 2709 N. Broad St., Philadelphia, PA 19132 215-229-9800
Datatex Corp., 10935 S. Wilcrest Dr., Houston, TX 77099 713-495-3100
Dynatech Corp., 1225 E. Wakeham Ave., P.O. Box 1019, Dept. E, Santa Ana, CA 92702 714-558-8755
Elctrn. Molding Corp., 96 Mill St., Woonsocket, RI 02895 401-769-3800
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§ Excel Prods., 401 Joyce Kilmer Ave., New Brunswick, NJ 08903 201-249-6600
§† Garry Mfg. Co., Div. of Brand-Rex Co., 9 Queen Anne Ct., Laghorne, PA 19047 215-949-2300
G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
H-A-Z Laboratories, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882 201-689-0110
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
† Hybricon Corp., 410 Great Rd., Littleton, MA 01460 617-486-3174
Instrumentation Measurements Lab., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061 201-757-3730
† Interconnection Technology, Inc., 5542 Buckingham Drive, Huntington Beach, CA 92649 714-891-5305
Kantz Elctrn. Ind., 1804 Wall Church Rd., Wall Township, NJ 07719 201-974-0090
Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
Methode Elctrns., Inc., 7444 W. Wilson Ave., Chicago, IL 60656 312-867-9600
§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400
Milton Ross Co., 511 Second St. Pike, Southampton, PA 18966 215-355-0200
† National Telephone & Elctrns. Inc., 7561 N.W. 77th Terr., Miami, FL 33166 305-885-9423
† Reactel, Inc., 687-D Lofstrand La., Rockville, MD 20850 301-279-5535
RMS Techn., 706 Industry Dr., Hampton, VA 23661 804-838-2458
Standard Logic, 2215 S. Standard Ave., Santa Ana, CA 92707 714-979-4770
† Stanford Applied Engrg. Inc., 3520 De La Cruz Blvd., Santa Clara, CA 95050 408-980-1600
Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700
T-F Elctrns., 9415 Neils Thompson Dr., Austin, TX 78759 512-836-7323
United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 214-350-4978
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 607-775-1102
V.I.P. Inds. Inc., 246 Knickerbocker Ave., Paterson, NJ 07503 201-345-5800
† Wire Graphics, 215 B. Central Ave., Farmingdale, NY 11735 516-293-1525

Servo Systems-4900

BEI Motion Systems Co., Corporate Off., 681 Market St., Ste. 741, San Francisco, CA 94105, 415-974-1275 ....1B•1832¢5561;5562;5563;5564;5565
Computer Prod. Div., BEI Motion Sys. Co., 1755 B La Costa Meadows Dr., San Marcos, CA 92069, 619-471-2600 ....1B•1832
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238, 412-963-0515 ....1B•1832
BEI Motion Sys. Co., Industrial Encoder Div., 7230 Hollister Ave., Goleta, CA 93117, 805-968-0782 ....1B•1832
BEI Motion Sys. Co., Position Controls Div., 819 Reddick Ave., Santa Barbara, CA 93103, 805-966-1538 ....1B•1832
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083, 619-727-7420 ....1B•1132-1134
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101, 212-361-2133 ....3•1930,1931
§ Electro-Craft, 1600 2nd St. S., Hopkins, MN 55343, 612-931-2700 ....1B•1143,1145
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955, 305-259-7105 ....3•1932
Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701, 813-822-2529 ....3•1135
† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990, 215-277-1300 ....1B•1172,1185
Portescap U.S., 1547 Trooper Rd., P.O. Box 666, Worcester, PA 19490, 215-277-0433 ....1B•1172
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331, 818-896-6676 ....3•1119
† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
† Aeroflex Labs., Magnetic Prods. Div., ; So. Service Rd., Plainview, NY 11803 516-694-6700
§ Aerotech, Inc., 101 Zeta Dr., Pittsburgh, PA 15238 412-963-7470
Amtek Digital Systems, Inc., 12740 28th N.E., Seattle, WA 98125 206-363-0217
Applied Control, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828 201-227-5454
B & B Motor & Control Corp., Apple Hill Commons, Burlington, CT 06013 203-673-7151
† Bendix Corp., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605 818-765-1010
§† Berg, W. M., Inc., 499 Ocean Ave., East Rockaway, NY 11518 516-599-5010
† Clifton Precision, Marple at Broadway, Clifton Hgts., PA 19018 215-622-1000
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Datron Sys., 20700 Plummer St., Chatsworth, CA 91311 818-882-9616
§ Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Distributed Computer Sys., 223 Crescent St., Waltham, MA 02154 .617-899-6619
† Electro-Magnetic Processes, Inc., 9616 Owensmouth Ave., Chatsworth, CA 91311 818-882-6333
† Electrospace Sys., Inc., Box 1359, Richardson, TX 75080 214-783-2004
Elm Systems, 1101 Brown St., Wauconda, IL 60084 312-526-5003
† Evershed & Vignoles Ltd., Acton Lane, Chiswick, London, W4 5HJ England 01-994-3670
† GAP Instr., 110 Marcus Blvd., Hauppauge, NY 11787 516-273-0909
† HH Controls Co., Inc., 16 Frost St., Arlington, MA 02174 617-646-2626
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
† HTL Electro Kinetics, 402 E. Gutierrez St., Santa Barbara, CA 93101 805-963-2055
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Industrial Elctrn. Engrs., Inc., 7740 Lemona Ave., Van Nuys, CA 91405 818-787-0311
† Inland Motor Specialty Prods. Div., Kollmorgen Corp., 501 First St., Radford, VA 24141 703-639-9045
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Ledex Inc., P.O. Box 427, Vandalia, OH 45377 513-898-3621
McFadden Sys., Inc., 8956 S. Atlantic Ave., South Gate, CA 90280-9990 213-564-5958
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
† Parabam, Inc., 3017 E. Las Hermanas St., Rancho Dominguez, CA 90221 213-537-1771
§ Perfect Gear & Instr., 55 S. Denton Ave., New Hyde Park, NY 11040 516-328-3300
† Performance Controls Inc., 333 Byberry Rd., Hatboro, PA 19040 215-675-6500
PMI Motors, Kollmorgen Corp., 5 Aerial Way, Syosset, NY 11791 516-938-8000
† Precision Mechanisms, 44 Brooklyn Ave., Westbury, NY 11590 ....516-ED3-5955

§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800

Servo-Tek Prods. Co., 1086 Goffle Rd., Hawthorne, NJ 07506 201-427-3100

Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000

Sterling Instr., Div. Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-3300

† Stock Drive Prods., Div. of Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-0200

§† Superior Mfg. & Instr., 19-36 38th St., Long Island City, NY 11105 212-932-1800

Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Unico, 3725 Nicholson Rd., Franksville, WI 53126-0505 414-886-5678

Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729 516-586-5100

† Vernitron Corp., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073 619-428-5581

† Westamp, 1542 15th St., Santa Monica, CA 90404 213-393-0401

Wide Range Elctrns. Corp., 2119 Schultz Rd., St. Louis, MO 63141 314-567-5366

Shaft Encoders, Shaft Position — See Encoders, Shaft Angle (Vol. 1B)

Shaft Locks — See Knobs, Locking, Control Shaft (Vol. 2)

Shafts & Adapters-3500 (Also See Couplings, Shaft, Rigid & Flexible) — *See Vol. 1B*

Shake Tables — See Testers, Vibration (Vol. 3)

Shells, Encapsulation — See Cups, Encapsulation (Vol. 2)

Shielding, EMI/RFI-4525 — *See Vol. 2*

Shielding Beads, Ferrite-4525 — *See Vol. 2*

Shields, Cable — See Braid, Cable (Vol. 2)

Shields, Cathode-Ray Tube-4525 — *See Vol. 2*

Shields, Coil-4525 — *See Vol. 2*

Shields, Corona-4525 — *See Vol. 2*

Shields, Electrostatic — See Shields, Tube (Vol. 2)

Shields, Indicator Light-4525 — *See Vol. 2*

Shields, Magnetic-4525 — *See Vol. 2*

Shields, Photomultiplier-4525 — *See Vol. 2*

Shields, RF-4525 (Also See Gaskets, Shielding, RF) — *See Vol. 2*

Shields, Transformer-4525 — *See Vol. 2*

Shields, Tube-4525 — *See Vol. 2*

Shields, Wire — See Braid, Cable (Vol. 2)

Shift Registers-2325

Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491

Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700

§ Midland-Ross Corp., Cambion Div., One Airwife Place, Cambridge, MA 02140 617-491-5400

RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000

§† RCA Solid State Div., CMOS IC Mktg., Rte. 202, Somerville, NJ 08876 201-685-6000

Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080

Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453

§† TRW LSI Products, PO Box 2472, La Jolla, CA 92038 619-457-1000

Shifters, Frequency — See Converters, Frequency to Frequency (Vol. 3)

Shifters, Phase, Microwave-3450 — *See Vol. 1A*

Shifters, Phase, RF-3450 — *See Vol. 1A*

Shifters, Phase 60/400 Hz-4050

KGS Electronics, Inc., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, 818-798-0786 .... 3•1891

† Ryan Intl. Corp., 4800 Evanswood Dr., Columbus, OH 43229, 614-885-3303 .... 3•1219

Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010

† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 .... 619-279-8620;800-356-2244;800-821-1634

Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850

Crompton Instrs., 1562 Parkway Loop, Units A & B, Tustin, CA 92680 714-731-2333

Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107

Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515

Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800

Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700

Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201

Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Universal Ad-Yu Elctrns., Inc., 2517 E. Norwich St., Milwaukee, WI 53207 414-482-4100

Shrinkable Plastics & Elastomers — See Caps, Forms & Tapes, Heat Shrinkable (Vol. 2), Tubing, Heat Shrinkable (Vol. 2),

Shunts, Meter-2900

Caddock Electronics, Inc., 1717 Chicago Ave., Riverside, CA 92507, 714-788-1700 .... 1A•1809,1818,1819

Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296

† Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550, 914-664-2333 .... 3•1226,1227

† Empro Mfg. Co., Inc., P.O. Box 26060, Indianapolis, IN 46226, 317-823-4478 .... 3•1234

† Janco Corp., Box 3038-Glenoaks Sta., Burbank, CA 91504, 818-846-1800 .... 1B•1668

Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1251

Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1296

Ultronix, Inc., P.O. Box 1090, Grand Junction, CO 81502, 303-242-0810 .... 1A•1997

§ API Instrs., 1601 Trapelo Rd., Waltham, MA 02254 617-890-2000

§ Bartlett-Emery Instr., 14th & Ave. 'M', P.O. Box 445, Ft. Madison, IA 52627 319-372-8366

§† Bell, F. W., Inc., 6120 Hanging Moss Rd., Orlando, FL 32807 305-678-6900

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Shutters, Microwave-3450 — *See Vol. 1A*

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† Norland, Norland Dr., Ft. Atkinson, WI 53538 414-563-8456

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Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523, 415-932-3911 .... 3•1006

Data Instruments Inc., 4 Hartwell Pl., Lexington, MA 02173, 617-861-7450 .... 1B•1840

Datel, 11 Cabot Blvd., Mansfield, MA 02048, 617-339-9341 .... 3•1152

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Ohio Semitronics, Inc., 1205 Chesapeake Ave., Columbus, OH 43212, 614-486-9561 .... 1B•1860,1865,1866

Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 3•1013,1089,1137,1284,1346,1347

Pacific Instrs. Inc., 2355 Whitman Rd., Concord, CA 94518, 415-827-9010 .... 3•1015

PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285

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Wilcoxon Resch., P.O. Box 5798, Bethesda, MD 20814, 301-770-3790 .... 1B•1886

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† Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700

§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816

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§ Preston Scientific, 805 E. Cerritos Ave., Anaheim, CA 92805 714-776-6400
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
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Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000
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† Vibration Instrs. Co., 1614 Orangethorpe Way, Anaheim, CA 92801 714-879-6085
† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
Whittaker Corp., 10880 Wilshire Blvd., Los Angeles, CA 90024 213-475-9411

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Signal Systems, Fiber Optic-2325

BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
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Rehlander Assocs., 363 Rantoul St., Beverly, MA 01915 617-922-5961

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Silk Screening Services — See Services, Silk Screening (Vol. 3)

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Simulators, Solar-2900

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Sockets, Transistor-2100 — *See Vol. 2*

Sockets, Tube-2100 — *See Vol. 2*

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Control-O-mation, Inc, 7300 W. Huron River Dr., Dexter, MI 48130 313-426-3935
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Compact Software, Inc., Comsat Corp., 1131 San Antonia Rd., Palo Alto, CA 94303 ... 415-966-8440
§ Data General, 4400 Computer Dr., Westboro, MA 01581 ... 617-366-8911
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ... Call Local Sls. Off.
Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 ... 415-361-1012
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 ... 612-638-7777
Siltran Digital, 2250 Monterey Rd., Atascadero, CA 93422 ... 805-466-3209
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 ... 201-231-9400

Software, Data Base Management-2050

Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 ... 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 ... 313-779-8700
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 ... 617-244-8190
BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 ... 617-667-4111
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 ... 213-829-7453
Computer Corp. of America, 675 Massachusetts Ave., Cambridge, MA 02139 ... 617-492-8860
Consumertronics, 2011 Crescent Dr., Alamogordo, NM 88310 ... 505-434-0234

§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Headway Resch., Inc., 3713 Forest La., Garland, TX 75042 214-272-5431
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Noumenon Corp., 512 Westline Dr., Alamdea, CA 94501 415-521-2145
SMC Software Sys., Science Management Corp., 1011 Rte. 22, Bridgewater, NJ 08807 201-685-9000
§ Systems Plus, 1120 San Antonio Rd., Palo Alto, CA 94303 415-969-7047
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
T S Products, 12455 Brandford St., Unit 22, Arleta, CA 91331 818-896-6676
USUS, Inc., UCSD Pascal Sys. User's Society, P.O. Box 1148, La Jolla, CA 92038 ....

Software, Data Base Management Dictionaries-2050

BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Computer Corp. of America, 675 Massachusetts Ave., Cambridge, MA 02139 617-492-8860
Consumertronics, 2011 Crescent Dr., Alamogordo, NM 88310 505-434-0234
§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ Systems Plus, 1120 San Antonio Rd., Palo Alto, CA 94303 415-969-7047
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Software, Data Base Query Language-2050

§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Data Communications Control-2050

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Computer Terminal Sys., 89 Arkay Drive, Hauppauge, NY 11788 516-435-2916
Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Disk/Tape File Utilities-2050

Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Consumertronics, 2011 Crescent Dr., Alamogordo, NM 88310 505-434-0234
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 617-828-2008
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
§ Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Emulation/Simulation-2050

Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830, 201-283-4925 .... 3•1112
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
§ Boston Systems Office, 469 Moody St., Waltham, MA 02154 617-894-7800
Compact Software, Inc., Comsat Corp., 1131 San Antonia Rd., Palo Alto, CA 94303 415-966-8440
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
§ General Instrument Corp., Microelectronics Div., 600 W. John St., Hicksville, NY 11802 516-733-3107
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
Kontron Elctrns., 630 Price Ave., Redwood City, CA 94062 415-361-1012
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
§† Megatek Corp., 9605 Scranton Rd., San Diego, CA 92121 619-455-5590
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
† Signatron, 12 Hartwell Ave., Lexington, MA 02173 617-861-1500
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Information Storage & Retrieval-2050

Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Headway Resch., Inc., 3713 Forest La., Garland, TX 75042 214-272-5431
§† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
Noumenon Corp., 512 Westline Dr., Alamdea, CA 94501 415-521-2145
§ Systems Plus, 1120 San Antonio Rd., Palo Alto, CA 94303 415-969-7047
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Job Scheduling/Accounting-2050

BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Headway Resch., Inc., 3713 Forest La., Garland, TX 75042 214-272-5431
§ Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
SMC Software Sys., Science Management Corp., 1011 Rte. 22, Bridgewater, NJ 08807 201-685-9000
§ Systems Plus, 1120 San Antonio Rd., Palo Alto, CA 94303 415-969-7047
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Librarians-2050

ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771
§ Boston Systems Office, 469 Moody St., Waltham, MA 02154 617-894-7800
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Operating Systems-2050

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Heurikon Corp., 3001 Latham Dr., Madison, WI 53713, 608-271-8700 .... 3•1082
§ **Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036, 602-244-6900 .... 3•1114**
Wintek Corp., 1801 South St., Lafayette, IN 47904-2993, 317-742-8428 .... 3•1118
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700

Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
§† Megatek Corp., 9605 Scranton Rd., San Diego, CA 92121 619-455-5590
§ Micro Digital Assocs., Inc., 12791 Western Ave., Unit C, Garden Grove, CA 92641 714-891-2363
NCR Comten, Inc., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113 612-638-7777
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 401-847-8000
§ RCA Solid State Div., Micro Processors, Route 202, Somerville, NJ 08876 201-685-6000
SMC Software Sys., Science Management Corp., 1011 Rte. 22, Bridgewater, NJ 08807 201-685-9000
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400
USUS, Inc., UCSD Pascal Sys. User's Society, P.O. Box 1148, La Jolla, CA 92038 ....
§ Volition Systems, P.O. Box 1236, Del Mar, CA 92014 619-481-2286

Software, Operating Systems Enhancement-2050

ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801, 617-935-6668 .... 3•1143
Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
CompuPro, 3506 Breakwater Ct., Hayward, CA 94545 415-786-0909
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
KLC Corp., 2234 East Colorado, Pasadena, CA 91107 818-796-0525
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 415-531-6500
† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 401-847-8000
§ RCA Solid State Div., Micro Processors, Route 202, Somerville, NJ 08876 201-685-6000
Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400
USUS, Inc., UCSD Pascal Sys. User's Society, P.O. Box 1148, La Jolla, CA 92038 ....
Volition Systems, P.O. Box 1236, Del Mar, CA 92014 619-481-2286

Software, Programming/Systems Development Aids-2050

Wintek Corp., 1801 South St., Lafayette, IN 47904-2993, 317-742-8428 .... 3•1118
Alden Computer Systems, 27 Strathmore Rd., Natick, MA 01760 ...617-655-6610
Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
§ Boston Systems Office, 469 Moody St., Waltham, MA 02154 617-894-7800
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Commercial Sys. Labs., Commercial Sys. Grp., P.O. Box 2710, Auburn, AL 36831 205-821-1133
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
Consumertronics, 2011 Crescent Dr., Alamogordo, NM 88310 505-434-0234
§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
Control-O-mation, Inc. 7300 W. Huron River Dr., Dexter, MI 48130 313-426-3935
§ Cromemco, 280 Bernardo Ave., Mountain View, CA 94043 415-964-7400
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335
† Exergetic Sys., Inc., 1499 Franklin St., Oakland, CA 94612 415-763-3460
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
§ General Instrument Corp., Microelectronics Div., 600 W. John St., Hicksville, NY 11802 516-733-3107
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
† Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
§ Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201 503-226-3515
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 ..914-373-9003
† Instruments and Controls Div., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431 513-426-2405
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
§† Megatek Corp., 9605 Scranton Rd., San Diego, CA 92121 619-455-5590
§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
§ RCA Solid State Div., Micro Processors, Route 202, Somerville, NJ 08876 201-685-6000
Step Engineering, P.O. Box 61166, Sunnyvale, CA 94088 408-733-7837
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400
USUS, Inc., UCSD Pascal Sys. User's Society, P.O. Box 1148, La Jolla, CA 92038 ....
§ Volition Systems, P.O. Box 1236, Del Mar, CA 92014 619-481-2286
§ Zax Corp., 2572 White Rd., Irvine, CA 92714 ....714-474-1170;800-421-0982

Software, Program Translators-2050

Antona Corp., 13600 Ventura Blvd., Sherman Oaks, CA 91423 213-986-6651
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Report Generators-2050

§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362, 818-991-1410 .... 3•1085
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Headway Resch., Inc., 3713 Forest La., Garland, TX 75042 214-272-5431
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Noumenon Corp., 512 Westline Dr., Alamdea, CA 94501 415-521-2145
§ SMC Software Sys., Science Management Corp., 1011 Rte. 22, Bridgewater, NJ 08807 201-685-9000
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Security-2050

Commercial Sys. Labs., Commercial Sys. Grp., P.O. Box 2710, Auburn, AL 36831 205-821-1133
Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Datatronic Systems Corp., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402 818-988-5290
Gould Compion, 1101 E. University, Urbana, IL 61081 217-384-8500
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Software, Sort/Merge-2050

Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Noumenon Corp., 512 Westline Dr., Alamdea, CA 94501 415-521-2145
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Spoolers-2050

§ Contel Info. Sys., Inc., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024 516-829-5900
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Metier Management Sys., Inc., 10175 Harwin Dr., Ste. 100, Houston, TX 77449 713-988-9100
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 201-231-9400

Software, Utilities-2050

Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 ... 602-622-8605
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 ... 703-642-4000
§ Boston Systems Office, 469 Moody St., Waltham, MA 02154 ... 617-894-7800
Data General, 4400 Computer Dr., Westboro, MA 01581 ... 617-366-8911
§ Data Translation, 100 Locke Dr., Marlboro, MA 01752 ... 617-481-3700
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 ... 516-273-8600
GEN/COMP Inc., 6 Algonquin Rd., Canton, MA 02021 ... 617-828-2008
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 ... 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 ... 305-974-1700
MicroTech Exports, 467 Hamilton Ave., Ste. 2, Palo Alto, CA 94301 ... 415-324-9114
Peritek Corp., 5550 Redwood Rd., Oakland, CA 94619 ... 415-531-6500
Unitronix Corp., 197 Meister Ave., Somerville, NJ 08876 ... 201-231-9400
USUS, Inc., UCSD Pascal Sys. User's Society, P.O. Box 1148, La Jolla, CA 92038 ...

Solar Cells — See Cells, Photovoltaic (Vol. 1B)

Solder (All Types)-4600 — *See Vol. 2*

Solder Lugs — See Terminals, Lug (All Types) (Vol. 2)

Solder Pots & Baths-4600 — *See Vol. 2*

Soldering Accessories-4600 — *See Vol. 2*

Soldering Equipment, Induction Heating-4100

† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 . 617-667-4111
§ Contact, Inc., 5 Elm Ave., Hudson, NH 03051 ... 603-883-7708
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 ... 214-353-9950
Hexacon Elec., 161 W. Clay Ave., Roselle Park, NJ 07204 ... 201-245-6200
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 ... 602-968-6241
† Lepel, 59-21 Queens-Midtown Expwy., Maspeth, NY 11378 ... 212-426-4580
Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 ... 215-355-7200
† Miller, L.C., Co., 717 Monterey Pass Rd., Monterey Pk., CA 91754 . 213-268-3611
† Reeve Elctrns., 444 N. Orleans, Chicago, IL 60610 ... 312-670-0150
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 ... 800-628-8862
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990

Soldering Equipment, Printed Circuit-4100

§ **APA Division, 399 Executive Blvd., Elmsford, NY 10523, 914-592-7322 ... 2•1924**
§ **Gardiner Solder Co., Div. of Gardiner Metal Co., 4820 S. Campbell Ave., Chicago, IL 60632, 312-847-0100 ... 2•1927**
§ **Hexacon Elec., 161 W. Clay Ave., Roselle Park, NJ 07204, 201-245-6200 ... 2•1928**
† Air-Vac Engrg., 100 Gulf St., Milford, CT 06460 ... 203-874-2541
Amlan, Inc., 97 Thornwood Rd., Stamford, CT 06903 ... 203-322-1913
§ Apollo Lasers, Inc., 9201 Independence Ave., Chatsworth, CA 91311 ... 213-709-1111
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 ... 516-654-1197
BEA electro-optics, Inc., 690 First Ave., Des Plaines, IL 60016 ... 312-298-1420
§ Beau Tech, P.O. Box 523, Portland, ME 04122 ... 207-775-6139
§ Caig Labs., 1175-0 Industrial Ave., Escondido, CA 92025 ... 619-743-7143
§† Casso-Solar, 3 Pearl Ct., Allendale, NJ 07401 ... 201-825-4600
§† Chemtronics Inc., 681 Old Willets Path, Hauppauge, NY 11788 ... 516-582-3322
Christiansen Radio Inc., 1950 San Remo, Laguna Beach, CA 92651 ... 714-497-1506
Cyclo-Tronics, Inc., 1345 N. Old Rand Rd., Wauconda, IL 60084 ... 312-526-0800
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 ... 214-353-9950
§ ESICO, Inc., Box 247, Deep River, CT 06417 ... 203-526-5361
Hollis Engrg., Inc., Charron Ave., Box 1189, Nashua, NH 03061 ... 603-889-1121
§ Hollis Engrg./Wire-Wrap, 15 Charron Ave., Nashua, NH 03061 ... 603-889-1121
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 ... 215-355-7200
§ Matrix Engineering Corp., 17000 S. Western Ave. 19, Gardena, CA 90247 ... 213-770-0521
Nu-Concept Computer Sys., Rte. 309 & Advance La., Colmar, PA 18915 ... 215-822-8400
OAL Assocs., P.O. Box J, Escondido, CA 92025 ... 619-743-7143
§ Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 ... 301-490-9860
Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ... 404-429-9061
§ Plato Prods., 2120 E. Allen Ave., Glendora, CA 91740 ... 800-423-4510
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 ... 800-628-8862
Technical Devices, 560 Alaska Ave., Torrance, CA 90503 ... 213-618-8437
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
§ Ungar, Div. Eldon Inds., Inc., 100 W. Manville St., Compton, CA 90224-6005 ... 213-774-5950
United Solder Wrap Inc., 2608 Electronic La., Ste 509, Dallas, TX 75220 ... 214-350-4978
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 ... 607-775-1102
§ Wilson, H.F., Engrg. Co., 475 Taft Ave., Glen Ellyn, IL 60137 ... 312-469-8473

Soldering Equipment, Resistance-4100

† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 ... 516-654-1197
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 . 617-667-4111
§ Contact, Inc., 5 Elm Ave., Hudson, NH 03051 ... 603-883-7708
Hexacon Elec., 161 W. Clay Ave., Roselle Park, NJ 07204 ... 201-245-6200
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 ... 602-968-6241
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 ... 201-867-6500
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 ... 215-355-7200
§ Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 ... 301-490-9860
Raychem Corp., Elctrns. Grp., 300 Constitution Dr., Menlo Park, CA 94025 ... 415-361-3860
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 ... 800-628-8862
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
§ Tech Spray, Inc., Box 949, Amarillo, TX 79105 ... 806-372-8523
Trans American Transformer, 142 Peconic Ave., Medford, NY 11763 ... 516-654-1880
§ Triton Mfg. Co., P.O. Box 361, East Haddam, CT 06423 ... 203-838-4666
† Weltek Intl., Inc., 760 W. Cotter St., South Bend, IN 46613 ... 219-232-5400

Soldering Systems, Temperature Controlled-4100

§ **Gardiner Solder Co., Div. of Gardiner Metal Co., 4820 S. Campbell Ave., Chicago, IL 60632, 312-847-0100 ... 2•1927**
§ **Hexacon Elec., 161 W. Clay Ave., Roselle Park, NJ 07204, 201-245-6200 ... 2•1928**
Air-Vac Engrg., 100 Gulf St., Milford, CT 06460 ... 203-874-2541
† Apollo Lasers, Inc., 9201 Independence Ave., Chatsworth, CA 91311 ... 213-709-1111
Aremco Prods., Box 429, Ossining, NY 10562 ... 914-762-0685
† Automated Prod. Equip. Corp., 142 Peconic Ave., Medford, NY 11763 ... 516-654-1197
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 . 617-667-4111
§ Caig Labs., 1175-0 Industrial Ave., Escondido, CA 92025 ... 619-743-7143
§† Cooper Group, PO Box 30100, Raleigh, NC 27622 ... 919-781-7200
Electrovert USA Corp., 10969 Shady Trail, 01, Dallas, TX 75220 ... 214-353-9950
E.P.E. Corp., P.O. Box 5238, Manchester, NH 03108 ... 603-669-9181
§ Hollis Engrg., Inc., Charron Ave., Box 1189, Nashua, NH 03061 ... 603-889-1121
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 ... 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 ... 714-752-3800
§ Jensen Tools, Inc., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040 ... 602-968-6241
Kahle Engrg., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087 ... 201-867-6500
§ Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 ... 215-355-7200
Newman, M. M., Corp., Heli-Tube Div., P.O. Box 615, Marblehead, MA 01945 ... 617-631-7100
OAL Assocs., P.O. Box J, Escondido, CA 92025 ... 619-743-7143
§ OK Industries, Inc., 3455 Conner St., Bronx, NY 10475 ... 212-994-6600
Pace Inc., 9893 Brewers Ct., Laurel, MD 20707 ... 301-490-9860
† Penn Resch. Corp. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144 ... 404-429-9061
Raychem Corp., Elctrns. Grp., 300 Constitution Dr., Menlo Park, CA 94025 ... 415-361-3860
Solder Absorbing Technology (SAT), South End Bridge Circle, Agawam, MA 01001 ... 800-628-8862
Technical Devices, 560 Alaska Ave., Torrance, CA 90503 ... 213-618-8437
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
§ Ungar, Div. Eldon Inds., Inc., 100 W. Manville St., Compton, CA 90224-6005 ... 213-774-5950
Universal Instrs., P.O. Box 825, Binghamton, NY 13902 ... 607-775-1102
§ Wellman Thermal Sys., 1 Progress Rd, Shelbyville, IN 46176 ... 317-398-4411
† Weltek Intl., Inc., 760 W. Cotter St., South Bend, IN 46613 ... 219-232-5400

Soldering Equipment, Ultrasonic-4100

§ Sonobond, 200 E. Rosedale Ave., West Chester, PA 19380 ... 215-696-4710
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990

Soldering Guns, Irons & Desoldering Tools-4600 — *See Vol. 2*

Soldering (MIL)-2440 — *See Vol. 1B*

Solenoids, Linear-4550 — *See Vol. 1B*

Solenoids, Proportional-4550 — *See Vol. 1B*

Solenoids, Rotary-4550 — *See Vol. 1B*

Solenoids (MIL)-2440 — *See Vol. 1B*

Solvents — See Cleaners & Solvents (Vol. 2)

Sonar Systems-3475

† Raytheon Co., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871 ... 401-847-8000

S100 Bus — See Board Computers & Subassemblies (Vol. 3)

Sound Absorbing Materials-2825 — *See Vol. 2*

Sound Level Indicators — See Meters, Audio Level (Vol. 3)

Sound Recording Equip. — See Microphones (Vol. 3), Recorders (Vol. 3), etc.

§—Product sold through distributors †—Product meets MIL specs

Spacers-2825 — *See Vol. 2*

Space Surveillance Systems-3475

Spaghetti — See Tubing, Spaghetti (Vol. 2)

Spark Gaps-4300 — *See Vol. 1B*

Speakers, Explosion & Flame Proof-1300

† Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045

† Adec, 12 Kulick Rd., Fairfield, NJ 07006 201-575-1570

§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 818-889-9304

§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800

§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160

CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400

§ ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 201-641-3650

§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637 312-488-5800

§ University Sound, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

Speakers, Horn-1300

§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 .... 3•1030

§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037

Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 .... 3•1040

Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054

AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 617-531-8886

§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800

§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160

§ Davis, J. W., & Co., P.O. Box 26177, Dallas, TX 75226 214-651-7341

§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300

§ Fourjay Industries, Box 1465 Northridge Br., Dayton, OH 45414 513-278-9416

§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441

§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661

§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511

ISL Products Intl. Ltd., 235 P Robbins Lane, Syosset, NY 11791-6093 516-822-9601

Kolin Inds., Box 357, Pondfield Rd. W., Bronxville, NY 10708 914-961-5065

§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286

Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183

§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800

§ Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918

§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200

§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 212-392-6442

§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516

§ University Sound, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696

Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880

§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Speakers, Intercom-1300

§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 .... 3•1030

§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037

NTK Technical Ceramics, NGK Spark Plugs (U.S.A.), Inc., 1701 N. Greenville Ave. 05, Richardson, TX 75081, 214-235-8332 .... 3•1043

§† Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045

§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637, 312-488-5800 .... 3•1048,1049

Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054

† Adec, 12 Kulick Rd., Fairfield, NJ 07006 201-575-1570

§ Aiphone, 1700 130th St. NE, Bellevue, WA 98005 206-455-0510

§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800

§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160

CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400

CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511

§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050

§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300

§ ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 201-641-3650

† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650

§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661

§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511

§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286

Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183

§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800

§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200

§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 212-392-6442

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516

† Telephonics, 770 Park Ave., Huntington, NY 11743 516-549-6000

§ University Sound, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

§ Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880

Speakers, Midrange-1300

Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 .... 3•1029

§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 .... 3•1030

§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037

§ Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045

§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637, 312-488-5800 .... 3•1048,1049

Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054

† Adec, 12 Kulick Rd., Fairfield, NJ 07006 201-575-1570

§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800

§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160

CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511

§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050

ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650

§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441

§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661

§† Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443

§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286

Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183

§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516

§ Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880

Speakers, Musical Instrument-1300

§† Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045

Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054

§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800

Celestion Inds., Inc., Kuniholm Dr., Box 521, Holliston, MA 01746 617-429-6706

CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511

§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050

§ Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443

§ Heath Co., Benton Harbor, MI 49022 616-982-3886

§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747 516-293-1500

§ Martin Sound Prods., 28 Alpha Park, Cleveland, OH 44143-2297 216-442-2286

§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400

§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200

§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637 312-488-5800

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700

Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444

§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516

Speakers, Paging — See Speakers, Intercom (Vol. 3)

Speakers, Pillow-1300

§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300

§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661

§ Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183

§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000

§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200

§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 212-392-6442

§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080

Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 .... 516-957-8700;800-645-5516
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Speakers, Public Address-1300

§ **International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 .... 3•1030**
§ **MG Electronics. 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037**
§† **Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045**
§ **Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637, 312-488-5800 .... 3•1048,1049**
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§ Argos Prods., 600 S. Sycamore St., Genoa, IL 60135 815-784-5118
§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 .... 203-268-4372; 800-243-8160
Celestion Inds., Inc., Kuniholm Dr., Box 521, Holliston, MA 01746 617-429-6706
CML MACARR Div., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217 212-857-2400
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 201-641-3650
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§ Harris Corp., Dracon Div., 809 Calle Plano, Camarillo, CA 93010 805-987-9511
Kolin Inds., Box 357, Pondfield Rd. W., Bronxville, NY 10708 914-961-5065
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Perma Power Elctrns., 5615 W. Howard Ave., Chicago, IL 60648 312-647-9414
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
§ RMS Electronics Inc., 50 Antin Pl., Bronx, NY 10462 212-892-6700
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 .... 516-957-8700;800-645-5516
§ University Sound, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696
Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880

Speakers, Replacement (Including Aircraft, Automotive & TV)-1300

§ **International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 .... 3•1030**
§ **MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037**
§† **Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045**
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530, 914-681-0700 .... 3•1055
† Adec, 12 Kulick Rd., Fairfield, NJ 07006 201-575-1570
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 .... 203-268-4372; 800-243-8160
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050
ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637 312-488-5800
§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 212-392-6442
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 .... 516-957-8700;800-645-5516

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§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 818-889-9304
† ERA Transpac Div., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074 201-641-3650
Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
§ University Sound, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

Speakers, Subminiature-1300 (Also See Bells, Buzzers, Gongs, Sirens & Aural Warning Devices)

Golden Pacific Elctrns., Inc., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, 714-538-9752/9753 .... 3•1029
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590, 516-935-3640 .... 3•1040
NTK Technical Ceramics, NGK Spark Plugs (U.S.A.), Inc., 1701 N. Greenville Ave. 05, Richardson, TX 75081, 214-235-8332 .... 3•1043
Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054
TDK Corporation of America, 4711 Golf Rd., Skokie, IL 60076, 312-679-8200 .... 3•1061
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747 516-293-1500
§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400
§ Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918
§ Rye Inds., Inc., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543 914-698-0080
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 .... 516-957-8700;800-645-5516
Star Micronics, Inc., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854 201-572-9512

Speakers, Tweeter-1300

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§† **Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045**
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054
§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 .... 203-268-4372; 800-243-8160
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§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
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§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
§† Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443
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§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637 312-488-5800
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 .... 516-957-8700;800-645-5516
§ Superex Electronics Corp., 151 Ludlow St., Yonkers, NY 10705 914-965-6906

Speakers, Weatherproof-1300

§ **International Comps. Corp., 105 Maxess Rd., Melville, NY 11747, 516-293-1500 .... 3•1030**
§† **Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045**
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AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 617-531-8886
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§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 .... 203-268-4372; 800-243-8160
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ Dai-Ichi Shoji of Amer., Inc., 150 Fifth Ave., New York, NY 10011 212-691-9050
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
§ ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 201-641-3650
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
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Kolin Inds., Box 357, Pondfield Rd. W., Bronxville, NY 10708 914-961-5065
§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788 516-582-3400
Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
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Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
§ Recoton Corp., 46-23 Crane St., Long Island City, NY 11101 212-392-6442
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021 516-466-0911
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
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† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
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Wheelock Signals, Inc., 273 Branchport Ave., Long Branch, NJ 07740 201-222-6880

Speakers, Woofer-1300

§ MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037
§ Oaktron Inds., 1000 30th St., Monroe, WI 53566, 608-328-5560 .... 3•1045
Shogyo Intl. Corp., 287 Northern Blvd., Great Neck, NY 11021, 516-466-0911 .... 3•1054
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
§ Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
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§ Frazier, 1930 Valley View La., Dallas, TX 75234 214-241-3441
§† Hartley Prods., 620 Island Rd., Ramsey, NJ 07446 201-327-4443
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ International Comps. Corp., 105 Maxess Rd., Melville, NY 11747 516-293-1500
§ Panasonic, Ind'l. Elctrn. Comps., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094 201-348-7000
§ Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200
§ Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637 312-488-5800
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Sparkomatic, Rte. 6 & 209, Milford, PA 18337 717-296-6444
§ SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516
University Sound, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117

Speakers (MIL)-2440

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§ Alpha Products, Inc., 5740 Corsa Ave. 04, Westlake Village, CA 91362 818-889-9304
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
† ERA Poly-Planar Div., 311 E. Park St., Moonachie, NJ 07074 201-641-3650
† SPECO Div., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757 ....516-957-8700;800-645-5516

Speaker Systems-1300

MG Electronics, 32 Ranick Rd., Hauppauge, NY 11788, 516-582-3400 .... 3•1037
Quam-Nichols Co., 234 E. Marquette Rd., Chicago, IL 60637, 312-488-5800 .... 3•1049
§ Altec Lansing, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806 714-632-7117
§ Amperex Electronic Corp., Hicksville Div., Box 418 - 230 Duffy Ave., Hicksville, NY 11802 516-931-6200
§ Argos Prods., 600 S. Sycamore St., Genoa, IL 60135 815-784-5118
§ Atlas Sound Div., 10 Pomeroy Rd., Parsippany, NJ 07054 201-887-7800
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 ....203-268-4372; 800-243-8160
§ Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
Pyle Inds., Inc., 501 Center St., P.O. Box 620, Huntington, IN 46750 219-356-1200

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Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
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§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
§† UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 408-738-3301
Varian Assocs., Instr. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Speech Compression & Synthesis Equipment-2325

† Mimic, Inc., P.O. Box 921, Acton, MA 01720 617-263-2101
Street Electronics Corp., 1140 Mark Ave., Carpinteria, CA 93013 805-684-4593
SYMBICON, 89 Route 101A, Amherst, NH 03031 603-673-8898
† Votan, 4487 Technology Dr., Fremont, CA 94538 415-490-7600

Speed Drives, Motor — See Controls, Motor Speed (Vol. 3)

Spiral Wrap — See Tubing, Spiral Wrap (Vol. 2)

Splicers, Coaxial Cable-5400 — *See Vol. 2*

Splicers, Wire (Incl. Butt & Cap Types)-5400 — *See Vol. 2*

Splicing Equipment, Magnetic Tape-1300

† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§† Benjamin electroproducts, inc., Robins Div., 80 Smith St., Farmingdale, NY 11735 516-293-7744
† Nitto Denko America, Inc., 27 Seaview Blvd., Port Washington, NY 11050 516-484-9700

Splicing Equipment, Fiber Optic-5400 — *See Vol. 2*

Splicers, Fiber Optic-2475 — *See Vol. 1B*

Splitters/Combiners, Power — See Dividers, Power (Vol. 1A)

Spoolers, Printer Buffers-2325

Algo, Inc., 9451 Sohap Lane, Columbia, MD 21045 301-730-7442
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
§ Consolink Corp., Lestronics, Inc., 1840 Industrial Cir., Longmont, CO 80501 303-651-2014
§ Data-Match Corp., 3810 Oakcliff Ind. Ct., Doraville, GA 30340 404-441-0408
§ Digital Dynamics, Inc., 123 Water St., Watertown, MA 02172 617-923-4315
Digital Labs. Inc., 600 Pleasant St., Watertown, MA 02172 617-924-1680

Spoolers, Punched Tape — See Readers, Punched Tape (Vol. 3)

Springs (All Types)-2500 — *See Vol. 2*

Stabilizers, Current — See Current Sources (Vol. 3), Regulators, Current (Vol. 3),

Stabilizers, Line Impedance-4050

Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
§ Computer Power, 124E W. Main St., High Bridge, NJ 08829 201-735-8000
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Franek, John, Co., Inc., P.O. Box 11752, Santa Ana, CA 92711-1752 ....714-832-0290;800-854-9420
† Georator Corp., Box 70, Manassas, VA 22110 703-368-2101
JMK, Inc., 15 Caldwell Dr., Amherst, NH 03060 603-886-4100
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200

Stabilizers, Voltage — See Regulators & Stabilizers, Voltage (Vol. 3), Transformers, Voltage Regulating (Vol. 1A), Voltage Sources (Vol. 3),

Stabilizers, Voltage/Current, Automatic — See Power Supplies, Constant Current (Vol. 3)

Stalos (Stabilized Local Oscillators) — See Oscillators, Microwave (Vol. 1A)

Standards, Atomic Beam-2900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1154
§† EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715, 714-752-2891 .... 1A•1350
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 .... 1A•1358
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 512-929-2051

Standards, Capacitance-2900

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 .... 3•1309
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
International Instrumentation, 31131-602 Via Colinas, Westlake Vlg., CA 91362 213-991-9614
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642

Standards, Current-2900

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1297
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1223,1225
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1249
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1297
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
† Precision Resistor Co., Inc., 109 U.S. Hwy. 22, Hillside, NJ 07205 201-926-3036
Rotek Instr. Corp., 390 Main St., Waltham, MA 02254 617-899-4611
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
† Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840 201-549-9280

Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Standards, Delay Line-2350 — *See Vol. 1A*

Standards, Frequency-2900

† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, 512-251-2313 .... 1A•1315
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1154
§† EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715, 714-752-2891 .... 1A•1350
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1223,1225
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 .... 1A•1358
† Vectron Labs., 166 Glover Ave., Norwalk, CT 06850, 203-853-4433 .... 1A•1440
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
CTS Corp., 905 North West Blvd., Elkart, IN 46514 219-293-7511
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
† FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 .... 312-231-3511; 312-932-9380
Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
† Greenray Inds., Inc., 840 W. Church Rd., Mechanicsburg, PA 17055 717-766-0223
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
Monitor Prods. Co., Inc., 502 Via Del Monte, Oceanside, CA 92054 619-433-4510
Ovenaire, 706 Forrest St., Charlottesville, VA 22901 804-977-8050
† Piezo Crystal, 100 "K" St., Box 619, Carlisle, PA 17013 717-249-2151
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
† Ryan Intl. Corp., 4800 Evanswood Dr., Columbus, OH 43229 614-885-3303
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
† Spectrum Technology, Inc., 300 Lopez Rd., Goleta, CA 93116 805-964-7791
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
T-F Elctrns., 9415 Neils Thompson Dr., Austin, TX 78759 512-836-7323
† Tracor Instruments, 6500 Tracor La., Bldg. 27, Austin, TX 78721 512-929-2051
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Standards, Inductance-2900

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281, 215-539-6050 .... 3•1309
† Dietz Design, Inc., 100 Electronics Pkwy., Belton, MO 64012 816-331-4911
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Standards, Noise-2900

† Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840, 201-549-9280 .... 3•1305
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Maury Microwave, 8610 Helms Ave., Cucamonga, CA 91730 714-987-4715
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100

Standards, Phase-2900

Deak Technology, Inc., Sainte Claire Plaza, 1121 Boyle Rd., Pittsburgh, PA 15241, 412-341-2245 .... 3•1216
Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1225
† Ryan Intl. Corp., 4800 Evanswood Dr., Columbus, OH 43229, 614-885-3303 .... 3•1219
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Universal Ad-Yu Elctrns., Inc., 2517 E. Norwich St., Milwaukee, WI 53207 414-482-4100

Standards, Resistance-2900

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1251
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
Elctrn. Precision Comps., 11 W. Sandford Blvd., Mt. Vernon, NY 10550 914-664-2333
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
† Precision Resistor Co., Inc., 109 U.S. Hwy. 22, Hillside, NJ 07205 ... 201-926-3036
Rotek Instr. Corp., 390 Main St., Waltham, MA 02254 617-899-4611
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Vishay Resistive Sys. Grp., 63 Lincoln Hwy., Malvern, PA 19355 215-644-1300
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ... 404-253-7000

Standards, Temperature-2900

Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111, 619-278-0600 .... 3•1007
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 .... 1B•1735
† Thermometrics, Inc., 808 U.S. Hwy. , Edison, NJ 08817-4695, 201-287-2870 .... 1B•1825
Advanced Techn. Research Labs., 5645 K General Washington Dr., Alexandria, VA 22312 703-750-2920
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Harrel, Inc., 16 Fitch St., E. Norwalk, CT 06855 203-866-2573
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
Kaye Instruments, 15 De Angelo Dr., Bedford, MA 01730 617-275-0300
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Minco Prods., 7300 Commerce La., Minneapolis, MN 55432 612-571-3121
† Oven Inds., 191 Hempt Rd., P.O. Box 290, Mechanicsburg, PA 17055 717-766-0721
§ Yellow Springs Instr., Box 279, Yellow Springs, OH 45387 513-767-7241

Standards, Time-2900

† Austron, Inc., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, 512-251-2313 .... 1A•1315
† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 .... 3•1154
§† EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715, 714-752-2891 .... 1A•1350
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 .... 3•1154
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 .... 1A•1358
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1097-1102
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Kinemetrics Truetime Instr. Co., 3243 Santa Rose Ave, Santa Rosa, CA 95401 707-528-1230
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Spectracom, 320 N. Washington St., Rochester, NY 14625 716-381-4827
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

Standards, Voltage-2900

Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005, 201-335-0900 .... 3•1191
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923, 617-246-1600 .... 3•1214,1215
Electrical Instr. Svc., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1297
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1223-1225
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1249,1250
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550, 914-699-9717 .... 3•1297
† Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840, 201-549-9280 .... 3•1305
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Connor-Winfield Corp., 109 Turner Ct., POB L, W. Chicago, IL 60185 312-231-5270
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850

§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
Ectron Corp., 8159 Engineer Rd., San Diego, CA 92111 619-278-0600
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
Greenray Inds., Inc., 840 W. Church Rd., Mechanicsburg, PA 17055 717-766-0223
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Rotek Instr. Corp., 390 Main St., Waltham, MA 02254 617-899-4611
† Sawyer Inds., 5649 Peck Rd., Arcadia, CA 91006 213-442-5981
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
§ Takeda Riken Ind., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan 930-4111
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

Standards, Voltage Ratio-2900

Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1249,1250
Ryan Intl. Corp., 4800 Evanswood Dr., Columbus, OH 43229, 614-885-3303 .... 3•1219
Standard Reference Labs, Inc., Coan Pl., Metuchen, NJ 08840, 201-549-9280 .... 3•1305
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471 203-481-5721
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
Tettex Instruments, Inc., P.O. Box 281, Fairview Village, PA 19409-0281 215-539-6050
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642

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Storage Equipment, Disk-3800 — *See Vol. 2*

Storage Equipment, Flexible Disk-3800 — *See Vol. 2*

Storage Equipment, Magnetic Card-3800 — *See Vol. 2*

Storage Equipment, Media Transport-3800 — *See Vol. 2*

Storage Equipment, Microform-3800 — *See Vol. 2*

Storage Equipment, Multifunctional-3800 — *See Vol. 2*

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Storage Equipment, Printout-3800 — *See Vol. 2*

Storage Equipment, Punched Card-3800 — *See Vol. 2*

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Strain Reliefs, Cable & Wire-2800 — *See Vol. 2*

Strip-Line Components, Microwave-3450 — *See Vol. 1A*

Strips, Ground-1900

Instrument Specialties Co., P.O. Box A, Delaware Water Gap, PA 18327, 717-424-8510 .... 2•1909
Wall-Able Manufacturing Corp., 1800 N. Clybourn Ave., Chicago, IL 60614, 312-440-1000 .... 2•1743
American Electric Cable Co., 181 Appleton St., Holyoke, MA 01040 413-539-9893
† Chomerics, Inc., 77 Dragon Ct., Woburn, MA 01888 617-935-4850
§ Christiansen Radio Inc., 1950 San Remo, Laguna Beach, CA 92651 714-497-1506
Sjoberg, C., & Son, Inc., 415 Station St., Cranston, RI 02910 401-461-8220
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990

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Substrates, Sapphire-2800 — *See Vol. 2*

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Suppressors, Transient Voltage (All Types)-4300 — *See Vol. 1B*

Surveillance (MIL), EW Drone-3475

Surveillance Sets (MIL)-3475

Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777

Surveillance Systems (MIL), Optical-3475

† ABA Electromechanical Sys. Inc., Box 500, Pinellas Pk., FL 34290-0500 813-541-6681
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 805-967-0423
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
§ Heitz, Karl, Inc., P.O. Box 427, Woodside, NY 11377 212-565-0004
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
† Warren-Knight Instr. Co., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116 215-464-9300

Surveillance Systems (MIL), Radio Frequency-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Applied Communications, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
Mathematical Systems Design, Inc., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405 213-450-9851

Surveillance/Warning Systems (MIL), Control-3475

American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† E-Systems, Greenville Div., P.O. Box 1056, Greenville, TX 75401 214-457-4694
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777

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Switches, Data, Manual-2325

Alco Elctrn. Prods., Inc., 1551 Osgood St., N. Andover, MA 01845, 617-685-4371 .... 1B•1506,1514
AMP Incorporated, Box 3608, Harrisburg, PA 17105, 717-564-0100 ...1B•1533,1535
Cherry Electrical Prods. Corp., 3623 Sunset Ave., Waukegan, IL 60087, 312-578-3500 .... 1B•1557-1563
Cole Instr., 2650 S. Croddy Way, Santa Ana, CA 92704, 714-556-3100 .... 1B•1567
EECO Incorporated, 1601 E. Chestnut Ave., P.O. Box 659, Santa Ana, CA 92702-0659, 714-835-6000 .... 1B•1612,1613
Electronic Components Groupe, 26 N. 5th St., Minneapolis, MN 55403, 612-375-0011 .... 1B•1621
NKK Switches of America, Inc., 14415 N. Scottsdale Rd., Ste. 600, Scottsdale, AZ 85260, 602-991-0942 .... 1B•1730
Advanced Sys. Concepts, 435 N. Lake Ave., Pasadena, CA 91101 .818-793-8971

§ Armiger & Assocs., Inc., Daniel Woodhead, Inc., 2525 Ridgmar Blvd., Fort Worth, TX 76116 817-737-2900
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
Crosspoint, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
§ CTS Electronics Corp., Paso Robles Div., Electromechanical Gp., 500 Linne Rd., Paso Robles, CA 93446 805-238-0350
Digital Labs. Inc., 600 Pleasant St., Watertown, MA 02172 617-924-1680
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
§ Dreefs Switch Inc., 3782 Hawthorn Ct., Waukegan, IL 60085 .... 312-662-7667; 800-323-9605
§ Front Panel Devices, Inc., 530 Burnside Ave., Inwood, NY 11696 212-471-9800
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082

Switches, Data, Programmable-2325

CTS Electronics Corp., Paso Robles Div., Electromechanical Gp., 500 Linne Rd., Paso Robles, CA 93446, 805-238-0350 .... 1B•1577,1578
Standard Grigsby, Inc., 920 Rathbone Ave., Aurora, IL 60507, 312-844-4300 .... 1B•1626,1627
Advanced Sys. Concepts, 435 N. Lake Ave., Pasadena, CA 91101 . 818-793-8971
† Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 703-370-0900
Bytex Corp., 2 California Ave., Framingham, MA 01701 617-879-5050
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
Crosspoint, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
Digital Labs. Inc., 600 Pleasant St., Watertown, MA 02172 617-924-1680
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
§ Front Panel Devices, Inc., 530 Burnside Ave., Inwood, NY 11696 212-471-9800
Gandalf Data, Inc., 1019 S. Noel Ave., Wheeling, IL 60090 312-541-6060
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 . 201-930-4600
Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

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Switches, Paddle Handle-5100 — *See Vol. 1B*

Switches, Peripheral-5100 — *See Vol. 1B*

Switches, Photoelectric-3700 — *See Vol. 1B*

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Switches, Rocker-5100 — *See Vol. 1B*

Switches, Rotary-5100 — *See Vol. 1B*

Switches, Sealed-5100 — *See Vol. 1B*

Switches, Slide-5100 — *See Vol. 1B*

Switches, Snap Action (All Types)-5100 — *See Vol. 1B*

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Switches, Thumbwheel-5100 — *See Vol. 1B*

Switches, Tilt — See Switches, Mercury Displacement (Vol. 1B)

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Switch Hardware-2800 — *See Vol. 2*

Switching Systems, Audio-1300

T-Bar Incorporated, Switching Components Div., P.O. Box T, 141 Danbury Rd., Wilton, CT 06897, 203-834-8227 .... 3•1308
† Aiken Advanced Sys., 5901 Edsall Rd., Alexandria, VA 22304 703-370-0900
Aiphone, 1700 130th St. NE, Bellevue, WA 98005 206-455-0510
§† Audiosone, Inc., 617 Fan Hill Rd., Monroe, CT 06468 .... 203-268-4372; 800-243-8160
Capitol Machine & Switch Co., Box 890, Danbury, CT 06810 203-744-3300
GRIM Corporation, Box 67, Medford, NJ 08055 609-267-7950
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
§† JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875
§ Ramko Resch., Inc., 11355A Folsom Blvd., Rancho Cordova, CA 95670 800-821-2545
Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200

Switching Systems, Test & Measurement-2900

Switch Seals, Environmental-2800 — *See Vol. 2*

Swivel Units, Data Entry Terminals-1400 — *See Vol. 2*

Synchronizers (MIL), Antenna-3475

† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Synchro Transmitters, Solid State-4900

† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735, 516-293-3100 .... 3•1170
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 619-727-7420
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Control Sciences, Inc., 9509 Vassar Ave., Chatsworth, CA 91311 818-709-5510
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
† ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
† Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
† Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072 617-344-7383
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000

Synchros-4900

† Portescap Transicoil, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990, 215-277-1300 .... 1B•1185
† Astrosyn America, 14349 Victory Blvd., Ste. 304, Van Nuys, CA 91401 213-785-2197
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083 619-727-7420
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† EDO Corp./Elinco Div., 272 Main Ave., Norwalk, CT 06851 203-847-5861
† Harowe Servo Controls, Westtown Rd. at West Chester Pike, W. Chester, PA 19380 215-692-2700
Henschel, 14 Cedar St., Amesbury, MA 01913 617-388-1103
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
† IMC Magnetics Corp., Western Div., 12627 Hiddencreek Way, Cerritos, CA 90701 213-926-0927
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950

North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788 516-582-6500
† Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
† Transmagnetics, 210 Adams Blvd., Farmingdale, NY 11735 516-293-3100
† Vernitron Corp., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073 619-428-5581

Synchros & Resolvers (MIL)-2440 — *See Vol. 1B*

Synthesizers, Delay Line-2350 — *See Vol. 1A*

Synthesizers, Frequency-2900

† Andersen Labs., 1280 Blue Hills Ave., Bloomfield, CT 06002, 203-242-0761 .... 1A•1450
Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 .... 1A•1686
Colorado Crystal Corp., 2303 W. 8th St., Loveland, CO 80537, 303-667-9248 .... 1A•1364
† Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 .... 3•1210
† Frequency Elctrns., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, 516-794-4500 .... 1A•1359
Programmed Test Sources, Beaver Brook Rd., Littleton, MA 01460, 617-486-3008 .... 3•1288
Abacus Controls Inc., 89 Readington Rd., Somerville, NJ 08876 201-526-6010
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
Applied Communications, 9125 Gaither Rd., Gaithersburg, MD 20877 301-948-5210
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Communication Techniques Inc., 36 Route 10, East Hanover, NJ 07936 201-884-2580
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§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
† EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
Engelmann Microwave Co., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981 201-887-5700
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400;800-648-7952
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Frederick Elctrns. Corp., 7630 Hayward Rd., P.O. Box 502, Frederick, MD 21701-0502 301-662-5901
† Frequency West, Inc., 3140 Alfred St., Santa Clara, CA 95050 408-727-8500
† Greenray Inds., Inc., 840 W. Church Rd., Mechanicsburg, PA 17055 717-766-0223
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
Leigh Instrs. Ltd., Frequency Control Div., C. R. Snelgrove Co., 141 Bond Ave., Don Mills, ON M3B 1M2 Canada 416-447-8531
§ Luff Research, Box 449, Jackson Hgts., NY 11372 212-429-5900
† M/A-COM OSW, Inc., 2626 S. Hardy Dr., Tempe, AZ 85282 602-966-1471
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† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
§† Nitron, 10420 Bubb Rd., Cupertino, CA 95014 408-255-7550
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† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
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Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
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§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 .. 415-676-5000
§ Tucker Elctrns., Box 461060, Garland, TX 75046 .... 214-348-8800;800-527-4642
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† Wavetek Rockland Scientific, Inc., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647 201-767-7900
§ Wavetek San Diego, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123 619-279-2200
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† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

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Intex Micro Systems Corp., 725 S. Adams Rd., Suite L-8, Birmingham, MI 48011 313-540-7601
Kinetic Sys., 11 Maryknoll Dr., Lockport, IL 60441 815-838-0005
Mitsubishi Elctrns. America, Inc., Semiconductor Div., 777 N. Pastoria Ave., Sunnyvale, CA 94086 408-730-5900
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700

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† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
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BEI Motion Systems Co., Corporate Off., 681 Market St., Ste. 741, San Francisco, CA 94105, 415-974-1275 .... 1B•1832¢5561;5562;5563;5564;5565
Computer Prod. Div., BEI Motion Sys. Co., 1755 B La Costa Meadows Dr., San Marcos, CA 92069, 619-471-2600 .... 1B•1832
BEI Motion Sys. Co., General Control Systems Div., 564 Alpha Dr., Pittsburgh, PA 15238, 412-963-0515 .... 1B•1832
BEI Motion Sys. Co., Industrial Encoder Div., 7230 Hollister Ave., Goleta, CA 93117, 805-968-0782 .... 1B•1832
BEI Motion Sys. Co., Position Controls Div., 819 Reddick Ave., Santa Barbara, CA 93103, 805-966-1538 .... 1B•1832
Bertsch U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083, 619-727-7420 .... 1B•1132,1133
Datametrics Dresser Inds., Inc., 340 Fordham Road, Wilmington, MA 01887, 617-658-5410 .... 1B•1841
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† Micro Mo Electronics, Inc., 742 2nd Ave. S., St. Petersburg, FL 33701, 813-822-2529 .... 3•1135
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1339
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Renco, 26 Coromar Dr., Goleta, CA 93017-3094, 805-968-1525 .... 1B•1874
Vernitech, 300 Marcus Blvd., Deer Pk., NY 11729, 516-586-5100 .... 1B•1207
Vernitron Corp., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073, 619-428-5581 .... 1B•1209
† Aeroflex Labs., Magnetic Prods. Div., , So. Service Rd., Plainview, NY 11803 516-694-6700
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§† Harris Circuits Mfg., 2706 Colley Ave., Norfolk, VA. 23517 804-467-1116
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§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .... 201-291-0500; 800-631-2165
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† GIC Thermodynamics, 2611 Parmenter, Royal Oak, MI 48073 313-280-1648
† Harowe Servo Controls, Westtown Rd. at West Chester Pike, W. Chester, PA 19380 215-692-2700
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Tees, Waveguide-3450 — *See Vol. 1A*

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Telephone Handsets — See Handsets, etc. (Vol. 3)

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Qwint Systems, 3693 Commercial Ave., Northbrook, IL 60062 312-498-5060
Sidereal Corp., 9600 S.W. Barnes Rd., Portland, OR 97225 503-297-5531
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Teleprinters, Keyboard Send/Receive-1900
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
§† Genicom Corp., General Electric Dr., Waynesboro, VA 22980 703-949-1000
Sidereal Corp., 9600 S.W. Barnes Rd., Portland, OR 97225 503-297-5531
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Teleprinters, Receive Only-1900
† Datametrics Corp., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406 818-989-3840
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
§† Genicom Corp., General Electric Dr., Waynesboro, VA 22980 703-949-1000
Qwint Systems, 3693 Commercial Ave., Northbrook, IL 60062 312-498-5060
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
§ TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Teletypewriters & Equipment-1900
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Digital Equip., One Iron Way, Marlborough, MA 01752
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Qwint Systems, 3693 Commercial Ave., Northbrook, IL 60062 312-498-5060
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† Teletype, 5555 Touhy Ave., Skokie, IL 60076 312-982-2000
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Television Systems & Equipment, Cable (CATV) & Master Antenna (MATV) — See CATV Systems & Equipment (Vol. 3)

Television Systems & Equipment Closed Circuit-1900
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 805-967-0423
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
Angenieux Inc., 120 Derry Rd., Hudson, NH 02051 603-889-2116
† Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
ATV Research, Inc., 1301 Broadway, Dakota City, NE 68731 402-987-3771
† Cohu, Box 85623, San Diego, CA 92138 619-277-6700
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Components Corp., 6 Kinsey Pl., Denville, NJ 07834 201-627-0290
§ Delta Elctrns., 145 Fayette St., Winston-Salem, NC 27101 919-725-4122
§ Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
§ Dyma Engrg., Box 1535, Los Lunas, NM 87031 505-865-6700
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ... 516-435-2808;800-DIAL EDL; 800 342-5335
† EDO Western Corp., EDO Corp., 2645 South 300 W., Salt Lake City, UT 84115 ....801-486-7481/3846
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 201-667-2262
Hamamatsu Photonics K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan 0534-34-3311
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
† Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
§† Lenco Elctrns., Inc., 300 N. Maryland St., Jackson, MO 63755 314-243-3147
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Math Assocs., 2200 Shames Dr., Westbury, NY 11590 516-334-6800
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998 213-828-7496
RCA Solid State Div., Route 202, Somerville, NJ 08876 201-685-6000
Stenning Instrments, Inc., 671 Enchanted Way, Pacific Palisades, CA 90272 213-459-2930
§ Tektone Sound & Signal, 1331 S. Killian Dr., Lake Park, FL 33403 .305-844-2383
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
§ Television Microtime, Inc., 1280 Blue Hills Ave., Bloomfield, CT 06002 203-242-4242
Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001 214-233-6631
§ Venus Scientific, Inc., 399 Smith St., Farmingdale, NY 11735 516-293-4100
§ Vicon Inds., 125 E Bethpage Rd., Plainview, NY 11803 516-293-2200
§ Video Automation Systems, Upper Shad Rd., Pound Ridge, NY 10576 914-764-4613
Visual Info. Institute, Box 33, Xenia, OH 45385 513-376-4361

Temperature Indicators — See Meters, Temperature (Vol. 3), Labels, Temperature Indicating (Vol. 1B),

Temperature Sensors — See Transducers, Temperature (Vol. 1B)

Tensile Testers — See Testers, Material (Vol. 3)

Terminal Blocks (Incl. Barrier Types)-2100 — *See Vol. 2*

Terminal Boards-2100 — *See Vol. 2*

Terminal Equipment, Digital-2000
Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
§ Ann Arbor Terminals, 6175 Jackson Rd., Ann Arbor, MI 48103 313-663-8000
§ Applied Digital Data Systems Inc., 100 Marcus Blvd., Hauppauge, NY 11787 516-231-5400
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 .617-667-4111
† Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Computerwise, 4006 E 137th Terr., Grandview, MO 64030 816-765-3330
§† Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
† Di/An Controls, Inc., 944 Dorchester Ave., Boston, MA 02125 617-288-7700
Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Frederick Elctrns. Corp., 7630 Hayward Rd., P.O. Box 502, Frederick, MD 21701-0502 301-662-5901
§† Genicom Corp., General Electric Dr., Waynesboro, VA 22980 703-949-1000
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362 818-991-1410
Memodyne, 220 Reservoir St., Needham Hgts., MA 02194 617-444-7000
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ MSI Data Corp., 340 Fischer Ave., Costa Mesa, CA 92626 714-549-6000
§ NEC Infor. Sys., 5 Militia Dr., Lexington, MA 02173 617-862-3120
§ Qume, 2350 Qume Dr., San Jose, CA 95131 408-942-4000
Qwint Systems, 3693 Commercial Ave., Northbrook, IL 60062 312-498-5060
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Standard Logic, 2215 S. Standard Ave., Santa Ana, CA 92707 714-979-4770
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
† Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
§ Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Terminal Strips (Including Barrier Types)-2100 — *See Vol. 2*

Terminals, Credit Authorization-2000
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402, 213-454-0302 .... 3•1104
Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700

Elcom Industries, Inc., 10268 Bach Blvd., St. Louis, MO 63132 314-429-3100
§ Lexicon Corp. of Miami, 1541 N. W. 65th Ave., Ft. Lauderdale, FL 33313 305-792-4400
§ TEC, 2727 N. Fairview, Box 5646, Tuscon, AZ 85703 602-792-2230
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Terminals, Data Display (including Alphanumeric & Graphic)-2000

Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001, 214-233-6631 .... 3•1096
A & B Technical Services, 11300 Hartland St., N. Hollywood, CA 91605 213-769-6772
ADAC Corp., 70 Tower Office Pk., Woburn, MA 01801 617-935-6668
Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
Advanced Elctrns. Design, 440 Potrero Ave., Sunnyvale, CA 94086 408-733-3555
† Ampex Corp., 401 Broadway, Redwood City, CA 94063 415-367-2011
§ Ann Arbor Terminals, 6175 Jackson Rd., Ann Arbor, MI 48103 313-663-8000
§ Applied Digital Data Systems Inc., 100 Marcus Blvd., Hauppauge, NY 11787 516-231-5400
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 408-748-1200
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
§† Aydin Controls, 414 Commerce Dr., Ft. Washington, PA 19034 215-542-7800
Bridge Computer Co., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-244-8190
† Calcomp, 2411 W. La Palma Ave., Anaheim, CA 92801 714-821-2011
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§ Computer Devices, 25 North Ave., Burlington, MA 01803 617-273-1550
Computer Talk, Inc., Box 148, Morrison, CO 80465 303-697-5485
Computerwise, 4006 E 137th Terr., Grandview, MO 64030 816-765-3330
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§ Coosol, 3013 Harbor Blvd., Costa Mesa, CA 92626 714-545-2216
CPS Inc., 110 Wolfe Rd., Sunnyvale, CA 94086 408-738-0530
§† Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ Data Rentals/Sls., Inc, P. O. Box 3257, Culver City, CA 90230 213-559-3822
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
ECD Corp., 196 Broadway, Cambridge, MA 02139 617-661-4400
Electro-Rent Corp., 4131 Van Owen Place, Burbank, CA 91505 213-843-3131
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
Evans & Sutherland Computer Corp., P.O. Box 8700, 580 Arapeen Dr., Salt Lake City, UT 84108 801-582-5847
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
General Digital, 700 Burnside Ave., E. Hartford, CT 06108 203-528-9041
Genstar Rental Elctrns., 2445 Faber Pl., Palo Alto, CA 94303 415-856-7600
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
HMW Enterprises Inc., 604 Salem Road, Etters, PA 17319 717-938-4691
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
Honeywell Info. Sys., 200 Smith St., MS 440, Waltham, MA 02154 .617-895-6000
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Industrial Elctrn. Engrs., Inc., 7740 Lemona Ave., Van Nuys, CA 91405 818-787-0311
§† Interstate Electronics Corp., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803 714-635-7210
Itoh Electronics, Inc. (C.), 5301 Beethoven St., Los Angeles, CA 90066 212-682-0420
Jupiter Systems, 1100 Marina Village Parkway, Alameda, CA 94501 415-523-9000
§ Lear Siegler, Inc., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406 213-452-6000
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
§ Megatek Corp., 9605 Scranton Rd., San Diego, CA 92121 619-455-5590
† Memorex Corp., San Thomas at Central Expwy., Santa Clara, CA 95052 408-987-1000
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
Mitronics, 18039 Crenshaw Blvd., Torrance, CA 90504 213-323-7934
§ Mitsubishi Elctrns., Industrial Electronics Div., 991 Knox Street, Torrance, CA 90502 213-515-3993
§ Motorola Semiconductor Prods. Sector, Adv. 72, Box 20912, Phoenix, AZ 85036 602-244-6900
Ontel Corp., 250 Crossways Park Dr., Woodbury, NY 11797 516-364-2121
§ Princeton Elctrn. Prods., Box 101, North Brunswick, NJ 08902 201-297-4448
Racal-Milgo, 8600 N.W. 41st St., Miami, FL 33166 305-592-8600
Ramcom Systems, 4121 Redwood Ave., Los Angeles, CA 90066 213-827-4432
§ Ramtek, 2211 Lawson Lane, Santa Clara, CA 95050 408-988-2211
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Sanders Assocs., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103 603-669-4615
Southwest Tech Prods Corp., 219 W. Rhapsody, San Antonio, TX 78216 512-344-0242
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
TEC, 2727 N. Fairview, Box 5646, Tuscon, AZ 85703 602-792-2230
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Teledyne/Geotech, 3401 Shiloh Rd., Garland, TX 75041 214-271-2561
† Teleram Communications, 2 Corporate Park Dr., White Plains, NY 10604 914-694-9270
Telesis Laboratory, Box 1972, Chillocothe, OH 45601 614-642-5000
† Teletype, 5555 Touhy Ave., Skokie, IL 60076 312-982-2000
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 ...301-881-7655
§ Texas Instrs., Inc., Box 225012-MS-84, Dallas, TX 75265 214-995-6611
§ Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
Trivex, 3180 Redhill Ave., Costa Mesa, CA 92626 714-546-7781

Terminals, Data Entry, Multimedia-2000

Bowmar Instrument Corp., Aerospace Div., 8000 Bluffton Rd., Ft. Wayne, IN 46809, 219-747-3121 ....1B•1763
§ InfoCap, Inc., 31119 Via Colinas 502, Westlake Village, CA 91362, 818-991-1410 .... 3•1085
Xico, Inc., 120 Ocean Way, Santa Monica, CA 90402, 213-454-0302 .... 3•1104
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
Computerwise, 4006 E 137th Terr., Grandview, MO 64030 816-765-3330
Comtec Infor. Sys., Inc., 53 John St., Cumberland, RI 02864 401-724-8500
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Elcom Industries, Inc., 10268 Bach Blvd., St. Louis, MO 63132 314-429-3100
§† Genicom Corp., General Electric Dr., Waynesboro, VA 22980 703-949-1000
§ Industrial Computer Designs, Inc., 31121 Via Colinas 1005, Westlake Village, CA 91362 818-889-3179
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
MSI Data Corp., 340 Fischer Ave., Costa Mesa, CA 92626 714-549-6000
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Terminals, Display-2000

Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001, 214-233-6631 .... 3•1096
§ Ann Arbor Terminals, 6175 Jackson Rd., Ann Arbor, MI 48103 313-663-8000
Antona Corp., 13600 Ventura Blvd.,, Sherman Oaks, CA 91423 213-986-6651
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Astec USA, Ltd., A BSR Intl. Co., 2880 San Tomas Expwy., 00, Santa Clara, CA 95051 408-748-1200
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
§† Aydin Controls, 414 Commerce Dr., Ft. Washington, PA 19034 215-542-7800
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
General Digital, 700 Burnside Ave., E. Hartford, CT 06108 203-528-9041
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
Jupiter Systems, 1100 Marina Village Parkway, Alameda, CA 94501 415-523-9000
Lundy Elctrns. and Systems, Inc., 1 Robert La., Glen Head, NY 11545 516-671-9000
Matrox Elctrn. Sys., 5800 Andover Ave., Montreal, QU H4T 1H4 Canada 514-735-1182
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
§ Ramtek, 2211 Lawson Lane, Santa Clara, CA 95050 408-988-2211
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
§ TEC, 2727 N. Fairview, Box 5646, Tuscon, AZ 85703 602-792-2230
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494
Zenith Components & Sys. Grp., Zenith Radio Corp., 1000 Milwaukee Ave., Glenview, IL 60025 312-391-7733

Terminals, Feedthru-2800 — *See Vol. 2*

Terminals, Financial-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
§ Lexicon Corp. of Miami, 1541 N. W. 65th Ave., Ft. Lauderdale, FL 33313 305-792-4400
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051

Terminals, Ferrule, Cable-End-2100 — *See Vol. 2*

Terminals, Intelligent/Programmable, Batch-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
§ Ann Arbor Terminals, 6175 Jackson Rd., Ann Arbor, MI 48103 313-663-8000
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
Comtec Infor. Sys., Inc., 53 John St., Cumberland, RI 02864 401-724-8500
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
Research, Inc., Box 24064, Minneapolis, MN 55424 612-941-3300
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Terminals, Intelligent/Programmable, Interactive-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§† Aydin Controls, 414 Commerce Dr., Ft. Washington, PA 19034 215-542-7800
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
Comtec Infor. Sys., Inc., 53 John St., Cumberland, RI 02864 401-724-8500
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Harris Corp., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309 305-974-1700
HMW Enterprises Inc., 604 Salem Road, Etters, PA 17319 717-938-4691
Jupiter Systems, 1100 Marina Village Parkway, Alameda, CA 94501 415-523-9000
§ Lexicon Corp. of Miami, 1541 N. W. 65th Ave., Ft. Lauderdale, FL 33313 305-792-4400
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Serial Lab Prods., Inc., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752 617-481-1684
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
§† TeleVideo Sys., Inc., 1170 Morse Ave., Sunnyvale, CA 94086 408-745-7760
Terminal Data Corp., 11878 Coakley Circle, Rockville, MD 20852 301-881-7655
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611
§ TTS-Telecom Terminal Systems, 3877 Grandview Blvd., Los Angeles, CA 90066 213-390-9494

Terminals, Intelligent/Programmable, Multiprogramming-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Terminals, Intelligent/Programmable, Multiuser-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Cambridge Digital Sys., Compumart, P.O. Box 568, 65 Bent St., Cambridge, MA 02139 617-491-2700
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§ GMR Inc., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746 213-639-4663
Jupiter Systems, 1100 Marina Village Parkway, Alameda, CA 94501 415-523-9000
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

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Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
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Control Module, 380 Enfield St., Enfield, CT 06082 203-745-2433
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
Jupiter Systems, 1100 Marina Village Parkway, Alameda, CA 94501 415-523-9000
Microsystems Dev. Corp. Inc., 1560 Teaneck Rd., Teaneck, NJ 07666 201-837-0051
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Terminals, Intelligent/Programmable, Transaction Processing-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
BMS Data Handling, Inc., 12155 Magnolia, Riverside, CA 92503 714-359-8820
† Custom Prods. Grp., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301 215-648-2241
§ Data General, 4400 Computer Dr., Westboro, MA 01581 617-366-8911
Enterprise Sys. Corp., P.O. Box 698, Dover, NH 03820 603-742-7363
§ Lexicon Corp. of Miami, 1541 N. W. 65th Ave., Ft. Lauderdale, FL 33313 305-792-4400
Sperry Univac, Mini-Computer Operations, Box C-19504, Irvine, CA 92713 714-754-6900
Texas Instrs., Data Sys. Group, P.O. Box 2909 MS 2222, Austin, TX 78769 214-995-6611

Terminals, Lug (All Types)-2100 — *See Vol. 2*

Terminals, Miniature & Subminiature-2100 — *See Vol. 2*

Terminals, Printed Circuit Board-2100 — *See Vol. 2*

Terminals, Point-of-Sale-2000

Addressograph Farrington Inc., Datatrol Div., Brent Dr., Hudson, MA 01749 617-568-1411
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Di/An Controls, Inc., 944 Dorchester Ave., Boston, MA 02125 617-288-7700
Elcom Industries, Inc., 10268 Bach Blvd., St. Louis, MO 63132 314-429-3100
General Digital, 700 Burnside Ave., E. Hartford, CT 06108 203-528-9041
§ Lexicon Corp. of Miami, 1541 N. W. 65th Ave., Ft. Lauderdale, FL 33313 305-792-4400
§ Weco Elctrl. Connectors Inc., P.O. Box 84, Ste. Anne De, Bellevue, PQ H9X 3L4 Canada 514-457-3648

Terminals, Push-on — See Connectors & Terminals, Push-on, Quick Disconnect (Vol. 2)

Terminals, Solderless-2100 — *See Vol. 2*

Terminals, Standoff-2100 — *See Vol. 2*

Terminals, Threaded-2100 — *See Vol. 2*

Terminals, Turret-2100 — *See Vol. 2*

Terminals, Wirewrap-2100 — *See Vol. 2*

Terminals (MIL), Ground Data-3475

† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† CO-ORD Switch Div., LVC Inds., Inc., 23 Hanse Ave., Freeport, NY 11520 516-868-1900
† LVC Inds., Inc., CO-ORD Switch Div., 23 Hanse Ave., Freeport, NY 11520 516-868-1900
† SAI Technlg. Co., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121 619-452-9150

§—Product sold through distributors †—Product meets MIL specs

Terminations, Antenna-2800 (Also See Dummy Loads) — *See Vol. 2*

Terminations, Fiber Optic-2475 — *See Vol. 1B*

Terminations, Microwave-3450 — *See Vol. 1A*

Terminations, VHF, Video, Pulse-1900

† **Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 ..... 1A•1687**
Compac, 279 Skidmore Rd., Deer Park, NY 11729, 516-667-3933 ..... 1A•1690
§ **ITT Pomona Electronics, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, 714-623-3463 ..... 2•1389,1393**
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542, 516-671-5700 ..1A•1774
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 ..... 1A•1787
† Arra Inc., 15 Harold Ct., Bay Shore, NY 11706 516-231-8400
Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
§† Dielectric Communications, General Signal, Tower Hill Rd., Raymond, ME 04071 ..... 207-655-4555;800-341-9678
† Elcom Systems, Inc., 4032 Clint Moore Rd., Boca Raton, FL 33431 305-994-1774
† Electro Impulse, Box 870, Red Bank, NJ 07701-0870 201-741-0404
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ..... Call Local Sls. Off.
§† JFW Inds., Inc., 2719 E. Troy Ave., Indianapolis, IN 46203 317-783-9875
§† Kings Elctrns., 40 Marbledale Rd., Tuckahoe, NY 10707 914-793-5000
Manger Elec. Co., Inc., W. Henry St., Stamford, CT 06902 203-348-7761
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
§† Systron-Donner Microwave Div., 14844 Oxnard St., Van Nuys, CA 91409 818-786-1760
† Trompeter Electronics, Inc., 8936 Comanche, Chatsworth, CA 91311 818-882-1020
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
§ Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
Wide Band Engrg. Co., Inc., Box 21652, Phoenix, AZ 85036 602-254-1570

Test Assemblies (MIL)-3475

† Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 ...203-828-6379
† Spectra-Strip, 7100 Lampson Ave., Garden Grove, CA 92642-0415 714-892-3361
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600

Test Benches (MIL), ECM-3475

† Manufacturing Sys., Div. LeDoux Inds., Inc., 2022-C S. Grand Ave., Santa Ana, CA 92705 714-540-6630

Test Benches (MIL), Shop-3475

† Manufacturing Sys., Div. LeDoux Inds., Inc., 2022-C S. Grand Ave., Santa Ana, CA 92705 714-540-6630

Test Equipment — See Meters, Acceleration, Admittance, etc. (Vol. 3)

Test Equipment, Closed Circuit TV-2900 (Also See Television Systems & Equipment, Closed-Circuit)

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1260
Alessi Inds., Inc., 3195-C Airport Loop Dr., Costa Mesa, CA 92626 .714-979-8912
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
Dotronix, 160 First St. SE, New Brighton, MN 55112 612-633-1742
ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 201-667-2262
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
Penn Video Inc., 929 Sweitzer Ave., Akron, OH 44311 216-762-4840
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ..... 800-547-1512; Oregon only 800-452-1877
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
§ Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
Texscan Instruments, 3169 N. Shadeland, Indianapolis, IN 46226 317-545-4196
Visual Info. Institute, Box 33, Xenia, OH 45385 513-376-4361
Wavetek Indiana, Inc., 5808 Churchman, Beech Grove, IN 46107 317-787-3332

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§ Asaca Shibasku Corp. of Amer., 12509 Beatrice St., Los Angeles, CA 90066 827-7144
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
§ Colorado Video, Inc., Box 928, Boulder, CO 80306 303-444-3972
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ..... Call Local Sls. Off.
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Poulin Associates, Inc., 302 North Rd., Sudbury, MA 01776 617-443-7333
Quantum Data, Inc., 455 E. Kehoe, Carol Stream, IL 60188 312-668-3301
§ REI Sls., 19525 Business Centre Dr., Northridge, CA 91324 617-938-0900
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ..... 215-EL5-1361
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Sylvania Electronic Components, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254 617-890-6107
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ..... 800-547-1512; Oregon only 800-452-1877
† Telectro Sys., 96-18 43rd Ave., Corona, NY 11368 212-651-8900
Telemet, 185 Dixon Ave., Amityville, NY 11701 516-842-2300
Television Equip. Assocs., Box 393, So. Salem, NY 10590-0393 914-763-8893
Visual Info. Institute, Box 33, Xenia, OH 45385 513-376-4361
VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626

Test Equipment, Fiber Optic-2475 — *See Vol. 1B*

Test Equipment, Mechanical Impedance-2900

Wilcoxon Resch., P.O. Box 5798, Bethesda, MD 20814, 301-770-3790 ..... 1B•1886
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
Burleigh Instrs., Burleigh Pk., Fishers, NY 14453 716-924-9355
Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730 617-275-0850
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ..... Call Local Sls. Off.
PCB Piezotronics, 3425 Walden Ave., Depew, NY 14043-2495 716-684-0001
† Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Solartron Instruments, Sangamo Weston Inc., 17972 Sky Park Cir.; Ste. F, Irvine, CA 92714 714-250-1172
Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
† Validyne Engrg. Corp., 8626 Wilbur Ave., Northridge, CA 91324 818-886-2057

Test Equipment, Memory Systems, Disk-2900

Applied Circuit Technlg. (ACT), 2931 La Jolla St., Anaheim, CA 92806 714-632-9230
AVA Instrmn., Inc., 8010 Highway 9, Ben Lomond, CA 95005 408-336-2281
Jaycor, P.O. Box 85154, San Diego, CA 92138 619-453-6580
Peripherals, 3001 Red Hill, Bldg. 6, Ste. 107, Costa Mesa, CA 92626 714-540-4925
Pioneer Magnetics, 1745 Berkeley St., Santa Monica, CA 90404 213-829-6751
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
Test & Measurement Systems, Inc., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086 408-720-8877

Test Equipment, Rental-2900 (Also See Services, Electrical Measurement & Test)

Continental Resources, Inc., 175 Middlesex Tpke., Bedford, MA 01730, 617-275-0850 ..... 3•1212
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ..... 3•1248
§ American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
Atlas Energy Sys., 9457 Rush St., S. El Monte, CA 91733 213-575-0755
† BEC Inc., 2709 N. Broad St., Philadelphia, PA 19132 215-229-9800
Dielectric Instr. Corp., 761 Franklin Ave., Pittsburgh, PA 15221 412-731-6566
Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ...516-231-6900
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
Step Engineering, P.O. Box 61166, Sunnyvale, CA 94088 408-733-7837
U.S. Instr. Rentals, 2988 Campus Dr., San Mateo, CA 94403 415-572-6600

Test Equipment (MIL)-3475

Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 ..... 3•1173
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 ..... 3•1248
Amdahl Communications Sys. Div., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291 213-822-3202
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
Bird Elctrn., 30303 Aurora Rd., Cleveland, OH 44139 216-248-1200
Cincinnati Sub-Zero Prods., 2612 Gilbert Ave., Cincinnati, OH 45206 513-751-8810
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
Custom Sci. Instrs., 13 Wing Dr., Cedar Knolls, NJ 07927 201-538-8500
§ EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715 714-752-2891
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
Electrostatic Consltg. Assocs., 556 Lowell Rd., Groton, MA 01450 ..617-448-5485
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Kollsman Instr., 220 Daniel Webster Hwy., Merrimack, NH 03054 ...603-889-2500
LTX, LTX Pk. University Ave., Westwood, MA 02090 617-329-7550
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
† Photo Resch., 3000 N. Hollywood Way, Burbank, CA 91505 213-843-6100
Pulsar Products Div., 2700 Merced St., San Leandro, CA 94577 415-577-7236
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666

† Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001 214-233-6631
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

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Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
Hollex, Inc., 81 W. Wyoming Ave., Melrose, MA 02176 617-665-2413
LTX, LTX Pk. University Ave., Westwood, MA 02090 617-329-7550
† Manufacturing Sys., Div. LeDoux Inds., Inc., 2022-C S. Grand Ave., Santa Ana, CA 92705 714-540-6630
§† Microtest Systems, Inc., 1188 Bordeaux Dr., Sunnyvale, CA 94089-1281 408-745-7000
Virginia Panel, 1400 New Hope Rd., Waynesboro, VA 22980 703-949-8376
Wire Graphics, 215 B. Central Ave., Farmingdale, NY 11735 516-293-1525

Test Methods (MIL)-2440

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† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300
† Comtech Microwave Corp., Comtech Corp., 63 Oser Ave., Hauppauge, NY 11788 516-435-4646
† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701
ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
Hollex, Inc., 81 W. Wyoming Ave., Melrose, MA 02176 617-665-2413
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700

Test Sets (MIL), Airborne Radar-3475

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† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666

Test Sets (MIL), ECM-3475

ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
Narda Microwave Corp., 435 Moreland Rd., Hauppauge, NY 11788 516-231-1700

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ETM Electromatic, 470 San Antonio Ave., Palo Alto, CA 94306 415-494-1505
† Flight Systems, Inc., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660 714-833-9661
Honeywell Inc., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408 612-870-5186
† Litton Applied Technology, 645 Almanor Ave., P.O. Box 3478, Sunnyvale, CA 94088-3478 408-773-0777
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414

Test Sets (MIL), Flight Line-3475

† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
Modular Devices, 50 Orville Dr., Bohemia, NY 11716 516-567-9620
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700

Test Sets (MIL), IRCM-3475

† Electro-Optical Inds., Box 3770, Santa Barbara, CA 93105 805-964-6701

Test Sets (MIL), TJS-3475

Test Systems, Automatic DC-2900

Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1248
Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401, 405-223-4773 .... 3•1300,1301
Vistar Corp., 13740 McCormick Dr., Tampa, FL 33625, 813-855-6611 .... 3•1317
§ Aerotronic Assocs., Inc., Riverside Dr., Contoocook, NH 03229 603-746-4631
American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
Augat/ESP, Inc., 12832 Chadron Ave., Hawthorne, CA 90250 213-973-0262
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940

Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
CYTEC Corp., 107 N. Washington St., E. Rochester, NY 14445 716-381-4740
Daytronic Corp., 2589 Corporate Pl., Miamisburg, OH 45342 513-866-3300
Eaton Corp., Test Sys. Div., Discrete Test, Precision Rd., Danbury, CT 06810 203-744-0096
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ GC Elctrns., 400 S. Wyman St., Rockford, IL 61101 815-968-9661
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ....Call Local Sls. Off.
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Hughes Aircraft Co., Indl. Prods. Div. FACT Sys., 6155 El Camino Real, Carlsbad, CA 92008 619-438-9191
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
LTX, LTX Pk. University Ave., Westwood, MA 02090 617-329-7550
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
Optimized Devices, Inc., 220 Marble Ave., Pleasantville, NY 10570 914-769-6100
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700
Tidewater Technological, Inc., 611 Industrial Pk. Dr., Newport News, VA 23602 804-874-2800
Virginia Panel, 1400 New Hope Rd., Waynesboro, VA 22980 703-949-8376
Zehntel, Inc., 2625 Shadelands Dr., Walnut Creek, CA 94598 415-932-6900

Test Systems, Board-2900

Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 .... 3•1246
Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401, 405-223-4773 .... 3•1300
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
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Advanced Techn. Research Labs., 5645 K General Washington Dr., Alexandria, VA 22312 703-750-2920

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Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821
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Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600
† ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055 713-468-7971
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Augat/ESP, Inc., 12832 Chadron Ave., Hawthorne, CA 90250 213-973-0262
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EG&G Gamma Scientific, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123 619-279-8034
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Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
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GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
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Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821

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§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
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§† Mechanical Techn., 968 Albany Shaker Rd., Latham, NY 12110 518-785-2353
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EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
Electron, Inc., P.O. Box 28640, San Diego, CA 92128 216-681-4700
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
Gould Inc., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050 408-988-6800
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Kurz-Kasch, Knob Div., 711 Hunter Dr., Wilmington, OH 45177 513-382-0966
S.I.R. Atlanta, 331 Luckie St., N.W., Atlanta, GA 30313 404-522-6317
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740

Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700
Zehntel, Inc., 2625 Shadelands Dr., Walnut Creek, CA 94598 415-932-6900

Testers, Loopback-2900

Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
§ Phoenix Microsystems, P.O. Box 4206, Huntsville, AL 35802 205-881-2173
§ Telebyte Technology, Inc., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797 516-423-3232

Testers, Magnetic Core-2900

LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, 313-528-2202 .... 3•1256
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226 317-545-2102
Magnetic Metals Co., Hayes Ave. at 21st St., Camden, NJ 08105 609-964-7842
§ Magnos, Old School House Rd., Harvard, MA 01451 617-456-8880
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Testers, Magnetic Medium-2900

§ Dennison Kube, Div. Dennison Computer Supplies Inc., 132 Calvary St., Waltham, MA 02254-0472 617-899-0012
Femco, Inc., P.O. Box 26710 Parkmoor Sta., San Jose, CA 95159 408-946-1188
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226 317-545-2102
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674

Testers, Magnetron-2900

Cober Elctrns., 102 Hamilton Ave., Stamford, CT 06902 203-327-0003

Testers, Material-2550

LDJ Incorporated, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, 313-528-2202 .... 3•1256
† Ametek, Inc, Hunter Spring Division, 1 Spring Ave., Hatfield, PA 19440 215-822-2971
† Custom Sci. Instrs., 13 Wing Dr., Cedar Knolls, NJ 07927 201-538-8500
Dillon, W. C., & Co., 2320 Airport Blvd., Santa Rosa, CA 95401 707-527-5555
† Dresser Inds., 1505 Elm St., Dallas, TX 75201 214-746-6000
Exact Electronics, Div. of Dynatech Nevada Inc., Box 1925, 2000 Arrowhead Dr., Carson City, NV 89701 .... 702-883-3400;800-648-7952
Instron Corp., 100 Royall St., Canton, MA 02021 617-828-2500
Magnetic Instrumentation, 8350 E. 48TH ST., Indianapolis, IN 46226 317-545-2102
§ Magnos, Old School House Rd., Harvard, MA 01451 617-456-8880
§ Pacific Transducer, 2301 Federal, Los Angeles, CA 90064 213-478-1134
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
Walker Scientific, Rockdale St., Worcester, MA 01606 617-852-3674

Testers, Memory Board-2900

Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 .... 3•1246
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Reliability Inc., 16400 Park Row, P.O. Box 218370, Houston, TX 77218 713-492-0550

Testers, Meter-2900

Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1248,1249
North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002, 609-488-1060 .... 3•1272
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 .... 3•1319
Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 .... 617-777-4500; 17-246-0300;800-451-1816
† Automation Dynamics, 77 Brookside Pl., Hillsdale, NJ 07642 201-666-2458
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Behlman Div., California Instrs., Div. of Norlin Inds., 5150 Convoy St., San Diego, CA 92111 619-279-8620
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 .... 516-435-2808;800-DIAL EDL; 800 342-5335
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
Elin Div., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111 619-279-8620
† Flow Techn., Box 21346, Phoenix, AZ 85036 602-437-1315
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
Photodyne, 1175 Tourmaline Dr., Newbury Park, CA 91320 818-889-8770
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
Rotek Instr. Corp., 390 Main St., Waltham, MA 02254 617-899-4611
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

Testers, Microwave-2900

Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647, 201-767-7250 .... 3•1259, 1260
Weinschel Engrg., One Weinschel La., Gaithersburg, MD 20877, 301-948-3434; 800-638-2048 .... 3•1319
Alford Mfg. Co., P.O. Box 2116, 32 Sixth Rd., Woburn, MA 01888 617-935-8610
† Bendix Corp., Test Systems Div., Teterboro, NJ 07608 201-288-2000
Coaxial Dynamics, 13110 Enterprise, Cleveland, OH 44135 216-267-2233
§ Eaton Corp., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779 516-588-3600
† General Microwave Corp., 155 Marine St., Farmingdale, NY 11735 516-694-3600
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
† Microlab/FXR, 10 Microlab Rd., Livingston, NJ 07039 201-992-7700
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Mitec Elctrns., 15 Commerce St., Williston, VT 05495 802-864-0064
Pacific Meas., Inc., 488 Tasman Drive, Sunnyvale, CA 94086 408-734-5780
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300
§ Waveline, Box 718, W. Caldwell, NJ 07006 201-226-9100
§ Wiltron, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290 415-969-6500

Testers, Modem-2900

Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 .... 3•1211
Telpar, Inc., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001, 214-233-6631 .... 3•1096
§ AQ Sys., 1736 Front St., Yorktown Hgts., NY 10598 800-431-2104
BLACK BOX Corp., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241 412-746-5500
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
Dataprobe, 110 Palisades Blvd., Palisades Park, NJ 07650 201-947-9500
§ Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
§† Digitech Inds., Inc., 66 Grove St., Ridgefield, CT 06877 203-438-3731
§ Glasgal Communications, Inc., 207 Washington St., Northvale, NJ 07647 201-768-8082
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§† International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
Lode Systems, 3501 Ryder St., Santa Clara, CA 95051 408-732-5110
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§ Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Spectron Corp., 344 New Albany Rd., Moorestown, NJ 08057 609-234-5700
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 215-825-4990
† Telecommunications Techniques Corp., 444 N. Frederick Ave., Gaithersburg, MD 20877 301-258-5011

Testers, Motor-2900

American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520, 301-826-8651 .... 3•1188
Androtek/dmi, Box 29098, Columbus, OH 43229 614-882-7821
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401 405-223-4773
Staco Energy Prods. Co., 301 Gaddis Blvd., Dayton, OH 45403 513-253-1191
§ Syntel Div., Tegam, Inc., 7230 North Ridge Rd., Madison, OH 44057 216-428-7505
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Vibrac, 1 Columbia Dr., Amherst, NH 03031 603-882-6777

Testers, Potentiometer-2900

Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
† Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
Solatron Enterprises, 421 E. Beach Ave., Inglewood, CA 90302 213-678-4981

Testers, Power Supply-2900

Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1248
Kikusui Intl. Corp., 17819 S. Figueroa St., Gardena, CA 90248, 213-515-6432; 800-421-5334 .... 3•1645
Standard Power, Inc., 1400 S. Village Way, Santa Ana, CA 92705, 714-558-8512 .... 3•1783
† Transistor Devices, 274 S. Salem St., Randolph, NJ 07869, 201-361-6622 .... 3•1312
§ ACDC Electronics, 401 Jones Rd., Oceanside, CA 92054 619-757-1880
Astrosystems, 6 Nevada Dr., Lake Success, NY 11042 516-328-1600

† Automation Dynamics, 77 Brookside Pl., Hillsdale, NJ 07642 201-666-2458
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ....619-279-8620;800-356-2244;800-821-1634
Datapower, Inc., 3328 West First St., Santa Ana, CA 92703 714-775-2000
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198 617-268-9696
Elgar Corp., 8225 Mercury Ct., San Diego, CA 92111 619-565-1155
§† Harris Corp., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791 516-364-0400
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Optimized Devices, Inc., 220 Marble Ave., Pleasantville, NY 10570 .914-769-6100
† Pacific Electro Dynamics, Inc., 11465 Willows Rd. N.E., Redmond, WA 98052 206-881-1700
§ Pass & Seymour, Inc., P.O. Box 4822, Syracuse, NY 13221 315-468-6211
Power/Mate Co., 514 S. River St., Hackensack, NJ 07601 201-440-3100
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
Universal Voltronics, 27 Radio Circle Dr., Mt. Kisco, NY 10549 914-241-1300
† Venable Industries, Inc., 3555 Lomita Blvd., Torrance, CA 90505 213-539-2522

Testers, Pulse Jitter-2900

Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 .... 3•1211
† Telecommunications Techniques Corp., 444 N. Frederick Ave., Gaithersburg, MD 20877 301-258-5011

Testers, Relay-2900

Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 .... 3•1246
† Anchor Specialty Mfg. Inc., 300 Hollister Rd., Teterboro, NJ 07608 201-288-1939
† Babcock Electro-Mechanical, Inc., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626 714-540-1234
Clarke-Hess Comm. Resch. Corp., 17 West 17th St., New York, NY 10011 212-255-2940
Coto Corporation, 55 DuPont Drive, Providence, RI 02907 401-943-2686
§ Jonard Inds. Corp., 134 Marbledale Rd., Tuckahoe, NY 10707 914-793-0700
† Markenrich Corp., 14946-A Shoemaker Ave., Santa Fe Springs, CA 90670 213-921-0250
Multi-Amp Corp., Indian Head Corp., 4271 Bronze Way, Dallas, TX 75237 214-333-3201
NOBEX Div., Griffith Plastics Corp., 1027 California Dr., Box 4365, Burlingame, CA 94010 415-342-8170
Optimized Devices, Inc., 220 Marble Ave., Pleasantville, NY 10570 .914-769-6100
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
Sigma Instrs., 170 Pearl St., Braintree, MA 02184 617-843-5000
Solatron Enterprises, 421 E. Beach Ave., Inglewood, CA 90302 213-678-4981
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Tidewater Technological, Inc., 611 Industrial Pk. Dr., Newport News, VA 23602 804-874-2800
Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668

Testers, Resistivity-2900

Chatsworth Data Corp, Cablemaster Div., 20710 Lassen St., Chatsworth, CA 91311, 818-341-9200 .... 3•1208
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, 213-341-3000 .... 3•1208
§ Alessi Inds., Inc., 3195-C Airport Loop Dr., Costa Mesa, CA 92626 .714-979-8912
§ Associated Research, Inc., 8221 N. Kimball Ave., Skokie, IL 60076 .312-647-7850
† Automation Dynamics, 77 Brookside Pl., Hillsdale, NJ 07642 201-666-2458
Blanck, A. R., Co., Box 249, Rutherford, NJ 07070 201-933-2091
† Custom Sci. Instrs., 13 Wing Dr., Cedar Knolls, NJ 07927 201-538-8500
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
Electrostatic Consltg. Assocs., 556 Lowell Rd., Groton, MA 01450 ..617-448-5485
† Electro-Tech Sys., Inc., 35 E. Glenside Ave., Glenside, PA 19038 215-887-2196
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
§† Kenco Industries, Inc., Elctrn. Chemicals Div., P.O. Box 88500, Atlanta, GA 30338 404-475-6100
Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 ....717-386-4156; 215-377-5990
Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
Rutherford Resch. Prods., Box 249, Rutherford, NJ 07070 201-933-2091
† Space Electronics, Inc., Box 2166, Meriden, CT 06450 203-235-7755
Transmet Corp., 4290 Perimeter Dr., Columbus, OH 43228 ....614-276-5522; 800-245-5253
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300
† Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 ...404-253-7000

Testers, Resistor-2900

IET Labs, Inc., 534 Main St., Westbury, NY 11590, 516-334-5959 .... 3•1244
Julie Resch. Labs., 211 West 61st St., New York, NY 10023, 212-245-2727 .... 3•1251
Shalltronix Corp., Preston St., P.O. Box 235, Selma, NC 27576, 919-965-6346 .... 3•1299
§ Alpha Comps., 115 Eucalyptus Dr., El Segundo, CA 90245 213-322-7780
† Anchor Specialty Mfg. Inc., 300 Hollister Rd., Teterboro, NJ 07608 201-288-1939
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ....303-469-5231;800-821-6327
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ....516-435-2808;800-DIAL EDL; 800 342-5335
Electro Scientific Inds., 13900 N.W. Science Pk. Dr., Portland, OR 97229 503-641-4141
Industrial Test Equip., 21 Yennicock Ave., Port Washington, NY 11050 516-883-1700
Meissner Inds., 551 Rte. 10, Dover, NJ 07801 201-366-1700
Micro Technical Inds., Micro-Ohm Corp., 23666 Birtcher Dr., B, Lake Forest, CA 92630 714-855-4326
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Optimized Devices, Inc., 220 Marble Ave., Pleasantville, NY 10570 .914-769-6100
Penn Airborne Prods., Industrial Hwy., Southampton, PA 18966 215-355-3400
RE Instruments Corp., 31029 Center Ridge Rd., Westlake, OH 44145 216-871-7617
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401 405-223-4773
† Space Electronics, Inc., Box 2166, Meriden, CT 06450 203-235-7755
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280

Testers, Servo — See Analyzers, Servo (Vol. 3)

Testers, Shock-2550

† Blue M, A Unit of General Signal, 138th & Chatham Sts., Blue Island, IL 60406, 312-385-9000 .... 3•1173
Chatsworth Data Corp, Cablemaster Div., 20710 Lassen St., Chatsworth, CA 91311, 818-341-9200 .... 3•1208
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, 213-341-3000 .... 3•1208
Jan Hardware Mfg. Co., 47-27 36th St., Long Island City, NY 11101, 212-361-0800 .... 2•1767
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
§ Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
Instron Corp., 100 Royall St., Canton, MA 02021 617-828-2500
Media Recovery Inc., Box 1407, Graham, TX 76046 .. 800-527-9497;214-630-9625 (Texas)
Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401 405-223-4773

Testers, Short Turn — See Testers, Coil (Vol. 3)

Testers, Signal Tracing-2900

Chatsworth Data Corp, Cablemaster Div., 20710 Lassen St., Chatsworth, CA 91311, 818-341-9200 .... 3•1208
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, 213-341-3000 .... 3•1208
Information Transfer Indl., Box 357, Holcomb, NY 14469, 716-657-7074 .... 3•1246
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Augat/ESP, Inc., 12832 Chadron Ave., Hawthorne, CA 90250 213-973-0262
† Automation Dynamics, 77 Brookside Pl., Hillsdale, NJ 07642 201-666-2458
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
Easco/K-D Tools, 3575 Hempland Rd., Lancaster, PA 17604 717-665-4557
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
§ Holub Industries, 1701 W. Bethany Rd., Sycamore, IL 60178 815-895-6501
Kurz-Kasch, Knob Div., 711 Hunter Dr., Wilmington, OH 45177 513-382-0966
Mac Panel Co., Box 5027, 216 Pine St., High Point, NC 27262 919-884-8111
Methode Elctrns., Inc., 7444 W. Wilson Ave., Chicago, IL 60656 312-867-9600
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Optimized Devices, Inc., 220 Marble Ave., Pleasantville, NY 10570 .914-769-6100
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
§† Projects Unltd., 3680 Wyse Rd., Dayton, OH 45414 513-890-1918
§ PTS Electronics Inc., Box 272, Bloomington, IN 47401 812-824-9331
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700
§ Vidaire Elctrns., 150 Buffalo Ave., Freeport, NY 11520 516-623-6696
† Virginia Panel, 1400 New Hope Rd., Waynesboro, VA 22980 703-949-8376
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242
"World" Enterprises, Inc., 550 N. Bayard Ave., Waynesboro, VA 22980 703-942-4159

Testers, Solderability-4100

Hexacon Elec., 161 W. Clay Ave., Roselle Park, NJ 07204, 201-245-6200 .... 2•1928
Hollis Engrg., Inc., Charron Ave., Box 1189, Nashua, NH 03061 603-889-1121

Testers, Synchro/Resolver-2900

Astrosystems, 6 Nevada Dr., Lake Success, NY 11042, 516-328-1600 .... 3•1189
† North Atlantic Inds., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, 516-582-6500 .... 3•1277
† Bendix Corp., Test Systems Div., Teterboro, NJ 07608 201-288-2000
† Computer Conversions Corp., 6 Dunton Ct., E. Northport, NY 11731 516-261-3300

Testers, Synchro/Resolver-2900 (Cont'd)

† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
† ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
† Industrial Control Co., 3100 Pineda Ave., Rockledge, FL 32955 305-259-7105
† Natel Engrg. Co., Inc., 4550 Runway St., Simi Valley, CA 93063 805-581-3950
Northern Precision Labs., 11 Madison Rd., Fairfield, NJ 07006 201-227-4800
Singer Co., Kearfott Div., 1150 McBride Ave., Little Falls, NJ 07424 201-785-6000
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Testers, Thickness (all types)-2900

Alessi Inds., Inc., 3195-C Airport Loop Dr., Costa Mesa, CA 92626 . 714-979-8912
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
† Custom Sci. Instrs., 13 Wing Dr., Cedar Knolls, NJ 07927 201-538-8500
† Electron-Machine Corp., Box M, Umatilla, FL 32784 904-669-3101
§ Hacker Instrs., Box 657, Fairfield, NJ 07007 201-226-8450
§ Hunter Tools, 6721 Baymeadow Dr., Glen Burnie, MD 21061 301-760-2200
Lehighton Elctrns., Inc., Box 328, Dept M, Lehighton, PA 18235 .... 717-386-4156; 215-377-5990
§ Lion Precision, 60 Bridge St., Newton, MA 02195 617-969-4710
§ Mechanical Techn., 968 Albany Shaker Rd., Latham, NY 12110 518-785-2353
Nuclear Resch. Corp., 125 Titus Ave., Warrington, PA 18976 215-343-5900
Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
Schaevitz Engrg., U.S. 130, Union Ave., Pennsauken, NJ 08110 609-662-8000
§ Sloan Technology, P.O. Box 4608, Santa Barbara, CA 93103 805-963-4431
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990

Testers, Thyristor-2900

Bermar Corp., 6300 Westgate Rd., Raleigh, NC 27612 919-821-5993
Markenrich Corp., 14946-A Shoemaker Ave., Santa Fe Springs, CA 90670 213-921-0250
Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700

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Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
§ Guildline Instrs., 2 Westchester Plaza, Elmsford, NY 10523 914-592-9101
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091

Testers, Transistor-2900

American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
Beckman Instrs., 2500 Harbor Blvd., Fullerton, CA 92634 714-871-4848
Dantronics, Inc., 3175 Hafner Ct., St. Paul, MN 55112 612-484-2108
§ Delta Elctrns., 145 Fayette St., Winston-Salem, NC 27101 919-725-4122
Eaton Corp., Test Sys. Div., Discrete Test, Precision Rd., Danbury, CT 06810 203-744-0096
EG&G Wakefield Engrg., 60 Audubon Rd., Wakefield, MA 01880 617-245-5900
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Exatron Automatic Test Equip., 3513 Ryder St., Santa Clara, CA 95051 ...... 408-737-7111;800-EXA-TRON
§† Fairchild Test Sys. Grp., Testline Instrs., 1400 White Dr., Titusville, FL 32780 305-267-7212
§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
§ Leader Instrs. Corp., 380 Oser Ave., Hauppauge, NY 11788-3694 ... 516-231-6900
§ Lectrotech, Inc., 5810 N. Western Ave., Chicago, IL 60659 312-769-6262
Micro Technical Inds., Micro-Ohm Corp., 23666 Birtcher Dr., B, Lake Forest, CA 92630 714-855-4326
§ North American Soar Corp., 11126 Cornell Ave., Cherry Hill, NJ 08002 609-488-1060
Optimized Devices, Inc., 220 Marble Ave., Pleasantville, NY 10570 . 914-769-6100
§ Scientific-Atlanta, Inc., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801 201-361-3100
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 .. 215-825-4990
Tecron Industrial Prods., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517 219-294-5571
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ...... 800-547-1512; Oregon only 800-452-1877
Telco Products Co., 44 Sea Cliff, Glen Cove, NY 11542 516-759-0300
Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700
† Trio-Tech Intl., 2040 N. Lincoln St., Burbank, CA 91504 818-846-9200
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242

Testers, Transmission & Delay-2900

Comstron Corp., 200 E. Sunrise Hwy., Freeport, NY 11520, 516-546-9700 ...... 3•1211
Atlantic Research, 5390 Cherokee Ave., Alexandria, VA 22312 703-642-4000
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Com/Tech Systems, 505 Eighth Ave., New York, NY 10018 212-594-5377
Convex Corp., P.O. Box 17225, Dulles Intl. Airport, Washington, DC 20041 703-661-8900
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
Decom Sys., 340 Rancheros Dr., San Marcos, CA 92069 619-744-1002
§ Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ...... Call Local Sls. Off.
§† International Data Sciences, 7 Wellington Rd., Lincoln, RI 02865 401-333-6200
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
Spectron Corp., 344 New Albany Rd., Moorestown, NJ 08057 609-234-5700
§ Tau-Tron Inc., 27 Industrial Ave., Chelmsford, MA 01824 617-256-9013
† Telecommunications Techniques Corp., 444 N. Frederick Ave., Gaithersburg, MD 20877 301-258-5011

Testers, Tube-2900

§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
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§ Hickok Elec. Instr., 10514 DuPont Ave., Cleveland, OH 44108 216-541-8060
RIL Elctrns., Inc., 125 Titus Ave., P.O. Box H, Warrington, PA 18976 ...... 215-EL5-1361
Sencore, 3200 Sencore Dr., Sioux Falls, SD 57107 605-339-0100
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ VIZ Test Equipment, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144 215-844-2626

Testers, Vibration-2900 (Also See Services, Environmental Test)

Chatsworth Data Corp, Cablemaster Div., 20710 Lassen St., Chatsworth, CA 91311, 818-341-9200 ...... 3•1208
Chatsworth Data Corp, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, 213-341-3000 ...... 3•1208
Acoustic Power Sys., 2151 Las Palmas Dr., Ste. G, Carlsbad, CA 92008 619-438-4848
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
Bently Nevada Corp., P.O. Box 157, Minden, NV 89423 702-782-3611
Bruel & Kjaer Instrs. Inc., 185 Forest St., Marlboro, MA 01752 617-481-7000
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† Columbia Resch. Labs., Macdade Blvd. & Bullens La., Woodlyn, PA 19094 215-532-9464
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Cyber Sys., Inc., 2031 E. Cerritos Ave., Anaheim, CA 92806 714-722-2051
Endevco, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675 714-493-8181
§ Epic, Inc., 150 Nassau St., New York, NY 10038 212-349-2470
GenRad, Inc., 300 Baker Ave., Concord, MA 01742 617-369-4400
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 ...... Call Local Sls. Off.
Instron Corp., 100 Royall St., Canton, MA 02021 617-828-2500
Jan Hardware Mfg. Co., 47-27 36th St., Long Island City, NY 11101 212-361-0800
§† Mechanical Techn., 968 Albany Shaker Rd., Latham, NY 12110 518-785-2353
Nicolet Instr. Corp., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711 608-271-3333
Scientific-Atlanta, Inc., P.O. Box 105600, Atlanta, GA 30348 404-441-4000
Spectral Dynamics Div., Scientific-Atlanta, Box 671, San Diego, CA 92112 619-268-7100
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
§ Vibra-Metrics, 385 Putnam Ave., Hamden, CT 06517 203-288-6158
Wilcoxon Resch., P.O. Box 5798, Bethesda, MD 20814 301-770-3790

Testers, Voltage-2900

ITT Jennings, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, 408-292-4025 ...... 3•1247
§ AEMC, 99 Chauncy, Boston, MA 02111 ...... 617-451-0227;800-343-1391
American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520 301-826-8651
† Amprobe Instr., 630 Merrick Rd., Lynbrook, NY 11563 ...... 516-LY3-5600
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
§ Associated Research, Inc., 8221 N. Kimball Ave., Skokie, IL 60076 . 312-647-7850
§ B & K Precision Prod. Grp., Dynascan, 6460 W. Cortland, Chicago, IL 60635 312-889-9087
§ BBC-Metrawatt/Goerz, 6901 W. 117th Ave., Broomfield, CO 80020 ...... 303-469-5231;800-821-6327
Biddle Instruments, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422 215-646-9200
§† Calibron Instrs., 220 Grove St., Waltham, MA 02154 617-894-6440
† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111 ...... 619-279-8620;800-356-2244;800-821-1634
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 .. 617-246-1600
Del Elctrns. Corp., 250 E. Sandford Blvd., Mt. Vernon, NY 10550 914-699-2000
§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ...... 516-435-2808;800-DIAL EDL; 800 342-5335
§ EMICO Inc., Box 368, Dublin, PA 18917 215-249-9330
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ... 206-356-5400
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
§ Holub Industries, 1701 W. Bethany Rd., Sycamore, IL 60178 815-895-6501
§ Ideal Industries, 4450 Becker Pl., Sycamore, IL 60178 815-895-5181
Julie Resch. Labs., 211 West 61st St., New York, NY 10023 212-245-2727
KeyTek Instr. Corp., 12 Cambridge St., Burlington, MA 01803 617-272-5170
Lark Electronics, Inc., Box 390, New York, NY 10040 212-569-0430
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Micro Instr., 2250 Micro Pl., Escondido, CA 92025 619-746-2010
§ Mura Corp., 177 Cantiague Rock Rd., Westbury, NY 11590 516-935-3640
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Pacer Industries, Inc., 1450 First Ave., Chippewa Falls, WI 54729 715-723-1141
Ross Engrg. Corp., 559 Westchester Dr., Campbell, CA 95008 408-377-4621
Schaffner EMC Inc., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083 201-851-0644
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
Teradyne, Inc., 183 Essex St., Boston, MA 02111 617-482-2700
TIF Instrs., Inc., 9101 N.W. 7th Ave., Miami, FL 33150 305-757-8811

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§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
Western Electro. Mech. Co. Inc., 300 Broadway, Oakland, CA 94607 415-452-1936
Yokogawa Corp. of America, 2 Dart Rd., Shenandoah, GA 30265 404-253-7000

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American HV Test Systems Inc., Central Garrett Ind'l. Pk., Accident, MD 21520, 301-826-8651 ..... 3•1188
† **Hipotronics, P.O. Drawer A, Brewster, NY 10509, 914-279-8091 ..... 3•1240-1242**
ITT Jennings, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, 408-292-4025 ..... 3•1247
§ **ROD-L Electronics, Inc., 1098 Hamilton Ct., Menlo Park, CA 94025, 415-322-0711 ..... 3•1292-1294**
§ **Slaughter Co., Moore & Hailey Sts., P.O. Box 1805, Ardmore, OK 73401, 405-223-4773 ..... 3•1300,1301**
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§ Associated Research, Inc., 8221 N. Kimball Ave., Skokie, IL 60076 312-647-7850
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Bertan Assocs., 121 New South Rd., Hicksville, NY 11801 516-433-3110
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† Tobe Deutschmann Labs., Inc., 550 Turnpike St., Canton, MA 02021 617-828-3366

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Thermal Platforms-2900

Sigma Systems Corp., 3163 Adams Ave., San Diego, CA 92116, 619-283-3193 ..... 3•1179
Hughes Aircraft Co., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509 213-517-6000
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Micro Technical Inds., Micro-Ohm Corp., 23666 Birtcher Dr., B, Lake Forest, CA 92630 714-855-4326
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Thermocouple Devices & Materials — See Cooling/Heating Modules, Thermoelectric (Vol. 1B)

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Thermographs-2900

Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
Onset Computer Corp., 199 Main St., P.O. Box 1016, N. Falmouth, MA 02556 617-563-2267
UTI Instruments Co., 325 N. Mathilda Ave., Sunnyvale, CA 94086 408-738-3301

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Thermometers, Resistance-2900

§ **Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401, 513-254-6251 ..... 3•1326**
Fenwal Elctrns., 63 Fountain St., Framingham, MA 01701, 617-872-8841 ..... 1B•1803
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 ..... 3•1239
Keystone Carbon, Thermistor Div., St. Marys, PA 15857, 814-781-1591 ..... 1B•1805-1807
Micro Switch, A Honeywell Div., 11 W. Spring St., Freeport, IL 61032, 815-235-6600 ..... 1B•1809
Omega Engrg., Box 4047, Stamford, CT 06907, 203-359-1660 ..... 1B•1818,1819
† **Thermometrics, Inc., 808 U.S. Hwy. , Edison, NJ 08817-4695, 201-287-2870 ..... 1B•1825**
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§ AEMC, 99 Chauncy, Boston, MA 02111 ..... 617-451-0227;800-343-1391
Analog Devices, P.O. Box 280, Norwood, MA 02062 617-329-4700
§ Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ..... 617-777-4500; 17-246-0300;800-451-1816
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§ Athena Controls, Inc., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462 215-828-2490
§ Atkins Tech., 3321 S.W. 40th Blvd., Gainesville, FL 32608 904-378-5555
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† Barnes Engrg., 44 Commerce Rd., P.O. Box 53, Stamford, CT 06904 203-348-5381
§ Bayley Instr. Co., Box 357, Kenwood, CA 95452 707-833-6014
BLH Elctrns., 42 Fourth Ave., Waltham, MA 02254 617-890-6700
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§ EDL Inc., 385 Oser Ave., Hauppauge, NY 11787 ..... 516-435-2808;800-DIAL EDL; 800 342-5335
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§ Fenwal, Inc., 400 Main St., Ashland, MA 01721 .....
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§ Hades Mfg. Corp., 151-A Verdi St., Farmingdale, NY 11735 516-249-4244
§† Heraeus-Volkert Inc., 222-34 96th Ave., Queens Village, NY 11429 212-464-8400
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Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ..... 800-321-5111, Ext. 596
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† KRL Elctrns., 160 Bouchard St., Manchester, NH 03103 ..... 603-668-3210; 800-257-3300
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
§ LFE, Process Control Div., 55 Green St., Clinton, MA 01510 617-835-1000
§ Love Controls, 1475 S. Wheeling Rd., Wheeling, IL 60090 312-541-3232
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§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
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§† RCD Components, Inc., 330 Bedford St., Manchester, NH 03101 603-669-0054
† RdF Corporation, 23 Elm Ave., Hudson, NH 03051 603-882-5195
Relco Prods., 5594 E. Jefferson Ave., Denver, CO 80237 303-756-1143
Science/Elctrns., 1224-26 McCook Ave., Dayton, OH 45404 513-228-6011
§ Simpson Elec. Co., 853 Dundee Ave., Elgin, IL 60120 312-697-2260
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§ United Elec. Controls, 85 School St., Watertown, MA 02172 ..... 617-WA6-1000
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ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 .... 3•1827
Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 .... 1B•1333
§ **Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, 812-426-2806 .... 1B•1336**
§† **Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 .... 1B•1458,1459**
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 .... 1B•1467**
Sokol Crystal Prods. Inc., 121 Water St., Mineral Point, WI 53565, 608-987-3363 .... 1A•1422,1424
† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 .... 215-337-5500;800-441-8245
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915 617-927-8220
§ Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 312-932-6900
Nolatron, P.O. Box 4042, Harrisburg, PA 17111 717-564-3398
Pacific Timer Inc., 21739 N.E. 18th Way, Redmond, WA 98052 206-881-1785
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
§ Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
§ Zenith Controls, 830 West 40th St., Chicago, IL 60609 312-247-6400

Timer/Counters-2900

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 .... 3•1123
Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, 201-964-4400 .... 3•1125
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1044,1045
§ **Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 .... 3•1343**
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Eldorado Instrs., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§† Engler Instrs., Sangamo Weston, Inc., 250 Culver Ave., Jersey City, NJ 07305 201-332-5353
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 617-890-7440
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
§ Global Specialties Corp., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509 203-624-3103
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 201-825-9696
† Holt Inc., 8 Chrysler Ave., Irvine, CA 92714 714-859-8800
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
§† Intersil, 10710 N. Tantau Ave., Cupertino, CA 95014 408-996-5000
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .... 201-291-0500; 800-631-2165
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
Scanning Devices, 108 Elm St., Waltham, MA 02154 617-891-8991
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§† Statek Corp., 512 N. Main St., Orange, CA 92668 714-639-7810
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 .... 800-547-1512; Oregon only 800-452-1877
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
Texmate, Inc., 348 S. Cedros Ave., P.O. Box 2000, Solana Beach, CA 92075 619-481-7177
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
§ Triplett Corp.—A Penril Co., One Triplett Dr., Bluffton, OH 45817-9987 419-358-5015
§ TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310 305-739-4300
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201

Timers, Counting-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 .... 3•1123
§ **Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 .... 3•1074**
Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, 201-964-4400 .... 3•1125
§ **Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 .... 1B•1332**
§ **C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126,1127**
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 .... 1B•1044,1045
Ballantine Labs., 90 Fanny Rd., Boonton, NJ 07005 201-335-0900
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
Canberra Ind., One State St., Meriden, CT 06450 203-238-2351
Canyon Elctrns., 2001 W. North Lane, Phoenix, AZ 85021 602-944-4421
§ Eaton Corp., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094 414-261-4070
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
† Electrodynamics, Inc., A Talley Inds. Co., 1200 Hicks Rd., Rolling Meadows, IL 60008 312-259-0740
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 201-825-9696
Gregg Elec., 608 W. Emporia, Ontario, CA 91761 714-983-1794
§† Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 .... 201-291-0500; 800-631-2165
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Philips Test & Measuring Instrs., 85 McKee Dr., Mahwah, NJ 07430 201-529-3800
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
Shokal Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
† Statek Corp., 512 N. Main St., Orange, CA 92668 714-639-7810
† Stoelting Co., 1350 S. Kostner Ave., Chicago, IL 60623 312-522-4500
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000

§—Product sold through distributors †—Product meets MIL specs

Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Tri-Tronics Co. Inc., 13420 Wright Clr., Tampa, FL 33624 813-855-4453
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668
Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971

Timers, Cycle & Reset-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 ....3•1123
§ Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, 201-964-4400 ....3•1125
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 ....1B•1332,1333
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 ....3•1126,1127
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, 812-426-2806 ....1B•1336
† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ....1B•1467
Ovenaire, 706 Forrest St., Charlottesville, VA 22901, 804-977-8050 ....1A•1402
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
Autotrol, P.O. Box 557, Crystal Lake, IL 60014 815-459-3080
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
Canyon Elctrns., 2001 W. North Lane, Phoenix, AZ 85021 602-944-4421
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
§† Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
§ Deltrol Controls, 2745 S. 19th St., Milwaukee, WI 53215 414-671-6800
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
§ Gould Inc., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157 301-876-2214
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 201-825-9696
§ Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
§ Intermatic, Intermatic Plaza, Spring Grove, IL 60081 815-675-2321
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
§ IVO Inds., Inc., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724 201-542-5151
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ....201-291-0500; 800-631-2165
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Mallory Timers, Emhart Elec./Elctrn. Grp., 3029 E. Washington St., Indianapolis, IN 46201 317-636-5353
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
§ Midland-Ross Corp., Midtex Div., P.O. Box 3328, No. Mankato, MN 56001 507-625-6521
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
MKC Elctrns., 454 E. Donovan Rd., Kansas City, KS 66115 913-371-1351
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 312-932-6900
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
§ Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Pacific Timer Inc., 21739 N.E. 18th Way, Redmond, WA 98052 206-881-1785
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
† Raymond Engrg. Inc., Raycorder Prods, Div., 217 Smith St., Middletown, CT 06457 203-632-1000
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 203-635-2200
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
§† Statek Corp., 512 N. Main St., Orange, CA 92668 714-639-7810
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 415-676-5000
Techniques, Inc., 235 Jackson St., Englewood, NJ 07631 201-569-5900
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tennelec, 601 Turnpike, Oak Ridge, TN 37830 615-483-8405
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
Vanguard Relay Corp., 225 Cortland St., Lindenhurst, NY 11757 516-226-5000
Wilmar Elctrns., Inc., 2430 Amsler St., Torrance, CA 90505 213-326-6668
§† Workman Elctrn. Prods., Box 3828, Sarasota, FL 33578 813-371-4242
Xanadu Controls, Electroid Corp., 45 Fadem Rd., Springfield, NJ 07081-3189 201-467-8100
§ Zenith Controls. 830 West 40th St., Chicago, IL 60609 312-247-6400

Timers, Delay-2200

§ Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, 201-964-4400 ....3•1125
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 ....1B•1332,1333
Data Delay Devices, 385 Lakeview Ave., Clifton, NJ 07011, 201-772-1106 ....1A•1471
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, 812-426-2806 ....1B•1336
§ Gould Inc., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157, 301-876-2214 ....1B•1407
† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 ....1B•1467
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 ....3•1285
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 617-531-8886
§ Air-O-Tronics Prods., Box K, Morrisville, NY 13408 315-684-3705
† Alarm Controls, 19 Brandywine Dr., Deer Park, NY 11729 516-586-4220
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
§† Amperite Co., Inc., 600 Palisade Ave., Union City, NJ 07087 201-864-9503
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
CAL Controls Inc., 1155 Waukegan Rd., Glenview, IL 60025 312-998-5720
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
§ C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
Dataprofits Corp., 2260 Distributors Dr., Indianapolis, IN 46241 ....
Deltrol Controls, 2745 S. 19th St., Milwaukee, WI 53215 414-671-6800
E-H Electronics, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
Electronic Prods. Corp., Interstate Indl. Plaza, R. D. , York, PA 17402 717-767-6517
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
§ IDEC Systems & Controls Corp., 3050 Tasman Dr., Santa Clara, CA 95050 408-988-7500
§ Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ....201-291-0500; 800-631-2165
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Mallory Timers, Emhart Elec./Elctrn. Grp., 3029 E. Washington St., Indianapolis, IN 46201 317-636-5353
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
§ Midland-Ross Corp., Midtex Div., P.O. Box 3328, No. Mankato, MN 56001 507-625-6521
§ Midwest Comps., 1981 Port City Blvd., Muskegon, MI 49443 616-777-2602
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 312-932-6900
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Pacific Timer Inc., 21739 N.E. 18th Way, Redmond, WA 98052 206-881-1785
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
† Plessey Electro-Products, 3860 Centinela Ave., Los Angeles, CA 90066 213-390-3585
Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
Power Sys. Grp., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311 818-885-8223
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
Regent Controls, 39 Fanny St., P.O. Box 767, Shelton, CT 06484-0767 203-736-2924
† Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 203-635-2200
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
† Statek Corp., 512 N. Main St., Orange, CA 92668 714-639-7810

Timers, Delay-2200 (Cont'd)

§ Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
Sylvania Control Devices, Rte. 35, Standish, ME 04084 207-642-4535
Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
† Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Thordarson Meissner, Electronic Center, Mt. Carmel, IL 62863 618-262-5121
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
Vanguard Relay Corp., 225 Cortland St., Lindenhurst, NY 11757 516-226-5000
Warren Comms., 101 Okner Pkwy., Livingston, NJ 07039 201-992-6200
Xanadu Controls, Electroid Corp., 45 Fadem Rd., Springfield, NJ 07081-3189 201-467-8100
§ Zenith Controls, 830 West 40th St., Chicago, IL 60609 312-247-6400

Timers, Electrolytic Cell-2200

Curtis Instrs., Inc., 200 Kisco Ave., Mt. Kisco, NY 10549 914-666-2971
ECO Instrs. Div., Sea Data Corp., 1 Bridge St., Newton, MA 02158 617-964-8360
† Fredericks Co., Philmont & Anne Sts., Huntingdon Valley, PA 19006 215-947-2500
General Electric Co., Power Elctrns. Semiconductor Dept., W. Genesee St., Auburn, NY 13021 315-253-7321
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
† Plessey Electro-Products, 3860 Centinela Ave., Los Angeles, CA 90066 213-390-3585

Timers, Interval-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 .... 3•1123
§ **Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083, 215-853-1130 .... 3•1074**
§ **Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, 201-964-4400 .... 3•1125**
§ **Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 .... 1B•1332,1333**
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
§ **Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, 812-426-2806 .... 1B•1336**
§ **Gould Inc., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157, 301-876-2214 .... 1B•1407**
Ledex Inc., P.O. Box 427, Vandalia, OH 45377, 513-898-3621 .... 1B•1674
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 .... 1B•1467**
§ **NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 .... 3•1341**
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
§ Air-O-Tronics Prods., Box K, Morrisville, NY 13408 315-684-3705
Allen-Bradley Co., 1201 S. Second St., Milwaukee, WI 53204 414-671-2000
Amperite Co., Inc., 600 Palisade Ave., Union City, NJ 07087 201-864-9503
Anadex, 1001 Flynn Rd., Camarillo, CA 93010 805-987-9660
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
Bulova Sys. & Instr., Green Acres Rd., W., Valley Stream, NY 11582 516-561-2600
CAL Controls Inc., 1155 Waukegan Rd., Glenview, IL 60025 312-998-5720
Canyon Elctrns., 2001 W. North Lane, Phoenix, AZ 85021 602-944-4421
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
§† Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 617-246-1600
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
§ Deltrol Controls, 2745 S. 19th St., Milwaukee, WI 53215 414-671-6800
Dielectric Instr. Corp., 761 Franklin Ave., Pittsburgh, PA 15221 412-731-6566
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 .513-254-6251
§ Dimco-Gray, 8200 S. Suburban Rd., Dayton, OH 45459 513-433-7600
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
§ Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216 414-449-7487
Eldorado Instrs., 7303 Edgewater Dr., Oakland, CA 94621 415-638-5656
† Electrodynamics, Inc., A Talley Inds. Co., 1200 Hicks Rd., Rolling Meadows, IL 60008 312-259-0740
Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§ Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
Electronic Prods. Corp., Interstate Indl. Plaza, R. D., York, PA 17402 717-767-6517
Electro Physics, 1910 West Birchwood Ave., Chicago, IL 60626 312-274-9669
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
§† Fairchild Microprocessor Div., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042 415-962-3838
§ Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Fork Standards, Inc., 666 Western Ave., Lombard, IL 60148 312-932-9380
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
FSI/Fork Standards Inc., 666 Western Ave., Lombard, IL 60148 ....312-231-3511; 312-932-9380
Gregg Elec., 608 W. Emporia, Ontario, CA 91761 714-983-1794
§† Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
Haydon Switch & Instr., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705 203-756-7441
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ....201-291-0500; 800-631-2165
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
§† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620 714-739-0770
Leach Corp., Relay Div., 5915 Avalon Blvd., Los Angeles, CA 90003 213-232-8221
Lektra Labs., 129-07 18th Ave., P.O. Box 222, College Point, NY 11356 212-939-7171
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Mallory Timers, Emhart Elec./Elctrn. Grp., 3029 E. Washington St., Indianapolis, IN 46201 317-636-5353
Marconi Instrs., 100 Stonehurst Ct., Northvale, NJ 07647 201-767-7250
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 312-932-6900
§ Newport Electronics, 630 E. Young St., Santa Ana, CA 92705 714-540-4914
§ Non-Linear Systems/Div. of Kaypro Corp., 533 Stevens Ave., Solana Bch., CA 92075 619-481-3900
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
§ Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Pacific Timer Inc., 21739 N.E. 18th Way, Redmond, WA 98052 206-881-1785
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
† Plessey Electro-Products, 3860 Centinela Ave., Los Angeles, CA 90066 213-390-3585
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
† Raymond Engrg. Inc., Raycorder Prods. Div., 217 Smith St., Middletown, CT 06457 203-632-1000
Regent Controls, 39 Fanny St., P.O. Box 767, Shelton, CT 06484-0767 203-736-2924
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
Republic Electronics, Inc., 575 Broad Hollow Rd., Melville, NY 11747 516-249-1414
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 203-635-2200
Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
† Stock Drive Prods., Div. of Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040 516-328-0200
Struthers-Dunn, Lamb's Rd., Pitman, NJ 08071 609-589-7500
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
§ Technic, Inc., Box 965, Providence, RI 02901 401-781-6100
§ Tecmar, Inc., 6225 Cochran Rd., Solon, OH 44139 216-349-0600
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
† Wahl Instruments, Inc., 5750 Hannum Ave., Culver City, CA 90230 .213-822-6144
Xanadu Controls, Electroid Corp., 45 Fadem Rd., Springfield, NJ 07081-3189 201-467-8100
Xycom, 750 N. Maple Rd., Saline, MI 48176 313-429-4971
§ Zenith Controls, 830 West 40th St., Chicago, IL 60609 312-247-6400

Timers, Programmed-2200

§ **Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, 812-426-2806 .... 1B•1336**
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 .... 1B•1467**
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ....208-263-1471;800-323-3343
§† Advanced Micro Devices, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088 408-732-2400
AES Corp., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960 .617-531-8886
† Applied Electro Technlg., Int., STI Company, 2220 So. Anne St., Santa Ana, CA 92704 714-556-6570
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107 612-222-3791
Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406 ....215-337-5500;800-441-8245
† Autronics, 314 E. Live Oak, Ste. A, Arcadia, CA 91006 818-445-5470
§† Bayshore Systems Corp., 5407 Port Royal Rd., Springfield, VA 22151 703-321-9625
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414

Bulova Sys. & Instr., Green Acres Rd., W., Valley Stream, NY 11582 516-561-2600
Canyon Elctrns., 2001 W. North Lane, Phoenix, AZ 85021 602-944-4421
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
CDS - Colorado Data Sys., 3301 W. Hampden, Unit C, Englewood, CO 80110 303-762-1640
Centent Co., 3879 S. Main St., Santa Ana, CA 92707 714-979-6491
Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195 312-843-2200
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880 617-246-1720
§ Custom Control Sys., 21 E. Canon Perdido St., Santa Barbara, CA 93101 805-965-7577
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
Dantronics, Inc., 3175 Hafner Ct., St. Paul, MN 55112 612-484-2108
Dataprofits Corp., 2260 Distributors Dr., Indianapolis, IN 46241 ....
Deltrol Controls, 2745 S. 19th St., Milwaukee, WI 53215 414-671-6800
§ Digitec Corp., 918 Woodley Rd., P.O. Box 458, Dayton, OH 45401 513-254-6251
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
§ Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
Eitel Mfg., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652 714-494-2012
Electronic Prods. Corp., Interstate Indl. Plaza, R. D., York, PA 17402 717-767-6517
Encoder Prods., 1601B Dover Rd., Sandpoint, ID 83864 208-263-8541
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Extech International Corp., 150 Bear Hill Rd., Waltham, MA 02154 617-890-7440
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 206-356-5400
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 201-825-9696
Gregg Elec., 608 W. Emporia, Ontario, CA 91761 714-983-1794
§† Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ Hobart Engrg., 4143 Cheshire Dr., Cypress, CA 90630 714-827-2135
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
§ Intermatic, Intermatic Plaza, Spring Grove, IL 60081 815-675-2321
§ International Microtronics Corp., 4016 E. Tennessee St., Tucson, AZ 85714 602-748-7900
† International Sensor Systems, Inc., Aurora Industrial Pk., Box 345, Aurora, NE 68818 402-694-6111
§ Kessler-Ellis Prods., 120 1st Ave., Atlantic Highlands, NJ 07716 ....201-291-0500; 800-631-2165
Lab-Line Instrs., 15th & Bloomingdale, Melrose Park, IL 60160 312-450-2600
§ Landis & Gyr, Inc., 4 Westchester Plaza, Elmsford, NY 10523 914-592-4400
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Mallory Timers, Emhart Elec./Elctrn. Grp., 3029 E. Washington St., Indianapolis, IN 46201 317-636-5353
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
§ Midland-Ross Corp., Midtex Div., P.O. Box 3328, No. Mankato, MN 56001 507-625-6521
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 312-932-6900
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Northwest Microcircuits, 2115 N. College, Newburg, OR 97132 503-538-7081
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
§ Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
Phoenix Microsystems, P.O. Box 4206, Huntsville, AL 35802 205-881-2173
§ Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
§ Ragen Data Systems, Inc., 3 Oval Dr., Central Islip, NY 11722 516-234-3800
† Raymond Engrg. Inc., Raycorder Prods. Div., 217 Smith St., Middletown, CT 06457 203-632-1000
§ Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 203-635-2200
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techniques, Inc., 235 Jackson St., Englewood, NJ 07631 201-569-5900
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
Vanguard Relay Corp., 225 Cortland St., Lindenhurst, NY 11757 516-226-5000
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Xanadu Controls, Electroid Corp., 45 Fadem Rd., Springfield, NJ 07081-3189 201-467-8100
§ Zenith Controls, 830 West 40th St., Chicago, IL 60609 312-247-6400

Timers, Sequence-2200

Automatic Timing & Controls Co., 201 So. Gulph Rd., King of Prussia, PA 19406, 215-337-5500;800-441-8245 .... 3•1123
§ **Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 .... 1B•1332**
C-Tek Inc., 4 Railroad Ave., Wakefield, MA 01880, 617-246-1720 .... 3•1126
† **Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 .... 1B•1467**
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
§ Adatek, Inc., P.O. Box 1339, Sandpoint, ID 83864 ....208-263-1471;800-323-3343
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
§ Artisan Elctrns., 5 Eastmans Rd., Parsippany, NJ 07054 201-887-7100
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
§ Bristol Saybrook, 97 Coulter St., Old Saybrook, CT 06475 203-388-3414
† BTU Engrg. Corp., Bruce Sys., Esquire Rd., N. Billerica, MA 01862 617-667-4111
Bulova Sys. & Instr., Green Acres Rd., W., Valley Stream, NY 11582 516-561-2600
Cardinal Control Co., 110 Kensington Rd., Kensington, CT 06037 203-828-6379
Cramer Division, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475 203-388-3574
Cybernetic Micro Sys., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074 415-726-3000
§ Deltrol Controls, 2745 S. 19th St., Milwaukee, WI 53215 414-671-6800
Durgin & Browne, 80 Allen Rd., So. Burlington, VT 05401 802-863-6873
Dynapar, 1675 Delany Rd., Gurnee, IL 60031 312-662-2666
§ Eagle Signal Controls, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761 512-837-8401
† Electrodynamics, Inc., A Talley Inds. Co., 1200 Hicks Rd., Rolling Meadows, IL 60008 312-259-0740
Electromatic Comps. Ltd., 1531 Burgundy Pkwy., Streamwood, IL 60103 312-837-4600
§† Electromech, Inc., 528 Elm Street, Kearney, NJ 07032 201-997-0950
Electronic Prods. Corp., Interstate Indl. Plaza, R. D., York, PA 17402 717-767-6517
Encoder Prods., 1601B Dover Rd., Sandpoint, ID 83864 208-263-8541
§ ESE, 142 Sierra St., El Segundo, CA 90245 213-322-2136
Frequency Control Prods., Inc., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377 212-458-5811
§† Furnas Elec., 1197 McKee St., Batavia, IL 60510 312-879-6000
§ Grasslin Controls Corp., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446 201-825-9696
Gregg Elec., 608 W. Emporia, Ontario, CA 91761 714-983-1794
§† Guardian California, 16100 S. Figueroa St., Gardena, CA 90240 213-532-3092
Innovatek Microsystems, Inc., Smithfield Rd., Millerton, NY 12546 914-373-9003
§ Instrumentation & Control Sys., 520 Interstate Rd, Addison, IL 60101 312-543-6200
† Ledex Inc., P.O. Box 427, Vandalia, OH 45377 513-898-3621
Magnum Opus Custom Elctrn. Engrg., 284 Kennedy St., Iselin, NJ 08830 201-283-4925
Mallory Timers, Emhart Elec./Elctrn. Grp., 3029 E. Washington St., Indianapolis, IN 46201 317-636-5353
§ Master Elctrn. Controls, P.O. Box 25905, Los Angeles, CA 90025 213-452-1336
Microavionics Corp., 3198-K Airport Loop Dr., Costa Mesa, CA 92626 714-957-6904
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
§ National Controls Corp., 931 N. DuPage Ave., Lombard, IL 60148 312-932-6900
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
§ Omnetics, P.O. Box 2577, Syracuse, NY 13220 315-699-5262
§ Omron Elctrns., Inc., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195 312-843-7900
Paragon Elect., 606 Parkway Blvd., Two Rivers, WI 54241 414-793-1161
Potter & Brumfield, P.O. Box 322, Princeton, IN 47671 812-386-1000
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122 216-292-6006
† Precision Mechanisms, 44 Brooklyn Ave., Westbury, NY 11590 ....516-ED3-5955
§ Precision Timer, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498 203-399-6253
† Racal-Dana Instrs., 18912 Von Karman Ave., Irvine, CA 92715 714-833-1234
† Raymond Engrg. Inc., Raycorder Prods. Div., 217 Smith St., Middletown, CT 06457 203-632-1000
Relay Specialties, 1300 Plaza Rd., Fair Lawn, NJ 07410 ....201-797-3313; 800-526-5376
§ Ripley, 46 Nooks Hill Rd., Cromwell, CT 06416 203-635-2200
§ Sealectro, 225 Hoyt St., Mamaroneck, NY 10543 914-698-5600
Sensor Corp., Box 140, Scottdale, PA 15683 412-887-4080
† Sigmapower, Inc., 20790 Leapwood Ave., Carson, CA 90746 ....213-32-Sigma
§ Sloan Technology, P.O. Box 4608, Santa Barbara, CA 93103 805-963-4431
§ Square D Co., Executive Plaza, Palatine, IL 60067 312-397-2600
§ S S A C, Box 395, Liverpool, NY 13088 315-622-1000
§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§ Syracuse Elctrns., P.O. Box 4770, Syracuse, NY 13221 315-488-4911
Techno, Inc., 14 Crandall Ave., Pompton Lakes, NJ 07442 201-839-0740
Tempo Instrument, Inc., 87 Modular Ave., Commack, NY 11725 516-694-4400
§ Tenor, 17020 W. Rogers Dr., New Berlin, WI 53151 414-782-3800
Therm-O-Disc, Inc., Sub. Emerson Elec. Co., 1320 South Main St., P. O. Box 3538, Mansfield, OH 44907 419-756-5911
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Thordarson Meissner, Electronic Center, Mt. Carmel, IL 62863 618-262-5121
Timeco, Inc., 1035 - 26th St., P.O. Box 8036, Huntington, WV 25705 304-523-5149
TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000
Tri-Tronics Co. Inc., 13420 Wright Cir., Tampa, FL 33624 813-855-4453
Vanguard Relay Corp., 225 Cortland St., Lindenhurst, NY 11757 516-226-5000
§ Veeder-Root, 70 Sargeant St., Hartford, CT 06102 203-527-7201
Xanadu Controls, Electroid Corp., 45 Fadem Rd., Springfield, NJ 07081-3189 201-467-8100
§ Zenith Controls, 830 West 40th St., Chicago, IL 60609 312-247-6400

Timers, Solid State-2200

ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 .... 3•1827

§ Control Prods. Div., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, 201-964-4400 .... 3•1125
§ Crouzet Controls, Inc., 1083 State Pkwy., Schaumburg, IL 60195, 312-843-2200 .... 1B•1333
DCI, Inc., 720 E. Dennis, Olathe, KS 66061, 913-782-5672 .... 3•1324
§ Diversified Elctrns., Inc., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, 812-426-2806 .... 1B•1336
§† Leach Corp., Control Prods. Div., 6900 Orangethorpe Ave., Buena Pk., CA 90620, 714-739-0770 .... 1A•1372
† Logitek Inc., 101 Christopher St., Ronkonkoma, NY 11779, 516-467-4200 .... 1B•1467
PPM, Inc., 23945 Mercantile Rd., Cleveland, OH 44122, 216-292-6006 .... 3•1285
† Abrams Instr. Corp., P.O. Box 26007, Lansing, MI 48909 517-332-6405
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Transistors, Power, Bipolar-4800 — *See Vol. 1A*

Transistors, Power, FET-4800 — *See Vol. 1A*

Transistors, Pressure Sensitive-4800 — *See Vol. 1A*

Transistors, RF-4800 — *See Vol. 1A*

Transistors, Silicon-4800 — *See Vol. 1A*

Transistors, Switching-4800 — *See Vol. 1A*

Transistors, Unijunction-4800 — *See Vol. 1A*

Transistors (MIL)-2440 — *See Vol. 1B*

Translators, Data-2325

Interface Engrg., 386 Lindelof Ave., Stoughton, MA 02072, 617-344-7383 . 3•1164, 1165

Precision Filters, 240 Cherry St., Ithaca, NY 14850, 607-277-3550 ..... 3•1016,1018, 1019,1286

† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 .... 3•1101

Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ......617-777-4500; 17-246-0300;800-451-1816
† Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Data Translation, 100 Locke Dr., Marlboro, MA 01752 617-481-3700
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
ILC Data Device Corp., 105 Wilbur Pl., Bohemia, NY 11716 516-567-5600
† Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
Scientific Columbus, Inc., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228 614-274-7160
§† Superior Elec. Co., 383 Middle St., Bristol, CT 06010 203-582-9561
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700

Translators, Time Code-2000

† Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ...... 3•1154
Frequency and Time Systems, Inc., 34 Tozer Rd., Beverly, MA 01915, 617-927-8220 ...... 3•1154
† TRAK Systems, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, 813-884-1411 ......3•1097-1102
Austron, Inc., P.O, Box 14766, Exit 248 N. IH 35, Austin, TX 78761 512-251-2313
§ Chrono-log Corp., 2 W. Park Rd., Havertown, PA 19083 215-853-1130
Datachron Inc., 3186 J Airway Ave., Costa Mesa, CA 92626 714-751-2211

Transmission Line, Wire & Cable — See Cable, Transmission Line (Vol. 2)

Transmission Lines (MIL), RF-2440 — *See Vol. 1B*

Transmission Systems, Data-2000

† GRIM Corporation, Box 67, Medford, NJ 08055, 609-267-7950 ...... 3•1064
MERET, Inc., 1815 24th St., Santa Monica, CA 90404-4998, 213-828-7496 1B•1116
Advanced Techn. Sys., 17-01 Pollitt Drive, Fair Lawn, NJ 07410 201-794-0200
Air Land Sys., 2710 Prosperity Ave., Fairfax, VA 22031 703-573-1100
† Alden Elctrns. Inc., Washington St., Westboro, MA 01581 617-366-8851
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 805-967-0423
§† Applied Data Communications, 14272 Chambers Rd., Tustin, CA 92680 714-731-9000
Applied Micro Technlg., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745 602-622-8605
Applied Sys., 26401 Harper Ave., St. Clair Shores, MI 48081 313-779-8700
Artel Communications Corp., 93 Grand St., Worcester, MA 01602 ..617-752-5690
† Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
† Cardion Elctrns., Div. of Gen. Sig. Conts., Inc. Unit of Gen. Sig. Corp., Long Island Expwy., Woodbury, NY 11797 516-921-7300
Continental Data Sys., 131 N. Ludlow St., Dayton, OH 45402 513-222-8626
Control Technology Co., 41-16 29th St., Long Island City, NY 11101 212-361-2133
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
§† Data-Control Sys., Commerce Dr., Box 860, Danbury, CT 06810 203-743-9241
Data Signal Corp., 149 California St., Newton, MA 02158 617-926-5080
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806 714-533-6333
Digital Radio Corp., 8901 La Cienega Blvd., Inglewood, CA 90301 ..213-670-8611
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022 201-941-4455
EOTec Corp., 200 Frontage Rd., W. Haven, CT 06516 203-934-7961
Fibronics Intl. Inc., 325 Stevens St., Hyannis, MA 02601 617-778-0700
† Foundation Instruments Inc., 24 Colonnade Rd., Nepean, ON K2E 7J6 Canada 613-226-4000
G B Instruments Inc., 2030 Coolidge St., Hollywood, FL 33020 305-920-0225
Honeywell, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034 ......800-321-5111, Ext. 596
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Hy-Cal Engrg., 9650 Telstar Ave., El Monte, CA 91731 213-444-4000
IPAC Grp., 3047 Indl. Blvd., Bethel Pk., PA 15102 412-831-9200
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Metric Sys., 645 Anchors St., Ft. Walton Beach, FL 32548 904-244-9600
Muirhead, 1101 Briston Rd., Mountainside, NJ 07092 201-233-6010
§ NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103 312-289-8820
North Hills Elctrns., Alexander Pl., Glen Cove, NY 11542 516-671-5700
† Optelecom, 15940 Lauanne Dr., Gaithersburg, MD 20760 301-948-4232
Potter Instr., 10 Main St., Gonic, NH 03867 603-332-1991
Proteon, Inc., 4 Tech Circle, Natick, MA 01760 617-655-3340
Raychem Corp., Elctrns. Grp., 300 Constitution Dr., Menlo Park, CA 94025 415-361-3860
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Rockwell Intl.. Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081 214-996-5000
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
Telautograph, 8700 Bellanca Ave., Los Angeles, CA 90045 213-641-3690
Theta Instr. Corp., 24 Dwight Pl., Fairfield, NJ 07006 201-227-1700
Timeplex, Inc., 400 Chestnut Ridge Rd., Woodcliff Lake, NJ 07675 .201-930-4600

Transmitters, Fiber Optic-3700 — *See Vol. 1B*

Transmitters, Fixed Frequency-1900

Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ...... 3•1155
† AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133 305-448-6503
† Applied Research Inc., 160 Dupont St., Plainview, NY 11803 516-349-9200
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
† Argent Elctrns., 3245 S. County Rd., 25A, Troy, OH 45373 513-335-0031
† Aydin Microwave, 75 East Trimble Rd., San Jose, CA 95131 408-946-5600
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
§ Brelonix, 106 No. 36th St., Seattle, WA 98103 206-633-1964
† Cincinnati Elctrns., 2630 Glendale Milford Rd., Cincinnati, OH 45241 513-563-6000
† Collins Avionics Divisions, Rockwell Intl., 400 Collins Rd. NE, Cedar Rapids, IA 52498 319-395-1000
Communication Assocs., 200 McKay Rd., Huntington Sta., NY 11746 516-271-0800
Continental Electronics Mfg. Co., P.O. Box 270879, Dallas, TX 75227 214-381-7161
† Farinon Div., Harris Corp., 1691 Bayport, San Carlos, CA 94070 415-594-3000
† M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
§ Pathcom, Inc., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710 213-325-1290
§† REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854 305-843-8484
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073
Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257

Transmitters, Laser-3700 — *See Vol. 1B*

Transmitters, Pressure & Flow-5500 — *See Vol. 1B*

Transmitters, Radar — See Radar System Components (Vol. 1A)

Transmitters, Telemetry-1900

Applied Research Inc., 160 Dupont St., Plainview, NY 11803, 516-349-9200 ......1A•1687
Datum Inc., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, 714-533-6333 ...... 3•1155
Dio-Rey, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, 201-941-4455 ...... 3•1159
NES, Inc., 1536 Brandy Pkwy., Streamwood, IL 60103, 312-289-8820 ...... 3•1088, 1136,1167
Newport Electronics, 630 E. Young St., Santa Ana, CA 92705, 714-540-4914 ...... 3•1343
American Electronic Labs., Box 552, Lansdale, PA 19446 215-822-2929
§ American Laser Sys., Inc., 106 Fowler Rd., Goleta, CA 93117 805-967-0423
Aydin Corp., 700 Dresher Rd., Horsham, PA 19044 215-657-7510
† Aydin Vector Div., Box 328, Newtown, PA 18940 215-968-4271
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Continental Data Sys., 131 N. Ludlow St., Dayton, OH 45402 513-222-8626
Crompton Instrs., 2763 Higgins Rd., Elk Grove Village, IL 60007 312-593-1107
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
† EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
§ Emergency Beacon Corp., 15 River St., New Rochelle, NY 10801 914-235-9400
Hughes Aircraft Co, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009 213-670-1515
Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
Kinemetrics, Inc., 222 Vista Ave., Pasadena, CA 91107 818-795-2220
M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
† NSD, 10936 Portal Dr., Los Alamitos, CA 90720 714-527-4896
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
§ REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854 305-843-8484
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
RFL Inds., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
RHG Electronics Lab., Inc., 161 E. Industry Ct., Deer Park, NY 11729 516-242-1100
Schneider Instr., 8115 Camargo Rd., Cincinnati, OH 45243 513-561-6803
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073
Solid State Elctrns. Corp., 18646 Parthenia St., Northridge, CA 91324 818-993-8257
† TRAK Microwave Corp., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614 813-884-1411
† TransKinetic Sys., 110 Shawmut Rd., Canton, MA 02021 617-828-3000
† TRW Microwave, 825 Stewart Dr., Sunnyvale, CA 94086 408-732-0880
† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300
† Zeta Labs., 3265 Scott Blvd., Santa Clara, CA 95051 408-727-6001

Transmitters, Tone-1900

§ American Microsignal, 8431 Monroe Ave., Stanton, CA 90680 714-761-1222
Bristol Babcock Inc., 40 Bristol St., Waterbury, CT 06708 203-575-3000
Dantel, 2991 N. Argyle Ave., Fresno, CA 93727 209-292-1111
Digital Transmission Techniques, Inc., P.O. Box 1847, Wayne, NJ 07470 201-831-1615

Electrocom Inds., 1105 N. Ironwood Dr., S. Bend, IN 46615 219-232-2743
M/A-COM Microwave Power Dvcs., 330 Oser Ave., Hauppauge, NY 11788 516-231-1400
OAR Corp., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121 619-453-4013
RCI/Data, 1992 Lakewood Rd., Toms River, NJ 08753 201-341-8361
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073

Transmitters (MIL), ECM-3475

† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
† Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Transmitters (MIL), Shipboard Jamming-3475

† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
† Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Transmitters (MIL), TWTs-3475

† MCL, Inc., 10 North Beach Ave., La Grange, IL 60525 312-354-4350
† Microwave/Sys., 1 Adler Dr., E. Syracuse, NY 13057 315-437-9951
Varian Associates, Inc., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000

Transponders-1900

† Allied Corp. Aerospace Sector, Bendix Communications Div., East Joppa Rd., Towson, MD 21204 301-583-4000
† A.R.F. Prods., 2559 75th St., Boulder, CO 80301 303-443-4844
Computer Instrs., 100 Madison Ave., Hempstead, NY 11550 516-483-8200
EDMAC Corp., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750 716-924-4000
† Hughes Aircraft Co., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715 714-752-3800
La Pointe Industries, Inc., Electronics Products Div., 155 W. Main St., Rockville, CT 06066 203-872-8581
† Radio Resch. Instr. Co., Inc., Two Lake Ave. Extension, Danbury, CT 06811-5295 203-792-6666
Resdel Engrg., 300 E. Live Oak Ave., Arcadia, CA 91006 213-684-2600
§ Seaboard Elctrns., 70 Church St., New Rochelle, NY 10805 914-235-8073
† Vega Precision Labs., 800 Follin La., Vienna, VA 22180 703-938-6300

Transports, Tape (all kinds)-2000

PHI Technologies, Inc., 4605 North Stiles, Oklahoma City, OK 73105, 405-521-9000 .... 3•1090
† Reproduction Technologies Inc., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518, 219-848-5233 .... 3•1050,1051
Amilon Corp., 49-12 30th Ave., Woodside, NY 11377 212-274-1794
California Minicomputer Sys., 5534 Westlawn Ave., Los Angeles, CA 90066 213-640-2930
Cipher Data Prods., Inc., P.O. Box 85170, San Diego, CA 92138 619-578-9108
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Digital Equip., One Iron Way, Marlborough, MA 01752 ....
† Genisco Memory Prods. Corp., 10874 Hope St., Cypress, CA 90630 ....213-537-4750;714-220-0720
International Electro Magnetics, Inc., 350 N. Eric Dr., Palatine, IL 60067 312-358-4622
Multi Prods. Intl., 218 Little Falls Rd., P.O. Box 238, Cedar Grove, NJ 07009 201-239-8183

Triacs-4800 — *See Vol. 1A*

Triggers, SCR — See Controls, SCR (Vol. 3)

Tube Heat Dissipators-5700 — *See Vol. 1A*

Tubes, Backward Wave-5700 — *See Vol. 1A*

Tubes, Ballast — See Resistors, Ballast (Vol. 1A)

Tubes, Cathode Ray, General Purpose-5700 — *See Vol. 1A*

Tubes, Cathode Ray, Special Purpose-5700 — *See Vol. 1A*

Tubes, Counting-5700 — *See Vol. 1A*

Tubes, Electrometer-5700 — *See Vol. 1A*

Tubes, Electron Multiplier-5700 — *See Vol. 1A*

Tubes, Flash-5700 — *See Vol. 1A*

Tubes, Gas-5700 — *See Vol. 1A*

Tubes, Ignitron-5700 — *See Vol. 1A*

Tubes, Image Converter-5700 — *See Vol. 1A*

Tubes, Indicator — See Tubes, Readout (Vol. 1A)

Tubes, Magnetron — See Tubes, Microwave (Vol. 1A)

Tubes, Microwave-5700 — *See Vol. 1A*

Tubes, Noise Source-5700 — *See Vol. 1A*

Tubes, Photomultiplier-5700 — *See Vol. 1A*

Tubes, Readout (CRT, Cold-Cathode, Vacuum Fluorescent, Incandescent, etc.)-5700 — *See Vol. 1A*

Tubes, Receiving-5700 — *See Vol. 1A*

Tubes, Rectifying-5700 — *See Vol. 1A*

Tubes, Strobe — See Lamps, Stroboscopic Source (Vol. 1B)

Tubes, Switching-5700 — *See Vol. 1A*

Tubes, TV Camera Pickup-5700 — *See Vol. 1A*

Tubes, Transmitting-5700 — *See Vol. 1A*

Tubes, Voltage Reference or Regulating-5700 — *See Vol. 1A*

Tubes, X-ray-5700 — *See Vol. 1A*

Tubes (MIL), Indicator & Pickup-2440 — *See Vol. 1B*

Tubes (MIL), Microwave-2440 — *See Vol. 1B*

Tubes (MIL), Power & Gas, Planar-2440 — *See Vol. 1B*

Tubes (MIL), Receiving, & Tube Shields-2440 — *See Vol. 1B*

Tubing, Ceramic-2500 — *See Vol. 2*

Tubing, Fiberglass-2800 — *See Vol. 2*

Tubing, Glass-2500 — *See Vol. 2*

Tubing, Heat Shrinkable-2800 (Also See Caps, Forms & Tapes, Heat Shrinkable) — *See Vol. 2*

Tubing, Metal-2500 — *See Vol. 2*

Tubing, Paper-2800 — *See Vol. 2*

Tubing, Plastic-2800 (Also See Tubing, Spaghetti) — *See Vol. 2*

Tubing, Spaghetti-2800 — *See Vol. 2*

Tubing, Spiral Wrap-2800 — *See Vol. 2*

Tubing, Waveguide-3450 — *See Vol. 1A*

Tubing, Zipper-6000 — *See Vol. 2*

Tuners, AM/FM-1300

Alps Electric (USA), Inc., 3553 N. First St., San Jose, CA 95131 408-946-6000
§ Bell Audio Sys., 994 Freeway Drive North, Columbus, OH 43229 614-846-2766
§ Cetec Raymer, 7315 Fulton Ave., No. Hollywood, CA 91605 213-875-0423
§† Dukane Corp., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174 312-584-2300
HDS Inc., 12310 Pinecrest Rd., Reston, VA 22091 703-620-6200
§ Heath Co., Benton Harbor, MI 49022 616-982-3886
§ Mitsumi Elec. Co., Ltd., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan 489-5333
Paso Sound Prods., 14 First St, Pelham, NY 10803 914-738-4800
§ Precision Elctrns., 9101 King Ave., Franklin Park, IL 60131 312-678-5350
§† PTS Electronics Inc., Box 272, Bloomington, IN 47401 812-824-9331
Shokai Far East Ltd., 280 North Central Ave., Hartsdale, NY 10530 914-681-0700
Toko America, Inc., 5520 W. Touhy Ave., Skokie, IL 60077 312-677-3640
† Watkins-Johnson Co., 3333 Hillview Ave., Palo Alto, CA 94304 415-493-4141

Tuners, Microwave-3450 — *See Vol. 1A*

Tuning Forks-2300 — *See Vol. 1A*

Tweezers, Manual & Vacuum-5400 — *See Vol. 2*

Ultraviolet Inspection Lighting-4100 (Also See Microscopes, Ultraviolet)

American Ultraviolet, 320 Commerce St., Chatham, NJ 07928 201-635-8355
Aristo Grid Lamp Prods., 65 Harbor Rd., Port Washington, NY 11050 516-944-3030
§ Clean Room Prods., 56 W. Penataquit Ave., Bay Shore, NY 11706 .516-968-8282
Gates, Geo. W., & Co., Inc., Hempstead Tpke. & Lucille Ave., Franklin Sq., NY 11010 212-347-0787
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720
§† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
§ Spectronics Corp., 956 Brush Hollow Rd., Westbury, NY 11590 516-333-4840
Stenning Instrments, Inc., 671 Enchanted Way, Pacific Palisades, CA 90272 213-459-2930
§ Techni-Tool, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462 ..215-825-4990
§ UVP, Inc., 5100 Walnut Grove Ave., P.O. Box 1501, San Gabriel, CA 91778 818-285-3123
Westinghouse Elec. Corp., Lamp Div., Parts Sls., 1 Westghse Plaza, Bloomfield, NJ 07003 201-429-3325

Urea Formaldehyde — See Plastic Raw Materials (Vol. 2)

Valves, Solenoid-4550 — *See Vol. 1B*

Valves, Vacuum-4100

§ A E G Telefunken, Semiconductor Grp., Rte. 22, Somerville, NJ 08876 201-722-9800
Barksdale Controls Div., Transamenca DeLaval, 3211 Fruitland Ave., P.O. Box 58843, Los Angeles, CA 90058 213-589-6181
† Bemco, 9908 San Fernando Rd., Pacoima, CA 91331 818-899-5296
§ CVC Prods., 525 Lee Rd., Rochester, NY 14603 716-458-2550
Everett/Charles Test Equip. Inc., 2887 N. Towne Ave., Pomona, CA 91767 714-621-9511
High Voltage Engrg. Corp., S. Bedford St., Burlington, MA 01803 617-272-1313
§ Hoke, 1 Tenakill Pk., Cresskill, NJ 07626 201-568-9100
† IMC Magnetics Corp., Arizona Div., 1900 East Fifth St., Tempe, AZ 85281 602-968-4441
§ Jamesbury, 640 Lincoln St., Worcester, MA 01605 617-852-0200
Materials Resch., Route 303, Orangeburg, NY 10962 914-359-4200
§ Roean Industries, Inc., 12970 Branford, Ste. C, Pacoima, CA 91331 818-767-7047
Temescal, 2850 Seventh St., Berkeley, CA 94710 415-841-5720
§† Ulvac North America, P.O. Box 890, Kennebunk, ME 04043 207-985-7169
Vactronic Lab. Equip., 65 Brightside Ave., E. Northport, NY 11731 516-AN1-2660
Varian Assocs., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303 415-493-4000
Veeco Instruments Inc., Terminal Dr., Plainview, NY 11803 516-349-8300

Varactors — See Diodes, Varactor (Vol. 1A)

Varistors — See Resistors, Voltage Sensitive (Vol. 3;1A)

VHF Equipment — See Generators (Vol. 3), Receivers (Vol. 3), etc.

Vibration Surveys — See Services, Vibration Surveys (Vol. 3)

Vibration Test Systems — See Testers, Vibration (Vol. 3)

Vibrators-4050

ATR Elctrns., Inc., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, 612-222-3791 ....3•1827
Wilcoxon Resch., P.O. Box 5798, Bethesda, MD 20814, 301-770-3790 ....1B•1886
Alpha-M Corp., 3009 Wildflower Dr., Dallas, TX 75229 214-620-0021
§ Chorus Data Systems, P.O. Box 810, 27 Proctor Hill Rd., Hollis, NH 03049 603-465-7100
Contraves Goerz Corp., 610 Epsilon Dr., Pittsburgh, PA 15238 412-967-7700
Endicott Coil, 22 E. Charlotte St., Binghamton, NY 13905 607-797-1263
† Harowe Servo Controls, Westtown Rd. at West Chester Pike, W. Chester, PA 19380 215-692-2700
Unholtz-Dickie Corp., 6 Brookside Dr., Wallingford, CT 06492 203-265-3929
§ Wilson, H. M., Co., 11501 Chimney Rock Rd., Houston, TX 77035 ..713-729-1183

Video Components & Equipment — See Specific Component: Amplifiers (Vol. 3), Cameras (Vol. 3), Networks (Vol. 3), etc.

Viewers (MIL), Infrared-3475

ElectroPhysics Corp., 48 Spruce St., Nutley, NJ 07110 201-667-2262
Image Technology Methods Corp., 103 Moody St., Waltham, MA 02154 617-894-1720

Viewing Hoods, Cathode Ray Tube-2975

Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303 .... Call Local Sls. Off.
§ Jan Hardware Mfg. Co., 47-27 36th St., Long Island City, NY 11101 212-361-0800
§ PacTec Div., LaFrance Corp., Enterprise & Executive Avenues, Philadelphia, PA 19153 215-365-8400
Tektronix, Inc., P.O. Box 500, V3-314, Beaverton, OR 97077 ....800-547-1512; Oregon only 800-452-1877

Vinyl Compounds — See Plastic Raw Materials (Vol. 2)

Vises-5400 — *See Vol. 2*

VLF Equipment — See Receivers (Vol. 3), Transmitters (Vol. 3), etc.

Voice Recognition Equipment — See Recognition Equipment, Speech (Vol. 3)

Voltage Sources-4000

† California Instruments, A Div. of Amstar Tech. Prods. Co., Inc., 5150-Convoy St., San Diego, CA 92111, 619-279-8620;800-356-2244;800-821-1634 .... 3•1840
† Electronic Dev. Corp., 11 Hamlin St., Boston, MA 02127-4198, 617-268-9696 .... 3•1224
General Resistance, Inc., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, 203-481-5721 .... 3•1239
Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303, Call Local Sls. Off. .... 3•1585
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Analogic Corp., 8 Centennial Dr., Peabody, MA 01961 ....617-777-4500; 17-246-0300;800-451-1816
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Burr-Brown, P.O. Box 11400, Tucson, AZ 85734 602-746-1111
† Calex Mfg. Co., Inc., 3355 Vincent Rd., Pleasant Hill, CA 94523 415-932-3911
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§† Data Precision Corporation, Electronics Ave., Danvers, MA 01923 ..617-246-1600
Datel, 11 Cabot Blvd., Mansfield, MA 02048 617-339-9341
Fluke, John, Mfg. Co., Box C9090, MS 250C, Everett, WA 98206 ...206-356-5400
Hipotronics, P.O. Drawer A, Brewster, NY 10509 914-279-8091
IET Labs, Inc., 534 Main St., Westbury, NY 11590 516-334-5959
Integra, Inc., 2368 Walsh Ave., Santa Clara, CA 95051 408-727-9601
Keithley Instrs., 28775 Aurora Rd., Cleveland, OH 44139 216-248-0400
Leeds & Northrup Instrs., A Unit of General Signal Corp., Sumneytown Pike, North Wales, PA 19454 215-643-2000
Power Designs, Inc., 1700 Shames Dr., Westbury, NY 11590 516-333-6200
Pulse Instrs. Co., 1536 W. 25th St., San Pedro, CA 90732 213-548-1327
RFL Inds., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005 201-334-3100
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Sensitive Research Instrs., 25 Dock St., Mt. Vernon, NY 10550 914-699-9717
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§ Sunshine Sci. Instr., 1810 Grant Ave., Philadelphia, PA 19115 215-673-5600
§† Systron-Donner Instr. Div., 2727 Systron Dr., Concord, CA 94518 ..415-676-5000
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† Trio Labs., 80 Dupont St., Plainview, NY 11803 516-349-0400
§ Tucker Elctrns., Box 461060, Garland, TX 75046 ....214-348-8800;800-527-4642
Valhalla Scientific, 7576 Trade St., San Diego, CA 92121 619-578-8280
ZI-TECH Instr. Corp., 2151 Park Blvd., Box 60490, Palo Alto, CA 94306 415-326-2151

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Warning Systems (MIL), Computerized-3475

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† General Instr., Govt. Sys., 600 W. John St., Hicksville, NY 11802 516-733-3000
Litton Potentiometer Div., 750 So. Fulton Ave., Mt. Vernon, NY 10551 914-664-7733
† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

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NWL Transformers, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, 609-298-7300 ....1A•2211
American Elctrn. Labs., Inc., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446
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† Systems Resch. Labs., Inc., 2800 Indian Ripple Rd., Dayton, OH 45440 513-426-6000

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† Santa Barbara Resch. Ctr., 75 Coromar Dr., Goleta, CA 93117 805-968-3511

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Wire Strippers, Automatic-4100

† Trans American Transformer, 142 Peconic Ave., Medford, NY 11763, 516-654-1880 .... 1A•2325
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§ Assem-Pro Instrs., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124 408-267-1168
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Coherent, Inc., 3210 Porter Dr., Palo Alto, CA 94304 415-493-2111
§ Eraser Co., Box 4961, Syracuse, NY 13221 315-454-3237
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† Ewald Instrs., Rte. 7R, Kent, CT 06757 203-927-3278
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Hollis Engrg./Wire-Wrap, 15 Charron Ave., Nashua, NH 03061 603-889-1121
§ Ideal Industries, 4450 Becker Pl., Sycamore, IL 60178 815-895-5181
§ ITT Cannon, 10550 Talbert Avenue, P.O. Box 8040, Fountain Valley, CA 92708 714-964-7400
§† Mann, Henry, Inc., 3983 Mann Road, Huntingdon Valley, PA 19006 215-355-7200
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Technical Devices, 560 Alaska Ave., Torrance, CA 90503 213-618-8437

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† Astronautics Corp. of America, P.O. Box 523, Milwaukee, WI 53201 414-447-8200
§† Compucorp, 2211 Michigan Ave., Santa Monica, CA 90404 213-829-7453
Digiac Corp., 175 Engineers Rd., Hauppauge, NY 11788 516-273-8600
First Computer Corp., 645 Blackhawk Dr., Westmont, IL 60559 312-920-1050
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Work Stations/Decks, Data Entry-1400 — *See Vol. 2*

Work Room, Shielded-1400 — *See Vol. 2*

Wrenches-5400 — *See Vol. 2*

X-ray Inspection Equipment-4100

§† Addelco Corp., Advanced Dev. Elctrns. Div., 20 Freeman Pl., Needham, MA 02192 617-444-4754
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Capintec Instrs., 6 Arrow Rd., Ramsey, NJ 07446 201-825-9500
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§† LogE/Spatial Data Sys., 508 S. Fairview, Goleta, CA 93017 805-967-2383
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Panametrics, 221 Cresent St., Waltham, MA 02254 617-899-2740
Pulsar Products Div., 2700 Merced St., San Leandro, CA 94577 415-577-7236
Spectro Equipment, Inc., 6021 Royalton Rd., N. Royalton, OH 44133 216-237-8910

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85 Manufacturers and Sales Offices Directory

Each manufacturer is listed alphabetically with complete address and elephone number of main offices. The names of those with data pages n this edition of EEM are shown in boldface.

Many manufacturers also show TWX and Telex numbers, FSC (Fed-eral Supply Code), other pertinent company data, their sales and/or ocal distributor offices and phones. The page numbers of their data ages in this edition are shown in all volumes.

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H	Cleveland, Tiby Co.	216-371-5335

& B TECHNICAL SERVICES, 11300 Hartland St., N. Hollywood, CA 91605, Tel: 213-769-6772, Telex: 66-2497, TWX: 910-499-2675; Empl.: 40; *Sls. Mgr.:* V. A. Littlefield; *Dist. Mgr.:* C. Cloud

& D ELEC. INSTRS., 73-07 88th St., Glendale, NY 11385, Tel: 212-275-6516; Empl.: 7

&M INSTRUMENT, INC., 5 Nassau St., Rockville Centre, NY 11571, Tel: 516-678-6960

AVID ENGRG., 30 Cook Ct., Laconia, NH 03246, Tel: 603-524-4443, TWX: 510-298-1127; FSC No.: 30161; Empl.: 180; *Sls. Mgr.:* Philip Johnson; *Dist. Mgr.:* Philip Johnson

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A	Wareham, Elctrn. Sls. of New England	617-295-7634
Y	Rochester, BKT Assocs.	716-586-5814
(	Dallas, True Techn.	214-691-7870

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TX	Richardson, Abbott Transistor Labs.	214-437-0697
VT	S. Burlington, Dynamic Sls.	802-863-6665

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OH	Columbus, Hughes-Peters	614-294-5351
OK	Tulsa, Norvell Elctrns.	918-663-1247
OR	Beaverton, Almac Elctrns.	503-641-9076
PA	Broomall, Time Elctrns.	215-359-1200
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
TX	Austin, Norvell Elctrns.	512-458-8106
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	Houston, Norvell Elctrns.	713-777-1666
WA	Bellevue, Almac Elctrns.	206-643-9992
WA	Seattle, R. V. Weatherford	206-575-1340
WI	Mequon, Taylor Elec.	414-241-4321

ACD-ELCOR PRODUCTS, P.O. Box 244, Bethel, CT 06801, Tel: 203-743-3510; Empl.: 3

ACHESON COLLOIDS, P.O. Box 288, Port Huron, MI 48060, Tel: 313-984-5581, TWX: 810-231-5265; Empl.: 150; *Sls. Mgr.:* Richard Doehring

A.C. INTERFACE, 2925 College Ave., Costa Mesa, CA 92626, Tel: 714-979-9830, Telex: 655-328; Empl.: 10; *Sls. Mgr.:* P. Marchetti

ACME CHEM. & INSULATION, 166 Chapel St., New Haven, CT 06513, Tel: 203-562-2171; Empl.: 75; *Sls. Mgr.:* Marvin Leonard

ACME ELEC. HEATING CORP., 4685 E. 11th, Hialeah, FL 33013, Tel: 305-685-8326; Empl.: 12

ACME MODEL ENGRG. CO., 654 Bergen Blvd., Ridgefield, NJ 07657, Tel: 201-943-7650; Empl.: 29

ACOPIAN CORP., Box 638, Easton, PA 18042, Tel: 215-258-5441, TWX: 510-651-4919; FSC No.: 14749; *Sls. Mgr.:* T. Skopal .... 3•1461-1495

Local Sales Offices & Reps

FL	Melbourne, Acopian	305-727-1172
MD	Ellicott City, Doss Elctrns.	301-465-1336

ACOUSTIC POWER SYS., 2151 Las Palmas Dr., Ste. G, Carlsbad, CA 92008, Tel: 619-438-4848, Telex: 67-8401; Empl.: 5

ACQUIS COMMUNICATIONS, 17192 Gillette Ave., Irvine, CA 92714, Tel: 714-545-3732; *Sls. Mgr.:* Patrice Garner

ACRODYNE CONTROLS, See Accudyne Corp.

ACROMAG, 30765 Wixom Rd., Wixom, MI 48096, Tel: 313-624-1541, Telex: 230-505; Empl.: 100; *Sls. Mgr.:* Bill Carey

ACROMARK, 60 Locust/Dept. 397, Berkeley Hgts., NJ 07922, Tel: 201-464-6474; Empl.: 50; *Sls. Mgr.:* W. H. Schmidt

ACTION INSTRS., 8601 Aero Dr., San Diego, CA 92123, Tel: 619-279-5726, TWX: 910-335-2030; Empl.: 260; *Sls. Mgr.:* Frank Williams

ACTIVE CONTROL INSTRMN., P.O. Box 243-Wildwood Circle, Key Largo, FL 33037, Tel: 305-451-1000; FSC No.: 55116; Empl.: 6 .... 3•1120

AC TRANSFORMER, 89 Madison St., Newark, NJ 07105, Tel: 201-589-8574; Empl.: 13; *Sls. Mgr.:* George Giangrande

ACUREX-AUTODATA, 555 Clyde, Mountain View, CA 94039, Tel: 415-964-3200, Telex: 34-6391, TWX: 910-379-6593; Empl.: 1000; *Sls. Mgr.:* Don Willett

ACUSHNET CAPACITOR CO., INC., 720 Belleville, New Bedford, MA 02741, Tel: 617-999-3291, TWX: 710-344-6451; FSC No.: 61152; Empl.: 300

ACUSHNET ELCTRNS. CO., INC., 8700 E. Thomas Rd., Scottsdale, AZ 85252, Tel: 602-947-7474, TWX: 910-950-1320

ADAC CORP., 70 Tower Office Pk., Woburn, MA 01801, Tel: 617-935-6668, Telex: 951802; Empl.: 80; *Sls. Mgr.:* Les Silvern .... 3•1143

Local Sales Offices & Reps

AZ	Phoenix, PLS Assocs.	602-246-661
CA	Los Angeles, ADAC Corp.	213-476-653
CA	Redwood City, ADAC Corp.	415-366-430
CO	Englewood, PLS Assocs.	303-799-426
FL	Orlando, E. G. Holmes & Assocs.	305-894-890
GA	Chamblee, E. G. Holmes & Assocs.	404-451-616
IL	Hoffman Estates, Carvel Engrg. & Sls. Co.	312-885-880
KS	Overland Park, Ramsey Assocs.	913-649-699
MI	Madison Hgts., WKM Assocs.	313-588-230
MN	Edina, Carvel Engrg. & Sls. Co.	612-835-792
MO	St. Louis, Ramsey Assocs.	314-878-504
NJ	Pennsauken, Sci-Reps	609-662-522
NM	Albuquerque, PLS Assocs.	505-345-550
NY	DeWitt, DB Assocs.	315-446-022
NY	White Plains, Cane Tech Sls.	914-694-924
NC	Carey, E. G. Holmes & Assocs.	919-469-885
OH	Dayton, WKM Assocs.	513-434-750
OH	Independence, WKM Assocs.	216-524-593
OR	Portland, Brett-Ross	503-256-972
PA	Pittsburgh, WKM Assocs.	412-892-295
TX	Dallas, SCI Sales	214-931-148
TX	Houston, SCI Sales	713-224-612
UT	Midvale, PLS Assocs.	801-566-067
VA	Fairfax, Sci-Reps	703-385-060
WA	Redmond, Brett-Ross	206-822-482
WI	New Berlin, Carvel Engrg. & Sls. Co.	414-784-700

ADALET-PLM DIV, Div. Scott & Fetzer Co., 480 W. 150th St., Cleveland, OH 44135, Tel: 216-267 9000, Telex: 98-5349; FSC No.: 73389; Empl.: 177 *Sls. Mgr.:* J. L. Smelko

ADAMS RITE PRODS., INC., 540 W. Chevy Chas Dr., Glendale, CA 91209, Tel: 213-241-5121, TWX 910-497-2276; Empl.: 130

ADAMS-RUSSELL, Antenna & Microwave Div. Haverhill Rd., Amesbury, MA 01913, Tel: 617-388 5210, TWX: 710-347-6360; Empl.: 300

ADAMS-RUSSELL, Anzac Div., 80 Cambridge St. Burlington, MA 01803, Tel: 671-273-3333, Telex 200155, TWX: 710-332-0258; FSC No.: 21912; Empl. 300; *Sls. Mgr.:* Julian D. Parker

ADAMS RUSSELL, Modpak Div., 80 Cambridg St., Burlington, MA 01803, Tel: 617-273-3333, TWX 710-332-0258; FSC No.: 21912; Empl.: 1; *Sls. Mgr.* Pat Corrigan

ADAMS-RUSSELL, Parisi Div., 280 Bear Hill Rd. Waltham, MA 02154, Tel: 617-890-0055, TWX: 710 324-6450; FSC No.: 27965; Empl.: 8; *Sls. Mgr.:* J. M Caputo

ADAPTER/CHARGER PRDTS., Box 3218, Peoria IL 61614, Tel: 309-691-0810; Empl.: 50

ADAPTIVE INTELLIGENCE, 2944 Scott Blvd. Santa Clara, CA 95050, Tel: 408-970-0777; *Sls. Mgr.* Jim Breen

ADAPTIVE SCIENCE, 4700 San Pablo Ave., Emery ville, CA 94608, Tel: 415-652-1805; FSC No.: 7379 Empl.: 26; *Sls. Mgr.:* Jesse Huffman

ADATEK, INC., P.O. Box 1339, Sandpoint, ID 83864 Tel: 208-263-1471, 800-323-3343; Empl.: 13; *Sls Mgr.:* Kim Jones or Ray Pelland; *Dist. Mgr.:* Jani Chilton

ADC MAGNETIC CONTROLS CO., 4900 W. 78t St., Minneapolis, MN 55435, Tel: 612-835-6800 Telex: 290321; Empl.: 2000; *Sls. Mgr.:* Ken Nicholls

ADCOTECH, 1980 Tarob St., Milpitas, CA 95035, Te 408-943-9430, TWX: 910-338-2333; Empl.: 82; *Sls Mgr.:* Bill Sendell

ADC PRODS., 4900 W. 78th St., Minneapolis, M 55435, Tel: 612-835-6800, TWX: 910-576-2832 Empl.: 1,435

ADDACON, INC., 3708 Alliance Dr., Greensboro, N 27407, Tel: 919-852-6200, TWX: 510-922-7361; *Sls Mgr.:* Lynn Cummings

A.D. DATA SYS., 200 Commerce Dr., Rochester, N 14623, Tel: 716-334-9649, TWX: 510-253-3246 Empl.: 45; *Sls. Mgr.:* Jack Petz

ADDELCO CORP., Advanced Dev. Elctrns. Div. 20 Freeman Pl., Needham, MA 02192, Tel: 617-444 4754, TWX: 710-325-0370; Empl.: 23; *Sls. Mgr.:* C. J Schmaling; *Dist. Mgr.:* M. B. Polayes

ADDINGTON LABS. INC., SOLID STATE PRODS DIV., See Eaton Corp. Comm. Prods. Div.

ADDITIVE PRODUCTS DIV., Kollmorgen Corp., P.O. Box 700, West La., Aquebogue, NY 11931, Tel: 516-722-4100, TWX: 510-220-0022; Empl.: 450

ADDMASTER CORP., 416 Junipero Serra Dr., San Gabriel, CA 91776, Tel: 213-285-1121, Telex: 67-4770; Empl.: 200; *Sls. Mgr.:* Louis Doshay

ADDRESSOGRAPH FARRINGTON INC., Datatrol Div., Brent Dr., Hudson, MA 01749, Tel: 617-568-1411; Empl.: 350; *Sls. Mgr.:* Tom Galloway

ADE, INC., 1560 E. 98th St., Chicago, IL 60628, Tel: 312-221-3400; FSC No.: 62049

ADEC, 12 Kulick Rd., Fairfield, NJ 07006, Tel: 201-575-1570; FSC No.: 5965; Empl.: 45; *Sls. Mgr.:* D.L. Wiesen

ADI ELECTRONICS, INC., 160 Wilbur Place, Bohemia, NY 11716, Tel: 516-567-3555

ADHESIVE PRODS., 1660 Boone Ave., Bronx, NY 10460, Tel: 212-542-4600; *Sls. Mgr.:* M. S. Peters

ADRET/COMSTRON, See Comstron/Adret

ADTECH POWER INC., 1620 S. Sunkist St., Anaheim, CA 92806, Tel: 714-634-9211, Telex: 68-1498; FSC No.: 56410; Empl.: 70; *Sls. Mgr.:* Fred Weishar; *Dist. Mgr.:* Fred Weishar

ADTEK, Geophysical Survey Sys., Inc., 15 Flagstone Dr., Hudson, NH 03051, Tel: 603-889-4841, Telex: 953038; Empl.: 35; *Sls. Mgr.:* J. V. Rosetta, Jr.

ADVANCE CONVERSION DEVICES CO., 274 S. Salem St., Randolph, NJ 07869, Tel: 201-989-0095; FSC No.: 52298; Empl.: 24; *Sls. Mgr.:* C. C. Applegate .... 3•1824, 1825

ADVANCED AUTOMATION CONCEPTS, INC., 3760 Lower Roswell Rd., Marietta, GA 30067, Tel: 404-973-0027, Telex: 703452; Empl.: 12; *Sls. Mgr.:* Bob Pap

ADVANCED CIRCUITRY, Litton Inds., 4811 W. Kearney, Springfield, MO 65803, Tel: 417-862-0751, TWX: 910-775-4705; Empl.: 1000; *Sls. Mgr.:* Steve Fadler

ADVANCED CIRCUIT TECHNLG., 118 N. Eastern Blvd., Nashua, NH 03062, Tel: 603-880-6000, TWX: 710-228-8961; FSC No.: 57034; Empl.: 125

ADVANCED COATINGS & CHEM., 4343 Temple City Blvd., Temple City, CA 91780, Tel: 818-579-6270, Telex: 675594

ADVANCED COLOR TECHNLG., 21 Alpha Rd., Chelmsford, MA 01824, Tel: 617-256-1222, Telex: 951-419; *Sls. Mgr.:* Jack Flynn

ADVANCED CONTROL SYS., 24 Teed Dr., Randolph, MA 02368, Tel: 617-963-4543; Empl.: 6; *Sls. Mgr.:* Kenneth Egan

ADVANCED DEVICES, 1618 Camino Uva, Los Alamos, NM 87544, Tel: 505-662-7729

ADVANCED ELCTRNS. DESIGN, 440 Potrero Ave., Sunnyvale, CA 94086, Tel: 408-733-3555, Telex: 357-498; *Sls. Mgr.:* Michael J. Long; *Dist. Mgr.:* Randy Fitzpatrick

ADVANCED ELECTRONIC PACKAGING, 2159 Bay St., Los Angeles, CA 90021, Tel: 213-622-9042; *Sls. Mgr.:* Douglas A. Hill

ADVANCED FILTER DEVICES INC., 6241 Yarrow Dr., Ste. D, Carlsbad, CA 92008, Tel: 619-438-2074; FSC No.: 56620; Empl.: 45; *Sls. Mgr.:* Herbert Johnson

ADVANCED HIGH VOLTAGE CO., INC., P.O. Box 2136, Lancaster, CA 93539-2136, Tel: 213-997-7222; *Sls. Mgr.:* J. Richardson

Local Sales Offices & Reps

A	Mountain View, Energy Devices	415-969-0330
A	Fairfax, Schibley Assoc.	703-591-3008

ADVANCED INPUT DEVICES, W. 250 A.I.D. Dr., Coeur d'Alene, ID 83814, Tel: 208-765-8000, TWX: 510-776-0584; FSC No.: 95666; Empl.: 550; *Sls. Mgr.:* Peter Wezeman

ADVANCED INTERCONNECTIONS CORP., 5 Division St., Warwick, RI 02818, Tel: 401-885-0485; *Sls. Mgr.:* Max E. Rice .... 2•1102-1104

Local Sales Offices & Reps

AR	Hot Springs, Automation Supplies	501-525-4588
CA	Arcadia, Van Gott & Assoc.	818-445-9728
CA	Rancho San Diego, Van Gott & Assoc.	619-286-3633
CA	Sunnyvale, M2 Mktg. Grp.	408-733-1361
CO	Denver, Control Agency	303-936-6641
FL	Melbourne, EMS, Inc.	305-724-1027
IL	Barrington, Richard Fisk Mktg.	312-381-0653
MD	Pikesville, Imagitron Sls. Co.	301-521-2020
MN	Minneapolis, Electro-Tech Assocs.	612-927-5878
NJ	Avalon, Imagitron Sls. Co.	609-368-5790
NJ	Fairfield, TAM	201-575-4390
NY	Fairport, Net Sales Co.	716-467-4538
NY	So. Hauppauge, TAM	516-348-0800
OH	Akron, B. J. Davis Corp.	216-645-0517
PA	Camphill, Imagitron Sls. Co.	717-763-9577
TX	Carrollton, Paulsen Elect. Sls.	214-386-4785
UT	Salt Lake City, Control Agency	801-972-8788
WA	Lynnwood, The Ransom Co.	206-775-0222

Local Distributors

AZ	Tempe, Elctrn. Hardware, Ltd.	602-967-1691
CA	Belmont, Lo Dan Elctrns., Inc.	415-592-4600; 800-541-1001
CA	No. Hollywood, Elctrn. Hardware, Ltd.	213-982-6100
CA	Santa Clara, Elctrn. Hardware, Ltd.	408-988-1000
CA	Sunnyvale, Sierra West Elctrn. Distrs.	408-747-1188
CO	Aurora, Elctrn. Hardware, Ltd.	303-363-6100
CT	East Haven, J. V. Elctrns. of Boston	203-469-2321
CT	Norwalk, Cobra Comps.	203-847-6442
FL	Palm Bay, Action Elctrns.	305-725-4920
IL	Arlington Heights, Lo Dan Elctrns., Inc.	312-398-5311; 800-323-5207
MD	Gaithersburg, Axis Elctrns. Inc.	301-840-9640
MD	Owings Mills, Cameo Elctrns. Co.	301-363-6161
MA	Burlington, J. V. Elctrns. of Boston	617-273-4300
NJ	Nutley, Vantage Comps., Inc.	201-667-1840
NJ	Whippany, Tonar Inds., Inc.	201-884-1400
NY	Commack, Vantage Comps., Inc.	516-543-2000
NY	Rochester, Masline Elctrns., Inc.	716-546-5373
RI	Warwick, Cal-Greg Comps.	401-738-6170
TX	Austin, Active Comp. Tech.	512-452-5254
TX	Dallas, Active Comp. Tech.	214-980-1888
TX	Houston, Active Comp. Tech.	713-496-4000
UT	No. Salt Lake, Western Controls	801-292-5900
WA	Lynnwood, Oman & Assocs.	206-774-1887

ADVANCED KINETICS, 1231 Victoria St., Costa Mesa, CA 92627, Tel: 714-646-7165; Empl.: 32; *Sls. Mgr.:* R. L. Gradishar

ADVANCED MATERIALS SYSTEMS, See Handy & Harman Electronic Materials Corp.

ADVANCED MICROCOMPUTERS, 3340 Scott Blvd., Santa Clara, CA 95051, Tel: 408-732-2400, Telex: 34-6306, TWX: 910-339-9280; *Sls. Mgr.:* Steve Zelencik; *Dist. Mgr.:* Rick Marz

ADVANCED MICRO DEVICES, P.O. Box 3453, 901 Thompson Pl., Sunnyvale, CA 94088, Tel: 408-732-2400, Telex: 34-6306, TWX: 910-339-9280; Empl.: 11000; *Sls. Mgr.:* Steve Zelencik; *Dist. Mgr.:* Len Brown

ADVANCED SYS. CONCEPTS, 435 N. Lake Ave., Pasadena, CA 91101, Tel: 818-793-8971, Telex: 701 215 ASCI; *Sls. Mgr.:* Wesley Ferris; *Dist. Mgr.:* Laurie Kalnin .... 1B•1501

Local Sales Offices & Reps

IA	Des Moines, Beams Co.	515-255-1148
MN	Edina, Integrated Peripheral Sys.	612-831-0349
OH	Dayton, Ashby Assocs.	513-252-5627
VA	Vienna, Advanced Technlg. Assocs.	703-556-0500

ADVANCED TECHN. RESEARCH LABS., 5645 K General Washington Dr., Alexandria, VA 22312, Tel: 703-750-2920; *Sls. Mgr.:* Bob Palma, Sr.; *Dist. Mgr.:* Bob Palma, Sr.

ADVANCED TECHN. SYS., 17-01 Pollitt Drive, Fair Lawn, NJ 07410, Tel: 201-794-0200, TWX: 710-988-2262; Empl.: 250; *Sls. Mgr.:* R. R. Draudin

ADVANCED TOOL TECHNOLOGY, INC., Sub. of Alliance Resch. Corp., 18217 Parthenia St., Northridge, CA 91325, Tel: 213-993-1202, Telex: 181011; *Sls. Mgr.:* Lou Davis

ADVANCED TRANSFORMERS INDS., INC., 114 Center St., El Segundo, CA 90245, Tel: 213-322-4249; *Sls. Mgr.:* Irma Spreitzer .... 1A•2264, 2265; 1B•1473

ADVANCE ENGRG., 18225 So. Hoover St., Gardena, CA 90248, Tel: 213-321-3100

AD-VANCE MAGNETICS, INC., 625 Monroe St., Rochester, IN 46975, Tel: 219-223-3158, TWX: 810-290-0294; FSC No.: 50788; Empl.: 30; *Sls. Mgr.:* Kay Nixon .... 2•1902

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
CA	El Cajon, A-Tronics	619-444-1501
CA	Los Altos, Frauman Assoc.	415-941-0660
CA	Woodland Hills, A-Tronics	213-703-7212
CT	Meriden, A. Allison	203-237-9232
FL	Orlando, Gillum Sales	305-857-2110
GA	Atlanta, Remco	404-447-6937
IL	Westchester, Brouillette	312-345-6500
NY	Commack, RC Engrg.	516-543-3325
NC	Raleigh, Remco	919-847-5079
OH	Cincinnati, Makin Assocs.	513-871-2424
PA	W. Conshohocken, Eastern Comps.	215-825-8610
TX	Houston, Space Elctns.	713-266-9245
TX	Irving, Space Elctns.	214-251-3636
VA	Herndon, Eastern Comps.	703-471-1025

ADVANCE WIRE & CABLE, 1661 Industrial Way, Belmont, CA 94002, Tel: 415-592-4550, Telex: 334475; FSC No.: 57775; Empl.: 158; *Sls. Mgr.:* Ed Mittelbusher; *Dist. Mgr.:* Ed Mittelbusher

Local Sales Offices & Reps

AL	Decatur, Tenn Tech Inc.	205-350-0630
AZ	Phoenix, Advance Electrical Sls.	602-243-4326
CA	Belmont, Advance Electrical Sls.	415-592-4550
CO	Denver, Advance Electrical Sls.	303-388-0923
FL	Ft. Lauderdale, Hollingsworth & Still	305-748-8964
FL	Winter Pk., Hollingsworth & Still	305-699-0505
GA	Atlanta, Tenn Tech Inc.	404-622-5784
IL	Highland Pk., Bransky Sls.	312-433-2375
KY	Fort Mitchell, G. W. Thelen Co.	606-341-8181
MD	Ellicott City, Marketing Technology	301-465-5944
MA	Sharon, Adcour Inc.	617-784-8123
MN	St. Paul, SKOR Inc.	612-426-1160
NJ	Haddonfield, Mill-Brown Assoc.	609-429-1005
NJ	Parlin, JMR Sls.	201-727-5335
NY	Rochester, Ontec	716-464-8636
NC	Raleigh, Tenn-Tech.	919-266-3610
TN	Nashville, Tenn Tech Inc.	615-646-9811
TX	Houston, Advance Electrical Sls.	713-956-5436
WA	Seattle, Advance Electrical Sls.	206-575-4323
WI	Cedarburg, Bransky Sls.	414-377-6837

A E CORP., 65 Wellesley Ave., Needham, MA 02194, Tel: 617-449-3142; Empl.: 10; *Sls. Mgr.:* H. Harrison

A E G TELEFUNKEN, High Power Grp., Rte. 22, Orr Dr., Somerville, NJ 08876, Tel: 201-722-9800, Telex: 833409; *Sls. Mgr.:* John Szafranski

A E G TELEFUNKEN, Semiconductor Grp., Rte. 22, Somerville, NJ 08876, Tel: 201-722-9800, Telex: 833409; *Sls. Mgr.:* Carl Golasa; *Dist. Mgr.:* Carl Golasa

AEL, INC, See American Electronic Labs

AEMC, 99 Chauncy, Boston, MA 02111, Tel: 617-451-0227, 800-343-1391, Telex: 95-1073; *Sls. Mgr.:* Jon Henderson

AERCOM, 405 Tasman Dr., Sunnyvale, CA 94086, Tel: 408-744-1320, TWX: 910-339-9308; Empl.: 50; *Sls. Mgr.:* H. Putnam

AEROCOM, 3090 S.W. 37th Ave., Miami, FL 33133, Tel: 305-448-6503, Telex: 51-9209; FSC No.: 81535; Empl.: 100; *Sls. Mgr.:* Thomas A. Coleman

AEROFLEX LABS., INTEGRATED MICROSYSTEMS DIV., See Aeroflex Labs., Microelectronics Div.

AEROFLEX LABS., MAGNETIC PRODS. DIV., So. Service Rd., Plainview, NY 11803, Tel: 516-694-6700, TWX: 510-224-6417; Empl.: 490; *Sls. Mgr.:* Herbert S. Kulik .... 1B•1123, 1829

Local Sales Offices & Reps

EXP	New York, Frathom Co.	212-687-9390

AEROFLEX LABS., MICROELCTRNS. DIV., 35 S. Service Rd., Plainview, NY 11803, Tel: 516-694-6700, TWX: 510-224-6417; FSC No.: 88379; Empl.: 100; *Sls. Mgr.:* Melvin D. Schwartz .... 1A•1644

Local Sales Offices & Reps

AZ	Phoenix, The Knight Co.	602-994-1311
CA	Los Altos Hills, HB Mktg.	415-941-4080

CA	Los Angeles, The Knight Co.	213-670-2833
CA	San Diego, The Knight Co.	714-451-0529
CO	Parker, Parker Webster Co.	303-841-4888
CT	Simsbury, Multitronics Sls. Co.	203-651-0140
FL	Altamonte Springs, R. W. Mitscher Co., Inc.	305-788-6844
FL	Boca Raton, R. W. Mitscher Co., Inc.	305-482-5649
IL	Northfield, Feller Assocs., Inc.	312-446-8065
IA	Cedar Rapids, Feller Assocs., Inc.	319-364-0566
MD	Baltimore, Micro Comp, Inc.	301-247-0400
MN	Minneapolis, International Elctrns, Inc.	612-571-0000
NJ	Cherry Hill (Southern N.J.), Danco Elctrn. Sls. Corp.	609-424-5590
NJ	Teaneck (Northern N.J.), Spectrum Sls., Inc.	201-692-8314
NY	Hartsdale, Spectrum Sls, Inc.	914-472-8600
TX	Garland, Tesco Inc.	214-681-1376
UT	Salt Lake City, Parker Webster Co.	801-266-9939
EXP	New York City, New York, Henley & Co.	212-687-9390

AEROSPACE OPTICS INC.

AEROSPACE OPTICS INC., 3201 Sandy La., Dept. E-83, Fort Worth, TX 76112, Tel: 817-451-1141, Telex: 75-8461; Empl.: 83; *Sls. Mgr.:* R. E. Borkowski .... 1B•1503

AEROTECH, INC., 101 Zeta Dr., Pittsburgh, PA 15238, Tel: 412-963-7470, TWX: 710-795-3125; Empl.: 125; *Sls. Mgr.:* Robert Mitchell

AEROTRONIC ASSOCS., INC., Riverside Dr., Contoocook, NH 03229, Tel: 603-746-4631; FSC No.: 67272; Empl.: 225; *Sls. Mgr.:* Gary Moravchik

AERTECH INDS., See TRW Microwave

AES CORP., 285 Newbury St., P.O. Box 2093, Peabody, MA 01960, Tel: 617-531-8886; *Sls. Mgr.:* Michael Sherman

AETNA ENGRG., P.O. Box 7749, Van Nuys, CA 91409-7749, Tel: 818-341-9409; Empl.: 10; *Sls. Mgr.:* T. W. Collins

AETNA TELECOMMUNICATIONS LABS., P.O. Box 723, 131 Flanders Rd., Westborough, MA 01581, Tel: 617-366-0400, Telex: 951356; *Sls. Mgr.:* Marjorie Katz

AGFA-GEVAERT, INC., 275 North St., Teterboro, NJ 07608, Tel: 201-288-4100, TWX: 710-990-6137; Empl.: 750

AHAM TOR INC (ATI), 999, 27901 Front St., Rancho California, CA 92390, Tel: 714-676-4151, Telex: 910-332-6201

AIE MAGNETICS, Div. of Vernitron, 701 Murfreesboro Rd., Nashville, TN 37210, Tel: 615-244-9024, Telex: 554466; FSC No.: 06978; Empl.: 300; *Sls. Mgr.:* J. Holeman

Local Sales Offices & Reps

AL	Huntsville, Glen White Assoc.	205-533-5272
CA	Culver City, De Angelo, Rothman & Co.	213-827-2202
CA	Santa Clara, Novatronix	408-727-9530
CO	Thronton, E & C Johnson Co.	303-457-2247
FL	Ft. Lauderdale, Donato & Assoc.	305-352-0727
FL	Tampa, Glen White Assocs.	813-886-6980
GA	Duluth, Glen White Assoc.	404-447-1825
IL	Chicago, M. Gottleib Assoc.	312-775-1151
IN	Indianapolis, Gottleib Assoc.	317-846-5788
IA	Cedar Rapids, Seltec Sales Corp.	319-393-1114
MD	Timonium, Glen White & Assoc.	301-252-6360
MA	Waltham, AIE-Eastern Region	617-899-5900
MI	Livonia, Luebbe Sls. Co.	313-477-3131
MO	Kansas City, A.G.E.S.	816-421-0426
NY	Great Neck, Tylinski Assoc.	516-466-9070
NY	Rochester, Canavan-Scanlon	716-424-1830
NY	Syracuse, Canavan-Scanlon	315-437-1271
NC	Raleigh, Glen White Assoc.	919-848-1931
OH	Cincinnati, Luebbe Sls. Co.	513-891-5770
OH	Cleveland, Luebbe Sls. Co.	216-333-0425
OH	Columbus, Luebbe Sls.	614-431-0474
OH	Dayton, Luebbe Sls. Co.	513-294-0426
OK	Tulsa, MGR, Inc.	918-369-5186
OR	Beaverton, W^3 Associates, Inc.	503-641-5790
PA	Pittsburgh, Luebbe Sales Co.	412-931-0414
PA	Washington Crossing, DVS Co.	215-493-4642
TN	Gray, Glen White Assocs.	615-477-8850
TX	Austin, MGR, Inc.	512-250-0926
TX	Dallas, MGR, Inc.	214-357-3173
VA	Charlottesville, Glen White Assoc.	804-295-0435
VA	Lynchburg, Glen White Assoc.	804-237-6291
WA	Seattle, W^3 Associates, Inc.	206-285-2663

AIKEN ADVANCED SYS., 5901 Edsall Rd., Alexandria, VA 22304, Tel: 703-370-0900, TWX: 710-832-0612; Empl.: 175; *Sls. Mgr.:* C. G. Gilmer

AIL, DIV. CUTLER-HAMMER, See Eaton Corp. AIL Div.

AILTEC DIV. CUTLER-HAMMER, See Eaton Corp., Elctrn. Instrmn. Div.

AIMSCO INC., 4000-4024 22nd Ave. W., Seattle, WA 98199-0056, Tel: 206-284-5563, TWX: 910-444-1333; Empl.: 30; *Sls. Mgr.:* C. Ernst; *Dist. Mgr.:* E. Chadwick

AIPHONE, 1700 130th St. NE, Bellevue, WA 98005, Tel: 206-455-0510, Telex: 32-0288; Empl.: 27; *Sls. Mgr.:* Jim Morrison

AIRBORN, INC., 4321 AirBorn Dr., Addison, TX 75001, Tel: 214-931-3200, Telex: 79-4200, TWX: 910-860-5230; FSC No.: 10400; Empl.: 350; *Sls. Mgr.:* J. L. Wolbrink .... 2•1105-1112

Local Sales Offices & Reps

AZ	Tempe, Piper Sls. Co.	602-949-0048
CA	Los Angeles, Air Born	213-670-7983
CA	Mountain View, Serra Assocs.	415-964-4300
CA	No. Hollywood, R. A. Strassner	213-761-1231
CA	San Diego, Ohm Spun Elctrns.	619-695-8102
FL	Cocoa Beach, Reynolds & Assoc.	305-259-7000
IL	Chicago, ESCO Assoc.	312-763-0800
MN	Edina, PWC	612-831-5999
MO	Bridgeton, Dytronics, Inc.	314-731-5799
NH	Nashua, Solla - Tronics	603-882-7146
NJ	Manville, Dynorep	201-685-0135
NY	Coxackie, R.P. Kennedy Co.	914-876-2700
NY	Rochester, R.P. Kennedy Co.	716-271-6322
OH	Dayton, Electro-Com	513-898-5140
PA	Doylestown, Monteiro Assocs.	215-345-5855
WA	Bellevue, Dillenbeck Sls.	206-747-4323

Local Distributors

TX	Addison, AirBorn Distribution Service	214-931-3200

AIRCO SPEER ELCTRNS., Resistor Plant, Bolivar Rd., Box 547, Bradford, PA 16701, Tel: 814-362-5536, Telex: 914404, TWX: 510-695-5921; Empl.: 1000; *Sls. Mgr.:* Larry Holzwarth; *Dist. Mgr.:* John Petersen

AIRCRAFT & ELCTRN. SPEC., Box 248, Plainfield, IN 46168, Tel: 317-272-2551; FSC No.: 00529; Empl.: 150; *Sls. Mgr.:* Harry Newburg

AIR ELECTRO SUPPLY, INC., 7700 Gloria Ave., Van Nuys, CA 91406, Tel: 213-873-6400, 818-988-4400, Telex: 66-2459, TWX: 910-495-1794

AIR/FLEX INDS. INC., 2422 Merced Ave., S. El Monte, CA 91733, Tel: 818-579-7060; FSC No.: 22782; *Sls. Mgr.:* Karl Thorp

airflyte ELECTRONICS CO.

AIRFLYTE ELCTRNS. CO., 56 New Hook Rd., Bayonne, NJ 07002, Tel: 201-436-2230, TWX: 710-729-4489; Empl.: 70; *Sls. Mgr.:* John Piret .... 1B•1124-1129

Local Sales Offices & Reps

CA	Culver City, Westaironics	213-641-4122
CA	Los Altos, Poltronics	415-941-3020
CT	No. Haven, Kitchen & Kutchin	203-239-0212
IL	Park Ridge, Probe Elctrns.	312-698-2044
MA	Lexington, Kitchen & Kutchin	617-862-8230
NJ	Kinnelon, Avionics Equip.	201-838-8105
NY	Rochester, R. P. Kennedy Co.	716-271-6322
PA	Philadelphia, R. P. Luce & Co.	215-884-8365
TX	Dallas, Jacobson Co.	214-363-7584

AIR LAND SYS., 2710 Prosperity Ave., Fairfax, VA 22031, Tel: 703-573-1100, Telex: 710-833-1174, TWX: Airland Frax; Empl.: 35; *Sls. Mgr.:* William C. Axe

AIRMATIC-ALLIED, 185 Park Dr., Wilmington, OH 45177, Tel: 513-382-1691; Empl.: 150

AIR-MAZE DIV., 25000 Miles Rd., Cleveland, OH 44128, Tel: 216-292-6800, Telex: 98-5413; *Sls. Mgr.:* John Cummings; *Dist. Mgr.:* Bob Glasler

AIR-O-TRONICS PRODS., Box K, Morrisville, NY 13408, Tel: 315-684-3705; FSC No.: 16663; Empl.: 10; *Sls. Mgr.:* G. M. Trush

AIRPAX CORPORATION, Woods Rd., Cambridge, MD 21613, Tel: 301-228-4600, Telex: 8-7715, TWX: 710-865-9655; FSC No.: 81541; Empl.: 550; *Sls. Mgr.:* D. Marshall .... 1B•1256

Local Sales Offices & Reps

AL	Huntsville, BCI	205-539-4411
AZ	Phoenix, Westrep	602-997-8899
CA	Pico Rivera, Westrep	213-949-2551
CA	San Diego, Westrep	714-276-0751
CO	Littleton, Lange Sls.	303-795-3600
CT	Wallingford, Selmark Assocs.	203-573-9088
FL	Ft. Lauderdale, ElectroComp	305-491-4141
GA	Chamblee, BCI	404-455-0405
IL	Palatine, Somers-Reagan, Inc.	312-991-1108
IN	Indianapolis, Leslie M. Devoe	317-842-3245
IA	Marion, Rep Assocs.	319-373-0152
MD	Baltimore, Pro-Rep, Inc.	301-653-3600
MA	Millis, Selmark	617-376-2914
MI	Troy, Pine Sls.	313-589-0350
MN	Hopkins, Peterson & Wolff	612-941-5400
MO	St. Louis, Delltron	314-869-4779
NY	Jericho, Airpax Corp.	516-822-2410
NY	Poughkeepsie, C. W. Floring	914-471-2973
NY	Rochester, Electra Sls.	716-461-5252
NY	Syracuse, C.W. Floring & Assoc.	315-478-2144
NC	Winston-Salem, L.G. White	919-725-3612
OH	Cincinnati, Baehr, Greenleaf	513-891-3826
OH	Cleveland, Baehr, Greenleaf	216-221-9030
OH	Columbus, Baehr, Greenleaf	614-486-4046
PA	Harleysville, T. Jackson	215-643-5560
PA	Pittsburgh, Russell F. Clark	412-242-9500
SC	Greenville, L.G. White	803-271-0630
TX	Dallas, Airpax Corp.	214-733-4377
UT	Salt Lake City, Lange Sls.	801-487-0843
VA	Richmond, L.G. White	804-740-7093
WA	Seattle, Don Smith	206-633-3160
WI	Wauwatosa, Larsen Assocs.	414-258-0529

AIRPAX CORPORATION, CHESHIRE DIV., Cheshire Indl. Pk., Box E, Cheshire, CT 06410, Tel: 203-272-0301, Telex: 962421, TWX: 710-455-4048; Empl.: 800; *Sls. Mgr.:* Robert Chlebek .... 1B•1131; 3•1121

Local Sales Offices & Reps

AL	Huntsville, B.C.I.	205-539-4411
AZ	Phoenix, Westrep	602-997-8899
CA	Anaheim, Westrep	213-404-3881
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, Airpax Corp.	408-980-0410
CO	Littleton, Lange Sls.	303-795-3600
CT	Wallingford, Selmark Assocs.	203-573-9088
FL	Ft. Lauderdale, Electrocomp Assocs.	305-491-4141
GA	Chamblee, B.C.I.	404-455-0405
IL	Palatine, Somers-Reagan, Inc.	312-991-1108
IN	Indianapolis, Leslie M. Devoe	317-842-3245
IA	Marion, Rep Assocs.	319-373-0152
MD	Baltimore, Pro-Rep, Inc.	301-653-3600
MA	Millis, Selmark Assocs.	617-376-2914
MI	Madison Heights, Pine Sls, Inc.	313-589-0350
MN	Bloomington, PWC	612-831-5999
MO	St. Louis, Delltron	314-869-4779
NH	Hopkinton, Selmark Assocs.	603-746-3299
NY	Jericho, Airpax Corp.	516-822-2410
NY	Rochester, Electra Sls.	716-461-5252
NY	Syracuse, C.W. Floring & Assocs.	315-478-2149
NC	Winston Salem, L.G. White Southern, Inc.	919-725-3612
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
OH	Dayton, Baehr, Greenleaf & Assocs.	513-439-0724
OR	Beaverton, Don Smith Sls. Co.	503-643-8020
PA	Harleysville, Thomas Jackson Assocs.	215-256-8877
PA	Pittsburgh, Russell F. Clark Co.	412-242-9500
SC	Greenville, L.G. White Southern, Inc.	803-271-0630
TX	Dallas, Airpax Corp.	214-733-4377
UT	Salt Lake City, Lange Sls.	801-487-0843
WA	Seattle, Don Smith Sls Co.	206-633-3160
WI	Wauwatosa, Larson Assocs.	414-258-0529

AIRPAX/NA PHILIPS CONTROLS CORP., Ft. Lauderdale Div., 6801 W. Sunrise Blvd., Ft. Lauderdale, FL 33313, Tel: 305-587-1100, Telex: 51-4448, TWX: 510-955-9866; Empl.: 200 .... 3•1929

Local Sales Offices & Reps

AZ	Scottsdale, Martech Assoc.	602-994-1285
CA	Buena Park, Pactec	213-921-8381

CA	Mountain View, Manco	415-964-7281
CO	Lafayette, Spectrum Sls.	303-759-4007
CT	Madison, S.I.R. Assoc.	203-245-2242
FL	Ft. Lauderdale, Bredesen Assoc.	305-566-3289
L	Chicago, Somers Reagan Inc.	312-991-1108
N	Indianapolis, Electro Dev. Engrg.	317-547-5274
LA	Kenner, D & W System Sls.	504-466-1692
MD	Phoenix, Rebco Sls.	301-592-8907
MA	Lexington, S.I.R. Assoc.	617-862-1812
MI	Detroit, Automatic Controls Co.	313-533-8890
MN	St. Paul, Kencotronics	612-645-7717
MO	Grandview, Harris-Hanson Co.	816-763-6200
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Spring Lakes Hgts., Neville & Vespo	201-974-1520
NY	Buffalo, Process Mgmt.	716-847-0450
NY	Montgomery, Vespo Mktg.	914-457-9209
NC	Charlotte, MacGuire & Crawford Inc.	704-366-3454
OH	Cincinnati, J. W. Murray & Assoc.	513-574-8500
OH	Cleveland, Automatic Controls Corp.	216-631-0333
OR	Portland, Fry Controls	503-226-2620
PA	Harleysville, T. Jackson & Assocs.	215-643-5560
PA	Pittsburgh, Friday Engrg. Sls.	412-341-1444
TX	Dallas, Automatic Sys.	214-688-1810
TX	Houston, Haltom Co.	713-782-5625
VA	Salem, Process Specialties	703-345-5683
WI	Wauwatosa, Larsen Assocs.	414-258-0529

AIRPAX CORP., FREDERICK DIV., A North American Philips Co., Husky Park P.O. Box 500, Frederick, MD 21701, Tel: 301-663-5141, TWX: 710-862-0901; Empl.: 600; *Sls. Mgr.:* Robert Chlebek; *Dist. Mgr.:* B. L. Reeder ......**1B**•1291, 1793

Local Sales Offices & Reps

AL	Huntsville, B.C.I.	205-539-4411
AZ	Scottsdale, TC Elctrns.	602-994-5153
CA	Brea, Masco	714-529-0866
CA	Los Angeles, Masco	213-295-7781
CA	Santa Clara, Airpax/NAPCC	408-980-0410
CA	Santee, Masco	714-448-6400
CO	Littleton, Lange Sls.	303-795-3600
CT	Cheshire, Selmark Assoc.	203-573-9088
FL	Lauderhill, B.C.I.	305-731-5851
FL	Orlando, B.C.I.	305-851-5747
GA	Doraville, B.C.I.	404-455-0405
IL	Palatine, Somers-Reagan	312-991-1108
N	Indianapolis, Leslie M. De Voe Co.	317-842-3245
MA	Millis, Selmark Assocs.	617-376-2914
MI	Troy, C.B. Jensen & Assocs.	313-643-0506
MN	St. Paul, Cahill, Schmitz & Cahill	612-646-7217
MO	St. Louis, Delltron Co.	314-869-4779
NH	Concord, Selmark Assocs.	603-623-5774
NJ	Parsippany, NAPCC/Airpax	201-887-6074
NJ	Pitman, Colrud Co.	609-589-5866
NY	Poughkeepsie, C.W. Floring Assocs.	914-471-2973
NY	Rochester, J.G. Welch Assocs.	716-266-2798
NY	Syracuse, C.W. Floring Assocs.	315-478-2149
NC	Raleigh, B.C.I.	919-781-9426
OH	Columbus, Rockford Controls Ohio	614-231-5890
OH	Dayton, Rockford Controls Ohio	513-898-5452
OH	Euclid, Rockford Controls Ohio	216-731-5250
TX	Austin, R.F. Kimball Co.	512-443-5284
TX	Houston, R.F. Kimball Co.	713-840-0590
TX	Richardson, R.F. Kimball Co.	214-231-3447
UT	Salt Lake City, Lange Sls.	801-487-0843
WA	Bellevue, Paul-Hilty Company	206-747-5767
WA	Renton, B&P Assocs.	206-454-6571

Local Distributors

CA	Santa Ana, Norstan Elctrns.	714-540-4165
OK	Tulsa, Altair	918-665-0524
TX	Houston, Altair	713-462-3029
TX	Richardson, Altair	214-231-5166

AIRPOT, 27 Lois St., Norwalk, CT 06851, Tel: 203-846-2021, Telex: 643-688; *Sls. Mgr.:* Mark A. Gaberman

AIRTRON, 200 E. Hanover Ave., Morris Plains, NJ 07950, Tel: 201-539-5500, TWX: 710-986-7473; FSC No.: 80006; Empl.: 350

AIR-VAC ENGRG., 100 Gulf St., Milford, CT 06460, Tel: 203-874-2541; Empl.: 30

AJAX MAGNETHERMIC CORP., 1745 Overland Ave., N.E., Warren, OH 44482, Tel: 216-372-8511, Telex: 098-2482; Empl.: 500

AKG ACOUSTICS, INC., 77 Selleck St., Stamford, CT 06902, Tel: 203-348-2121; Empl.: 40; *Sls. Mgr.:* Peter Wellikoff

Local Sales Offices & Reps

CA	Culver City, Marshank Sls. Co.	213-559-2591
CA	San Francisco, L.P. Mktg.	415-532-5600
CO	Denver, Brake & Assoc.	303-431-5791
DC	Washington, Taub Sls. Inc.	301-942-3100
FL	Miami, World Wide Prods.	305-754-5475
GA	Atlanta, Elrep Sls. Co.	404-938-7108
IL	Chicago, Steffey Mktg.	312-480-3575
IN	Fort Wayne, N. Browning & Co.	219-432-9738
KY	Louisville, N. Browning & Co.	502-955-6473
MA	Boston, VF Sls. Inc.	617-237-6544
MI	Detroit, VF Sls. Inc.	313-453-8720
MN	Minnetonka, Clark Gibb Co.	612-938-5050
MO	Ballwin, Throckmorton Sls.	314-227-7222
MO	Kansas City, Throckmorton Sls.	816-333-0303
NE	Omaha, Throckmorton Sls.	402-346-7500
NY	Stamford, J. B. Anthony Co.	203-322-9209
NY	Syracuse, B. Darmstedter Assoc.	315-638-1261
PA	Erie, N. Browning & Co.	814-456-6453
TX	Dallas, Dimension Mktg.	214-348-9657
TX	Houston, Dimension Mktg.	713-870-9094
WA	Redmond, Luppnow Assoc.	206-883-3205

AKRO-MILS, 1293 S. Main St., Akron, OH 44301, Tel: 216-253-5593, Telex: 98-6321; Empl.: 200; *Sls. Mgr.:* W. J. Tonachio; *Dist. Mgr.:* D. Martin

Local Sales Offices & Reps

CA	Cerritos, Akro-Mils, Inc.	213-926-0465

ALADDIN ELCTRNS., See AIE Div. of Vernitron

ALAN GORDON ENTPRS., INC., P.O. Box 3914, 5362 Cahuenga Blvd., N. Hollywood, CA 91605, Tel: 818-985-5500, Telex: 662532 A-GB FOTO. LSA, TWX: 910-321-4526 GORDON NT LSA; *Sls. Mgr.:* D. Sahlenn

ALAN INDS., P.O. Box 1203, Columbus, IN 47201, Tel: 812-372-8869; FSC No.: 52750; Empl.: 36

Local Sales Offices & Reps

AL	Huntsville, Saber Assocs.	800-327-0853
CA	Los Angeles, RF Assocs.	213-478-1586
CA	Mountain View, Mark V Assoc.	415-964-6275
FL	Bradenton, Saber Assocs.	800-327-0853
FL	Longwood, Saber Assocs.	800-327-0853
FL	Melbourne, Saber Assoc.	800-327-0853
GA	Griffin, Saber Assocs.	800-327-0853
IN	Columbus, Chambers Mktg.	812-372-0272
MD	Randallstown, C. L. Malinow & Co.	301-922-2092
MA	Needham, Addelco Corp.	617-444-4754
MO	St. Louis, Abrams & Assocs.	314-569-0447
NY	Liverpool, R. & D. Assocs.	315-457-0100
NY	New Rochelle, Ascor Elctrns.	914-235-8838
NC	Clayton, Saber Assocs.	800-327-0853
OH	Dayton, Frederic L. Ohmer	513-434-1454
PA	Lafayette Hill, M. Lader Co.	215-825-3177
SC	Columbia, Saber Assoc.	800-327-0853
TX	Dallas, Airep Elctrns.	214-349-4360
TX	Houston, Airep Elctrns.	713-944-2055
EXP	CT, Stamford, Dage Corp.	203-324-3123

ALARM CONTROLS, 19 Brandywine Dr., Deer Park, NY 11729, Tel: 516-586-4220; FSC No.: 55042; Empl.: 50; *Sls. Mgr.:* Howard Berger

ALBAR, INC., 19013 36th Ave. W., Lynnwood, WA 98036, Tel: 206-771-4006; *Sls. Mgr.:* Ronald B. Bradshaw

ALBEROX, New Bedford Ind'l. Pk., New Bedford, MA 02745, Tel: 617-995-1725; Empl.: 140 ......**2**•1787

Local Sales Offices & Reps

CA	Los Gatos, Alberox Corp.	408-358-1714
IL	Chicago, Karl D. Engle Co.	312-539-1820
IN	Indianapolis, Butler Components	317-253-5143
MA	Weston, J. Goode Assocs.	617-235-3900
MI	Birmingham, Clifford Armstrong Co.	313-851-1404
MN	Minneapolis, Magner & Assocs.	612-483-0656
NY	Fayetteville, S. F. Foster Co.	315-637-5427
NY	Valley Stream, Levison Sls.	516-561-9696
OH	Cleveland, Greenleaf & Assocs.	216-333-5480
PA	Philadelphia, Shelton Sls. Corp.	215-248-0131
TX	Dallas, C. M. Farmer Co., Inc.	214-339-4970
WA	Seattle, Demarest Assocs.	206-523-3210

ALCO ELCTRN. PRODS., INC., 1551 Osgood St., N. Andover, MA 01845, Tel: 617-685-4371, TWX: 710-342-0552; Empl.: 300 ...... **1B**•1029, 1504-1514; **2**•1758; **3**•1122

Local Sales Offices & Reps

AL	Huntsville, Glen White Assocs. Inc.	205-883-7938
AZ	Phoenix, Knight Co.	602-582-8506
CA	Los Angeles, Knight Co.	213-670-2833
CA	Redwood City, J. Heaton Co.	415-367-9000
CA	San Diego, Knight Co.	619-571-7903
CO	Littleton, Simpson & Assocs.	303-794-8381
FL	Safety Harbor, Augat/ALCO	813-725-1037
FL	Tamarac, Augat/ALCO	305-721-6021
GA	Norcross, Glen White Assocs. Inc.	404-441-1447
IN	Indianapolis, Rockford Controls	317-248-2518
MA	Norwood, Augat Sls.	617-762-3164
MI	Livonia, Luebbe Sls. Co.	313-477-3131
MN	St. Paul, Countryman Assocs.	612-645-9151
MO	Blue Springs, Kathrinus-Kelly-Baumhauer-Co.	816-229-0001
MO	St. Louis, Kathrinus-Kelly-Baumhauer-Co.	314-647-2400
NM	Albuquerque, C. T. Carlberg & Assoc.	505-888-3883
NY	E. Rochester, Tri-Tech Elctrns.	716-385-6500
NY	Endwell, Tri-Tech Elctrns.	607-754-1094
NY	Fayetteville, Tri-Tech Elctrns.	315-446-2881
NY	Fishkill, Tri-Tech Elctrns.	914-897-5611
NY	Great Neck, Cooper-Simon & Co. Inc.	516-487-1142
NC	Raleigh, Glen White Assocs. Inc.	919-787-7023
OH	Cincinnati, Luebbe Sls. Co.	513-891-5770
OH	Cleveland, Luebbe Sls. Co.	216-333-0425
OH	Columbus, Luebbe Sls. Co.	614-431-0474
OH	Dayton, Luebbe Sls. Co.	513-294-0426
OR	Beaverton, D. Smith Sls. Co.	503-643-8020
PA	Pittsburgh, Luebbe Sls. Co.	412-931-0414
PA	Trevose, P.S.A., Inc.	215-245-0513
TN	Gray, Glen White Assocs. Inc.	615-477-8850
TX	Dallas, Augat/ALCO	214-788-4211
TX	Georgetown, Augat/ALCO	512-479-9447
TX	Houston, Augat/ALCO	713-495-3100
UT	Midvale, Simpson Assocs. Inc.	801-566-3691
VA	Lynchburg, P.S.A. Inc.	800-233-4242
VA	McLean, P.S.A. Inc.	800-233-4242
WA	Seattle, D. Smith Sls. Co.	206-633-3160

Local Distributors

AL	Huntsville, Hall-Mark Elexs.	205-837-8700
AL	Huntsville, Arrow Elctrns.	205-882-2730
AZ	Phoenix, Hall-Mark Elexs.	602-437-1200
AZ	Phoenix, Kachina Elctrns.	602-269-6201
AZ	Tempe, Acacia Sls.	602-894-2874
AR	Little Rock, Carlton-Bates	501-562-9100
CA	Burbank, Switching Devices	213-849-3211
CA	Chatsworth, Arrow Elexs.	213-701-7500
CA	Gardena, CA Switch & Signal	213-770-2330
CA	Hollywood, Yale Radio Electric	213-465-3186
CA	Irvine, Acacia Sales	714-660-0834
CA	Los Angeles, Electric Switch	213-664-1141
CA	Mountain View, Abacus Elctrns.	415-961-1500
CA	Newport Beach, Arrow Elexs.	714-851-8961

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CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Pasadena, Dow Radio	213-793-1195
CA	Riverside, Elctrn. Supp.	714-683-7300
CA	San Diego, Arrow Elexs.	619-565-4800
CA	San Diego, Hall-Mark Elexs.	619-268-1201
CA	San Diego, Acacia Sls.	619-565-4365
CA	San Diego, El-Com Inc.	619-578-0900
CA	San Francisco, Steven Engrg.	415-588-9200
CA	San Jose, Ratel Inc.	408-946-4300
CA	San Jose, Hall-Mark Elexs.	408-946-0900
CA	Santee, Mouser Elexs.	619-449-2300
CA	Sunnyvale, Arrow Elexs.	408-745-6600
CA	Sunnyvale, Acacia Sls.	408-745-7200
CA	Van Nuys, Pacific Switch Controls	213-873-4802
CO	Denver, Arrow Elexs.	303-758-2100
CO	Denver, Ragon Elexs.	303-744-1992
CO	Englewood, Hall-Mark Elexs.	303-694-1662
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Greenwich, Wise Comps.	203-531-4880
CT	Hartford, Wes-Garde	203-525-6907
CT	Stratford, Utronics	203-378-4201
CT	W. Hartford, Atlantic Switch Controls	203-527-7705
CT	Wallingford, Arrow Elexs.	203-265-7741
FL	Ft. Lauderdale, Arrow Elexs.	305-776-7790
FL	Ft. Lauderdale, Hall-Mark Elexs.	305-971-9280
FL	Lakeland, Switch Controls	813-644-7564
FL	Miami, Elctrn. Equip.	305-871-3500
FL	Orlando, Hall-Mark Elexs.	305-855-4020
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	Palm Bay, Arrow Elexs.	305-725-1480
FL	Pompano Beach, Components South	305-971-0350
GA	Norcross, Hall-Mark Elexs.	404-447-8000
GA	Norcross, Arrow Elexs.	404-449-8252
IL	Arlington Heights, Lo Dan Elctrns.	312-398-5311
IL	Bensenville, Diplomat/Illinois	312-595-1000
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Glen Ellyn, Rockford Controls Co.	312-469-6016
IL	Itasca, Voyager Elexs. Corp.	312-773-4900
IL	Palatine, OHM Elexs.	312-359-5500
IL	Rockford, Midwest Assocs. Inc.	815-962-8036
IL	Rosemont, Advent Elctrns.	312-298-4210
IL	Schaumberg, Arrow Elexs.	312-397-3440
IL	Wheaton, Conectrix	312-653-1460
IN	Indianapolis, Neunier Elex. Supply	317-635-3511
IN	Indianapolis, Arrow Elexs.	317-243-9353
IN	Indianapolis, Graham Elexs.	317-634-8202
IN	South Bend, Genesis Elctrns.	219-287-2911
IA	Cedar Rapids, Deeco Inc.	319-365-7551
IA	Cedar Rapids, Arrow Elexs.	319-395-7230
KS	Lenexa, Hall-Mark Elexs Corp.	913-888-4747
KS	Witchita, Lee Products	316-264-2172
MD	Baltimore, Arrow Elexs	301-247-5400
MD	Baltimore, A. S. I.	301-265-5100
MD	Gaithersburg, Pioneer Wash.	301-921-0660
MD	Kensington, Marine Air Supp.	301-949-9560
MD	Rockville, Arrow Elexs	301-251-0644
MA	Burlington, Heilind Elexs	617-272-5610
MA	Canton, Impact Sls.	617-821-1500
MA	Canton, H. Young Jr. Co.	617-828-4880
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	Lynn, Land Elctrns.	617-592-2220
MA	Norwood, Gerber Elctrns.	617-769-6000
MA	Woburn, Arrow Elexs	617-933-8130
MA	Woburn, CNC	617-933-5017
MI	Ann Arbor, Arrow Elexs	313-971-8220
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Grand Rapids, Arrow Elexs	616-243-0912
MI	Zeeland, Tubergen & Assocs. Inc.	616-772-1548
MN	Edina, Arrow Elexs	612-830-1800
MN	Minneapolis, Newark Elexs	612-331-6350
MN	St. Paul, Ragon	612-642-2828
MO	Kansas City, Walter's Radio Supply	816-531-7015
MO	Maryland Heights, Hall-Mark Elexs.	314-291-5350
MO	St. Louis, Van Sickle Elexs.	314-621-5000
MO	St. Louis, Arrow Elexs.	314-426-4500
MO	St. Louis, Olive Elctrn. Supp.	314-426-4500
NH	Manchester, Arrow Elexs.	603-668-6968
NJ	Bellmawr, Mid Atlantic Elctrns.	609-931-5303
NJ	Camden, General Radio	609-961-8560
NJ	Clifton, J-Mar Elexs. Inc.	201-772-6400
NJ	E. Marlton, Arrow Elexs.	609-596-8000
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Mt. Laurel, Jerseyswitch	609-778-8190
NJ	Springfield, Federated Purchaser	201-272-0505
NM	Albuquerque, Walker Elex. Sup.	505-242-2288
NM	Albuquerque, Arrow Elexs.	505-243-4566
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Farmingdale, Arrow Elctrns.	516-293-4020
NY	Hauppauge, Broadline Elexs.	516-231-4100
NY	Hauppauge, Arrow Elexs.	516-231-1000
NY	Hempstead, Elctrn. Equip.	516-538-5510
NY	Liverpool, Arrow Elexs.	315-652-1000
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Melville, Arrow Elexs.	516-694-6800
NY	Rochester, Arrow Elexs.	716-275-0300
NY	Rochester, Simcona Elctrns.	716-328-3230
NY	Vestal, Pioneer/Harvey	607-748-8211
NC	Raleigh, Hall-Mark Elex. Inc.	919-722-9131
NC	Raleigh, Arrow Elexs.	919-725-8711
NC	Winston-Salem, Arrow Elexs.	919-725-8711
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Centerville, Arrow Elexs.	513-435-5563
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cleveland, Pruitt Energy Sources Inc.	216-566-1545
OH	Columbus, Ohioswitch	614-885-0319
OH	Columbus, Arrow Elexs.	614-885-8362
OH	Columbus, Hughes-Peter	614-294-5351
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Solon, Arrow Elexs.	216-248-3990
OK	Tulsa, Arrow Elexs.	918-665-7700
OK	Tulsa, Hall-Mark Elexs.	918-665-3200
OR	Beaverton, Component Resources Inc.	503-641-8188
OR	Beaverton, Acacia Sales	503-646-3377
PA	Allentown, A.A. Peters	215-434-5237
PA	Braddock, Leff Elexs.	412-351-5000
PA	McKean, Advacom	814-476-7774
PA	Monroeville, Arrow Elexs.	412-856-7000
PA	Norristown, Century Elctrns.	215-631-5400
PA	Philadelphia, Philadelphia Elexs.	215-568-7400
PA	Philadelphia, Almo Elctrns.	215-698-4000
TN	Knoxville, Indl. Elctrns.	615-573-7135
TX	Austin, Arrow Elexs.	512-835-4180
TX	Austin, Hall-Mark Elex. Corp.	512-258-8848
TX	Dallas, Hall-Mark Elex. Corp.	214-341-1147
TX	Dallas, Arrow Elexs.	214-386-7500
TX	Dallas, Texaswitch	214-357-1768
TX	El Paso, Ideal Industrial Elexs.	915-779-6643
TX	Garland, Newark Elexs.	214-494-5911
TX	Houston, Hall-Mark Elexs. Corp.	713-781-6100
TX	Midland, E.S.I.	915-694-9657
TX	Stafford, Arrow Elexs.	713-491-4100
TX	Stafford, Southwest Elctrns.	713-240-4000
UT	Salt Lake City, Arrow Elexs.	801-539-1135
UT	Salt Lake City, Standard Supply	801-486-3371
VA	Arlington, Arrow Elexs.	804-282-0413
VA	Arlington, Arlington Elctrns.	703-524-2412
WA	Bellevue, Arrow Elexs.	206-643-4800
WA	Bellevue, Almac/Stroum Elctrns.	206-643-9992
WA	Seattle, Zepher Elctrns.	206-241-1980
WI	Madison, Arrow Elexs.	608-273-4977
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Oak Creek, Arrow Elexs.	414-764-6600

ALCOSWITCH, See Alco Elctrn. Prods., Inc.

ALDEN COMPUTER SYSTEMS, 27 Strathmore Rd., Natick, MA 01760, Tel: 617-655-6610; *Sls. Mgr.:* Bob Whitten

ALDEN ELCTRNS. INC., Washington St., Westboro, MA 01581, Tel: 617-366-8851, Telex: 94-8404; Empl.: 125; *Sls. Mgr.:* L. A. Farrington

ALDEN

ALDEN PRODUCTS CO., P.O. Box 860, 117 N. Main St., Brockton, MA 02403, Tel: 617-583-0160, Telex: 92-4451; FSC No.: 01009; Empl.: 135; *Sls. Mgr.:* Donald J. Paul .... **2**•1113-1119

Local Sales Offices & Reps

CA	Tarzana, High Voltage Sales	213-881-9194

ALDEN SYS., 262 N. Main St., P.O. Box 860, Brockton, MA 02403, Tel: 617-583-0160, Telex: 92-4451; Empl.: 5; *Sls. Mgr.:* G. Morrison

A.L. DESIGN INC., 2070 Niagara Falls Blvd., Tonawanda, NY 14150, Tel: 716-692-6272; Empl.: 9

ALESSI INDS., INC., 3195-C Airport Loop Dr., Costa Mesa, CA 92626, Tel: 714-979-8912, TWX: 910-595-1528; *Sls. Mgr.:* Tim McFadden

ALFORD MFG. CO., P.O. Box 2116, 32 Sixth Rd., Woburn, MA 01888, Tel: 617-935-8610, TWX: 710-348-1063; FSC No.: 07177; Empl.: 30; *Sls. Mgr.:* Fred Abel

ALGO, INC., 9451 Sohap Lane, Columbia, MD 21045, Tel: 301-730-7442; *Sls. Mgr.:* C.W. "Chuck" Alexander

Local Sales Offices & Reps

AL	Huntsville, Ram-Z Assoc. Inc.	205-532-7808
CA	Novato, Ed Driscoll Assoc.	415-883-0353
FL	Sarasota, Ram-Z Assoc.	813-921-5561
GA	Atlanta, Ram-Z Assoc.	404-898-9091
IL	Park Ridge, Adtech Inc.	312-692-7320
MA	Framingham, J.M. Lancaster Assoc.	617-875-8893
MO	Grandview, Digital Sys. Sls.	316-685-9725
NJ	Englewood Cliffs, Sci. Dvs. East	201-871-3916
OH	Chesterland, EQS, Sys. Inc.	216-729-2222
TX	Houston, Knox Mktg.	713-780-2516
VA	Alexandria, Dyna-Repco	703-354-1222
WA	Bellevue, Gerry Mara Assoc.	206-614-3535

ALINABAL, 28 Woodmont Rd., Milford, CT 06460, Tel: 203-877-3241, TWX: 710-462-1178; Empl.: 255

ALLACO PRODS. DIV., 192 Pleasant St., Watertown, MA 02172-2399, Tel: 617-926-2550, TWX: 710-327-6518; FSC No.: 99098; Empl.: 23; *Sls. Mgr.:* R.S. Cass

ALLEN AVIONICS, INC.

ALLEN AVIONICS, 224 E. 2nd St., Mineola, NY 11501, Tel: 516-248-8080 .... **1A**•1446-1449, 1578-1583, 2124

Local Sales Offices & Reps

AZ	Tempe, J. F. Hurlbut Co.	602-968-5962
CA	Arcadia, Van Gott & Assocs.	818-445-9728
CA	Palo Alto, Adtek Assocs.	415-323-5414
CA	San Diego, Van Gott & Assocs.	619-272-8452
CO	Golden, J. F. Hurlbut Co.	303-279-7796
FL	Ft. Lauderdale, Reynolds & Assocs.	305-581-6611
FL	Melbourne, Reynolds & Assocs.	305-259-7000
FL	St. Petersburg, Reynolds & Assocs.	813-360-1484
GA	Atlanta, Reynolds & Assocs.	404-393-9113
MA	Wayland, High-Tech Sls.	617-653-3838
MN	Anoka, Ken Haugen & Assocs.	612-421-3395
MO	Independence, Engrg. Svcs. Co.	816-254-3600
MO	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Bloomingdale, Eastern Metro Assocs.	201-492-1747
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NY	Rochester, J. G. Welch Assocs.	716-244-1100
NY	Utica, J. G. Welch Assocs.	315-736-7821
OR	Portland, Components West	503-643-5588
PA	Huntingdon Valley, Rabal Assocs.	215-947-4825
TX	Dallas, Bradenco Corp.	214-243-7261
UT	Salt Lake City, J. F. Hurlbut Co.	801-973-4443
VA	Alexandria, Vanguard Engrg. Sls.	703-768-1660
WA	Redmond, Components West	206-885-5880
EXP	CT, Stamford, Dage Corp.	203-324-3123

ALLEN-BRADLEY

ALLEN-BRADLEY CO., 1201 S. Second St., Milwaukee, WI 53204, Tel: 414-671-2000, TWX: 910-262-3451; Empl.: 6500; *Sls. Mgr.:* C. Grimsley; *Dist. Mgr.:* Dale Van Scoyk .... **1A**•1788, 1792-1802, 2019-2021, 2088, 2089; **2**•1788-1791

Local Sales Offices & Reps

AL	Birmingham, A-B Co.	205-879-4641
AK	Anchorage, J. A. Tudor & Assoc.	907-243-4641
AZ	Scottsdale, A-B Co.	602-994-9547
AR	Little Rock, C. H. Stout Inc.	501-372-2555
CA	City of Commerce, A-B Co.	213-724-5713
CA	S. San Francisco, A-B Co.	415-871-0200
CA	San Diego, A-B Co.	619-292-4016
CO	Denver, A-B Co.	303-985-8787
CT	Stratford, A-B Co.	203-378-7364
FL	Ft. Lauderdale, A-B Co.	305-771-0400
FL	Jacksonville, Van & Smith Co.	904-384-2376
FL	Orlando, Van & Smith Co.	305-898-8520
FL	Tampa, Van & Smith Co.	813-877-8393
GA	Doraville, A-B Co.	404-455-7422
HI	Honolulu, J. M. Elec. Sls.	808-833-1744
IL	Chicago, A-B Co.	312-922-9302
IL	Rockford, A-B Co.	815-965-8795
IN	Fort Wayne, A-B Co.	219-432-9538
IN	Indianapolis, A-B Co.	317-293-5223
IN	Merrillville, A-B Co.	219-769-7770
IA	Bettendorf, A-B Co.	319-355-5316
KS	Wichita, A-B Co.	316-686-9631
KY	Louisville, A-B Co.	502-893-2571
LA	Baton Rouge, A-B Co.	504-927-5955
LA	Metairie, A-B Co.	504-888-2281
LA	Shreveport, C. H. Stout	318-221-5555
ME	Portland, A-B Co.	207-772-3555
MD	Baltimore, A-B Co.	301-265-5600
MA	Agawam, A-B Co.	413-785-1984
MA	Framingham, A-B Co.	617-879-5900
MI	Flint, A-B Co.	313-733-3560
MI	Grand Rapids, A-B Co.	616-455-2250
MI	Kalamazoo, A-B Co.	616-344-6163

MI	Lansing, A-B Co.	517-351-4560
MI	Madison Heights, A-B Co.	313-583-9400
MN	Minneapolis, A-B Co.	612-781-3406
MS	Jackson, A-B Co.	601-981-4191
MO	Kansas City, A-B Co.	816-421-4595
MO	Maryland Heights, A-B Co.	314-567-6326
NE	Omaha, A-B Co.	402-592-2010
NJ	Bloomfield, A-B Co.	201-338-4600
NM	Albuquerque, A-B Co.	505-265-7723
NY	Albany, A-B Co.	518-869-5373
NY	Buffalo, A-B Co.	716-634-2711
NY	Rochester, A-B Co.	716-461-3660
NY	Syracuse, A-B Co.	315-463-4501
NC	Charlotte, A-B Co.	704-394-9341
NC	Greensboro, A-B Co.	919-272-5870
OH	Akron, A-B Co.	216-253-2106
OH	Cincinnati, A-B Co.	513-793-7580
OH	Cleveland, A-B Co.	216-442-0000
OH	Columbus, A-B Co.	614-882-7722
OH	Dayton, A-B Co.	513-294-4466
OH	Toledo, A-B Co.	419-841-7726
OK	Tulsa, J. W. Elder Co.	918-583-9149
OR	Eugene, J. A. Tudor & Assoc.	503-686-1252
OR	Portland, J. A. Tudor & Assoc.	503-288-5154
PA	Allentown, A-B Co.	215-437-2401
PA	Erie, A-B Co.	814-868-8214
PA	King of Prussia, A-B Co.	215-337-1990
PA	Pittsburgh, A-B Co.	412-923-1844
PA	York, A-B Co.	717-848-2239
SC	Greenville, A-B Co.	803-235-1280
TN	Knoxville, A-B Co.	615-588-0591
TN	Memphis, C. H. Stout	901-362-1616
TN	Nashville, A-B Co.	615-834-1860
TX	Dallas, A-B Co.	214-243-3665
TX	Houston, A-B Co.	713-445-8474
TX	San Antonio, A-B Co.	512-732-4362
UT	Salt Lake City, Stevens Sls. Co.	801-487-8971
VA	Richmond, A-B Co.	804-282-4285
WA	Pasco, J. A. Tudor & Assoc.	509-547-8414
WA	Seattle, J. A. Tudor & Assoc.	206-682-7444
WA	Spokane, J. A. Tudor & Assoc.	509-327-3328
WV	Charleston, S. C. Payne	304-755-8193
WI	Appleton, A-B Co.	414-731-3202

ALLEN CO., INC., ROBERT G., 7267 Coldwater Canyon, N. Hollywood, CA 91605, Tel: 818-765-8300, Telex: 18-2699; *Sls. Mgr.:* Carl M. Witas

ALLEN DATAGRAPH, INC., 24 Keewaydin Dr., Salem, NH 03079, Tel: 603-893-1983, TWX: 710-366-0504; *Sls. Mgr.:* David Colinan

ALLEN MFG., 22 E. Dudley Town Rd., Bloomfield, CT 06002, Tel: 203-242-8511, Telex: 710-425-0099; Empl.: 420; *Sls. Mgr.:* M. Kubick; *Dist. Mgr.:* M. Kubick

ALLIED CORP. AEROSPACE SECTOR, Bendix Communications Div., East Joppa Rd., Towson, MD 21204, Tel: 301-583-4000, TWX: 710-232-1823; Empl.: 1350; *Sls. Mgr.:* Palmer H. Arnold

ALLIED SYSTEMS CORP., Box 18077, Greensboro, NC 27419, Tel: 919-299-2294; Empl.: 25; *Sls. Mgr.:* E. V. Saude 2•1874

Local Sales Offices & Reps

CA	Seal Beach, Texel Engr. Sls. Rep.	213-596-9411
NY	New Hook, R. P. Kennedy Co.	914-876-2700
NY	Rochester, R. P. Kennedy Co.	716-271-6322
NC	Bladenboro, Everette Bolte	919-294-4141
VA	Arlington, H. J. Heffernan Co.	703-522-6666

ALLMETAL SCREW PRODUCTS CO., INC., 821 Stewart Ave., Garden City, NY 11530, Tel: 516-222-1200, TWX: 510-222-8132; Empl.: 200; *Sls. Mgr.:* Fred C. Sidebotham

ALL-STATES, INC., 1801 W. Foster Ave., Chicago, IL 60640, Tel: 312-728-0525; FSC No.: 26863; *Sls. Mgr.:* E. B. Phillips; *Dist. Mgr.:* E. B. Phillips

ALLTECH ASSOCS. INC., Applied Science Labs., 2051 Waukegan Rd., Deerfield, IL 60015, Tel: 312-948-8600, Telex: 687-1132; FSC No.: 36-2696920; *Sls. Mgr.:* Pat Krebs

ALMOND INSTRUMENTS, See EG & G Almond Instruments

ALMOR CO., INC., PO Box 1790, 155 Crescent St., Brockton, MA 02403, Tel: 617-586-5406; *Sls. Mgr.:* Bill Wolfreys

ALPHA COMPS., 115 Eucalyptus Dr., El Segundo, CA 90245, Tel: 213-322-7780; Empl.: 12

ALPHA COMPS., 1106 E. Simpson Rd., Mechanicsburg, PA 17055, Tel: 717-697-8595, TWX: 510-650-4930; FSC No.: 52748

Local Sales Offices & Reps

CO	Boulder, Herb Bass Assocs.	303-499-7509
MD	Towson, Dickison Sls. Co.	301-823-0923
NY	Rochester, H. C. Johnson Agencies	716-586-8777

ALPHA INDS., INC.-MICROELECTRONIC DIV., 3015 Advance Lane, Colmar, PA 18915, Tel: 215-822-1311, TWX: 510-661-7370; FSC No.: 17540; *Sls. Mgr.:* Joe Diesso

ALPHA INDS., INC., Microwave Comp. Div., 90 Glenn St., Lawrence, MA 01843, Tel: 617-681-8520, Telex: 949436, TWX: 710-342-8033; FSC No.: 17540; *Sls. Mgr.:* Frank Tarr

ALPHA INDS., INC.-MSD DIV., 20 Sylvan Rd., Woburn, MA 01801, Tel: 617-935-5150, Telex: 949436, TWX: 710-393-1236; FSC No.: 17540; *Sls. Mgr.:* Peter K. Butler; *Dist. Mgr.:* Nicholas Bishop

ALPHA INDS., INC., 20 Sylvan Rd., Woburn, MA 01801, Tel: 617-935-5150, Telex: 949436, TWX: 710-393-1236; FSC No.: 17540; Empl.: 1200

ALPHA INDS., INC. - TRG MILLIMETER COMP., 20 Sylvan Rd., Woburn, MA 01801, Tel: 617-935-5150, Telex: 949436, TWX: 710-393-1236; FSC No.: 17540; *Sls. Mgr.:* Peter K. Butler; *Dist. Mgr.:* Nicholas Bishop

ALPHA-M CORP., 3009 Wildflower Dr., Dallas, TX 75229, Tel: 214-620-0021; Empl.: 8; *Sls. Mgr.:* W. L. Cowley

ALPHA MERICS CORP., 20931 Nordhoff St., Chatsworth, CA 91311, Tel: 213-709-1155, Telex: 182314, TWX: ALPHA-MER-CHCA 910-494-1931; *Sls. Mgr.:* Geoffrey Groom; *Dist. Mgr.:* Geoffrey Groom

ALPHA METALS, 600 Rte 440, Jersey City, NJ 07304, Tel: 201-434-6778, Telex: 12-5798; Empl.: 400; *Sls. Mgr.:* D. Zerfoss

ALPHA PRODUCTS, INC., 5740 Corsa Ave. #104, Westlake Village, CA 91362, Tel: 818-889-9304

ALPHA WIRE CORP., 711 Lidgerwood Ave., P.O. Box 711, Elizabeth, NJ 07207, Tel: 201-925-8000, Telex: 6853017, TWX: 710-996-5895; Empl.: 450; *Sls. Mgr.:* Paul Dietlian 2•1940, 1941

ALPS ELECTRIC (USA), INC., 3553 N. First St., San Jose, CA 95131, Tel: 408-946-6000, Telex: 157061; Empl.: 21 3•1068

Local Sales Offices & Reps

AL	Huntsville, Jack Harvey & Assocs.	205-536-4414
AZ	Phoenix, Eltron	602-266-2164
CA	Garden Grove, West Electronic Sls. Co.	714-829-0120
CA	San Diego, Harvey King, Inc.	619-566-5252
CA	Santa Clara, Nova-Tronix	408-727-9530
CO	Englewood, Nelligan Co.	303-761-2121
CT	Yalesville, Technology Sls.	203-269-8853
FL	Clearwater, Jack Harvey & Assocs.	813-725-1841
FL	Ft. Lauderdale, Jack Harvey & Assocs.	305-763-1945
GA	Norcross, Jack Harvey & Assocs.	404-449-4643
IL	Arlington Hgts., Micro Sls.	312-956-1000
IN	Indianapolis, Jack Harvey & Assocs.	317-872-1031
IN	Indianapolis, Alps Elec. (USA)	317-248-2577
IN	Kokomo, Jack Harvey & Assocs.	317-453-4260
KS	Kansas City, BC Electronic Sls.	913-342-1211
KS	Wichita, BC Elctrn. Sls.	316-942-9840
KY	Prospect, Jack Harvey & Assocs.	502-228-4100
MD	Baltimore, Burgin-Kreh Assocs., Inc.	301-265-8500
MA	Waltham, Technology Sls.	617-647-5700
MI	Oak Park, A. Blumenberg Assoc.	313-968-3230
MN	Minneapolis, PSI	612-944-8545
MO	St. Louis, BC Elec. Sls.	314-291-1101
NJ	Boonton, PAF Assoc.	201-335-0680
NY	Albany, Reagan/Compar Albany	518-489-4777
NY	Endwell, Reagan/Compar	607-723-8743
NY	Fairport, Reagan/Compar	716-271-2230
NY	New Hartford, Reagan/Compar	315-732-3775
NY	Rockville Centre, Alps Elec. (USA)	516-766-3636
NY	Smithtown, PAF Assocs.	516-360-0940
NC	Greensboro, Wallace Elctrn. Sls.	919-996-2742
OH	Rocky River, Norm Case Assocs.	216-333-0400
OK	Tulsa, Norcom	918-832-7747
OR	Aloha, Venture Elctrns.	503-642-9090
PA	Willow Grove, Harry Nash Assocs.	215-657-2213
TN	Johnson City, Jack Harvey & Assocs.	615-928-7588
TX	Austin, Norcom	512-451-2757
TX	Dallas, Norcom	214-386-4888
TX	Houston, Norcom	713-778-0392
UT	Salt Lake City, Nelligan Co.	802-261-1121
VA	Lynchburg, Burgin-Kreh Assocs., Inc.	804-239-2626
WA	Bellevue, Venture Elctrns.	206-454-4594
WI	Milwaukee, Micro Sales, Inc.	414-782-1171

ALTEC LANSING, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806, Tel: 714-632-7117, Telex: 665415; Empl.: 200; *Sls. Mgr.:* Gayle Campbell

ALTEK CO., P.O. Box 1128, Torrington, CT 06790, Tel: 203-482-7626; FSC No.: 53939; Empl.: 34; *Sls. Mgr.:* Stephen Altschuler

ALTEK CORP., 2150E Indl. Pkwy., Silver Spring, MD 20904, Tel: 301-622-3906, TWX: 710-825-0422; Empl.: 55; *Sls. Mgr.:* Lowell Nerenberg; *Dist. Mgr.:* Lowell Nerenberg

ALUMINUM FILTER, P.O. Box 1311, Santa Barbara, CA 93102, Tel: 805-684-7651, Telex: 658325, TWX: 910-336-1113; FSC No.: 17504; Empl.: 40; *Sls. Mgr.:* B. L. Baker

Local Sales Offices & Reps

AZ	Tucson, Windcliff Service Co.	602-624-2272
CA	Fremont, Vontek	415-651-7966
CA	Reseda, Jerry Budenz & Assoc.	818-342-4276
CA	San Diego, Aluminum Filter	805-684-7651
CO	Louisville, X-O Sales Inc.	303-666-7690
MA	Brookline, Harman & Assocs.	617-232-6687
MN	Edina, Peterson & Wolff	612-941-5400
OK	Tulsa, NTR/Data Comp Inc.	918-664-2180

ALZBEAR CORP., 15411 Red Hill Ave., Unit F, Tustin, CA 92680, Tel: 714-557-0910; Empl.: 45; *Sls. Mgr.:* Al Robinson; *Dist. Mgr.:* Al Robinson

AMATOM ELCTRN. HARDWARE, 446 Blake St., New Haven, CT 06515, Tel: 203-397-3311, Telex: 963-419; FSC No.: 06540; Empl.: 55; *Sls. Mgr.:* Vince Maida

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Phoenix, Gabriel & Assoc.	602-866-3622
AR	Ft. Smith, Electra Reps.	501-452-4030
CA	Costa Mesa, Gabriel & Assoc.	714-957-1981
CA	El Monte, MITE/Western	213-686-1354
CA	San Francisco, Tom Boyd	408-727-4401
CO	Englewood, Dynatech, Inc.	303-773-2830
CT	Bethany, Reps. Corp.	203-393-0024
FL	Ft. Lauderdale, Electrocomp Assoc.	305-491-4141
FL	Melbourne, Electrocomp Assoc.	305-242-0621
FL	St. Petersburg, Electrocomp Assoc.	813-327-9677
GA	Atlanta, Remco	404-447-6937
IL	Elk Grove Village, Control Sls.	312-595-2110
IN	Ft. Wayne, Aktron Corp.	219-747-3650
IA	Marion, M.S.B. Assocs.	319-377-6261
KS	Shawnee Mission, M.S.B. Assocs.	913-432-2131
MA	Wellesley, Reps. Corp.	617-237-6476
MI	Dearborn, Pitcher-Poulin	313-582-5450
MN	St. Louis Pk., C. E. Bohlig Co.	612-922-7011
MO	St. Charles, M.S.B. Assocs.	314-946-5577
NY	Bayside, Robert Diamond, Inc.	212-423-7330
NY	Syracuse, Lenard Co.	315-479-9191
NC	Raleigh, Remco	919-847-5079
OH	Cincinnati, J. O. Olsen Co.	513-574-7711
OH	Cleveland, J. O. Olsen Co.	216-662-3454
PA	Birchrunville, Jadelectronics Assocs.	215-296-3800
PA	Pittsburgh, J. O. Olsen Co.	412-279-2550
TX	Dallas, Electra Reps.	214-387-3594
TX	Houston, Electra Reps.	713-988-9022
WA	Seattle, Blum & Assocs.	206-285-2590
WI	Thiensville, Control Sls.	414-242-4580
EXP	NY, North Babylon, EIM	516-643-5700

AMBI-TECH INDS., 319 Knickerbocker Ave., Hillsdale, NJ 07642, Tel: 201-666-0504; Empl.: 20; *Sls. Mgr.:* Al Nagler; *Dist. Mgr.:* Al Nagler

AMBROID CO., P.O. Box 1089, Taunton, MA 02780, Tel: 617-823-1726; Empl.: 10; *Sls. Mgr.:* J. F. Strauss

AMCO ENGRG., 3801 N. Rose St., Schiller Pk., IL 60176, Tel: 312-671-6670, TWX: 910-227-3152; Empl.: 280; *Sls. Mgr.:* F. A. Johnson 2•1006, 1007, 1803

Local Sales Offices & Reps

AL	Huntsville, Kemp Instrs.	205-837-4304
AZ	Phoenix, Gramer & Co.	602-995-9455
CA	Burlingame, Polach & Bensinger	415-697-2525
CA	Los Angeles, Knight Co.	213-670-2833
CA	Orange County, Knight Co.	714-833-8250
CA	San Diego, Knight Co.	619-693-1806
CO	Englewood, FG Mktg. Co.	303-795-9176
CT	Stratford, Instr. Dynamics	203-378-6019
FL	Altamonte Springs, WMM Assocs.	305-831-4530
FL	Clearwater, WMM Assocs.	813-442-3913

FL	Davie, WMM Assocs.	305-581-7036
FL	Indialantic, WMM Assocs.	305-773-1157
GA	Atlanta, Kemp Instrs.	404-452-8050
IL	Schiller Park, R. L. Lang & Assocs.	312-671-3228
IN	Ft. Wayne, Aktron Corp.	219-747-3650
IA	Davenport, Ensco-Rep	319-386-6600
KS	Overland Park, Ensco-Rep	913-381-7557
KS	Wichita, Ensco-Rep	316-683-1070
LA	Lafayette, Kemp Engrg.	318-269-9452
MD	Silver Spring, L. G. White & Co.	301-434-1555
MA	Wakefield, Instr. Dynamics	617-245-5100
MI	Livonia, Electro Sls. Assocs.	313-474-7320
MN	St. Paul, Bonament Heyda Co.	612-484-8531
MO	Maryland Heights, Ensco-Rep	314-423-3935
NJ	Woodcliff Lake, J. Freid & Assocs.	201-391-6792
NM	Albuquerque, C. T. Carlberg Assocs.	505-888-3883
NY	Fairport, Naco Elctrns.	716-223-4490
NY	Great Neck, F & F Metro Inc.	516-482-4080
NY	Syracuse, NACO Elctrns.	315-699-2651
NY	Utica, Naco Elctrns.	315-732-1801
NC	Winston Salem, L. G. White & Co.	919-725-3612
OH	Cleveland, Electro Sls. Assocs.	216-261-5440
OH	Dayton, Electro Sls. Assocs.	513-426-5551
OK	Tulsa, Don Shuhart Co.	918-747-4136
OR	Beaverton, Barrett/Squibb & Assocs.	503-642-1661
PA	Allison Park, Electro Sls. Assocs.	412-487-3801
PA	Broomall, White-Whiddett	215-353-6343
SC	Greenville, L. G. White & Co.	803-271-0630
TX	Dallas, Don Shuhart Co.	214-349-6000
TX	Houston, Kemp Engrg.	713-466-1465
VA	Richmond, L. G. White & Co.	804-740-7093
WA	Redmond, Barrett/Squibb & Assocs.	206-885-6991
EXP	NJ, Mahwah, Intl. Sls. Div.	201-825-0473

AMDAHL COMMUNICATIONS SYS. DIV., Amdahl Corp., 2500 Walnut Ave., Marina del Rey, CA 90291, Tel: 213-822-3202; Empl.: 350

AMECON

AMECON, INC., 1900 S. Chris La., Anaheim, CA 92805, Tel: 714-634-2220, 800-392-2292; *Sls. Mgr.:* Frank Carleone .... **1A**•2125-2130

AME CORP., 101 E. Main St., Little Falls, NJ 07424, Tel: 201-256-3939; Empl.: 12; *Sls. Mgr.:* Edward Dimitry .... **1B**•1515

Local Sales Offices & Reps

FL	Orlando, EAB Inc.	305-898-7444
NJ	Wyckoff, Chandler Co.	201-891-7866
TX	Dallas, Control Comps. Corp.	214-559-4090

AMERACE CORP., Elastimold Div., Newburg Rd., P.O. Box 503, Hackettstown, NJ 07840, Tel: 201-852-1122

AMEREX, P.O. Box 2815, Riverside, CA 92516, Tel: 714-686-1400; *Sls. Mgr.:* Roger D. Orton .... **2**•1005

AMERICAN AEROSPACE CONTROLS, 570 Smith St., Farmingdale, NY 11735, Tel: 516-694-5100; Empl.: 37; *Sls. Mgr.:* Gregory D'Abramo .... **1B**•1830, 1831

Local Sales Offices & Reps

CA	Los Angeles, Dyna Sls. Co.	213-268-1175
WA	Bellevue, Al Smith Co.	206-746-6770

AMERICAN ALUMINUM, 230 Sheffield St., Dept. EEM, Mountainside, NJ 07092, Tel: 201-233-3500; Empl.: 125

AMERICAN AUTOMATION, 14731 Franklin Avenue, Tustin, CA 92680, Tel: 714-731-1661, TWX: 910-595-2670 AMAUTO TSTN; *Sls. Mgr.:* Paul Niquette

AMERICAN CAPACITOR, 2080 Central Ave, Duarte, CA 91010, Tel: 818-357-8806; FSC No.: 59366; Empl.: 50

AMERICAN CHEMICAL ETCHING, See American Etching & Mfg.

AMERICAN COMPUTER HARDWARE CORP., 2205 S. Wright St., Santa Ana, CA 92705, Tel: 714-549-2688

AMERICAN CYANAMID CO., Metal Coated Fibers Dept., One Cyanamid Plaza, Wayne, NJ 07470, Tel: 201-831-3148, Telex: 130-400, TWX: 710-988-3045; *Sls. Mgr.:* James Tonges;Dave Molnar

AMERICAN ELECTRIC CABLE CO., 181 Appleton St., Holyoke, MA 01040, Tel: 413-539-9893; Empl.: 100; *Sls. Mgr.:* P. Tutschek

AMERICAN ELECTRONIC LABS., Box 552, Lansdale, PA 19446, Tel: 215-822-2929, TWX: 510-661-4976; Empl.: 1300

AMERICAN ELCTRN. LABS., INC., Antenna Div., P.O. Box 552, Lansdale, PA 19446

AMERICAN ELCTRN. LABS., INC., Govt. Grp. Div., P.O. Box 552, Lansdale, PA 19446

AMERICAN ELCTRN. LABS., INC., Hybrid/MIC Div., P.O. Box 552, Lansdale, PA 19446

AMERICAN ELCTRN. LABS., INC., Special Prods. Div., P.O. Box 552, Lansdale, PA 19446

AMERICAN ELCTRNS., 1600 E. Valencia Dr., Fullerton, CA 92631, Tel: 714-871-3020, TWX: 910-592-1256; FSC No.: 89321; Empl.: 200; *Sls. Mgr.:* B. G. Guy

AMERICAN ETCHING & MFG., 13730 Desmond St., Pacoima,, CA 91331, Tel: 213-896-1187; Empl.: 90

Local Sales Offices & Reps

AZ	Tucson, Clemick & Assoc.	602-749-4003
CA	San Diego, The Rep. Co.	619-292-9001
CA	San Mateo, Halbar Assoc.	415-349-4700
CT	Guilford, Hamer Assocs.	203-457-1634
MA	W. Boylston, Compatible Comps.	617-835-3614
TX	Plano, Precision Devices	214-596-7379

AMERICAN

HV TEST SYSTEMS, INC.

AMERICAN HV TEST SYSTEMS INC., Central Garrett Ind'l. Pk., Accident, MD 21520, Tel: 301-826-8651, Telex: 86223; Empl.: 45; *Sls. Mgr.:* Rolf B. Persson .... **3**•1188

AMERICAN INSULATED WIRE CORP., Leviton Mfg. Co., 36 Freeman St., Pawtucket, RI 02862, Tel: 401-726-0700, TWX: 710-384-0150; *Sls. Mgr.:* Stanton D. Ose; *Dist. Mgr.:* Gilbert R. DuBois .... **2**•1942

Local Sales Offices & Reps

CA	Los Angeles, Leviton/American	213-949-6575
GA	Atlanta, Leviton/American	404-691-9303
IL	Chicago, Leviton/American	312-766-4100
MA	Boston, Associated Agencies	617-423-9880
MI	Detroit, Jim Groff Sls. Co.	313-933-3100
NY	New York, Leviton Mfg. Co.	212-229-4040
OH	Cleveland, Leviton/American	216-831-0615
WA	Seattle, Leviton/American	206-576-0242

AMERICAN LASER SYS., INC., 106 Fowler Rd., Goleta, CA 93117, Tel: 805-967-0423, Telex: 364412 INTR; *Sls. Mgr.:* L. Shallenberger

AMERICAN MAGNETICS, 740 Watson Center Rd., Carson, CA 90745, Tel: 213-775-8651, TWX: 910-345-6258; Empl.: 175; *Sls. Mgr.:* Robert Mos

AMERICAN MAGNETICS, P.O. Box 8, Carterville, IL 62918, Tel: 618-985-4838; Empl.: 120

AMERICAN MAGNETICS, Box R, Oak Ridge, TN 37830, Tel: 615-482-1056, Telex: 557-482; Empl.: 16

AMERICAN MICROSEMICONDUCTOR, 133 Kings Rd., Madison, NJ 07940, Tel: 201-377-9566, TWX: 710-986-8500; Empl.: 15; *Sls. Mgr.:* W. M. Foley; *Dist. Mgr.:* D. B. Wilson . **1A**•1645, 2090, 2091

AMERICAN MICROSIGNAL, 8431 Monroe Ave., Stanton, CA 90680, Tel: 714-761-1222, TWX: 910-591-1202; Empl.: 80; *Sls. Mgr.:* Pat Nelson

AMERICAN MICROSYSTEMS, INC., See GOULD AMI

AMERICAN MONARCH, 2801-37th Ave., N.E., Minneapolis, MN 55421, Tel: 612-788-9161; Empl.: 300; *Sls. Mgr.:* B. Sutherland

AMERICAN PHOTONICS INC., 71 Commerce Dr., Brookfield Center, CT 06805, Tel: 203-775-8950; *Sls. Mgr.:* James A. Walyus

AMERICAN PLASTICRAFT CO., 814 N. Sacramento Blvd., Chicago, IL 60622, Tel: 312-722-7727, Telex: 910-221-6068; Empl.: 250; *Sls. Mgr.:* Larry J. Ferguson

AMERICAN POWER DEVICES, 7 Andover St., Andover, MA 01810, Tel: 617-475-4074, Telex: 951206; Empl.: 140; *Sls. Mgr.:* Robert Dimodana

AMERICAN RADIO RELAY LEAGUE, 225 Main St., Newington, CT 06111, Tel: 203-666-1541; Empl.: 120; *Sls. Mgr.:* Bobbie Chamalian

AMERICAN RESEARCH & ENGINEERING, 1500 Executive Dr., Elgin, IL 60120, Tel: 312-888-7245, TWX: 910-251-3008 .... **1B**•1516-1518

ASC American Switch Corp.

AMERICAN SWITCH CORP., 134 Water St., Wakefield, MA 01880, Tel: 617-246-1007, TWX: 710-348-6756; FSC No.: 54659; Empl.: 40; *Sls. Mgr.:* Mike Palmerino; *Dist. Mgr.:* Mike Palmerino .... **1B**•1519

Local Sales Offices & Reps

AZ	Scottsdale, Bill Earl Assoc.	602-994-3813
CA	Mountain View, Serra Assocs.	415-964-4300
CA	Temple City, HMC Inc.	818-285-0485
CO	Aurora, Sage Sls.	303-750-3501
CT	Madison, Eastronix, Inc.	203-421-4514
FL	Tampa, J-R Controls, Inc.	813-961-9478
GA	Lawrenceville, Tek-Rep Mktg.	404-963-1600
IL	Wheaton, Chadra-Schilke & Assoc.	312-653-8126
IN	Ft. Wayne, Augnat Assoc.	219-483-0259
IA	Marion, M-S-B Assocs.	319-377-6261
KS	Shawnee Mission, M-S-B Assocs.	913-432-2131
MA	Bedford, Eastronix	617-275-5775
MI	Detroit, Burcaw Co.	313-533-7700
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
MO	St. Charles, M-S-B Assocs.	314-946-5577
NJ	Englewood, ABS Assocs.	201-871-0020
NY	Macedon, M. M. Hare Co.	315-986-3742
OH	Medina, Augnat Assocs.	216-273-1211
PA	Elkins Park, Arnold Assocs.	215-742-0600
PA	Pittsburgh, Augnat Assocs.	412-281-8283
TX	Dallas, TPC, Inc.	214-357-8207
UT	Salt Lake City, Sage Sls.	801-467-5451
VT	Shelburne, Eastronix	802-985-3743
WA	Bellevue, Comtec	206-453-1188
EXP	CT, Litchfield, Intrade	203-567-5901

Local Distributors

AL	Huntsville, RM Alabama	205-852-1550
AL	Mobile, Specialty Distrbg.	205-344-0450
AZ	Phoenix, Arizona Comps.	602-269-5655
AZ	Phoenix, Kachina Elctrn. Distrs.	602-269-6201
CA	Buena Park, RPS Elctrns.	213-744-0355
CA	Burlingame, Rose Elctrns.	415-348-2740
CA	Los Angeles, Elec. Switches	213-660-1310
CA	Santa Monica, Master Distrs.	213-452-1229
CA	Sunnyvale, Sierra West	408-747-1188
CA	Tustin, Western Switch & Controls	714-731-4333
CA	Van Nuys, Patane Avionics	818-988-4455
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Englewood, Indl. Elctrns.	303-771-2636
CT	Greenwich, Wise Comps.	203-531-4880
CT	Wallingford, Mid-State Elctrns.	203-265-9900
FL	Casselberry, Afcom Inc.	305-831-6630
IL	Chicago, NEP Elctrns.	312-625-8400
IL	Northbrook, Rayal Elctrns.	312-498-0935
IN	Terre Haute, Indl. Elctrns.	812-232-5328
IA	Cedar Rapids, Iowa Radio Supply	319-393-4510
IA	W. Des Moines, Ramco Co.	515-225-6933
KS	Wichita, Radio Inc.	316-264-2798
MD	Kensington, Marine Air Supp.	301-949-9560
MA	Newton Upper Falls, In-Stock Prods. Co.	617-964-6200
MA	Woburn, Abbott Elctrns.	617-935-2040
MN	Eden Prairie, Cassidy Elctrns.	612-944-0100
MN	Minneapolis, Tortec Corp.	612-866-3662
NE	Omaha, Radio Equip. Co.	402-341-7700
NJ	E. Brunswick, Brothers Elctrns.	201-238-2200
NJ	Fair Lawn, Relay Specialties	201-797-3313
NJ	Mt. Laurel, P.A.C. Elctrns.	609-778-1526
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NY	Bohemia, Key Comps.	516-567-7500
NY	E. Syracuse, Add Elctrns.	315-437-0300

NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Mt. Vernon, QAR	914-699-2224
NC	Winston-Salem, Kirkman Elect.	919-722-9131
OH	Columbus, Whitehead Elctrns.	614-224-1186
OH	Dayton, Stotts-Friedman	513-298-5555
OK	Tulsa, Radio Inc.	918-587-9123
PA	Norristown, Kimberly James Co.	215-666-7286
PA	Philadelphia, Shap Elctrns.	215-969-3300
RI	Pawtucket, MAJOR/Edwards	401-725-7400
TN	Knoxville, Industrial Elctrns.	615-573-7135
TX	Austin, Galtronics	512-837-7470
TX	Dallas, Force/Solid State	214-438-5700
TX	Dallas, Wholesale Elctrn. Supp.	214-824-3001
TX	El Paso, Intl. Elctrns.	915-598-3406
TX	Ft. Worth, Industrial Elctrns.	817-731-7321
UT	Salt Lake City, Standard Supp. Co.	801-486-3371
WA	Kent, Pyramid/Interface	206-872-5800
WA	Redmond, Murphy Elctrns.	206-881-1234
WI	Mequon, Lakeview Elctrns.	414-377-8250

american technical ceramics

AMERICAN TECH. CERAMICS, 1 Norden La., Huntington Sta., NY 11746, Tel: 516-271-9600, Telex: 221201, TWX: 510-226-6993; FSC No.: 29990; Empl.: 482; *Sls. Mgr.:* R. Blumkin ....**1A**•1007-1009

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Scottsdale, Faser Tech. Sls.	602-948-4404
CA	El Segundo, Fetty/Schoenduve	213-322-4991
CA	Mtn. View, Fetty/Schoenduve	415-962-8330
CA	San Diego, Fetty/Schoenduve	619-292-5136
CO	Englewood, FC Mktg.	303-795-9176
DC	Washington, M. Lader Co.	202-296-2497
FL	Lighthouse Point, R. C. Simon & Co.	305-941-2757
GA	Norcross, Interep Assocs.	404-449-8680
IL	Chicago, Tech. Sls.	312-237-7210
MA	Topsfield, R.F. Assocs.	617-887-9762
MN	New Brighton, TWC Sls.	612-636-1770
MO	Grandview, Harris-Hanson Co.	816-763-6200
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NY	Rochester, Sweetco Assocs.	716-225-2383
NY	Utica, Sweetco Assocs.	315-797-6721
OH	Chagrin Falls, Crest Comp. Sls. Co.	216-543-9808
PA	Lafayette Hill, M. Lader Co.	215-825-3177
TX	Richardson, Vector Sls. Co.	214-234-4291
WA	Bellevue, SD-R^2	206-747-9424

AMERICAN TIME PRODS. DIV., See Frequency Control Prods., Inc.

AMERICAN ULTRAVIOLET, 320 Commerce St., Chatham, NJ 07928, Tel: 201-635-8355, Telex: 13-9266; Empl.: 14; *Sls. Mgr.:* M. C. Stines; *Dist. Mgr.:* M. C. Stines

AMERICAN VOLPI CORP., 26 Aurelius Ave., Auburn, NY 13021, Tel: 315-255-1105

AMERICAN ZETTLER, 16881 Hale Ave., Irvine, CA 92714, Tel: 714-660-1670, Telex: 67-8472; Empl.: 200; *Sls. Mgr.:* D. O. Barkhurst ....**1B**•1322, 1520-1530

Local Sales Offices & Reps

AL	Huntsville, MacKay, Smith & Assocs.	205-539-8000
AZ	Scottsdale, Thorson Desert States, Inc.	602-998-2444
CA	Fullerton, Groh Assocs.	714-738-7105
CA	Mountain View, G.C. Woempner	415-964-5454
CA	San Diego, Addem/San Diego	619-729-9216
CO	Englewood, Delta Sls. Assoc.	303-799-0646
CT	Madison, Forsberg Sls.	800-343-9610
FL	Clearwater, Perrott Assoc.	813-443-5214
FL	Orlando, Perrott Assoc.	305-298-7748
FL	Sunrise, Perrott Assoc.	305-792-2211
GA	Norcross, McKay, Smith & Assoc.	404-449-7444
IL	Rolling Meadows, KMA Sls.	312-398-5300
IN	Carmel, Berndt Assocs.	317-844-0114
KS	Wichita, Baka Corp.	316-262-0179
MA	Brockton, Forsberg Sls.	617-522-6300
MI	Union Lake, Imtech	313-363-7129
MN	Minneapolis, R.W. Marshall Co.	612-929-0457
MO	Ferguson, Baka Corp.	314-878-4224
NJ	Cherry Hill, Danco Elctrn. Sls.	609-424-5590
NJ	Parlin, Martech	201-721-2200
NM	Albuquerque, Thorson Desert States, Inc.	505-293-8555
NY	Alexander, B.H. Tollefson Assoc.	716-591-1219
NY	Auburn, B.H. Tollefson Assocs.	315-253-4109
NY	Manhasset, Martech	516-627-1151
NY	Rochester, B.H. Tollefson Assoc.	716-271-4141
NC	Raleigh, J & B Sales	919-878-8600
OH	Cincinnati, Makin Assocs.	513-871-2424
OR	Beaverton, Thorson Co. N.W.	503-644-5900
TX	Houston, AID Elctrns.	713-955-6204
TX	Irving, AID Elctrns.	214-259-4761
UT	Salt Lake City, Delta Sls. Assocs.	801-487-7571
WA	Bellevue, Thorson Co. N.W.	206-455-9180
WI	Milwaukee, KMA Sales Company	414-259-1771

Local Distributors

AZ	Tempe, Acacia Sls.	602-894-2874
CA	Irvine, Acacia Sls.	714-660-0834
CA	Los Angeles, Master Distrs.	213-452-1229
CA	San Diego, Acacia Sls.	619-565-4365
CA	San Diego, Shanks & Wright	619-239-0176
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Santa Clara, Components Center	408-988-3751
CA	Santa Monica, Distr. Spec.	213-393-9666
CA	Torrance, Cypress Elctrns.	213-533-6005
CO	Lakewood, Acacia Sls.	303-232-2882
CT	New Haven, The Green-Shaw Co.	203-397-0710
IL	Northbrook, Classic Comps.	312-272-9650
IN	Carmel, Altex Elctrns.	317-848-1323
MD	Savage, Pyttronic Inds.	301-953-9650
MA	Woburn, Time Elctrns./New England	617-935-8080
NV	Reno, Elec. Dist. Co. of Nev.	702-323-2766
NJ	Fairlawn, Relay Specialties	201-797-3313
NY	Farmingdale, Pride Elctrns.	516-293-4020
OR	Beaverton, Acacia Sls.	503-646-3377
TN	Memphis, Bluff City Elctrns.	901-345-9500
TX	Dallas, Wallace Elctrns.	214-340-0400
WA	Seattle, Westlake Elec. Supp.	206-622-6600
Can	Vancouver, B.C., Intek	604-324-6831
Can	Winnipeg, Manitoba, L. A. Varah, Ltd.	204-633-6190

AMETEK, 2 Station Square, Paoli, PA 19301, Tel: 215-355-6900; Empl.: 100

AMETEK, INC, Hunter Spring Division, 1 Spring Ave., Hatfield, PA 19440, Tel: 215-822-2971, TWX: 510-661-4888; Empl.: 270; *Sls. Mgr.:* F. J. York

AMETEK/RODAN DIV., 2905 Blue Star St., Anaheim, CA 92806, Tel: 714-630-0081, TWX: 910-591-1684; FSC No.: 15454; Empl.: 100; *Sls. Mgr.:* Steve Iovin

Local Sales Offices & Reps

AL	Huntsville, Alpha Marketing	205-533-0766
CA	Mountain View, Gene Woempner Co.	415-964-5454
CO	Westminster, Straube Assocs.	303-426-0890
FL	Coral Springs, H.A. Inc.	305-752-7520
IL	Downers Grove, Richmar Elctrns.	312-968-0118
IN	Ft. Wayne, Menze Sls. Co.	219-747-5616
IA	Cedar Rapids, Snider Sls.	319-362-4410
KS	Overland Park, S. W. Wollard Co.	913-898-6552
MA	Hopkinton, Marathon Sls.	617-435-6984
MI	Lathrup Village, R. C. Nordstrom Co.	313-559-7373
MI	Southfield, R. A. Casalou	313-559-0350
MN	Mendota Hgts., G-II Sls.	612-454-3086
MO	St. Louis, Abrams & Assocs.	314-569-0447
NJ	Cherry Hill, Danco Elctrn. Sls.	609-424-5590
NM	Albuquerque, Straube Assocs.	505-265-7759
NY	Fayetteville, Henry G. Richter, Inc.	315-637-6713
NY	Melville, Comtronic Assoc.	516-249-0505
NY	Rochester, Henry G. Richter, Inc.	716-436-0300
TX	Dallas, Cunningham Components Corp.	214-233-4303
TX	Houston, Cunningham Components Corp.	713-461-4197
UT	Salt Lake City, Straube Assocs.	801-486-5473
VA	Gladys, Ralley Entprs.	804-283-5656
WA	Vancouver, R. Over Sls.	206-695-6179
EXP	NY, Westbury, CPS Intl.	516-334-8500

AMF INC., AMF Cuno/General Filter Products Division, 400 Research Pkwy., Meriden, CT 06450, Tel: 203-237-5541, Telex: 962457; Empl.: 700; *Sls. Mgr.:* Gregg Samal

AMF/ELECTRO COMPS. DIV., AMF, 2713 Gateway Dr., Pompano Beach, FL 33060, Tel: 305-973-8620, TWX: 510-956-9400; Empl.: 900; *Sls. Mgr.:* C. Smith; *Dist. Mgr.:* C. Smith

AMF POTTER & BRUMFIELD, See Potter & Brumfield

AMGLO, 5265 Michigan Ave., Rosemont, IL 60018, Tel: 312-671-4321; Empl.: 21

AMI/COAST MAGNETICS, AMI Div., 1207 North La Brea Ave., Inglewood, CA 90302, Tel: 213-673-3245

AMICON CORP., 25 Hartwell Ave., Lexington, MA 02173, Tel: 617-861-9600; Empl.: 300; *Sls. Mgr.:* James Gilliland

AMILON CORP., 49-12 30th Ave., Woodside, NY 11377, Tel: 212-274-1794; Empl.: 50; *Sls. Mgr.:* L. Rosenblatt

AMKEY, INC., Sub. American Pwr. Dvs., Inc., 220 Ballardvale St., Wilmington, MA 01887, Tel: 617-658-7800; *Sls. Mgr.:* P. D. Prevett

amlan inc.

AMLAN, INC., 97 Thornwood Rd., Stamford, CT 06903, Tel: 203-322-1913, Telex: 643647; *Sls. Mgr.:* Mark Landeweer; *Dist. Mgr.:* Mark Landeweer ....**2**•1153-1159

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs., Inc.	205-533-1730
CA	Escondido, Cirolia Elctrn. Sls., Inc.	619-489-9607
CA	Santa Cruz, Krippner & Assocs.	408-429-9798
CA	Ventura, Astralonics	213-706-0488
FL	Tampa, J-R Controls	813-961-9478
GA	Norcross, Interep Assocs. Inc.	404-449-8680
IL	Chicago, Electro-Tech Mktg. Assoc.	312-588-4535
MA	Scituate, Marketing Svcs.	617-545-0899
MN	St. Paul, Complete Sls.	612-644-0484
NJ	Parlin, JMR Sales	201-727-5335
NY	E. Setauket, JMR Sales	516-689-8871
NY	N. Syracuse, JMR Sales, Inc.	315-458-6576
NC	Raleigh, Interep Assocs. Inc.	919-872-1401
TN	Greeneville, Interep Assocs. Inc.	615-639-3491
VA	Reston, Tytronics Tech. Sls.	703-471-0440
WA	Mukilteo, Krippner & Assocs.	206-743-3579

Local Distributors

CT	New Haven, Greene-Shaw Co., Inc.	203-397-0710
CT	Torrington, Northeast Connectors	203-482-2817
MA	Chelmsford, Dynamic Engrg.	617-250-0200
MA	Norwood, Emtel Elctrns.	617-769-9500
MA	Waltham, Vantage Elctrns. Corp.	617-894-8690
MA	Woburn, EPC	617-935-0400
WA	Seattle, Pacific Elctrns.	206-575-1057

AMP

AMP INCORPORATED, Box 3608, Harrisburg, PA 17105, Tel: 717-564-0100, TWX: 510-657-4110; Empl.: 19,650 ... **1A**•1584; **1B**•1109-1111, 1532-1536, 1761; **2**•1121-1148, 1869, 1944

Local Sales Offices & Reps

CA	Compton	213-537-4490
CA	Cupertino	408-255-3830
CO	Englewood	303-773-0422
CT	Windsor	203-683-2715
FL	Altamonte Springs	305-869-6766
GA	Atlanta	404-934-6363
IL	Edwardsville	618-656-5081
IL	Schaumburg	312-351-7811
IN	Carmel	317-848-1250
MA	Boston	617-891-7500
MA	Framingham	617-879-3255
MI	Southfield	313-645-5590
MN	Minneapolis	612-831-8242
NJ	Parsippany	201-334-6664
NY	Holbrook	516-585-4430
NY	Pittsford	716-385-2860
NC	Winston- Salem	919-725-8968
OH	Dublin	614-764-8866
PA	Berwyn	215-647-6060
PA	Malvern	215-296-5303
TN	Knoxville	615-691-5711
TX	Irving	214-258-1114
VA	Alexandria	703-683-5955
WA	Renton	206-255-0064

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Phoenix, Dalis Elctrn. Supp.	602-275-2626
CA	Buena Park, RPS Elctrns.	213-744-0355
CA	Canoga Park, Marshall Elctrns. Grp., LA Div.	213-999-5001
CA	Fullerton, Pyramid Elctrns., Fullerton Div.	714-773-0781
CA	Hawthorne, Electro-Sonic Comps.	213-679-9781
CA	Irvine, Marshall Elctrns. Grp., Irvine Div.	714-556-6400
CA	San Diego, Marshall Elctrns. Grp., San Diego Div.	619-578-9600
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CO	Denver, CSID, Inc.	303-893-9594
CT	Wallingford, Cronin Elctrns.	203-265-3134
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Norcross, Schweber Elctrns. Corp.	404-449-9170
IL	Elk Grove, Schweber Elctrns. Corp.	312-364-3750
IL	Elmhurst, Semiconductor Spec.	312-279-1000
IN	Indianapolis, Graham Elctrns.	317-634-8202
KS	Edwardsville, C. Tennant, Sons & Co.	913-441-1801
MD	Columbia, Powell Elctrns.	301-621-4070
MD	Rockville, MS Elctrns.	301-621-4070
MA	Needham, Cronin Elctrns.	617-449-5000
MA	Winchester, Rush Industries, Inc.	617-729-5800
MI	Grand Rapids, RS Elctrns.	616-241-3483
MI	Livonia, RS Elctrns.	313-525-1155
MO	St. Charles, Lectronix	314-946-6424
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Buffalo, Summit Distrs.	716-884-3450
NJ	Kenilworth, Federated Purchaser	201-272-0505
NY	Farmingdale, Harrison Radio Corp.	516-293-7990
NY	Lynbrook, Peerless Elctrns.	516-593-2121
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Akron, Akron Elctrn. Supp. Co.	216-762-8818
OH	Columbus, Hughes-Peters Inc.	614-294-5351
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Philadelphia, Almo Elctrns. Corp.	215-698-4000
TX	Austin, Kent Elctrns. Corp.	512-834-1900
TX	Houston, Kent Elctrns.	713-780-7770
TX	Richardson, Kent Elctrns. Corp.	214-669-2600
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
WA	Kent, Interface Elctrns. Corp.	206-872-5800

AMP PRODUCTS CORP., P.O. Box 1776, Paoli, PA 19301, Tel: 215-647-1000; Empl.: 20,000 ..... **1B**•1531; **2**•1120, 1858, 1945

Local Sales Offices & Reps

CA	Los Angeles	213-639-1691
CA	San Francisco	415-573-7722
CO	Denver	303-773-1885
GA	Atlanta	404-939-7604
IL	Chicago	312-439-7800
KS	Kansas City	913-642-9800
MA	Boston	617-879-8221
MI	Detroit	313-646-0090
NJ	Cranford	201-272-4600
NC	Winston-Salem	919-725-9222
OH	Cincinnati	513-984-5302
PA	Philadelphia	215-647-3250
PA	Pittsburgh	412-344-7900
TX	Dallas (Irving)	214-258-1911

Local Distributors

AMP Standard Distributors

AL	Birmingham, Forbes Elctrn. Distr.	205-251-3941
AL	Decatur, Forbes Elctrn. Distr.	205-353-4546
AZ	Tucson, Inland Elctrns.	602-889-5301
AR	Little Rock, Electro Entprs.	501-664-9207
AR	Little Rock, Carlton-Bates Co.	501-562-9100
CA	Cerritos, El-Com	213-404-2961
CA	Costa Mesa, Mar Vac Elctrns.	714-540-3280
CA	Fountain Valley, Comps. Center	714-979-0433
CA	Fresno, Jack C. Arbuckle Co.	209-264-6554
CA	Gardena, California Switch & Signal	213-538-9830
CA	Manhattan Bch., Prime Electro Prods.	213-379-3642
CA	Monrovia, Erik-A-Elctrn. Distr.	213-574-1020
CA	North Hollywood, Alatec Prods.	213-875-1790
CA	Northridge, Acort Inds.	213-993-6444
CA	Oakland, Brill Elctrns.	415-834-5888
CA	Sacramento, Dunlap Elctrns.	916-442-5801
CA	Sacramento, Sacramento Elctrn. Supp. Co.	916-441-4821
CA	San Diego, Western Radio	619-239-0361
CA	San Diego, El-Com	619-578-0900
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	San Jose, Quement Elctrns.	408-998-5900
CA	Santa Ana, C R Elctrns.	714-556-2040
CA	Santa Clara, Cypress Elctrns.	408-945-8400
CO	Commerce City, Waco Elctrns.	303-289-4743
CO	Denver, Denver Wintronics	303-934-2406
CT	Danbury, Pilgrim Elctrns.	203-792-7274
CT	E. Hartford, R & S Elctrn Distrs.	203-528-9901
CT	Norwalk, Park Distrs.	203-853-2010
CT	Stratford, Electro Comp.	203-375-5811
FL	Casselberry, AFCOM	305-831-6630
FL	Dania, Summit Distrs.	305-920-6263
FL	Ft. Lauderdale, EMSCO Div. Hammond Elctrns.	305-973-7103
FL	Ft. Lauderdale, Southeastern Elctrns.	305-563-4131
FL	Jacksonville, EMSCO Div. Hammond Elctrns.	904-356-4851
FL	Miami, Elctrn. Equip. Co.	305-871-3500
FL	Miami, Electro Std. Labs.	305-633-6973
FL	Orlando, EMSCO Div. Hammond Elctrns.	305-849-6362
FL	Pensacola, Pensacola Elctrns.	904-478-3771
FL	Sarasots, Dow Elctrns.	813-365-3393
FL	Tampa, EMSCO Div. Hammond Elctrns.	813-253-0104
FL	Tampa, Leader Elctrns.	813-870-3315
GA	Atlanta, Ack Radio Supp. Co.	404-351-6340
GA	Atlanta, Specialty Distrbg. Co.	404-873-2521
HI	Honolulu, Tech. Mktg. Corp.	808-841-4175
HI	Honolulu, Elctrl. Equip. Co.	808-533-3884
ID	Boise, Kimball Elctrns.	208-342-3559
ID	Pocatello, Kimball Elctrns.	208-232-2201
ID	Spirit Lake, A-I Elctrn. Supp.	208-623-3111
IL	Addison, L-Comp	312-628-1400
IL	Berwyn, B-B&W Elctrns.	312-749-1710
IL	Chicago, Elctrn. Connector Corp.	312-767-2200
IL	Chicago, Stranco Prods.	312-738-1580
IL	Chicago, NEP Elctrns.	312-625-8400
IL	Harvey, George Elctrns.	312-331-1983
IL	Melrose Park, Belford Elctrns.	312-865-2400
IL	Mt. Prospect, Tri-State Elctrn. Corp.	312-255-0600
IL	Niles, Joseph Elctrns.	312-297-4200
IL	Northbrook, Classic Comps. Supp.	312-272-9650
IL	Palatine, OHM Elctrns.	312-359-5500
IL	Peoria, Warren Radio Co.	309-674-5998
IL	Rosemont, Advent Elctrns.	312-297-6200
IL	Villa Pk., Melvin Elctrns.	312-279-5015
IL	Wheeling, Hawk Elctrns.	312-459-4030
IN	Evansville, Hutch & Son	812-425-7201
IN	Fort Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Meunier Elctrns.	317-635-3511
IN	Indianapolis, Advent Elctrns.	317-872-4910
IA	Cedar Rapids, Deeco	319-365-7551
KY	Louisville, Peerless Elctrn. Equip. Co.	502-637-7674
LA	Lafayette, Ralph's Elctrns. Supp.	318-233-0105
LA	Marrero, AFG Elctrn. Supp.	504-368-9696
LA	New Orleans, Radio Parts	504-581-5959
LA	New Orleans, Southern Radio Supp. Co.	504-524-2343
LA	New Orleans, W. B. Allen Supp. Co.	504-525-8222
LA	Shreveport, Industrial Elctrn. Supp.	318-222-9459
MD	Aberdeen, Harco Elctrns.	301-838-7990
MD	Baltimore, Whitney Distrs.	301-944-8080
MD	Rockville, Capitol Radio Wholesalers	301-881-2270
MA	Burlington, J. V. Elctrns. of Boston	617-273-4300
MA	Burlington, Heiland Elctrns.	617-272-5610
MA	Burlington, QPL Elctrn Distrs.	617-891-0460
MA	Cambridge, Apollo Elctrns.	617-868-3120
MA	Canton, Impact Sls. Co.	617-821-1500
MA	Lynn, Land Elctrns. Supp.	617-592-2220
MA	Mendon, ADD Elctrns. Corp.	617-478-4200
MA	Middleboro, Glynn Elctrns.	617-947-4262
MA	N. Chelmsford, Pilgrim Elctrns.	617-251-8746
MA	Needham, You Do It Elctrns.	617-449-1005
MA	Newton, In-Stock Prods. Co.	617-964-6200
MA	S. Boston, Controller Svc & Sls. Co.	617-269-1300
MA	Waltham, March Elctrns.	617-899-4220
MA	Waltham, Vantage Elctrns. Corp.	617-894-8690
MA	Westboro, Future Elctrns. Corp.	617-366-2400
MA	Westborough, Powell Elctrns.	617-366-6100
MA	Wilmington, Aved Elctrns.	617-657-8310
MA	Woburn, AFCOM	617-935-3200
MA	Woburn, A.C.I. Elctrns. Corp.	617-935-7230
MA	Woburn, Abbot Elctrns.	617-935-2040
MA	Woburn, Semtex Indl. Corp.	617-935-2466
MI	Flint, Shand Elctrns.	313-743-8940
MI	Grand Rapids, RM Elctrns.	616-531-9300
MI	Grand Rapids, S-F Elctrn. Supp.	616-459-0219
MI	Livonia, Camelot Elctrns.	800-482-3905
MI	Troy, Northern Wire & Cable	313-589-0510
MN	Minneapolis, Stark Elctrns. Supp.	612-332-1325
MN	Minneapolis, Elctrn. Center	612-371-5200
MN	St. Paul, Gopher Elctrns. Co.	612-483-3322
MS	Pascagoula, Hooper Elctrns. Supp. Co.	601-762-9383
MO	Kansas City, Electrn. Supp. Co.	816-931-0250
MO	St. Louis, Olive Elctrns.	314-426-4500
MO	St. Louis, Van Sickle Radio-Elctrns.	314-621-5000
NE	Lincoln, Scott Elctrns. Supp. Corp.	402-466-8221
NV	Las Vegas, CRW, Inc.	702-451-5490
NH	Manchester, Yankee Elctrn. Supp.	603-625-9746
NJ	Edison, William Elctrns. Supp.	201-985-3700
NJ	Hanover, State Elctrns. Parts Corp.	201-887-2550
NJ	Pine Brook, Alatec Prods.	201-227-8140
NJ	Prospect Park, Kappe Inds.	201-790-1999
NJ	Springfield, Route Elctrns. 22	201-379-7710
NM	Albuquerque, Elctrn. Parts	505-293-6161
NY	Binghamton, Help Elctrns.	607-729-3528
NY	Brooklyn, Brooklyn Elctrns.	212-748-1300
NY	Buffalo, Genesee Radio & Parts Co.	716-873-9661
NY	Elmsford, Ancar Elctrns. Supp.	914-592-7100
NY	Hempstead, Davis Elctrns. Corp.	516-483-9200
NY	Port Chester, Wise Components	914-939-8600
NY	Poughkeepsie, Chief Elctrns.	914-471-1300
NY	Rochester, Rochester Radio Supp. Co.	716-454-7800
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rome, Rome Elctrns.	315-337-5400
NY	West Babylon, Delman Elctrns.	516-420-1234
NY	West Hempstead, March Elctrns.	516-486-6511
NC	Cary, Powell Elctrns.	919-467-1212
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Cincinnati, U.R.I. Elctrns.	513-761-4030
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Columbus, Whitehead Elctrns.	614-224-1186
OH	Columbus, Thompson Elctrn. Supplies	614-228-6191
OH	Dayton, Stotts-Friedman Co.	513-298-5555
OH	Dayton, E.S.C.O., Inc.	513-226-1133
OH	Lima, LRP Elctrns.	419-228-1220
OH	Marion, Servex Elctrns. Distrib.	614-383-3117
OH	Solon, Repco Elctrns.	216-248-8900
OH	Solon, Target Elctrns. Corp.	216-248-7930
OH	Twinsburg, Schuster Elec. Co.	216-425-8134
OH	Warren, REM Elctrns. Supp. Co.	216-373-1300
OK	Oklahoma City, Elctrn. Supp. Co.	405-232-5215
OK	Oklahoma City, Electro Engerprises	405-478-1752
OK	Tulsa, Combined Technlog. Cos.	918-582-8242
OK	Tulsa, Radio, Inc.	918-587-9123
PA	Allentown, P.A. Peters, Inc.	215-434-5237
PA	Altoona, Allegheny Elctrns.	814-946-0871
PA	Braddock, Leff Radio Parts Co.	412-351-5000
PA	Drexel Hill, Kass Elctrns. Distrib.	215-449-2300
PA	Essington, Tri-Com Inc.	215-521-3080
PA	Folcroft, Delphi Wire and Cable	215-534-3900
PA	Philadelphia, Arch Elctrns. Co.	215-563-4660
PA	Reading, Barbey Elctrns. Corp.	215-376-6116
PA	Wayne, Peak Elctrns. Corp.	215-293-9000
RI	Pawtucket, Major Elctrn. Supp.	401-725-7400
RI	Pawtucket, Jabbour Elctrn. Supplies	401-728-4600
SC	Charleston, Wholesale Indl. Elctrns.	803-722-2634
SC	Columbia, Dixie Elctrns.	803-779-5332
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Chattanooga, Curle Elctrns.	615-266-4727
TN	Nashville, Electra Distrib. Co.	615-329-3971
TX	Corpus Christi, Douglas Elctrns.	512-883-5103
TX	Dallas, LBI Electro-Optics Corp.	214-358-4151
TX	Dallas, Wallace Elctrns. Co.	214-340-0400
TX	Dallas, Target Elctrns. Ind.	214-350-6853
TX	El Paso, Ideal Indl. Elctrn.	915-779-6647
TX	Fort Worth, Indl. Elctrns.	817-731-7321
TX	Fort Worth, Swieco, Inc.	817-335-6521
TX	Fort Worth, Texas Connector Corp.	817-246-0109
TX	Houston, Electrotex	713-526-3456
TX	Houston, Geophysical Supp. Co.	713-666-4100
TX	Houston, Elctrn. Packaging Comp.	713-447-5800
TX	Houston, Powerline Products	713-461-9791
TX	Midland, ESI Supp.	915-694-9657
UT	Provo, Central Utah Elctrns.	801-373-7522
VT	Rutland, S.A.I. Semispecial of Amer.	802-775-7126
VA	Norfolk, Priest Elctrns.	804-855-0105
VA	Richmond, Sterling Elctrns.	804-226-2190
VA	Richmond, Avec Elctrns. Corp.	804-359-6071
VA	Roanoke, Mexitronics	703-342-4444
WA	Seattle, Radar Electric Co.	206-282-2511
WA	Seattle, Pacific Elctrns.	206-575-1050
WA	Seattle, Connector World Supp.	206-767-6773
WV	Dunbar, State Electric Supp.	304-523-7491
WV	Kenova, Burco Distrs.	304-292-1641
WV	Morgantown, State Elctrns. Co.	304-292-1641
WI	Fond du Lac, Fedco Elctrns.	414-922-6490
WI	Madison, Superior Elctrns.	608-257-1477
WI	Milwaukee, Indl. Elctrns. Corp. of WI	414-276-1212
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Oshkosk, Elctrn. Inds.	414-235-8930

AMP Industrial Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Phoenix, Dalis Elctrn. Supp.	602-275-2626
CA	Buena Park, RPS Elctrns.	213-744-0355
CA	Canoga Park, Marshall Elctrns. Grp.	213-999-5001
CA	Fullerton, Pyramid Elctrns.	714-773-0781
CA	Hawthorne, Electro-Sonic Comps.	213-679-9781
CA	Irvine, Marshall Elctrns. Grp.	714-556-6400
CA	San Diego, Marshall Elctrns. Grp.	619-578-9600
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Santa Clara, Pyramid Elctrns. Supp.	408-727-9810
CO	Denver, CSID	303-292-9594
CT	Wallingford, Cronin Elctrns.	203-265-3134
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Norcross, Schweber Elctrns. Corp.	404-449-9170
IL	Elmhurst, Semiconductor Specialists	312-279-1000

IN	Indianapolis, Graham Elctrns.	317-634-8202
KS	Edwardsville, C. Tennant Sons & Co.	913-441-1801
MD	Rockville, MS Elctrns.	301-340-6400
MA	Needham, Cronin Elctrns.	617-449-0500
MA	Winchester, Rush Inds.	617-729-5800
MI	Grand Rapids, RS Elctrns.	616-241-3483
MI	Livonia, RS Elctrns.	313-525-1155
MO	St. Charles, Lectronix	314-946-6424
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Kenilworth, Federated Purchaser	201-272-0505
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Farmingdale, Harrison Radio Corp.	516-293-7990
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Akron, Akron Elctrn. Supp. Co.	216-762-8818
OH	Columbus, Hughes-Peters	614-294-5351
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Philadelphia, Almo Elctrns. Corp.	215-698-4000
TX	Austin, Kent Elctrns. Corp.	512-834-1900
TX	Houston, Kent Elctrns. Corp.	713-780-7770
TX	Richardson, Kent Elctrns. Corp.	214-669-2600
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
WA	Kent, Interface Elctrns.	206-872-5800

AMPEREX ELECTRONIC CORP., Ferroxcube Div., 5083 Kings Hwy., Saugerties, NY 12477, Tel: 914-246-2811, TWX: 510-247-5410; Empl.: 1200; *Sls. Mgr.:* R. Denison; *Dist. Mgr.:* Ed Hellenschmidt

Refer to Amperex, Slatersville Div. for sales office information.

AMPEREX ELECTRONIC CORP., Hicksville Div., Box 418 - 230 Duffy Ave., Hicksville, NY 11802, Tel: 516-931-6200, TWX: 510-221-1839; Empl.: 270; *Sls. Mgr.:* Robert Carlin; *Dist. Mgr.:* Robert Carlin

AMPEREX ELCTRN. CORP., Slatersville Div., Providence Pike, Slatersville, RI 02876, Tel: 401-762-3800, Telex: 927584, TWX: 710-382-6332; FSC No.: 73445; Empl.: 565; *Sls. Mgr.:* Robert Carlin

AMPEREX ELECTRONIC INDS., Smithfield Div., George Washington Hwy., Smithfield, RI 02917, Tel: 401-232-0500, Telex: 92 76 43

Refer to Amperex, Slatersville Div. for sales office information.

AMPERITE CO., INC., 600 Palisade Ave., Union City, NJ 07087, Tel: 201-864-9503, TWX: 710-992-8834; FSC No.: 70563; Empl.: 76; *Sls. Mgr.:* T. Whalen; *Dist. Mgr.:* T. Whalen

AMPEX CORP., 401 Broadway, Redwood City, CA 94063, Tel: 415-367-2011, TWX: 910-364-9034; Empl.: 9,800

AMPHENOL, 2801 South 25th Ave., Broadview, IL 60153, Tel: 312-345-9000

AMPHENOL, An Allied Co., 2122 York Rd., Oak Brook, IL 60521, Tel: 312-986-2300, TWX: 910-651-0191; Empl.: 3600

AMPHENOL R F OPERATIONS, 33 E. Franklin St., Danbury, CT 06810, Tel: 203-743-9272

AMPLIFIER RESEARCH

AMPLIFIER RESEARCH, 160 School House Rd., Souderton, PA 18964-9990, Tel: 215-723-8181, TWX: 510-661-6094; FSC No.: 30639; Empl.: 27; *Sls. Mgr.:* D.W. Roth .... 3•1002, 1003

Local Sales Offices & Reps

AZ	Tempe, Mar Tech Assocs.	602-968-4944
CA	N. Hollywood, O'Halloran Assoc.	213-877-0173
CA	Palo Alto, O'Halloran Assoc.	415-326-1493
CA	Santa Ana, Shoshin, U.S.A.	714-641-0417
CO	Boulder, H. Bass. Assoc.	303-499-7509
CT	Hamden, J.B.L. Assoc.	203-281-3161
FL	Orlando, E.G. Holmes & Assocs.	305-894-8901
GA	Chamblee, E.G. Holmes & Assocs.	404-451-6161
IL	Park Ridge, Elctrn. Instr. Assocs.	312-298-2290
IN	Indianapolis, Elctrn. Instr. Assocs.	317-257-7231
MD	Severna Park, Delmarva Eng. Assoc. Ltd.	301-647-8007
MA	Lexington, R.J. Sickles	617-862-5100
NJ	Denville, Metro-Mics	201-625-5959
NJ	Westfield, Metro Mics	201-233-6116
NM	Albuquerque, Don Hewitt & Assocs.	505-299-7746
NY	Melville, Metro Mics	516-433-3333
NC	Cary, E.G. Holmes & Assocs.	919-469-8850
OH	Centerville, Micro Sls.	513-433-8171
OH	North Olmsted, Micro Sls.	216-734-3080
PA	Philadelphia, R. Meyers Assoc.	215-224-1663
TX	Austin, Airep Elctrns.	512-327-0778
TX	Dallas, Airep Elctrns.	214-349-4360
TX	Houston, Airep Elctrns.	713-944-2055
UT	Bountiful, Herb Bass Assoc.	801-295-0469
UT	Salt Lake City, Herb Bass Assoc.	801-268-0262
WA	Seattle, J. B. Jolly	206-938-4166

AMPLIFONIX INC., 220 Rte. 13, Bristol, PA 19007, Tel: 215-788-2350, TWX: 510-667-0501; *Sls. Mgr.:* Jason A. Day; *Dist. Mgr.:* Jason A. Day

AMPROBE INSTR., 630 Merrick Rd., Lynbrook, NY 11563, Tel: 516-LY3-5600, TWX: 510-225-8403; Empl.: 230; *Sls. Mgr.:* W. Eagle

AMPTEK, INC., 6 De Angelo Dr., Bedford, MA 01730, Tel: 617-275-2242; Empl.: 11; *Sls. Mgr.:* George Kobaly, Jr.

Local Sales Offices & Reps

EXP	MA, Plainville, Teknis	617-695-3591

AMPTEK INC., Teksys Inc., 11103 Dennis Rd., P.O. Box 59841, Dallas, TX 75229, Tel: 214-241-2511, Telex: 730338; *Sls. Mgr.:* Don Stephens

AMRAD, Div. Transcon Mfg. Co., Box 876, Paris, TX 75460, Tel: 214-785-4544; FSC No.: 55943; Empl.: 17; *Sls. Mgr.:* Curtis Vining; *Dist. Mgr.:* Curtis Vining

AMTEK DIGITAL SYSTEMS, INC., 12740 28th N.E., Seattle, WA 98125, Tel: 206-363-0217, Telex: 329473 (Burgess Sea); Empl.: 18; *Sls. Mgr.:* Fred Graham

AMTEK SYS., INC., 1400 S. Sherman, #202, Richardson, TX 75081, Tel: 214-238-5300; *Sls. Mgr.:* Barry Epstein; *Dist. Mgr.:* Peter Diamond

AMUNEAL MFG., 4737 Darrah St., Philadelphia, PA 19124, Tel: 215-535-3000; FSC No.: 23740; Empl.: 120; *Sls. Mgr.:* S. M. Kamens; *Dist. Mgr.:* S. M. Kamens .... 2•1903

Local Sales Offices & Reps

AZ	Phoenix, Shefler-Kahn	602-257-9015
CA	Fremont, William Parks Assocs.	415-490-2011
CA	San Diego, C.E.M., Inc.	619-692-3551
CA	Santa Ana, C.E.M., Inc.	714-835-2702
CO	Wheatridge, Waugaman Assocs.	303-423-1020
GA	Stone Mountain, Dixie Tech. Mktg.	404-962-2530
IL	Chicago, Brock & Cushman, Inc.	312-622-4110
KS	De Soto, Midtec Assocs.	913-441-6565
MD	Baltimore, Muncy Sls.	301-484-6376
MA	Norwood, MPS Elctrns.	617-769-8700
MI	Ann Arbor, Metal-Tronics	313-437-7530
MN	Hamel, Hedtke Mktg.	612-478-2120
MO	Florissant, Midtec Assocs.	314-837-5200
NM	Albuquerque, Shefler Kahn Co.	505-296-0749
NY	Queens Village, L.A. Buscaglia Co.	212-468-3666
OH	Akron, Imtech Inc.	216-666-1185
OH	Dayton, Imtech Inc.	513-278-6507
OK	Tulsa, Barry Sls.	918-749-7775
TX	Houston, Barry Sls.	713-784-5860
TX	Richardson, Barry Sls.	214-234-0255
UT	Salt Lake City, Waugaman Assocs. Utah, Inc.	801-261-0802
WA	Seattle, Rep-West	206-283-8351
WI	Menomonee Falls, Brock & Cushman, Inc.	414-255-2166
EXP	NJ, Oradell, Sylvan Ginsbury	201-261-3200

ANACONDA-ERICSSON INC., Continental Wire & Cable, P.O. Box 1863, York, PA 17405, Tel: 717-767-4434

ANADEX, 1001 Flynn Rd., Camarillo, CA 93010, Tel: 805-987-9660, TWX: 910-494-2761; Empl.: 350

ANADYNE, 14830 Valley View Ave., La Mirada, CA 90638, Tel: 714-522-8924, TWX: 910-583-4807; Empl.: 100

ANAHEIM AUTOMATION, 910 E. Orangefair Lane, Anaheim, CA 92801, Tel: 714-992-6990; Empl.: 25; *Sls. Mgr.:* Bud McNally

ANALOG & DIGITAL PERIPHERALS, INC. (ADPI), 815 Diana Dr., Troy, OH 45373, Tel: 513-339-2241, TWX: 810-450-2685; FSC No.: 31-0949-745; Empl.: 19; *Sls. Mgr.:* Alan Kuebier

ANALOG DEVICES, P.O. Box 280, Norwood, MA 02062, Tel: 617-329-4700, TWX: 710-394-6577; FSC No.: 24355; Empl.: 4,000

ANALOGIC CORP., 8 Centennial Dr., Peabody, MA 01961, Tel: 617-777-4500, 617-246-0300, 800-451-1816, Telex: 94-9307, TWX: 710-348-0425; Empl.: 2000; *Sls. Mgr.:* M. E. Culverhouse; *Dist. Mgr.:* D. Vermilyea

Local Distributors

AL	Mobile, Brownell Electro	205-479-8581
AZ	Phoenix, Metermaster	602-243-4111
CA	Costa Mesa, F.L.W.	714-751-7512
CA	Gardena, Instr. Lab.	213-327-3279
CA	Los Angeles, E.I.L. Instrs.	213-685-7020
CA	Los Angeles, Metermaster	213-685-4340
CA	North Hollywood, B. J. Wolfe Entprs.	213-877-5518
CA	Palo Alto, Metermaster	415-968-0313
CA	Redwood City, Marchi Assoc.	415-364-3411
CA	San Diego, Metermaster	714-560-4841
CA	Santa Clara, Fisher Brownell	408-988-6041
CA	Santa Clara, E.I.L. Instrs.	408-727-0396
CO	Denver, E.I.L. Instrs.	303-534-4160
CT	Middletown, E.I.L. Instrs.	203-346-6646
FL	Miami, Brownell Electro.	305-591-3215
FL	Orlando, Brownell Electro.	305-843-6770
FL	Palm Bay, E.I.L. Instrs.	305-725-8300
GA	Atlanta, Brownell Electro	404-762-5181
IL	Bridgeview, E.I.L. Instrs.	312-430-2292
IL	Elk Grove Village, Metermaster	312-593-8650
IN	Indianapolis, E.I.L. Instrs.	317-545-1373
LA	Kenner, Breard-Gardner	504-466-3401
LA	Slidell, Mid-South Sls.	504-641-7480
MD	Gaithersburg, Pioneer Instr.	301-948-0710
MD	Sparks, E.I.L. Instrs.	301-771-4800
MA	Burlington, E.I.L. Instrs.	617-272-9450
MA	Waltham, Calibron Corp.	617-894-6440
MA	Woburn, Brownell Electro	617-935-7820
MI	Farmington Hills, Star-Tronic Dist.	313-477-7586
MI	Royal Oak, George Instr. Co.	313-280-1111
MN	Minneapolis, Process Meas. Co.	612-544-4035
MO	St. Louis, Instr. & Control Sls.	314-535-5760
NJ	Fairfield, Ampower Elctrn. Instr.	201-227-7720
NJ	Plainfield, Brownell Electro.	201-753-4600

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NY	Clarence, Trott Elctrns.	716-634-8500
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NC	Charlotte, Brownell Electro	704-597-1270
OH	Cleveland, Pioneer/Instr. Div.	216-587-3600
OH	Dayton, Pioneer/Dayton Div.	513-236-9900
OH	Dayton, E.I.L. Instrs.	513-435-2134
OR	Portland, Branom Instr.	503-283-2555
PA	Philadelphia, Sunshine Sci. Instr.	215-673-5600
PA	Pittsburgh, E.I.L. Instrs.	412-731-5230
TN	Knoxville, Brownell Electro	615-966-3441
TN	Memphis, Brownell Electro	901-795-8487
TN	Nashville, Brownell Electro	615-889-8230
TX	Allen, Prime Distrib. Co.	214-231-0170
TX	Dallas, Economy Gauge & Instr. Supp.	214-243-8370
TX	Garland, Metermaster	214-271-5671
TX	Houston, Quality Instr.	713-524-0528
TX	Houston, E.I.L. Instrs.	713-271-3100
UT	North Salt Lake, Western Controls	801-292-5900
VA	Alexandria, E.I.L. Instrs.	703-354-4330
VA	Virginia Beach, E.I.L. Instrs.	804-499-3746
WA	Seattle, Eicher-Richards	206-523-7888
WA	Seattle, Branom Instr.	206-762-6050
WA	Seattle, E.I.L. Instrs.	206-762-0880

ANALOGIC CORP., Data Conversion Prods. Grp., Audubon Rd., Wakefield, MA 01880, Tel: 617-246-0300, Telex: 94-9307, TWX: 710-348-0425; *Sls. Mgr.:* Leonard D. Sacon .... **3**•1140, 1141

Local Sales Offices & Reps

AZ	Scottsdale, Arcom Sls., Inc.	602-947-5745
CA	Carson, AMASCO	213-516-8561
CA	San Jose, Analogic Corp.	408-247-6401
CA	Sunnyvale, AMASCO	408-733-8690
CO	Denver, Westek Data Prods., Inc.	303-232-2250
CT	Portland, BBI	203-342-0648
GA	Atlanta, Beacon Elctrns. Assoc.	404-256-9640
IL	Rosemont, Synmark Sls. Co.	312-825-3455
MA	Holbrook, McLellan Assocs.	617-767-4771
MI	Livonia, Lowell-Wendt Mktg. Co.	313-464-2722
MO	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Montville, PAF Assocs.	201-335-0680
NY	Smithtown, PAF Assocs.	516-360-0940
OH	Cincinnati, Analogic Corp.	606-371-0064
OH	Dayton, Midwest Mktg. Assocs.	513-433-2511
PA	Ambler, Denco Data Equip. Corp.	215-542-9876
TX	Dallas, Norcom	214-386-4888

ANALOG MODULES, INC., 126 Baywood Avenue, Longwood, FL 32750, Tel: 305-339-4356/4355, Telex: ANALOG MOD C1 467617; FSC No.: 61651; Empl.: 20; *Sls. Mgr.:* Ian D. Crawford .... **3**•1004

ANALOG SYSTEMS, P.O. Box 35879, Tucson, AZ 85740-5879, Tel: 602-293-4923, TWX: 910-952-1185; FSC No.: 58976; Empl.: 13; *Sls. Mgr.:* Sharon Raban; *Dist. Mgr.:* Julie Kosmata

ANALOG TECHNOLOGY CORP., 15859 E. Edna Pl., Irwindale, CA 91706, Tel: 213-960-4004, TWX: 910-584-1855; *Sls. Mgr.:* James L. Lawrence, Jr.

ANALYTICAL MEAS., 31 Willow St., Chatham, NJ 07928, Tel: 201-273-7500; Empl.: 35

ANALYTICS COMMUNICATIONS SYS., 1820 Michael Faraday Dr., Reston, VA 22090, Tel: 703-471-0892, Telex: 710-833-0326; Empl.: 35; *Sls. Mgr.:* Paul G. Jones

ANAREN MICROWAVE, P.O. Box 178, 6635 Kirkville Rd., E. Syracuse, NY 13057, Tel: 315-432-8909, Telex: 937351, TWX: 710-541-1507; FSC No.: 31597; Empl.: 310

ANCHOR SPECIALTY MFG. INC., 300 Hollister Rd., Teterboro, NJ 07608, Tel: 201-288-1939; Empl.: 10

AN/COM INDUSTRIES, P.O. Box 530, 5521 Cleon Ave., N. Hollywood, CA 91603, Tel: 818-769-5518, TWX: 910-498-5713; *Sls. Mgr.:* E. J. Wubben; *Dist. Mgr.:* E. J. Wubben

AND

AND, 770 Airport Blvd., Burlingame, CA 94010, Tel: 415-347-9916, TWX: 910-374-2353; Empl.: 30; *Sls. Mgr.:* Dean Ransom .... **1B**•1023-1025

Local Sales Offices & Reps

AL	Huntsville, Currie, Peak, Frazier	205-536-1506
AZ	Tempe, Foley, Tallent & Lee	602-438-1564
AR	Little Rock, J. Y. Schoonmaker	501-375-2168
CA	Burlingame, William J. Purdy	415-347-7701
CA	Costa Mesa, Berman-Gravely Co.	714-549-2122
CO	Denver, William J. Purdy	303-777-1411
CT	Hartford, Sturgeon Co.	203-249-7800
FL	Orlando, Currie, Peak, Frazier	305-855-0843
IL	Elmhurst, Hill-Gray Assocs.	312-832-4101
MD	Baltimore, S. K. MacDonald	301-924-5880
MA	Needham Heights, Sturgeon Co.	617-444-6603
MI	Detroit, R. P. Urban Assoc.	313-535-2355
MI	Grand Rapids, R. P. Urban Assoc.	616-245-0511
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
MO	Grandview, Harris-Hanson	816-763-6200
MO	St. Louis, Harris-Hanson	314-432-3611
NJ	Englewood, Harold Gray Assocs.	201-894-0894
NM	Albuquerque, William J. Purdy	505-266-7959
NY	Syracuse, Paston-Hunter Co.	315-437-2843
NC	Greensboro, Currie, Peak, Frazier	919-273-3040
OH	Columbus, McFadden Sls.	614-459-1280
OR	Beaverton, W. J. Purdy Co.	503-641-9373
PA	Philadelphia, Samuel K. MacDonald	215-545-1205
TX	Austin, J. Y. Schoonmaker	512-467-8809
TX	Dallas, J. Y. Schoonmaker	214-349-1650
TX	Houston, J. Y. Schoonmaker	713-738-2427
UT	Salt Lake City, W. J. Purdy Co.	801-486-8557
WA	Seattle, William J. Purdy	206-284-8020

Local Distributors

CA	Burlingame, Rose Elctrn.	415-348-2740
CA	Chatsworth, Panel Parts Co.	213-998-5991
CA	Sacramento, Dunlap Elctrns.	916-442-5801
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CA	Van Nuys, Patane Avionics	213-988-4455
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CT	Stratford, Utronics	203-378-4201
CT	Wallingford, Sager Electrical Supp.	203-265-4600
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MN	Minneapolis, Elctrn. Center	612-371-5200
MN	Minneapolis, The Joel Co.	612-545-5669
NJ	Cranford, Garden State Elect.	201-272-6400
NY	Buffalo, Genessee Radio & Parts Co., Inc.	716-873-9661
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NY	Farmingdale, Midway Indl. Elctrns. Inc.	516-293-6800
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NY	Rome, Rome Elctrns.	315-337-5400
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Warren, REM Elect.	216-373-1300
OR	Beaverton, Almac/Stroum	503-641-9070
OR	Lake Oswego, Rose Elctrns.	503-635-8823
PA	Drexel Hill, Kass Elect.	215-449-2300
PA	Philadelphia, Almo Elctrns.	215-698-4000
TX	Fort Worth, Allied Elctrns.	817-336-5401
TX	Richardson, Southwest Elect.	214-234-3050
TX	Stafford, Southwest Elctrns.	713-491-4900
UT	Salt Lake City, Standard Supp. Co.	801-486-3371
WA	Bellevue, Integrated Elctrns.	206-455-2727
WA	Bellevue, Almac/Stroum	206-643-9992
WA	Seattle, United Products	206-682-5025
WI	Milwaukee, Industrial Elect.	414-276-1212

ANDERS, INC., 77 Wolcott Rd., Simsbury, CT 06070, Tel: 203-658-7666; FSC No.: 52045; Empl.: 18; *Sls. Mgr.:* R. A. Grover

ANDERSEN LABS., 1280 Blue Hills Ave., Bloomfield, CT 06002, Tel: 203-242-0761, TWX: 710-425-2390; FSC No.: 03947; Empl.: 125; *Sls. Mgr.:* Donald Lowcavage .... **1A**•1450

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AL	Huntsville, Beacon	205-881-5031
AR	Little Rock, Beacon	501-224-5449
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CA	Sherman Oaks, Midwin & Olifson	213-996-9093
FL	Clearwater, Beacon	813-796-2378
FL	Ft. Lauderdale, Beacon	305-491-1054
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GA	Atlanta, Beacon	404-256-9640
IL	Northfield, Feller Assocs.	312-446-8065
IA	Cedar Rapids, Feller Assocs.	319-364-0566
MD	Randallstown, Beacon	703-591-1300
MA	Wayland, High-Tech Sls.	617-653-3838
NY	Melville, Carnes Assocs.	516-694-1600
NC	Greensboro, Beacon	919-275-9997
PA	Huntingdon Valley, Rabal Assoc.	215-947-4825
TN	Johnson City, Beacon	615-282-2421
TX	Fort Worth, McDonald Assocs.	817-429-4272
VA	Fairfax, Beacon North	703-591-1300

ANDERSON ELCTRNS., 310 Penn St., P.O. Box 89, Hollidaysburg, PA 16648, Tel: 814-695-4428, TWX: 510-691-2516; Empl.: 85; *Sls. Mgr.:* W. H. Anderson .... **1A**•1313

Local Sales Offices & Reps

AZ	Scottsdale, Fryco	602-945-3281
CA	Fullerton, GRU Assocs.	714-738-0903
CA	Santa Clara, Logan Sls	408-496-0660
GA	Lawrenceville, B. T. Funderburk, Inc.	404-963-9495
IL	South Elgin, R.K. Elctrn.	312-695-8552
IN	Indianapolis, Wilson Techn. Sls.	317-259-4032
MA	Plymouth, Newby, Inc.	617-746-3869
MI	Lathrup Village, R. C. Nordstrom & Co.	313-559-7373
NY	Smithtown, Long Island, PAF Assocs.	516-360-0940
NC	Apex, Wolff's Elctrn Sls.	919-362-5022
OH	Dayton, Dynel Co.	513-434-6467
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TX	Plano, GW Prods.	214-422-1746
WA	Bellevue, Western Techn. Sls.	206-641-3900

ANDERSON POWER PRODS., Div. of High Voltage Engrg., 145 Newton St., Boston, MA 02135, Tel: 617-787-5880, Telex: 940453; *Sls. Mgr.:* Robert G. Maxwell; *Dist. Mgr.:* Robert G. Maxwell

ANDREW CORP., 10500 W. 153rd St., Orland Pk., IL 60462, Tel: 312-349-3300, Telex: 25-3897, TWX: 910-651-3340; *Sls. Mgr.:* Carl Van Hecke

ANDRICH SYS., INC., 1699 Roosevelt Ave., Bohemia, NY 11716, Tel: 516-589-5656; *Sls. Mgr.:* Robert G. Andrews

ANDROMEDA SYS., 9000 Eton Ave., Canoga Park, CA 91304, Tel: 818-709-7600, TWX: 910-444-1248; Empl.: 23; *Sls. Mgr.:* Mike Morgan; *Dist. Mgr.:* J. William Graham

ANDROTEK/DMI, Box 29098, Columbus, OH 43229, Tel: 614-882-7821; *Sls. Mgr.:* James M. Shively

ANGENIEUX INC., 120 Derry Rd., Hudson, NH 02051, Tel: 603-889-2116, Telex: 94-3469; *Sls. Mgr.:* Edward A. Wollensak

ANGO ELECTRONICS CORP., Post Office Box 112, Harrison, NJ 07029, Tel: 212-685-6336, 201-483-7116, Telex: 421531; *Sls. Mgr.:* Brian K. Yuen .... **2**•1008

ANN ARBOR TERMINALS, 6175 Jackson Rd., Ann Arbor, MI 48103, Tel: 313-663-8000, TWX: 810-223-6033; Empl.: 50; *Sls. Mgr.:* Gary DeLuca

ANORAD CORP., 110 Oser Ave., Hauppauge, NY 11788, Tel: 516-231-1990, TWX: 510-227-9894; Empl.: 200

ANRO ELCTRN. INDS., 300 Wildcat Rd., Downsview, ON, Canada, Tel: 416-661-2600; Empl.: 85; *Sls. Mgr.:* E.H. Jones

ANSLEY ELECTRONICS, DIVISION OF THOMAS & BETTS, See Thomas & Betts

ANTENNACRAFT, Box 1005, Burlington, IA 52601

ANTENNA RESCH. ASSOCS., 11317 Frederick Ave., Beltsville, MD 20705, Tel: 301-937-8888, Telex: 908754; Empl.: 25; *Sls. Mgr.:* H.W. Rapalus

ANTENNA SPECIALISTS, 12435 Euclid Ave., Cleveland, OH 44106, Tel: 216-791-7878, Telex: 980-732, TWX: 810-421-8149; Empl.: 1000; *Sls. Mgr.:* Patti Fritz

ANTEX DIV., 7 Hawkes St., Marblehead, MA 01945, Tel: 617-631-7100; *Sls. Mgr.:* C. Loutrel; *Dist. Mgr.:* C. Loutrel

ANTONA CORP., 13600 Ventura Blvd., Sherman Oaks, CA 91423, Tel: 213-986-6651

ANTRONIC CORP., 7755 E. Redfield Rd., Ste. 300, Scottsdale, AZ 85260, Tel: 312-287-5110

APAHOUSER-ELCOM, INC., 101 Walnut St., Watertown, MA 02172, Tel: 617-924-1500; FSC No.: 53721; Empl.: 90; *Sls. Mgr.:* Fred Gately

APA DIVISION, 399 Executive Blvd., Elmsford, NY 10523, Tel: 914-592-7322, Telex: 646186; *Sls. Mgr.:* Carl Gruenberg ....2•1924

Local Distributors

AZ	Phoenix, Scottsdale Tool & Supply	602-273-7376
AZ	Tempe, Marshall Claude Michael	602-894-2188
CA	El Monte, Marshall Claude Michael	213-442-7204
CA	Fullerton, Bertech	714-526-3700
CA	Irvine, Marshall Claude Michael	714-556-6500
CA	Sunnyvale, Marshall Claude Michael	408-739-8720
CA	Sunnyvale, Com-Kyl	408-734-9660
CO	Denver, Marshall Claude Michael	305-841-1878
FL	Clearwater, Tartan Tools	813-447-5364
GA	Norcross, Marshall Claude Michael	404-925-1895
IL	Chicago, McMaster-Carr Supp.	312-834-9600
IL	Chicago, EMF Co. Inc.	312-889-8323
IL	Chicago, Addison Int'l Soldering Sy. Inc.	312-628-8083
IL	Hillside, Miltex Sls. Co.	312-449-0420
MA	Burlington, Marshall Claude Michael	617-272-1234
MI	Royal Oak, Murray Percival Co.	313-548-1971
MN	Excelsior, Tonka Elctrn. Supp.	612-474-5414
NJ	Fairfield, Marshall Claude Michael	201-882-0320
NJ	Mt. Laurel, Marshall Claude Michael	609-778-8720
NM	Alberquerque, Betatron Elctrns.	505-344-2381
NY	Hauppauge, Marshall Claude Michael	516-273-1515
OR	Portland, Murphy Indl. Supp.	503-620-8680
OR	Portland, MPI Assocs.	503-641-6624
TX	Dallas, Marshall Claude Michael	214-233-7650
TX	Dallas, Roy E. Davis Co.	214-688-0652
TX	Houston, Specialized Prods.	713-995-0595
UT	Salt Lake City, Indl. Supp.	801-484-8644
Can	Markham, ON, Brock Elctrns. Ltd.	416-294-8080

A. P. CIRCUIT CORP., 513 East 86th St., P.O. Box 1350, New York, NY 10028, Tel: 212-737-1348, Telex: 428759 ....1A•1585

Local Sales Offices & Reps

MI	Detroit, Comtel Instrs.	313-255-1970
OH	Cleveland, Comtel Instrs.	216-442-8080
OH	Dayton, Comtel Instrs.	513-298-7573

APEX MICROTECHNOLOGY CORP., 1130 E. Pennsylvania St., Tucson, AZ 85714, Tel: 602-746-0849, TWX: 910-952-1176; Empl.: 30; *Sls. Mgr.:* Rita Olschewski; *Dist. Mgr.:* Rita Olschewski ....3•1005

Local Sales Offices & Reps

CA	Los Altos, Kolm Mktg.	415-948-2635
CA	San Diego, California Elctrn. Mktg.	619-692-3551
CA	Santa Ana, California Elctrn. Mktg.	714-835-2702
CO	Denver, W. H. Howard Assocs.	303-426-3499
IL	La Grange Park, Bierhaus Sls.	312-354-5100
IN	Indianapolis, J & B Sales	219-483-2813
MD	Ellicott City, Nelson Elctrns.	301-747-7887
MA	Malden, J.K. Assocs.	617-321-2922
MN	Bloomington, Merril Franklin Co.	612-854-9446
NJ	Upper Saddle River, Bob Cameron Assocs., Inc.	201-825-1304
NY	Smithtown, T & K Sls.	516-724-3456
OH	Fort Wayne, TX Sales	219-489-4447
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
TX	Dallas, Repmasters	214-247-6236
TX	Houston, Repmaster	713-692-8204
WI	Elm Grove, Bierhaus Sls.	414-963-0318

Local Distributors

Intl	Finland, Helsinki, Turion Oy	90-372144
Intl	France, Orsay, Microel	907-08-24
Intl	Germany, Nauheim, Emtron Vertriebs GmbH	(06152) 6003
Intl	India, Bombay, Elmatronic Dvs.	362421
Intl	Israel, Giuataim, EIM	03-77-40-41
Intl	Italy, Milan, Disprel	02-284-0539
Intl	Japan, Tokyo, Kyokuto Boeki Kaisha	244-3511
Intl	Netherlands, Oosterhout, Klaasing Elctrns.	01620-51400
Intl	Norway, Oslo, Eltron	02-462-870
Intl	South Africa, Johannesburg, Advanced Semiconductor	27/11802-4107
Intl	Sweden, Stockholm, Scancopter AB	046-828-9425
Intl	Switzerland, Zug, Anatech AG	042-315-477
Intl	Taiwan, Taipei, Hitek Co. Ltd.	536-1157
Intl	UK, Sunbury-on-Thames, Pascall Elctrns.	09327-87418

API INSTRS., 1601 Trapelo Rd., Waltham, MA 02254, Tel: 617-890-2000, Telex: 92-3445, TWX: 710-324-0681; FSC No.: 20905; Empl.: 350; *Sls. Mgr.:* R. Yates; *Dist. Mgr.:* G. Wood

APM-HEXSEAL, 44 Honeck St., Englewood, NJ 07631, Tel: 201-569-5700, Telex: 13-3403; Empl.: 80; *Sls. Mgr.:* Riva Solins; *Dist. Mgr.:* Riva Solins

APOLLO LASERS, INC., 9201 Independence Ave., Chatsworth, CA 91311, Tel: 213-709-1111, Telex: 66-2278; Empl.: 82; *Sls. Mgr.:* John Q. Adams

APOLLO MAGNETICS CORP., 2720 W. Beverly Rd., Los Angeles, CA 90057, Tel: 213-381-2500, TWX: 910-321-4348; Empl.: 420 ....3•1069

Local Sales Offices & Reps

CT	Stratford, Gerald Rosen	203-375-5456
MA	Framingham, Gerald Rosen	617-879-5505
NH	Hollis, Gerald Rosen	603-465-7902
NY	Rochester, J. W. Welch	716-244-1100
NY	Utica, J. W. Welch	716-244-1100
OK	Oklahoma City, MGR Elctrns.	918-366-0125
TX	Dallas, MGR Elctrns.	214-349-9940

APPLETON PAPERS INC., P.O. Box 359, Appleton, WI 54912, Tel: 414-734-9841 ....3•1070

APPLIED CIRCUITS, INC., 36-06 43rd. Ave., Long Island City, NY 11101, Tel: 212-786-7200; Empl.: 20

APPLIED CIRCUIT TECHNLG. (ACT), 2931 La Jolla St., Anaheim, CA 92806, Tel: 714-632-9230; *Sls. Mgr.:* Hank Pselos

APPLIED COMMUNICATIONS, Amstar Tech. Prods. Co., 9125 Gaither Rd., Gaithersburg, MD 20877, Tel: 301-948-5210, TWX: 710-828-9706; Empl.: 200; *Sls. Mgr.:* Joseph Rock

APPLIED COMMUNICATIONS, 9125 Gaither Rd., Gaithersburg, MD 20877, Tel: 301-948-5210, TWX: 701-828-9706; Empl.: 200; *Sls. Mgr.:* Joseph Rock

APPLIED CONTROL, 1275 Bloomfield Ave., Fairfield, NJ 07006-2828, Tel: 201-227-5454; FSC No.: 4A725; Empl.: 26; *Sls. Mgr.:* Monica E. Merel

APPLIED DATA COMMUNICATIONS, 14272 Chambers Rd., Tustin, CA 92680, Tel: 714-731-9000; Empl.: 75

APPLIED DIGITAL DATA SYSTEMS INC., 100 Marcus Blvd., Hauppauge, NY 11787, Tel: 516-231-5400, TWX: 510-227-9886; Empl.: 760; *Sls. Mgr.:* Dennis O'Donnell

APPLIED ELECTRO TECHNOLOGY, INT.
AN Sti COMPANY

APPLIED ELECTRO TECHNLG., INT., STI Company, 2220 So. Anne St., Santa Ana, CA 92704, Tel: 714-556-6570, TWX: 910-595-1797; FSC No.: 52797; Empl.: 25; *Sls. Mgr.:* Deborah Core ....1B•1293

Local Sales Offices & Reps

CA	Mountain View, Scientific Technlg.	415-965-0910
OR	Eugene, Dennis Ellingsen	503-484-5564
TX	Richardson, Dwain Lawhon	214-231-2289

APPLIED ENGRG. PRODS., P.O. Box A-D, Amity Sta., New Haven, CT 06525, Tel: 203-387-5282, TWX: 710-465-1173; FSC No.: 19505; Empl.: 65; *Sls. Mgr.:* C. Goff; *Dist. Mgr.:* C. Goff

APPLIED INSTRS., INC., 25 Will Place, Brooklyn, NY 11207, Tel: 212-257-0885; *Sls. Mgr.:* I. L. Litty

APPLIED MAGNETICS, 75 Robin Hill Rd., Goleta, CA 93117, Tel: 805-683-5353, TWX: 910-334-1195; FSC No.: 11935; Empl.: 4000; *Sls. Mgr.:* O. M. Fundingsland

APPLIED MICRO TECHNLG., A Burr Brown Co., 2430 N. Hauchuca, Ste. A, Tucson, AZ 85745, Tel: 602-622-8605, TWX: 910-952-1164; Empl.: 15; *Sls. Mgr.:* Lee Davis

APPLIED MICROWAVE DIV. EPSCO, See Epsco Microwave

APPLIED RESEARCH INC., 160 Dupont St., Plainview, NY 11803, Tel: 516-349-9200; Empl.: 50; *Sls. Mgr.:* S. Klipper ....1A•1686, 1687

Local Sales Offices & Reps

CA	Los Angeles, EBA Microwave	213-822-7510
CA	Orange, E. Bell Assocs.	714-857-6079
MA	Lowell, Russell Engrg.	617-458-7146
NY	Great Neck, Industron Assocs.	516-487-2620

Applied
Solar
Energy
Corporation

APPLIED SOLAR ENERGY CORP., Photosensor Div., 15251 E. Don Julian Rd., City of Industry, CA 91749, Tel: 818-968-6581, TWX: 910-584-4890; Empl.: 160; *Sls. Mgr.:* George Pankau ....1B•1211

Local Sales Offices & Reps

CA	Lomita, Component Mkt. Assoc.	213-326-1460
CA	Mountain View, Weseloh Swanson	415-961-0565
CT	Hartford, Sturgeon Co.	203-249-7800
GA	Stone Mountain, Dixie Tech.	404-962-2530
IL	Chicago, Hill Sls.	312-541-0661
MA	Needham, Sturgeon Co.	617-444-6603
MI	Brooklin, Engineered Comps.	517-592-3236
MN	Minneapolis, Furber Sales	612-881-3620
OH	Centerville, Engrg. Mktg. Assocs.	513-433-2800
PA	Lancaster, Supra Tech.	717-569-0243

APPLIED SYS., 26401 Harper Ave., St. Clair Shores, MI 48081, Tel: 313-779-8700; Empl.: 15; *Sls. Mgr.:* Marty Wyrod

AP PRODUCTS
INCORPORATED

A P PRODUCTS INCORPORATED, 9450 Pineneedle Dr., Box 540, Mentor, OH 44060, Tel: 216-354-2101, TWX: 810-425-2250; Empl.: 84; *Sls. Mgr.:* Kathy M. Dusa ....2•1900, 1901

Local Sales Offices & Reps

AZ	Tempe, Electronic Development & Sls.	602-829-9699
AR	Little Rock, Erickson Sls.	501-225-7379
CA	Anaheim, Westrep	714-527-2822
CA	Los Altos, Ewing-Foley, Inc.	415-941-4525
CA	San Diego, D^2 Sales, Inc.	619-560-6266
CO	Englewood, Computech Mktg.	303-773-3981
FL	Clearwater, Hutto-Hawkins-Peregoy	813-797-4447
FL	Ft. Lauderdale, Hutto-Hawkins-Peregoy	305-971-5750
FL	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
GA	Roswell, Henry W. Philips Co.	404-992-3070
IL	Lombard, RMP/McBride Corp.	312-932-9090
IN	Indianapolis, M & L Elctrn. Sls.	317-359-4742
LA	Chalmette, Erickson Sls.	504-271-1976
MA	Norwood, MacInnis Co.	617-762-8090
MN	Minneapolis, Donald Luger & Assocs.	612-553-1122
MO	Blue Springs, Kathrinus Kelly Baumhauer	816-229-0001
MO	St. Louis, Kathrinus Kelly Baumhauer	314-647-2400
NJ	Englewood, ABS Assocs.	201-871-0020
NJ	Medford, Champion Elctrn. Sls.	609-983-0932
NY	Buffalo, R. W. Mitscher Co.	716-633-7970
NC	Matthews, Henry W. Phillips Co.	704-882-2878
OH	Dayton, Shamrock Elctrn. Sls.	513-258-1227
OH	Mentor, K. W. Braund Co.	216-255-2334
OK	Oklahoma City, Erickson Sls.	405-682-2947
OR	Portland, Dussault & Assocs. Inc.	503-641-8540
TX	Austin, Erickson Sls.	512-244-3068
TX	Dallas, Erickson Sls.	214-739-5833
TX	Houston, Erickson Sls.	713-980-9609
UT	Salt Lake City, Meridian Mktg.	801-968-4177
WA	Seattle, Dussault & Assocs. Inc.	206-527-5454
WI	Colgate, Rep 1 & Assocs.	414-628-4016

Local Distributors

AL	Birmingham, Ack Radio Supp. Co.	205-322-0588
AZ	Phoenix, Arizona Comps. Co.	602-269-5655
AZ	Phoenix, Tri-Tek	602-995-9352
CA	Burlingame, Rose Elctrn. Dist.	415-348-2740
CA	Chatsworth, Priority One Elctrns.	213-709-5464
CA	Concord, Pacific Radio Supp.	415-682-4700
CA	El Monte, Marshall Inds.	213-442-7204
CA	Laguna Hills, M P Systems	714-770-6411
CA	Mountain View, Haltek Elctrns.	415-969-0510
CA	Palo Alto, Zack Elctrns. of Palo Alto	415-326-5432

CA	Redwood City, HDB Elctrns.	415-368-1388
CA	San Diego, Mock III Sls. Co.	619-560-0515
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	San Jose, Advanced Computer	408-946-7010
CA	San Jose, Ratel Elctrns.	408-946-4300
CA	San Jose, Quement Elctrns.	408-998-5900
CA	Santa Clara, R.G.B. Electro-Industrial	408-980-1300
CA	Santa Clara, Quest Elctrns.	408-988-1640
CA	Santa Clara, Anchor Elctrns.	408-727-3693
CA	Sun Valley, Richey Western	213-768-3800
CA	Sunnyvale, Sunnyvale Elctrns.	408-736-1324
CO	Colorado Springs, Centennial Elctrns.	303-633-4666
CO	Denver, Integrated Elctrns.	303-292-6121
CT	Danbury, Pilgrim Elctrns.	203-792-7274
CT	East Hartford, E. J. Stephens Inc.	203-568-1927
CT	Hartford, Hatry Elctrns.	203-527-1881
CT	New Haven, Hatry Elctrns.	203-787-5921
CT	New London, Jan Elctrn. Supplies	203-442-4386
CT	New London, Aikens Elctrn.	203-442-4406
CT	Norwalk, Park Distributors	203-853-2010
CT	Old Lyme, Electronics Warehouse	203-434-8308
CT	Stratford, Hatry Elctrns.	203-375-5886
CT	West Hartford, Signal Elctrn. Ctr.	203-233-8551
FL	Ft. Lauderdale, Southeastern Elect.	305-563-4131
FL	Melbourne, H.I.S. Computermation Inc.	305-254-9399
FL	Miami, Electronic Equip.	305-871-3500
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	Orlando, Sun Elctrn. Supp. Inc.	305-841-4650
FL	W. Palm Beach, Nurmi Elctrn. Supp.	305-686-8553
GA	Atlanta, Atlanta Computer Mart	404-455-0647
GA	Atlanta, Ack Radio Supp. Co.	404-351-6340
IL	Champaign, Klaus Radio, Inc.	217-356-1896
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Semiconductor Specialists	312-279-1000
IL	Mt. Prospect, Tri State Elect. Corp.	312-255-0600
IL	Niles, Joseph Elctrns., Inc.	312-297-4200
IL	Rosemont, Advent Elctrns.	312-298-4210
IN	Evansville, Ohio Valley Sound, Inc.	812-425-6173
IN	Fort Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Pioneer/Indiana	317-849-7300
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Cedar Rapids, Deeco	319-365-7551
KY	Louisville, Peerless Elctrn. Equip. Co.	502-637-7677
LA	New Orleans, Wm. B. Allen Supp. Co., Inc.	504-525-8222
MD	Aberdeen, Harco Elctrns., Inc.	301-838-7990
MD	Rockville, Capitol Radio Wholesalers	301-881-2270
MA	Burlington, Contact East	617-272-5051
MA	Lowell, Frank P. McCartin Co.	617-454-9101
MA	Lowell, A B Company	617-452-6120
MA	Needham, YDI Elctrn. Corp.	617-449-1005
MA	Needham, Cronin Elctrns.	617-449-0500
MA	Newton, In-Stock Products Co.	617-964-6200
MA	Newton, Greene-Shaw Co.	617-969-8900
MA	Somerville, Solid State Sls.	617-547-7053
MA	Westboro, Future Elctrns. Corp.	617-366-2400
MA	Wilmington, R C Components	617-273-1860
MA	Woburn, Pacer Elctrns.	617-935-8330
MA	Worcester, RM Elctrns.	617-756-8311
MI	Livonia, RS Elctrns.	313-525-1155
MI	Westland, Westland Elctrns.	313-728-0650
MN	Burnsville, Electronic Tool Supp.	612-894-3700
MN	Minneapolis, Acme Elctrns.	612-338-4754
MN	St. Paul, Ragon Elctrns.	612-642-2828
MN	Thief River Falls, Digi-Key Corp.	800-346-5144
MO	Columbia, Alpha Labs	314-874-1514
MO	St. Louis, Van Sickle Radio	314-621-5000
MO	St. Louis, Olive Elctrns.	314-426-4500
NH	Hudson, C & H Elctrns.	603-882-1133
NH	Manchester, Yankee Elctrns.	603-625-9746
NJ	Camden, General Radio Supp.	609-964-8560
NJ	East Brunswick, Brothers Elctrns.	201-238-2200
NJ	East Hanover, State Elctrns. Parts	201-887-2550
NJ	Greenbrook, Greenbrook Elect.	201-968-3500
NJ	Kenilworth, Federated Purchaser	201-272-0505
NJ	Rahway, R.S.R./Elctrns.	201-381-8777
NJ	Springfield, Route Elctrns.	201-467-0166
NM	Albuquerque, Electronic Devices Co.	505-884-2950
NY	Astoria, S. L. Jack	212-545-8843
NY	Bohemia, Car Lac Elctrns.	516-567-4200
NY	Buffalo, Summit Distributors	716-887-2800
NY	Hempstead, Davis Elctrns. Corp.	516-483-9200
NY	Mamaroneck, Logicomp Elctrns.	914-698-9332
NY	Plainview, ACI Elctrns. Corp.	516-293-6630
NY	Pleasantville, Electronic Tool Co.	914-769-8070
NY	Rochester, Compuworld	716-473-5790
NY	Rochester, Rochester Radio Supp.	716-454-7800
NY	Schenectady, Grimmer's Elect. Supp.	518-374-8480
NY	Troy, Trojan Elctrn. Supp.	518-274-4481
NY	Yorktown Hts., ABL Elctrn. Supp.	914-962-2253
OH	Cincinnati, United Radio	513-761-4030
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Englewood, Argent/Electra	513-836-8633
OH	Reynoldsburg, Hydun Lab Assocs.	614-861-7779
OR	Beaverton, Norvac Elctrns.	503-644-1025
PA	Allentown, P. A. Peters, Inc.	215-434-5237
PA	Colmar, A. B. Computers	215-822-7727
PA	Drexel Hill, Kass Elctrns.	215-449-2300
PA	Philadelphia, Almo Elctrns. Corp.	215-698-4000
PA	Reading, Barbey Elctrns.	215-376-7451
PA	York, Alvo Elctrns.	814-238-0506
PA	York, E.C.I. Inc.	717-843-8971
RI	Pawtucket, Major Elctrn. Supp.	401-724-7100
RI	Pawtucket, Jabbour Elctrn. Supplies	401-728-4600
SC	Columbia, Dixie Elctrns.	803-779-5332
TN	Chattanooga, Curle Elctrns.	615-266-4727
TN	Nashville, Eddie Warner's, Inc.	615-254-1224
TX	Dallas, Specialized Prods. Co.	214-358-4663
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Dallas, Redco	214-688-0652
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	Fort Worth, Allied Elctrns.	817-336-5401
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
UT	Salt Lake City, Standard Supply Co.	801-486-3371
VT	Essex Junction, I.E.S. Elctrns. Inc.	802-878-5369
VA	Annandale, Arcade Elctrns.	703-256-4610
VA	Arlington, Arlington Elctrn. Wholesalers	703-524-6256
VA	Fairfax, Nine Assocs.	703-273-1803
WA	Bellevue, Integrated Elctrns.	206-455-2727
WA	Seattle, Radar Elec. Co.	206-282-2511
WA	Seattle, United Products	206-682-5025
WI	Madison, Schrenk Sls. Co.	608-255-7400
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Milwaukee, Industrial Elctrns.	414-276-1212
WI	Oshkosh, Electronic Inds.	414-235-8930

APTEK MICROSYSTEMS, INC., Hillsboro Plaza, 700 N.W. 12th Ave., Deerfield Beach, FL 33441, Tel: 305-421-8450, Telex: 441020; Empl.: 250; *Sls. Mgr.:* Joseph F. Centeno

APT APTRONICS
CORPORATION

APTRONICS CORPORATION, 9450 Pineneedle Dr., P.O. Box 270, Mentor, OH 44060, Tel: 216-354-9239, TWX: 810-425-2250; FSC No.: 30146; *Sls. Mgr.:* Phillip F. Fram; *Dist. Mgr.:* Debra L. Kardum .... 2•1160, 1161

Local Sales Offices & Reps

AL	Huntsville, Electronic Sls.	205-533-1735
AZ	Tempe, Electronic Dev. & Sls.	602-438-1547
AR	Little Rock, Erickson Sls.	501-225-7379
CA	Anaheim, Westrep	714-527-2822
CA	Mountain View, Brooks Tech. Grp.	415-960-3880
CA	San Diego, D² Sales	619-560-6266
CA	Santa Clara, Ross Mktg. Assocs.	408-988-8111
CO	Denver, West Inc.	303-692-0131
FL	Ft. Lauderdale, Interface Dynamics	305-565-5075
GA	Norcross, Electronic Sls.	404-448-6554
IL	Lombard, RMP/McBride Corp.	312-932-9090
IN	Indianapolis, M & L Elctrn. Sls., Inc.	317-359-4742
LA	Chalmette, Erickson Sls.	504-271-1976
MA	Burlington, Omni-Rep	617-938-0039
MI	St. Joseph, I. E. Hampton & Assocs.	616-983-0862
MO	Blue Springs, Kathrinus-Kelly-Baumhauer	816-229-0001
MO	St. Louis, Kathrinus-Kelly-Baumhauer	314-647-2400
NJ	Englewood, ABS Assocs.	201-871-0020
NJ	Medford, Champion Elctrn. Sls. Co.	609-983-0932
NY	Buffalo, R. W. Mitscher Co.	716-633-7970
OH	Rocky River, Norm Case Assocs.	216-333-0400
OK	Oklahoma City, Erickson Sls.	405-682-2947
TX	Austin, Erickson Sls.	512-445-2952
TX	Dallas, Erickson Sls.	214-739-5833
TX	El Paso, Epec, Inc.	915-593-8481
TX	Houston, Erickson Sls.	713-980-9606
UT	Salt Lake City, West, Inc.	801-466-2888
WA	Seattle, ECCO Mktg.	206-364-0200

Local Distributors

AL	Huntsville, Marshall Inds.	205-381-9235
AZ	Phoenix, Arizona Comps.	602-279-9446
AZ	Tempe, Marshall Inds.	602-968-6181
AZ	Tempe, Richey Elctrns.	602-894-9251
CA	Burlingame, Rose Elctrn. Distributing	415-348-2740
CA	Canoga Park, Marshall Inds.	213-999-5001
CA	El Monte, Marshall Inds.	213-442-7204
CA	Fremont, Terminal Sls. Corp.	415-656-7722
CA	Irvine, Marshall Inds.	714-556-6400
CA	Irvine, Ratel Elctrns.	714-549-8611
CA	San Diego, Mock III Sls. Co.	619-560-0515
CA	San Diego, Marshall Inds.	619-578-9600
CA	San Jose, Richey Elctrns.	408-946-6611
CA	San Jose, Ratel Elctrns.	408-946-4300
CA	Sun Valley, Richey Elctrns.	213-768-3800
CA	Sunnyvale, Marshall Inds.	408-732-1100
CO	Denver, Integrated Elctrns.	303-534-6121
CO	Denver, Marshall Inds.	303-427-1818
CT	Danbury, Pilgrim Elctrns.	203-792-7274
CT	Norwalk, Park Distrs.	203-853-2010
CT	Wallingford, Marshall Inds.	203-265-3822
FL	Orlando, Marshall Inds.	305-841-1878
GA	Norcross, Marshall Inds.	404-923-5750
IL	Chicago, Semiconductor Specialists	312-279-1000
IL	Rosemont, Advent Elctrns.	312-298-4210
IL	Schaumberg, Marshall Inds.	312-490-0155
IN	Indianapolis, Pioneer/Indiana	317-849-7300
MD	Gaithersburg, Marshall Inds.	301-840-9450
MA	Burlington, Marshall Inds.	617-272-8200
MA	Newton, In-Stock Products	617-964-6200
MA	Newton Upper Falls, Greene-Shaw Co.	617-969-8900
MA	Westboro, Future Elctrns.	617-366-2400
MA	Wilmington, RC Components	617-273-1860
MN	Minneapolis, Semiconductor Specialists	612-854-8841
MN	Plymouth, Marshall Inds.	612-559-2211
MO	Kansas City, Semiconductor Specialists	816-452-3900
MO	St. Charles, Finnigan Elctrns., Inc.	314-946-6201
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Camden, General Radio Supp.	609-964-8560
NJ	East Brunswick, Brothers Elctrns.	201-238-2200
NJ	East Hanover, State Elctrns. Parts	201-887-2550
NJ	Fairfield, Marshall Inds.	201-882-0320
NJ	Mt. Laurel, Marshall Inds.	609-234-9100
NY	Bohemia, Car Lac Elctrn. Indl. Sls.	516-567-4200
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Endwell, Marshall Inds.	607-754-1570
NY	Hauppauge, Marshall Inds.	516-273-2424
NY	Mamaroneck, Logicomp Elctrns.	914-698-9332
NY	Rochester, Masline Elctrns., Inc.	716-546-5373
NY	Rochester, Marshall Inds.	716-235-7620
NY	Troy, Trojan Elctrn. Supp.	518-274-4481
NY	Yorktown Hgts., ABL Elctrn. Supp.	914-962-2253
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Dayton, Marshall Inds.	513-236-8088
OK	Tulsa, Norvell Elctrns.	918-663-1247
OR	Portland, Radar Elec. Co.	503-232-3404
PA	Pittsburgh, Semiconductor Specialists	412-963-7241
PA	York, E.C.I., Inc.	717-843-8971
TX	Austin, Norvell Elctrns.	512-458-8106
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	Dallas, Marshall Inds.	214-233-5200
TX	Houston, Norvell Elctrns.	713-777-1666
TX	Houston, Marshall Inds.	713-789-6600
WA	Bellevue, Marshall Inds.	206-747-9100
WA	Seattle, Radar Elec. Co.	206-282-2511
WA	Seattle, Carlyle Technical Sls.	206-575-6750
WA	Spokane, Radar Elec. Co.	509-747-3053
WI	Milwaukee, Marsh Elctrns.	414-475-6000

A.P.W. CO., 72 W. Main, Rockaway, NJ 07866, Tel: 201-627-0643; Empl.: 18

AQ SYS., 1736 Front St., Yorktown Hgts., NY 10598, Tel: 800-431-2104; Empl.: 15; *Sls. Mgr.:* Charles E. Fitzsimmons; *Dist. Mgr.:* Charles E. Fitzsimmons

ARCO CABLE, 7361 Ethel Ave., North Hollywood, CA 91605, Tel: 818-982-2832; Empl.: 10; *Sls. Mgr.:* J. R. Parke

ARCO ELCTRNS., 400 Moreland Rd., Commack, NY 11725, Tel: 516-864-7000, TWX: 510-226-0241; FSC No.: 84171; Empl.: 40; *Sls. Mgr.:* Abe Kosakowsky

ARCOLECTRIC CORP., 9001 Canoga Ave., Canoga Park, CA 91304, Tel: 818-700-1933, Telex: 65-1349; Empl.: 20; *Sls. Mgr.:* L. Lewis; *Dist. Mgr.:* G. Miller .... 1B•1026-1028, 1538-1542

Local Distributors

AZ	Tucson, Electronic City	602-622-1173
CA	Berkeley, Al Lashers Elctrns.	415-843-5915
CA	Fullerton, Orvac Elctrns.	714-871-1020
CA	Los Angeles, Electric Switches	213-664-1141
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Pasadena, Dow Radio	213-681-3416
CA	Riverside, Material Techniques	714-686-6186
CA	San Diego, Western Radio	619-239-0361
CA	San Jose, Quement Elctrns.	408-998-5900
FL	Hialeah, Hialeah Elctrns.	305-887-5936
ID	Caldwell, A Gem Supply	208-537-5291
IL	Rockford, GC Elctrns.	815-968-9661
LA	Harvey, AFG Elctrns.	504-368-9696
MA	Needham, YDI Elctrns.	617-449-1005
NJ	Denville, Lashen Elctrns.	201-627-3783
NJ	Springfield, Route Elctrns.	201-379-7710
NY	Bronx, CAM Elctrns.	212-893-8300
NY	Bronx, Wescon Elctrns.	212-584-6325

NY	New Hyde Park, Electronic City	516-352-7145
NC	Raleigh, Capital Elctrns.	919-832-2811
OH	Ashtabula, Sesco Sims Elctrns.	216-997-8391
OR	Eugene, Larsco	503-484-7491
PA	Willow Grove, Resco Elctrns.	215-659-4575
RI	Newport, J. S. Elctrns.	401-847-2991
TX	Houston, City Elctrns.	713-621-1060

ARC SYSTEMS, INC., 400 Oser Ave., Hauppauge, NY 11788, Tel: 516-231-9261, Telex: 230199 SWIFT UR ARC; *Sls. Mgr.:* Robert Miller

AREMCO PRODS., Box 429, Ossining, NY 10562, Tel: 914-762-0685, Telex: 13-7442; Empl.: 30; *Sls. Mgr.:* Mark Wandzilak

ARENBERG SAGE INC., P.O. Box 250, 57 Cornwall St., Jamaica Plain, MA 02130, Tel: 617-522-8640; FSC No.: 04-2593524; Empl.: 9; *Sls. Mgr.:* R. J. Toronto

A.R.F. PRODS., 2559 75th St., Boulder, CO 80301, Tel: 303-443-4844, TWX: 910-940-3446; Empl.: 65; *Sls. Mgr.:* R. C. Lloyd, Jr.

ARGA CONTROLS, 35 E. Glenarm St., Pasadena, CA 91105, Tel: 213-682-3314; FSC No.: 50290; Empl.: 20; *Sls. Mgr.:* Linda Galman

Local Sales Offices & Reps

AL	Atlanta, A.P. Beamish & Assocs.	404-394-0077
AZ	Phoenix, RLS Instrs.	602-892-9329
CA	Santa Ana, Brooks-Moore & Assoc.	714-544-8900
GA	Atlanta, A.P. Beamish & Assocs.	404-394-0077
MA	Boston, Adcour	617-784-8123

ARGENT ELCTRNS., 3245 S. County Rd., 25A, Troy, OH 45373, Tel: 513-335-0031; FSC No.: 55901; Empl.: 20; *Sls. Mgr.:* W. Zickafoose

ARGOS PRODS., 600 S. Sycamore St., Genoa, IL 60135, Tel: 815-784-5118; Empl.: 50; *Sls. Mgr.:* Ron Evers

Local Sales Offices & Reps

CA	Burlingame, Meyer, Ross & Fleming	415-348-6800
CA	Culver City, W. Alderson	213-837-1398
CO	Wheatridge, Bill Newman & Co.	303-425-9503
FL	Ocala, Bencsik Assoc.	904-732-9775
GA	Atlanta, Murphy & Cota	404-875-2525
IL	Chicago, G. Mcl. Cole	312-774-3535
IN	Mulberry, Maish Sls.	317-296-2322
MA	North Scituate, W.A. Hendrickson	617-545-0652
MI	Pontiac, Ted Firaneck Sls.	313-373-9595
MN	Edina, Foster Tech. Sls.	612-941-9800
MO	Kansas City, Nevco	816-421-1751
NJ	Fort Lee, TMC Sls.	201-944-5665
NY	Syracuse, Lewis & Dunnigan	315-446-5522
OH	Dayton, Shamrock Elctrn	513-258-1227
PA	Wynnewood, Stinson Assocs.	215-896-7378
WA	Lynnwood, Pacnor Mktg.	206-284-8020
EXP	N.Y., New York, Roburn Agencies	212-989-5939

ARGO TRANSDATA CORP., Box 554, Clinton, CT 06413, Tel: 203-669-2233; Empl.: 15

ARIES®
ELECTRONICS, INC.

ARIES ELCTRNS., Box 130, Frenchtown, NJ 08825, Tel: 201-996-6841, TWX: 510-235-3391; FSC No.: 51167; Empl.: 110; *Sls. Mgr.:* Frank Folmsbee .... **2•**1149-1152

Local Sales Offices & Reps

AL	Huntsville, CSR	205-533-2444
AZ	Glendale, Adtek, Inc.	602-931-9289
CA	Los Angeles, Universal Comp.	213-641-4255
CA	Santa Clara, Nova-Tronix	408-727-9530
CO	Aurora, Mountain View Mktg.	303-360-9641
CT	Canton, Bell Controls	203-693-8926
FL	Ft Lauderdale, APM Assoc.	305-565-0056
FL	Longwood, APM Assoc.	305-869-6831
FL	Merritt Island, APM Assoc.	
FL	Tampa, APM Assoc.	813-886-2457
GA	Atlanta, CSR	404-396-3720
ID	Boise, Doran Sls. Assoc.	208-343-9969
IL	Elk Grove Village, Carlson Sls. Assoc.	312-956-8240
IN	Indianapolis, J and W Sls.	317-842-3740
IA	Cedar Rapids, Carlson Sls. Assoc.	319-377-6341
KS	Gladstone, Delltron Co.	816-436-6445
MD	Lutherville, J. A. Dougherty Sls.	301-321-7890
MI	St. Joseph, OBE Inc.	616-429-7788
MI	W. Bloomfield, OBE Inc.	313-332-4900
MI	West Bloomfield, OBE Inc.	313-332-4900
MN	Bloomington, Northport Engrg.	612-854-5556
MO	Gladstone, Delltron Co.	816-436-6445
MO	St. Louis, Delltron Co.	314-869-4779
NH	Nashua, Bell Controls	603-882-6984
NJ	Ho-Ho-Kus, DJ Fisher Co.	201-652-0090
NM	Albuquerque, Varigon Assoc.	505-344-5503
NY	Morrisville, Promark Elect.	315-662-3310
NC	Raleigh, CSR	919-878-9200
OH	Akron, Augnat Assoc.	216-273-1211
OH	Dayton, Augnat Assoc.	513-298-1507
OH	Mansfield, Augnat Assoc.	419-526-1488
OK	Tulsa, Advance Technical Sls.	918-664-0482
OR	Forest Grove, Doran Sls. Assoc.	503-357-3333
PA	Harleysville, Thomas Jackson Assoc.	215-643-5560
PA	Harrison City, Augnat Assoc.	412-281-8283
SC	Matthews, CSR	704-847-1927
TX	Austin, Advance Tech. Sls.	512-459-1351
TX	Dallas, Advance Tech. Sls.	214-340-1300
TX	Houston, Advance Tech. Sls.	713-440-3888
UT	Murray, Mountain View Mktg.	801-261-4867
WA	Greenacres, Doran Sales Assoc.	509-922-2317
WA	Redmond, Doran Sls. Assoc.	206-885-1885
WI	Milwaukee, Carlson Sls. Assoc.	414-476-2790

Local Distributors

AL	Huntsville, Comp. Dist.	205-993-7501
AZ	Phoenix, Arizona Comps.	602-269-5655
AZ	Scottsdale, Fiesta Elctrns.	602-861-1141
AZ	Tempe, Circuit Specialists	602-966-2878
AR	Little Rock, Component Distrs.	501-227-6278
CA	Canoga Park, Tim-Co	213-992-5040
CA	Fullerton, Pyramid Elctrns.	213-691-0561
CA	San Diego, Sigma Elec.	619-565-2000
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CA	Santa Clara, Peters De-Laet	408-727-9440
CO	Englewood, Industrial Elctrns.	303-694-9444
CT	Danbury, Pilgrim Elect.	203-792-7274
CT	Norwalk, Cobra Comps.	203-847-6442
CT	Wallingford, Cronin	203-265-3134
FL	Ft. Lauderdale, Comp. Dist.	305-971-4950
GA	Atlanta, KSM Elect.	800-554-9227; 404-458-2013
GA	Norcross, CDI	404-441-3320
IL	Northbrook, Classic Comps. Supply	312-272-9650
IN	Indianapolis, Meunier Elctrn. Supply	317-635-3511
LA	Lafayette, Ralph's	318-234-4507
MD	Baltimore, A S I Elctrns.	301-265-5100
MA	Burlington, OPL Elctrns.	617-229-2424
MA	Middleboro, Glynn Elctrns.	617-947-4262
MA	Wilmington, Cronin Elctrns.	617-449-5000
MI	Grand Rapids, T & W Elctrns.	616-241-3645
MN	Minneapolis, The Joel Co.	612-545-5669
MO	Valley Park, Beckwith Computer Elctrns.	314-825-2237
NH	Salem, Cronin	603-898-4440
NM	Albuquerque, Intl. Elctrns.	505-345-8120
NY	Rochester, Simcona Elctrns.	716-328-3230
NC	Raleigh, Comp. Distrs.	919-834-9465
OH	Cleveland, Pruitt Energy	216-566-1545
OH	Columbus, Wedemeyer Elect. Supp.	614-436-9600
OH	Warren, REM Elctrns.	216-373-1300
OR	Portland, Carlyle	503-292-2053
PA	Erie, REM Elctrns.	814-453-5626
PA	McKeesport, Barno Radio	412-751-5966
PA	Philadelphia, Shap Elctrns.	215-969-3300
TX	Addison, Connec-Tek	214-239-7552
TX	Arlington, Bell Comp. Sls.	817-461-5303
TX	Austin, Quality/Components	512-835-0220
TX	El Paso, Intl. Elctrns.	915-598-3406
TX	Fort Worth, Indl. Elctrns.	817-731-7321
TX	Houston, Ralph's	713-748-4909
TX	Richardson, Air Quip Sls.	214-234-3285
VA	Falls Church, Comp. Dist.	703-533-3500
WA	Seattle, Pacific Elctrns	206-575-1050
WA	Seattle, Carlyle Wire & Cable	206-575-6750
WI	Mequon, Taylor	414-241-4321
WI	New Berlin, Classic	414-786-5300

ARISTO GRID LAMP PRODS., 65 Harbor Rd., Port Washington, NY 11050, Tel: 516-944-3030; Empl.: 21

ARK ELCTRNS. CORP., 1325 Industrial Hwy., Southampton, PA 18966, Tel: 215-322-6510; *Sls. Mgr.:* S. Kalos

ARMIGER & ASSOCS., INC., Daniel Woodhead, Inc., 2525 Ridgmar Blvd., Fort Worth, TX 76116, Tel: 817-737-2900; *Sls. Mgr.:* Dave Forcey; *Dist. Mgr.:* Dave Forcey

ARK-LES, 51 Water St., Watertown, MA 02172, Tel: 617-924-2330, Telex: 92-2441; Empl.: 700; *Sls. Mgr.:* Stephen Glorioso

ARMEL ELCTRNS., 1601 75th St., N. Bergen, NJ 07047, Tel: 201-869-4201, TWX: 710-992-8842; FSC No.: 91663; Empl.: 55; *Sls. Mgr.:* V. A. Pasqualino

ARMSTRONG WORLD INDS., W. Liberty St., Lancaster, PA 17604, Tel: 717-397-0611, TWX: 717-560-4405; Empl.: 24,000

ARMTEC INDUSTRIES, INC., Daven Components Grp., Manchester Airport, Manchester, NH 03103, Tel: 603-669-0940, TWX: 710-220-1747; FSC No.: 58880; Empl.: 400; *Sls. Mgr.:* Dave Richards .... **1B•**1543

Local Sales Offices & Reps

AL	Huntsville, Technlg. Mktg. Assoc.	205-883-7893
AZ	Tempe, Trembly Assoc.	602-967-2058
CA	Fullerton, Groh Assoc.	714-738-7105
CA	Santa Clara, Fischer Assoc.	408-733-7350
CO	Lakewood, Trembly Assoc.	303-233-9544
FL	Pompano Beach, Techlg. Mktg. Assoc.	305-942-0774
GA	Atlanta, Technlg. Mktg. Assoc.	404-257-0374
IL	Northfield, Imex	312-446-8934
IN	Ft. Wayne, J&B Eng. Sls.	219-483-2813
KS	Shawnee Mission, Technical Sls.	913-888-3330
MD	King of Prussia, Freedman-Malta Assoc.	215-337-9211
MA	Norwood, MPS Elctrns.	617-769-8700
MN	Minneapolis, R-J Inc.	612-866-3661
MO	St. Louis, Technical Sls.	314-725-5361
NV	Las Vegas, Trembly Assoc.	702-739-9770
NJ	New Providence, Al Robinson Assoc.	201-464-4812
NM	Albuquerque, Trembly Assoc.	505-266-8616
NY	Clarence Center, Nu-Tekneex Inc.	716-741-9138
NY	Guilderland, Nu-Tekneex Inc.	518-355-1829
NY	Lynbrook, HLJ Comp-Tech	516-599-2999
NC	Burlington, P. J. Nahser	919-226-8053
OH	Englewood, Allen Nace Co.	513-836-0931
OH	Richfield, Allen Nace Co.	216-659-7178
OR	Portland, Comp. Technlg. Inc.	503-292-1518
PA	King of Prussia, Freedman-Malta Assoc.	215-337-9211
TX	Dallas, Oeler & Menelaides	214-361-8876
TX	Houston, Oeler & Menelaides	713-772-0730
UT	Salt Lake City, Trembly Assoc.	801-486-5292
WA	Seattle, Comp. Technlg. Inc.	206-789-4555
EXP	NY, Islip, Lothar-Sanford	516-581-3662

ARNOLD ENGRG., Box "G", Marengo, IL 60152, Tel: 815-568-2000, Telex: 25-7448, TWX: 910-642-2790; Empl.: 900; *Sls. Mgr.:* C. F. Templeton, V.P.

ARNOLD MAGNETICS

ARNOLD MAGNETICS, 11520 W. Jefferson Blvd., Culver City, CA 90230, Tel: 213-390-3537/8837, TWX: 910-343-6468; FSC No.: 04879; Empl.: 105; *Sls. Mgr.:* Phil Kite; *Dist. Mgr.:* Phil Kite .... **3•**1496-1499

Local Sales Offices & Reps

AZ	Phoenix, Faser Tech. Sls.	602-948-4404
CA	El Segundo, L. L. Stoakes	213-640-2178
CA	Los Altos, Kolm Mktg. Assocs.	415-948-2635
CA	San Diego, L. L. Stoakes	619-452-1600
FL	DeBary, DJE Assocs.	305-668-6827
MD	Silver Springs, Youth Assocs.	301-598-5740
MA	Andover, Bee Assocs.	617-475-2124
NY	New Rochelle, Ascor Elctrns.	914-235-8838
TX	Houston, Spectra Sls.	713-747-2798
TX	Richardson, Spectra Sls.	214-234-3600

Aromat
Member of Matsushita Group

AROMAT CORP., 250 Sheffield St., Mountainside, NJ 07092, Tel: 201-232-4260, TWX: 710-997-9536; Empl.: 150 .... **1B•**1294-1309

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns. Assoc.	205-881-5031
AZ	Tempe, Sys. Sls. of Arizona, Inc.	602-829-9338
AR	Little Rock, Beacon Elctrns. Assoc.	501-224-5449
CA	Cupertino, Aromat Corp.	408-446-5000
CA	Garden Grove, Aromat Corp.	714-895-7707
CA	Garden Grove, Elsco	213-533-1255

CA	Santa Clara, Westrep	408-988-8833
CO	Littleton, Omega Ltd.	303-798-7040
CT	Madison, United Comps.	203-245-4810
FL	Fern Park, EIR	305-830-9600
FL	Orlando, Aromat Corp.	305-855-1075
GA	Atlanta, Beacon Elctrns. Assoc.	404-256-9640
IL	Elk Grove Village, Carlson Elctrn. Sls.	312-956-8240
IL	Elk Grove Village, Aromat Corp.	312-593-8535
IN	Indianapolis, J & W Sls. Co.	317-842-3740
IA	Cedar Rapids, Carlson Elctrn. Sls.	319-377-6341
MD	Pikesville, Imagitron Sls.	301-521-2020
MA	Gilman, United Comps.	203-889-4050
MA	Norwood, United Comps.	617-226-0556
MI	Grand Rapids, R. P. Urban & Assocs.	616-245-0511
MI	Redford, R. P. Urban & Assocs.	313-535-2355
MN	Bloomington, Northport Engrg.	612-854-5556
MO	Independence, Repco	816-254-3410
NJ	Hackensack, Meg Elctrn. Sls.	201-489-7700
NJ	Mountainside, Aromat Corp.	201-232-4260
NM	Albuquerque, SSA Inc. of New Mexico	505-881-8877
NY	Binghamton, Rochester Comps.	607-772-9292
NY	W. Henrietta, Rochester Comp.	716-546-4766
NC	Raleigh, Beacon Elctrns. Assoc.	919-787-0330
OH	Cleveland, J. R. Thornberry Co.	216-321-3328
OH	Kettering, J. R. Thornberry Co.	513-258-1863
OK	Tulsa, Advanced Tech. Sls.	918-664-0482
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
TX	Austin, C. R. Colvin & Assocs.	512-474-8698
TX	Dallas, Advanced Tech. Sls.	214-340-1300
TX	Houston, C. R. Colvin & Assocs.	713-961-1262
TX	Richardson, Aromat Corp.	214-235-0415
WA	Bellevue, Sls. & Engrg.	206-883-4999
WA	Vancouver, Sls. & Engrg.	206-573-5161
WI	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

Local Distributors

AL	Huntsville, Contact Elctrns.	205-881-9321
AZ	Tempe, Bell Inds.	602-966-7800
CA	Chatsworth, Mil-Com Dist.	213-998-3111
CA	Mountain View, U.S.I.	415-969-5420
CA	Santa Clara, Patane Selectronics	408-496-6151
CA	Santa Monica, Master Distrs.	213-452-1229
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Van Nuys, Patane Avionics	213-988-4455, 213-873-5541
CO	Denver, Ragon Elctrns.	303-744-3601
CO	Englewood, Industrial Elctrns.	303-694-9444
CT	Naugatuck, SCR Elec. Co.	203-729-8274
FL	Longwood, Intertec Comps.	305-834-7777
IL	Lombard, R. M. Elctrns.	312-932-5150
IL	Mt. Prospect, Magnuson Elctrns.	312-956-0700
IN	Indianapolis, R. M. Elctrns.	317-247-9701
IN	Indianapolis, Magnuson Elctrns.	317-247-5108
IA	Cedar Rapids, Bergquist Co.	319-366-8733
IA	Cedar Rapids, Ragon Elctrns.	816-254-3410
KS	Derby, Ragon Elctrns.	816-254-3410
MA	Canton, Impact Sls. Co.	617-821-1500
MA	Middleboro, Glynn Elctrns.	617-947-4262
MI	Grand Rapids, R. M. Elctrns.	616-531-9300
MN	Minneapolis, Joel Co.	612-545-5669
MN	Minneapolis, Bergquist Co.	612-835-2322
MN	St. Paul, Ragon Elctrns.	612-642-2828
MO	Berkeley, Ragon Elctrns.	319-254-3410
MO	Independence, Ragon Elctrns.	816-254-3410
NJ	Bellmawr, Mid-Atlantic Elctrns. Corp.	609-931-5303, 215-923-6868
NJ	Fair Lawn, Relay Specialties	201-797-3313
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Lynbrook, Peerless Radio Corp.	516-593-2121, 212-523-3456
NY	Millbrook, Villarreal Elctrns.	914-677-3447
NY	Mt. Vernon, QAR Indl. Elctrn. Sls.	914-699-2224
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rome, Rome Elctrns.	315-337-5400
NC	Charlotte, Elctrns. Mktg. Corp.	704-394-6195
NC	Charlotte, Dixie Elctrns.	704-377-5413
NC	Hickory, Dixie Elctrns.	704-328-2646
NC	Winston-Salem, Dixie Elctrns.	919-724-5961
OH	Columbus, Elctrns. Mktg. Corp. (EMC)	614-299-4161
OH	Highland Heights, Elctrns. Mktg. Corp. (EMC)	216-442-3441
OH	Kettering, Elctrns. Mktg. Corp. (EMC)	513-439-4711
OK	Tulsa, Norvell Elctrns.	918-254-8606
OR	Portland, P&R Inds.	503-641-9525
PA	Harrisburg, Advacom	717-545-5674
PA	Horsham, Pioneer/Delaware Valley	215-674-4000
PA	McKean, Advacom	814-476-7774
PA	Wayne, Peak Elctrns.	215-293-9000
RI	Pawtucket, Major/Edwards	401-725-7400
SC	Charleston, Dixie Elctrns.	803-554-7515
SC	Columbia, Dixie Elctrns.	803-779-5332
SC	Greenville, Dixie Elctrns.	803-297-1430
TN	Gray, Dixie Elctrns.	615-477-3838
TN	Knoxville, Dixie Elctrns.	615-938-4131
TX	Austin, Southwest Elctrns.	512-837-8971
TX	Austin, Norvell Elctrns.	512-458-8106
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	Dallas, Computer Comps. Corp.	214-239-0271
TX	El Paso, ERA Elctrns., Inc.	915-592-4126
TX	Houston, Norvell Elctrns.	713-777-1666
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Stafford, Southwest Elctrns.	713-491-4900
VA	Roanoke, Mexitronics Corp.	703-342-4444
WA	Bellevue, Bell Inds.	206-747-1515
WA	Seattle, Pacific Elctrns.	206-575-1050
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AL	Huntsville, Redstone Military Svc.	205-837-6136
AZ	Chandler, Blackhart Assoc.	602-831-2566
CA	Los Angeles, McDougall/McLaughlin	213-477-8556
CA	Mountain View, Mark V Assocs.	415-964-6275
FL	Winter Park, Microwave Mktg.	305-678-2141
IL	Mt. Prospect, Cain & Co.	312-253-3578
IA	Cedar Rapids, Palatine Sls.	319-365-8071
KS	Mission, Palatine Sls.	913-831-0555
KS	Wichita, Palatine Sls.	316-776-0065
MD	Ellicott City, Doss Elctrns.	301-465-1336
MA	Chelmsford, BBC	617-256-6593
MO	Hazelwood, Palatine Sls.	314-839-0800
NY	Great Neck, EAC	516-466-9798
NY	Utica, B D Hummel Co.	315-736-7821
NC	Raleigh, Barker Assoc.	919-851-7841
OH	Dayton, Haacke Co.	513-254-1951
OH	Lancaster, Cain & Co.	614-654-4800
PA	Newtown, SWR Assocs. Corp.	215-356-8550
TX	Garland, TESCO	214-681-1376
WA	Seattle, Datacom Assocs.	206-285-2525

ARRAY TECHNOLOGY, 992 S. Saratoga-Sunnyvale Rd., San Jose, CA 95129, Tel: 408-252-9900; *Sls. Mgr.:* Jim Schenck

ARROW FASTENER, 271 Mayhill St., Saddlebrook, NJ 07662, Tel: 201-843-6900; Empl.: 600

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Local Sales Offices & Reps

AL	Huntsville, Hollingsworth & Still	800-241-5712
AZ	Phoenix, Elec-Com	602-967-8643
CA	Los Angeles, Arrow Hart Div.	213-588-5251
CO	Denver, West, Inc.	303-692-0131
CT	Hartford, Arrow Hart	203-249-8471
FL	Ft. Lauderdale, Hollingsworth & Still	800-241-5712
FL	Miami, Hollingsworth & Still	800-241-5712
FL	Orlando, Hollingsworth & Still	800-241-5712
GA	Norcross, Hollingsworth & Still	800-241-5712
IL	Wood Dale, Arrow Hart Div.	312-766-9570
MO	St. Louis, Arrow Hart	314-569-0626
NJ	Berlin, Arrow Hart	609-768-9520
NM	Albuquerque, Elec-Com Assoc.	505-898-6101
NC	Greensboro, Hollingsworth & Still	800-241-5712
NC	Kernersville, Hollingsworth & Still	800-241-5712
OH	Mason, Arrow Hart	513-398-0156
OR	Portland, Micro Sales, Inc.	503-297-4726
PA	Willow Grove, Arrow Hart	215-659-3728
TX	Richardson, Arrow Hart Div.	214-644-6210
UT	Salt Lake City, Meridian West	801-466-2888
WA	Belleview, Micro Sales, Inc.	206-451-0569
WI	Pewaukee, Arrow Hart Div.	414-367-0081

Local Distributors

AL	Muscle Shoals, Jones Elctrns.	205-383-1241
AZ	Phoenix, Be Switched	602-275-4805
AZ	Tempe, Fisher/Brownell	602-967-1464
AR	Little Rock, Carlton-Bates Co.	501-562-9100
CA	Alhambra, Fisher/Brownell	213-289-0255
CA	Commerce, Electro Comps.	213-727-0200
CA	Covina, Selecta Switch	213-967-4123
CA	Gardena, California Switch & Signal	213-770-2330
CA	Los Angeles, Master Distributor	213-452-1229
CA	Los Angeles, Electric Switches	213-660-1310
CA	Sacramento, Integrated Elctrns.	916-424-5297
CA	San Diego, Fisher/Brownell	714-560-8545
CA	San Francisco, Zack Elctrns.	408-626-1444
CA	San Jose, Consolidated Parts	408-263-9521
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	San Leandro, Electro Components	415-352-5210
CA	Santa Clara, Fisher/Brownell	408-988-6041
CA	Santa Fe Springs, Eurton Elec.	213-946-4477
CA	Tustin, Western Switches & Control	714-731-4333
CO	Denver, Elctrn. Parts	303-744-1992
CO	Denver, Integrated Elctrns.	303-534-6121
CO	Denver, Denver Wintronics	303-934-2406
CO	Denver, Consolidated Parts	303-623-5313
CO	Denver, Star for Parts	303-623-4224
CO	Denver, Fistells Elctrn. Supp.	303-244-4691
CT	Shelton, Century Elec. Sy	203-736-2684
CT	West Hartford, Gal Elec.	203-232-9880
FL	Ft. Lauderdale, Peerless Radio	305-973-4141
FL	Jacksonville, Ace Elec. Supp.	904-398-9857
FL	Miami, Electrn. Equip.	305-871-3500
FL	Miami, Alpeco Intl.	305-592-2985
FL	Sarasota, Workman Elctrn.	813-371-4242
FL	Sarasota, Dow Elctrns.	813-365-3393
GA	Atlanta, Ack Radio Supply	404-351-6340
GA	Atlanta, A-C Equip.	404-451-2747
HI	Honolulu, Honolulu Elctrns.	808-949-5564
IL	Addison, LComp Chicago	312-628-1400
IL	Chicago, Revere Elec. Supp.	312-738-3636
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Palatine, OHM Elctrns.	312-359-5500
IL	Rockford, G. C. Elctrns.	815-968-9661
IL	Wood Dale, Electro Kinetics	312-595-6700
IN	East Chicago, Acro Elctrns.	219-397-8681
IN	Evansville, Hutch & Son	812-425-7201
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Marion, Brenneman & Assoc.	319-377-6394
LA	Lafayette, Ralph's Elctrns.	318-233-0105
LA	New Orleans, William B. Allen	504-525-8222
LA	Shreveport, Ind. Elctrns.	318-222-9459
MD	Bethesda, Empire Elec. Sy	301-656-3300
MD	Rockville, Capital Radio Whlsrs.	301-881-2270
MA	Allston, Hilco Elec. Supp.	617-783-2600
MA	Billerica, A. W. Mayer Co.	617-229-2255
MA	Hingham, Sager Elctrl.	617-749-6700
MI	Grand Rapids, S-F Elctrn. Sy.	616-459-0216
MI	Livonia, Pioneer Michigan	313-525-1800
MI	Livonia, RS Elctrns.	313-525-1155
MI	St. Clair Shores, SPEMCO	313-771-2700

MN	Minneapolis, Sterling Elec.	612-332-4571
MN	St. Paul, Gopher Elctrns. Co.	612-483-4450
MS	Jackson, Ellington Elctrns.	601-355-0561
MO	Kansas City, LComp Kansas City	816-221-2400
MO	Maryland Heights, LComp St. Louis	314-291-6200
NE	Lincoln, Scott Elctrns.	402-466-8221
NJ	Camden, General Radio Sy. Co.	609-964-8560
NJ	East Hanover, State Elctrn. Parts	201-887-2550
NJ	Manasquan, Heiman H. Smith	201-223-9400
NJ	Prospect Park, Kappe	201-790-1999
NM	Albuquerque, Walker Radio	505-247-2288
NY	Binghamton, Florance Elec Sy	607-724-2455
NY	Buffalo, Genesee Radio & Parts	716-873-9661
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Farmingdale, S.A.I.	516-293-2710
NY	Hempstead, Electronic Equip.	516-538-5510
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	New York City, Browneli Electro	212-691-1171
NY	Rochester, Rochester Radio Sy.	716-454-7800
NY	Woodside, Switches Unltd.	212-478-5000
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Cleveland, Midland Elec.	216-248-3800
OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Esco	513-226-1133
OH	Dayton, Pioneer/Dayton	513-236-9900
OR	Portland, Johnstone Corp.	503-231-4833
PA	Philadelphia, Philadelphia Elctrns.	215-568-7444
RI	Providence, W. M. Dandreta	401-861-2800
TN	Memphis, Bluff City Elctrns.	901-345-9500
TN	Nashville, Carlton-Bates	615-244-3562
TN	Nashville, Randolph & Rice	615-255-5602
TX	Austin, Harrison Equip.	512-458-3555
TX	Dallas, Associated Aircraft	214-331-4381
TX	Dallas, Wilkinson Brothers	214-941-9963
TX	Dallas, Harrison Equip.	214-239-2750
TX	El Paso, Midland Specialty	915-533-9555
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Garland, Newark Elctrns.	214-494-5911
TX	Houston, Harrison Equip.	713-879-2600
TX	Lubbock, Texas Elctrn. Sy. Corp.	806-765-8456
TX	Richardson, Fisher/Brownell	214-235-3177
TX	San Antonio, Sherman Elctrns.	512-224-1004
UT	Salt Lake City, Standard Supp.	801-486-3371
VA	Charlottesville, Virginia Radio Sy	804-296-4184
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Bellevue, Bell Ind.	206-747-1515
WA	Bellevue, Integrated/Jaco	206-455-2727
WA	Seattle, Zepher Elctrn. Sls.	206-241-1980
WA	Seattle, Radar Elec.	206-282-2511
WI	Mequon, Taylor Elec. Co.	414-241-4321

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Local Sales Offices & Reps

CA	San Diego, S & A Technical Sales	619-295-8330
FL	North Miami, Ben Goldner	305-932-2782
GA	Atlanta, Electro Sls.	404-394-1122
IL	Chicago, Berndt Assoc.	312-283-0713
KY	Louisville, KW Electronic Sales, Inc.	502-451-1860
MA	Southboro, K.S.A. of New England	617-485-9432
MI	Novi, Lektronics Sales	313-349-3304
MN	Minneapolis, Berndt Assoc.	612-546-2021
NY	Bayside, John Kavanagh	212-229-2731
NC	Greensboro, KZJ Component Sales	919-852-5990
OH	Dayton, KW Electronic Sales, Inc.	513-890-2150
OH	Shaker Heights, KW Electronic Sales, Inc.	216-491-9177
OH	Worthington, KW Electronic Sales, Inc.	614-888-0483
PA	Philadelphia, Check Associates	215-487-3007
TN	Chattanooga, Electro Sales	615-267-4260

ARTECH CORP., 2901 Telestar Ct., Falls Church, VA 22042, Tel: 703-560-3292; Empl.: 40; *Sls. Mgr.:* S. Martin

ARTEL COMMUNICATIONS CORP., 93 Grand St., Worcester, MA 01602, Tel: 617-752-5690

ARTISAN ELCTRNS., 5 Eastmans Rd., Parsippany, NJ 07054, Tel: 201-887-7100; Empl.: 200; *Sls. Mgr.:* Gail Norton; *Dist. Mgr.:* Gail Norton

Local Distributors

CA	Haywards, Allied Elctrns. Inc.	415-487-5250
IL	Elgin, Allied Elctrns. Inc.	312-697-8200
NJ	Fair Lawn, Relay Specialties	800-526-5376
NY	Rochester, Simcona Elctrns. Corp.	716-328-3230
OH	Euclid, Rockford Controls Ohio, Inc.	216-731-5250
PA	Washington Crossing, Riverside Comp. Supp. Co.	215-493-5228
TX	Fort Worth, Allied Elctrns.	817-336-5401

ARTRONIC INSTR. CO., INC., 9 Division St., Sidney, NY 13838, Tel: 607-563-8444; FSC No.: 09446

ART WIRE/DODUCO, 9 Wing Dr., Cedar Knolls, NJ 07927, Tel: 201-267-2000, Telex: 13-6455; Empl.: 100

ASACA SHIBASKU CORP. OF AMER., 12509 Beatrice St., Los Angeles, CA 90066, Tel: 827-7144, Telex: 182089; *Sls. Mgr.:* Alan R. Davis; *Dist. Mgr.:* Susan Grossinger

ASCO WIRE & CABLE CO., 412 Housatonic Ave., Bridgeport, CT 06608, Tel: 203-366-5294; Empl.: 30; *Sls. Mgr.:* M. Madow

Local Sales Offices & Reps

FL	Melbourne Beach, James Indus.	305-725-9807
IL	Inverness, James Indus.	312-358-8000
VA	Portsmouth, FBD Sales	804-484-3162

Local Distributors

NY	Corona, Magnet Wire	212-651-0900

ASHLAND CHEMICAL, Ashland Oil, Inc., Box 2219, Columbus, OH 43216, Tel: 614-889-3333

ASHLAND ELEC. PRODS., 32-02 Queens Blvd., Long Island City, NY 11101, Tel: 212-392-4010; Empl.: 115; *Sls. Mgr.:* Harland W. Cashman

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ASMANN COMPONENTS, Div. of ebm Industries, Inc., 525 New Britain Ave., Unionville, CT 06085, Tel: 203-674-1515, TWX: 710-423-8723; *Sls. Mgr.:* Edward A. Cyr .... 2•1255

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ASSEM-PRO INSTRS., Div. of Overnight Engineering Inc., 1859 Andrews Ave., San Jose, CA 95124, Tel: 408-267-1168; *Sls. Mgr.:* Lynn Riordan; *Dist. Mgr.:* Lynn Riordan

ASSEMBLY SPECIALISTS, 914 Main St., Box 965, Acton, MA 01720, Tel: 617-263-9100; *Sls. Mgr.:* George L. Boyden

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CT	Bristol	203-582-9581
GA	Atlanta	404-955-1123
IL	Lombard	312-495-4760
IL	Mattoon	217-235-5601
MI	Ann Arbor	313-665-8686
MI	Livonia	313-478-5300
NY	Syracuse	315-457-9200
NC	Arden	704-684-7836
OH	Dayton	513-253-4131
PA	Corry	814-664-9646
TN	Memphis	901-362-9544
TX	Dallas	214-330-8661
WI	Milwaukee	414-482-1600

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Local Sales Offices & Reps

AL	Huntsville, 20th Century Mktg.	205-533-9281
AZ	Tempe, Cantec Sls.	602-829-0191
CA	San Diego, SR Elctrns.	619-560-8330
CA	Santa Clara, I Squared	408-988-3400
CA	Santa Clara, Astec (USA) Ltd.	408-748-1200
CA	Thousand Oaks, SC Cubed	805-496-7307
CA	Tustin, SC Cubed	714-731-9206
CO	Wittleton, Lange Sales Inc.	303-795-3300
DC	Fairfax, Scientific Assocs.	703-385-0600
GA	Stone Mtn., 20th Century Mktg.	404-292-7088
IL	Rolling Meadows, Sumer	312-991-8500
MA	Burlington, Mill-Bern Assocs.	617-273-1313
MN	Bloomington, Elctrn. Sls. Agency	612-884-8291
NJ	Pennsauken, Representatives Inc.	609-662-5222
NY	Jamaica, SJ Assocs.	212-291-3232
OH	Beachwood, Elctrn. Salesmasters	216-831-9555
OK	Tulsa, West Assocs.	918-492-0390
TN	Knottsville, 20th Century Mktg.	615-690-1618
TX	Austin, West Assocs.	512-454-3681
TX	Dallas, West Assocs.	214-248-7060
TX	Houston, West Assocs.	713-777-4108
WA	Bellevue, SDR Squared	206-747-9424

Local Distributors

CA	El Segundo, Wyle Labs.	213-322-8100
CA	Irvine, Wyle Labs.	714-863-9953
CA	Rancho Cordova, Wyle Labs.	916-638-5282
CA	San Diego, Wyle Labs.	619-565-9171
CA	Santa Clara, Wyle Labs.	408-727-2500
CO	Phoenix, Wyle Labs.	602-249-2232
CO	Thornton, Wyle Labs.	303-457-9953
OK	Tulsa, Quality Comps.	918-634-8812
OR	Hillsboro, Wyle Labs.	503-640-6000
TX	Austin, Quality Comps.	512-835-0220
TX	Dallas, Quality Comps.	214-387-4949
TX	Sugarland, Quality Comps.	713-491-8812
UT	Salt Lake City, Wyle Labs.	801-974-9953
WA	Bellevue, Wyle Labs.	206-453-8300

ASTRO CIRCUIT, 100 Hale St., Lowell, MA. 01851, Tel: 617-458-3240, TWX: 710-343-0754; Empl.: 220

ASTROCOM ELECTRONICS, INC., Box 370, Oneonta, NY 13820, Tel: 607-432-1930

ASTRO DYNAMICS, INC., 2 Gill St., Woburn, MA 01801, Tel: 617-935-4944; Empl.: 50

ASTRODYNE, 35 Executive Dr., Hudson, NH 03051, Tel: 603-880-8600; FSC No.: 28023; Empl.: 60; *Sls. Mgr.:* Warren Heinzelmann; *Dist. Mgr.:* Warren Heinzelmann

ASTRO-GEO-MARINE, INC., 202 E. Cota St., Santa Barbara, CA 93101, Tel: 805-965-7005; FSC No.: 51473; Empl.: 15

ASTRO INSTRUMENT CORP., 2501 NW 17th Ln., Pompano Beach, FL 33064, Tel: 305-748-5527, TWX: 510-956-9601; FSC No.: 51761; *Sls. Mgr.:* William E. Watson

ASTROLAB, 345 Dalziel Rd., Linden, NJ 07036, Tel: 201-862-0022, TWX: 710-996-5930; FSC No.: 16301; Empl.: 36; *Sls. Mgr.:* J. R. Toma

ASTRO-MED, INC., Atlan-Tol Indl. Pk., W. Warwick, RI 02893, Tel: 401-828-4000, TWX: 710-382-6409; Empl.: 120; *Sls. Mgr.:* Everett V. Pizzuti; *Dist. Mgr.:* Everett V. Pizzuti .... 3•1382

ASTRONAUTICS CORP. OF AMERICA, P.O. Box 523, Milwaukee, WI 53201, Tel: 414-447-8200, TWX: 910-262-3153; FSC No.: 10138

ASTRON CORP., 2852 Walnut #E, Tustin, CA 92680, Tel: 714-832-7770; *Sls. Mgr.:* William Pochirowski; *Dist. Mgr.:* William Pochirowski .... 3•1501

Local Distributors

CA	Los Angeles, Henry Radio	213-820-1234
CA	Northridge, Ora Elctrns.	213-701-5848
CA	Sun Valley, Cartwright Comms.	213-768-7744
CO	Aurora, Electro Tech Sls.	303-343-8937
GA	Marrietta, NBC Mktg.	404-424-9097
IL	Joliet, Primus Elctrns.	815-436-8945
IL	Joliet, Communications Assoc.	815-744-6444
MD	Cockleysville, Tessco.	301-252-0860
NJ	Clifton, Meridian Comms.	201-473-1623
OH	Cincinnati, Cartwright Comms.	513-489-1755
TX	Dallas, M. Hutton Co.	214-484-0580

ASTROSYN AMERICA, 14349 Victory Blvd., Ste. 304, Van Nuys, CA 91401, Tel: 213-785-2197, Telex: 651446; *Sls. Mgr.:* D. F. Dowis; *Dist. Mgr.:* D. F. Dowis

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ASTROSYSTEMS, 6 Nevada Dr., Lake Success, NY 11042, Tel: 516-328-1600, TWX: 510-223-0411; Empl.: 150; *Sls. Mgr.:* James R. Boyer .... **3**•1189, 1504, 1817

Local Sales Offices & Reps

AL	Huntsville, Kemp Engrg.	205-837-4304
AR	El Dorado, Indust. Controls Assoc.	501-862-2051
CA	Cerritos, Foxco Equip.	213-921-3421
CO	Englewood, Dynatech	303-773-2830
CO	Englewood, Dynatech	303-773-2830
FL	Sanibel, Motion Products	813-472-0066
GA	Atlanta, Kemp Instrs.	404-452-8050
GA	Doraville, Kemp Inst.	404-938-5973
IL	Elgin, JHS Assocs.	312-741-9070
IN	Mishawaka, Engineered Sls.	219-255-5111
MD	Bethesda, Multi-Measurements, Inc.	301-889-0471
MI	Detroit, Static Controls Corp.	313-537-2975
MI	Walled Lake, Static Controls Corp.	313-363-4500
MS	Industrial, Controls Assoc.	501-862-2051
NC	Charlotte, Jake Rudisill Assoc. Inc.	704-377-6901
OH	Cleveland, Instr. Sys.	216-845-8800
OH	Dayton, Instr. Sys.	513-294-2838
OK	Tulsa, Industrial Controls Assoc.	501-862-2051
PA	Pittsburgh, Instrumentation Sys.	412-243-1111
PA	Warminster, Multi-Measurements	215-675-3082
TX	Fort Worth, Indust. Controls Assoc.	501-862-2051
TX	Houston, Indust. Controls Assoc.	501-862-2051
WA	Bothell, Pacific N.W. Controls Inc.	206-821-0448

ASTRO TOOL CO., INC., 21615 Southwest Tualatin Valley Hwy., Beaverton, OR 97006, Tel: 503-642-9853

AT&T, 475 South St., Morristown, NJ 07960, Tel: 201-631-6790; *Sls. Mgr.:* D. J. Liedberg

Local Sales Offices & Reps

CA	Sunnyvale	408-746-2332
CO	Denver	303-538-2406
GA	Atlanta	404-257-6495
MA	Burlington	617-229-5672
MN	Minneapolis	612-724-2019
NJ	Morristown	201-631-6790
OH	Columbus	614-860-5155
PA	King of Prussia	215-768-2626

ATEC, Box 19426, 8219 Kempwood Dr., Houston, TX 77055, Tel: 713-468-7971, Telex: 77-4132 FLEKS HOU; FSC No.: 09552; Empl.: 80; *Sls. Mgr.:* F. Sawberger

A-SYSTEMS INC., Box 13, Ivy, VA 22945, Tel: 804-295-7200; *Sls. Mgr.:* F. M. Artrip

ATEC SYS., 107 N. Washington St., E. Rochester, NY 14445, Tel: 716-381-4740; Empl.: 6; *Sls. Mgr.:* Harry Turner

ATHENA CONTROLS, INC., 5145 Campus Dr., Whitemarsh Ind. Campus, Plymouth Meeting, PA 19462, Tel: 215-828-2490; Empl.: 85; *Sls. Mgr.:* David A. Tryon; *Dist. Mgr.:* Allen Breckenridge

ATKINS TECH., 3321 S.W. 40th Blvd., Gainesville, FL 32608, Tel: 904-378-5555, Telex: 51-4736-HALA; Empl.: 30; *Sls. Mgr.:* Walter Fitz-William; *Dist. Mgr.:* Walter Fitz-William

ATLANTIC MAGNETICS, INC., P.O. Box 4127, Margate, FL 33063, Tel: 305-492-5196; *Sls. Mgr.:* Edward Cammarata; *Dist. Mgr.:* Rolando Marrero

ATLANTIC OPTICAL MOULDING, Ellis St., P.O. Box 309, Dudley, MA 01570, Tel: 617-943-1746; Empl.: 6

ATLANTIC RESEARCH, 5390 Cherokee Ave., Alexandria, VA 22312, Tel: 703-642-4000, Telex: 248893; FSC No.: 95335; Empl.: 2000

ATLANTIC
SCIENTIFIC CORPORATION

ATLANTIC SCIENTIFIC CORP., 2711 S. Harbour City Blvd., Melbourne, FL 32901, Tel: 305-725-8000, Telex: 755959; *Sls. Mgr.:* Murray W. Boggs .... **1B**•1257

Local Sales Offices & Reps

AZ	Phoenix, R. A. Mayes Co.	602-279-5243
CO	Englewood, R. A. Mayes Co.	303-761-9447
CT	Mt. Carmel, Scientific Dvcs.	203-248-9361
MA	Waltham, Scientific Dvcs.	617-890-2252
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	Albany, H. C. Johnson Agencies Inc.	518-459-1239
NY	Buffalo, H. C. Johnson Agencies Inc.	716-632-7880
NY	Rochester, H. C. Johnson Agencies Inc.	716-586-0777

Distributor

ATLANTIC SWITCH CONTROLS, INC., 194 Elliott St., Hartford, CT 06114, Tel: 203-527-7705 .... **1B**•1742

ATLANTIC SWITCH CONTROLS, INC., 5 Coliseum Ave., Nashua, NH 03063, Tel: 603-880-1971 .... **1B**•1742

ATLAS
ENERGY SYSTEMS

ATLAS ENERGY SYS., 9457 Rush St., S. El Monte, CA 91733, Tel: 213-575-0755, TWX: 910-587-3531; Empl.: 35; *Sls. Mgr.:* J. Thompson .... **3**•1826

Local Sales Offices & Reps

CA	Santa Ana	714-953-9645
CA	Santa Clara	408-988-5386
IL	Chicago	312-372-2237
MA	Boston	617-492-2525

ATLAS ENGRG. CORP., 10 Cheney St., Dorchester, MA 02121, Tel: 617-445-7100; FSC No.: 07001; Empl.: 75; *Sls. Mgr.:* Norman Scotch

ATLAS EYELETS, Pinkham St., Fairhaven, MA 02719, Tel: 617-997-9491; *Sls. Mgr.:* Arthur S. Tisch

ATLAS SOUND DIV., 10 Pomeroy Rd., Parsippany, NJ 07054, Tel: 201-887-7800, Telex: 13-6119; Empl.: 350; *Sls. Mgr.:* H. M. Jaffe; *Dist. Mgr.:* David A. Chambers

ATLEE

ATLEE INC., One Gill St., Woburn, MA 01801, Tel: 617-933-3510, Telex: 949407; FSC No.: 99378; Empl.: 40; *Sls. Mgr.:* Leon Kadls ...... **1B**•1259; **2**•1009, 1859, 1875, 1904

Local Sales Offices & Reps

CA	Agoura, Cal Rep	213-991-1940
CA	Corte Madera, Paul Oneal Assoc.	415-924-1691
CO	Arvada, Challange Sls.	303-427-3149
FL	Melbourne, R-Rep	305-725-6993
MD	Baltimore, Stitzer Assocs.	301-823-7688
MN	St. Paul, Countryman Assoc	612-645-9151
NY	Huntington, C. R. Mayer Co.	516-921-7876
NY	Rochester, Net Sls.	716-467-4538
NC	Raleigh, B. T. Funderburk	919-782-3493
OH	Cleveland, Techn. Sls. Assocs.	216-461-0826
PA	Paoli, Stitzer Assocs.	215-644-5500
TX	Dallas, Rem-Air Comp. Corp.	214-234-1069

Local Distributors

AZ	Phoenix, EGR	602-840-0320
CA	Northridge, Acort Inds.	213-993-6444
CA	San Jose, Afcom	408-263-0660
CA	San Jose, Bisco Inds.	408-946-8980
IN	Ft. Wayne, Graham Elec. Supp.	219-423-3422
IA	Cedar Rapids, Deeco	319-365-7551
MA	Winchester, Rush Inds.	617-729-5800
MN	Minneapolis, Aerospace Computer	612-884-4725
NJ	Nutley, Essex Electric	201-661-2600
NJ	Paramus, N.Y. Fastener	201-265-8770
NY	Bayshore, Merrit Fastener	516-242-1800
NY	Bohemia, Car-Lac	516-567-4200
NY	Buffalo, Summit Dist.	716-887-2800
NY	Long Island City, Hardware Specialty	212-361-9393
NY	Plainview, G & B Fastener	516-694-0990
NY	Plainview, G & B Fasteners	516-694-0990
TX	Dallas, National Precision	214-357-3921
TX	Richardson, Altair Co.	214-231-5166
VA	Charlottesville, Virginia Radio Supp. Co.	804-296-4184

ATMOSPHERE CONTROLS PRODS., 295 Polaris, Mountain View, CA 94043, Tel: 415-969-2640; Empl.: 14; *Sls. Mgr.:* Walter Quave Jr.; *Dist. Mgr.:* W. H. Ellis

ATR ELCTRNS., INC., 280 E. Lafayette Frontage Rd., St. Paul, MN 55107, Tel: 612-222-3791; *Dist. Mgr.:* R. D. Van Valin .... **3**•1827

ATV RESEARCH, INC., 1301 Broadway, Dakota City, NE 68731, Tel: 402-987-3771; *Sls. Mgr.:* Mel Shadbolt

AUBURN MFG., Pease Ave. & Stack St., Middletown, CT 06457, Tel: 203-346-6677; Empl.: 45; *Sls. Mgr.:* Richard Agria

AUDIO EQUIP., Div. W. Kidde & Co., Inc., 706 Forrest St., Charlottesville, VA 22901, Tel: 804-977-8050, TWX: 510-587-5461; Empl.: 50

AUDIOSEARS, South St., Stamford, NY 12167, Tel: 607-652-7305; FSC No.: 97101; Empl.: 140; *Sls. Mgr.:* D. Hartwell

AUDIOSONE, INC., 617 Fan Hill Rd., Monroe, CT 06468, Tel: 203-268-4372, 800-243-8160; *Sls. Mgr.:* Rudolph Duris

AUDIOTRONICS CORP., 7428 Bellaire Ave., N. Hollywood, CA 91605, Tel: 818-765-2645, Telex: 69-1241; Empl.: 300; *Sls. Mgr.:* Roy Schaub

AUDIOVOX CORP., 150 Marcus Blvd., Hauppage, NY 11787

AUGAT INC., 33 Perry Ave., Box 779, Attleboro, MA 02703, Tel: 617-222-2202, TWX: 710-391-0644; FSC No.: 91506; Empl.: 3,200; *Sls. Mgr.:* Jim Fuchs; *Dist. Mgr.:* William Hall .... **2**•1162, 1163, 1876-1879

Local Sales Offices & Reps

AL	Huntsville, Glen White Assocs.	205-883-7938
CA	Los Angeles, Wiley Co.	213-666-1611
CA	San Diego, Wiley Co.	619-571-2881
CA	Santa Clara, Augat Sls.	408-980-0955
CO	Littleton, Simpson Assocs.	303-794-8381
FL	Castleberry, Augat Sls.	305-339-3724
FL	Safety Harbor, Augat Sls.	813-725-1037
FL	Tamarac, Augat Sls.	305-721-6021
GA	Norcross, Glen White Assocs.	404-441-1447
HI	Honolulu, Hawaii Elctrns. Sls. & Svc.	808-845-8207
IL	Rolling Meadows, Sumer	312-991-8500
IA	Davenport, Ensco-Rep. Inc.	319-386-6600
KS	Overland Park, Ensco-Rep, Inc.	913-381-7557
KS	Wichita, Ensco-Rep. Inc.	316-683-1070
MD	Silver Spring, NKA Inc. (Govt.)	301-585-6141
MA	Norwood, Augat Sls.	617-762-3164
MI	Detroit, Rathsburg Assocs.	313-882-1717
MN	Edina, Augat Sls.	612-925-0255
MO	Maryland Hts., Ensco-Rep. Inc.	314-423-3935
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NJ	Maple Shade, NKA Inc. (Govt.)	609-234-4008
NM	Albuquerque, C. T. Carlberg Assoc.	505-888-3883
NY	Mt. Vernon, D. Sonkin Assocs.	914-668-9809
NY	N. Syracuse, L. D. Allen, Inc.	315-437-8387
NC	Raleigh, Glen White Assocs.	919-787-7016
OH	Dayton, NKA, Inc.	513-268-8771
OH	Englewood, A. Nace Co.	513-836-0931
OH	Richfield, A. Nace Co.	216-659-7178
TN	Gray, Glen White Assocs.	615-447-8850
TX	Houston, Augat Sls.	713-495-3100
TX	Richardson, Augat Sls.	214-235-7166
UT	Midvale, Simpson Assocs.	801-566-3691
VA	Lynchburg, Glen White Assocs.	804-237-6291
WA	Bellevue, Augat Sls.	206-455-2846
WI	Brookfield, Sumer Inc.	414-784-6641

AUGAT/ALCOSWITCH, See Alco Elctrn. Prods., Inc.

AUGAT/ES•P, INC., 12832 Chadron Ave., Hawthorne, CA 90250, Tel: 213-973-0262, Telex: 66-4467; Empl.: 85

AUGAT FIBEROPTICS, 40 Perry Ave., Attleboro, MA 02703, Tel: 617-222-2202, TWX: 710-391-0644; *Sls. Mgr.:* Bob Goecheler; *Dist. Mgr.:* Bill Hall

AULT, INC.

AULT, INCORPORATED, 1600 Freeway Blvd., Minneapolis, MN 55430, Tel: 612-560-9300, TWX: 910-756-3435; Empl.: 450; *Sls. Mgr.:* Dennis Getter .... **3**•1502, 1503

Local Sales Offices & Reps

AL	Huntsville, L & D, Inc.	205-837-1469
AZ	Scottsdale, DAR-C, Inc.	602-948-2240
CA	Los Angeles, West Elctrn. Sls.	714-898-0120
CA	San Diego, Dick West & Assocs.	619-233-0236
CA	Santa Clara, Magna Sls.	408-727-8753
CO	Denver, William J. Purdy	303-777-1411
CT	Manchester, G/M Assocs.	203-646-4443
FL	Ft. Lauderdale, QXI, Inc.	305-485-6030
FL	St. Petersburg, QXI, Inc.	813-821-2281
GA	Atlanta, L & D, Inc.	404-455-3483
IL	Arlington Hgts., MSI	312-956-1000
IN	Indianapolis, McFadden Sls.	614-459-1280
IA	Des Moines, Beams Co.	515-255-1148
KS	Shawnee Mission, Beams Co.	913-631-0300
MD	Columbia, Delta III Assocs.	301-730-4700
MA	Framingham, G/M Assocs.	617-872-4871
MI	Plymouth, Jay Mktg. Assocs.	313-459-1200
MO	St. Louis, Beams Co.	314-569-1060
NV	Carson City, Magna Sls.	702-883-1471
NH	Exeter, G/M Assocs.	603-778-7472
NJ	Ocean, P. Saftler Assoc.	201-922-3014
NY	Lynbrook, P. Saftler Assoc.	516-593-7880
NC	Greensboro, L & D, Inc.	919-292-3201
OH	Cleveland, Lyons Corp.	216-659-9224
OH	Dayton, E. Lyons Co.	513-278-0714
OR	Portland, Jas. J. Bacher Co.	503-297-8744
PA	Philadelphia, Samuel K. MacDonald, Inc.	215-545-1205
TX	Austin, R. F. Kimball Co.	512-443-5284
TX	Houston, R. F. Kimball Co.	713-840-0590
TX	Richardson, R. F. Kimball Co.	214-231-3447
WA	Seattle, Jas. J. Backer Co.	206-285-1300

Local Distributors

CA	Cincinnati, Hughes Peters	513-351-2000
CA	Mountain View, USI Elctrn. Comps.	415-969-5420
CA	San Diego, Tauber Elctrns.	619-274-7242
CA	Santa Monica, Distr. Specialists	213-393-9666
CA	Van Nuys, Natl. Electro Sls. Corp.	213-781-0505
IL	Downers Grove, JaBro Batteries	312-964-9358
MA	Sharon, Adcour	617-784-8123
MO	St. Charles, Finnigan Elctrns.	314-946-6201
Can	St. Laurent, Quebec, Tech-Rep Elctrns. Ltd.	514-337-6046

AURA MFG., 50 McDermott Rd., New Haven, CT 06473, Tel: 203-777-2541; Empl.: 150; *Sls. Mgr.:* Joe Abbatiello

AURIC CORP., 470 Frelinghuysen Ave., Newark, NJ 07114, Tel: 201-242-4100; Empl.: 35

AUSTRON, INC., P.O. Box 14766, Exit 248 N. IH 35, Austin, TX 78761, Tel: 512-251-2313, TWX: 910-874-1356; FSC No.: 24672; Empl.: 153; *Sls. Mgr.:* R. Ellis .... **1A**•1314, 1315

Local Sales Offices & Reps

AL	Huntsville, Sci. Devices - SE	205-536-1969
AZ	Scottsdale, Territorial Mktg.	602-994-8665
CA	Goleta, Thorson Co.	805-964-8751
CA	Pleasant Hill, Austron	415-930-7268
CA	San Carlos, Westronics Assocs.	415-592-1417
CA	San Diego, Thorson Co.	619-292-8525
CA	Signal Hill, Thorson Co.	213-595-0361
CT	Southington, Scheinfein Assocs.	203-621-3492
FL	Orlando, Sci. Devices - SE	305-841-8180
FL	Shalimar, Sci. Devices - SE	904-651-4407
GA	Atlanta, Sci. Devices-SE	404-452-8709
IL	Elk Grove, Loren Green Assoc.	312-593-0282
IN	Indianapolis, Loren Green Assoc.	317-293-9827
MA	Reading, Scheinfein Assocs.	617-944-2304
MI	Union Lake, Ashby Assocs.	313-363-1100
MN	Minneapolis, Loren Green Assoc.	612-571-6666
NY	Frankfort, Kapital Instr. Sls.	315-894-4245
NY	Huntington, CDB Entprs.	516-692-5200
NC	Winston Salem, Sci. Devices-SE	919-765-5766
OH	Dayton, Ashby Assocs.	513-252-5627
OH	Lyndhurst, Ashby Assocs.	216-461-0826
OR	Portland, Cascade Data Mktg.	503-641-9266
PA	Plymouth Meeting, Sci. Devices - Phila.	215-825-9515
TX	Houston, Sci. Devices - Gulfcoast	713-864-1711
TX	Richardson, Sci. Devices - SW	214-231-8106
VA	McLean, Austron	703-734-1990
WA	Woodinville, Cascade Data Mktg.	206-788-3421

AUTOMATED PROD. EQUIP. CORP., 142 Peconic Ave., Medford, NY 11763, Tel: 516-654-1197, TWX: 510-228-2120; FSC No.: 57216; *Sls. Mgr.:* Edward F. Farnham; *Dist. Mgr.:* Edward F. Farnham

AUTOMATIC COIL CORP., Sub. Designatronics, Inc., 455 E. 10th Ave., Hialeah, FL 33010, Tel: 305-883-5311, TWX: 810-848-8097; Empl.: 125 .... **1A**•1221-1223, 1451-1453

Local Sales Offices & Reps

AL	Huntsville, CRS Elctrns.	205-533-2444
CA	Huntington Beach, Mil-Com Sls.	714-840-2424
GA	Atlanta, CRS Elctrns., Inc.	404-396-3720
IL	Palatine, T-Squared Assocs.	312-999-2144
MA	Manchester, Alard, Galagan & Assoc.	617-526-7733
NY	Brooklyn, Irv Morse Sls.	212-444-4974
OH	Dayton, Rockford Controls Ohio, Inc.	513-898-5452
OH	Euclid, Rockford Controls Ohio, Inc.	216-731-5250
OK	Broken Arrow, Genzel Sls. & Assoc., Inc.	918-258-8656

AUTOMATIC Connector, Inc.®

AUTOMATIC CONNECTOR, INC., 400 Moreland Rd., Commack, NY 11725, Tel: 516-543-5000, TWX: 510-226-3744; FSC No.: 94375; Empl.: 250; *Sls. Mgr.:* William Pitcher

Local Sales Offices & Reps

AZ	Tucson, WJM Sls.	602-888-4847
CA	Cupertino, Dura Elctrn. Sls.	408-255-2084
CA	Garden Grove, Elsco Elctrns.	714-891-4621
CA	San Diego, Elsco Elctrns.	714-292-1771
CO	Boulder, Comp. Prods. Sls.	303-530-2800
CT	Bridgeport, Millennium Elctrn. Sls.	203-372-2037
FL	Clearwater, Brennan Assoc.	813-446-5006
FL	Melbourne, Brennan Assoc.	305-724-0854
GA	Atlanta, Brennan Assoc.	404-996-6623
IL	Westchester, WG Controls	312-344-0690
IN	Ft. Wayne, Given Corp.	219-432-5585
MD	Union, Jedco Elctrn. Sls.	201-355-0474
MA	Woburn, Component Technology	617-933-5390
MO	St. Louis, R. F. Carlson Co.	314-961-4485
NJ	Haddonfield, Sunday - O'Brien	609-429-4013
NJ	Ho-Ho-Kus, J&B Assocs.	201-447-0126
NJ	Union, Jedco Elctrn. Sls.	201-355-0474
NM	Albuquerque, WJM Sls.	505-898-5917
NY	Buffalo, Quality Comp.	716-837-5430
NY	Manlius, Quality Comp.	315-682-8885
NY	Mt. Vernon, Sonkin Assoc.	914-668-9809
NC	Raleigh, B. T. Funderburk	919-782-3493
OH	Cincinnati, Stegman Blaine Mktg.	513-729-1969
OH	Kettering, Government Bidders Svc.	513-296-5991
OH	Vandalia, Stegman Blaine Mktg.	513-890-7975
TX	El Paso, WJM Sls.	915-566-4628
TX	Houston, Aid Elctrns.	713-777-3882
TX	Irving, Aid Elctrns.	214-259-4761
UT	Salt Lake City, Comp. Prods. Sls.	801-262-0000
WA	Bellevue, Venture Elctrn.	206-454-4594

AUTOMATIC TEST SYSTEMS, 23 Poplar St., Malden, MA 02148, Tel: 617-322-1107

AUTOMATIC TIMING & CONTROLS CO., 201 So. Gulph Rd., King of Prussia, PA 19406, Tel: 215-337-5500, 800-441-8245, Telex: 84-6437; Empl.: 300; *Sls. Mgr.:* V. C. McMahon .... **3**•1123

Local Sales Offices & Reps

AZ	Phoenix, Portis & Assocs.	602-947-4379
CA	Gardena, Instrument Lab.	213-327-3282
CA	San Francisco, Automated Process Controls	415-467-6162
CO	Englewood, E & M Sls.	303-761-6202
FL	Lakeland, A.A. Elec. Div.	813-665-6941
GA	Norcross, A.A.Electric Div. of AEC	404-449-8670
IL	Glen Ellyn, Rockford Controls	312-469-6016
IN	Indianapolis, Rockford Controls	317-248-2518
KY	Louisville, Air-Hydro Power	502-451-1000
LA	New Orleans, Mid South Sls.	504-641-7480
MD	Baltimore, Jobe & Co.	301-327-0220
MA	Hingham, Hingham Bay Corp.	617-749-8700
MI	Brighton, H. H. Barnum Co.	313-229-2961
MN	Minneapolis, Automated Controls	612-941-4092
MO	Kansas City, Duncan Sls. & Engrg.	816-356-1888
MO	St. Louis, E. Mooney Co.	314-878-9910
NE	Omaha, Lakeland Engrg. Equipt.	402-734-2600
NJ	Newark, Norman Bragar Co.	201-344-1100
NM	Albuquerque, E & M Sls.	505-883-8955
NY	Buffalo, Niagara Electric Sls.	716-886-4000
NY	Rochester, Niagara Electric Sls.	716-271-1223
NY	Syracuse, Niagara Elec. Sls.	315-437-1656
NC	Charlotte, Brown & Morrison	704-554-8570
OH	Cincinnati, Anderson-Bolds	513-528-5680
OH	Cleveland, Anderson-Bolds	216-229-4700
OH	Worthington, Anderson-Bolds	614-885-3933
OK	Tulsa, Driscoll Automatic Control	918-747-6625
OR	Portland, Coons Western	503-295-0411
PA	King of Prussia, Applied Controls	215-265-3832
PA	Pittsburgh, Gilson Engrg. Sls.	412-931-6114
TX	Houston, Gettys-Eads-Adair	713-781-3005
UT	Salt Lake City, Control Equip.	801-487-7741
VA	Richmond, Jobe & Co.	804-232-6508
WA	Seattle, J. A. Tudor & Assoc.	206-682-7444
WA	Spokane, J. A. Tudor & Assoc.	509-327-3328
WI	Cedarburg, Automation Engrg.	414-377-7500

AUTOMATION ASSOCS., 1212 Westheimer, #120, Austin, TX 78752, Tel: 512-458-4412

AUTOMATION DISPLAYS INC., 3833 N. White Ave., Eau Claire, WI 54701, Tel: 715-834-9595; Empl.: 38

Local Sales Offices & Reps

AZ	Scottsdale, Al Meurer Co.	602-941-4848
GA	Atlanta, Secom Sys.	404-434-8101
IN	Indianapolis, GEB Controls Group Inc.	317-271-9008
MA	Norwell, Besco	617-659-4915
MN	Minneapolis, Countryman Assocs.	612-645-9151
NY	New York, Friedman-Smith Elctrn. Sls.	914-664-4866
TX	Dallas, Jacobson Co.	214-363-7584
WA	Bellevue, Hudson Co.	206-455-0773

AUTOMATION DYNAMICS, 77 Brookside Pl., Hillsdale, NJ 07642, Tel: 201-666-2458; FSC No.: 53089; Empl.: 40

AUTOMATION COMPONENTS, INC., One Short Ave., Peckville, PA 18452, Tel: 717-489-7508

AUTOMATION PRODS., INC., 3030 Max Roy, Houston, TX 77008, Tel: 713-869-0361, Telex: 775-959

AUTOMATION UNLTD., 10H Roessler Rd., Woburn, MA 01801, Tel: 617-933-7288, Telex: 949329; *Sls. Mgr.:* Stephen A. Gould

AUTOSPLICE, INC., 59-12, 37th Ave. Woodside, NY 11377, Tel: 212-429-0500, Telex: 420902, TWX: 968171; Empl.: 86; *Sls. Mgr.:* O. Nedelkovich

Local Sales Offices & Reps

CA	Glendale, Tooltronics	213-240-4000
CA	San Diego, Autosplice West	619-560-0571
CA	Santa Clara, Tooltronics	408-496-6000
IL	Chicago, Schiffer Assoc.	312-847-2400
IN	Fort Wayne, Menze Sls.	219-747-5616
MA	Cambridge, Autosplice Northeast	617-576-3838

AUTO-SWAGE PRODS., 726 River Rd., Shelton, CT 06484, Tel: 203-929-1401, Telex: 963-542; Empl.: 170; *Sls. Mgr.:* R. Mikuisky .... **2**•1860

Local Sales Offices & Reps

CA	Glendale, Haldeman & Frazier	213-247-3330
CO	Denver, Regional Sls. Co.	303-433-7397
CT	Newtown, Yankee Engrg.	203-426-5679
FL	Boca Raton, F/G Assocs.	305-395-3907
IL	Barrington, Perhats Assocs.	312-381-6360
IN	Greensburg, H. K. Feaster Assocs.	812-663-5689
MN	Minneapolis, W R. Maleckar Co.	612-926-7601
MO	St. Louis, Meiners Sls.	314-383-4833
NY	Rochester, Antil-Thrasher Assoc.	315-468-2370
OH	Chagrin Falls, Bray Assocs.	216-247-4474
PA	Broomall, AM Tech. Sls. Co.	215-356-0574
SC	Fort Mills, Eagle Sales, Inc.	803-548-2222
EXP	NY, New York, Lang & Zysk	212-227-1743

AUTOTROL, P.O. Box 557, Crystal Lake, IL 60014, Tel: 815-459-3080, Telex: 72-2417; Empl.: 140; *Sls. Mgr.:* Gerald L. Adair

AUTO-TROL TECH., 12500 N. Washington St., Denver, CO 80233, Tel: 303-452-4919, TWX: 910-320-0772; Empl.: 600; *Sls. Mgr.:* Jim Norrod

AUTRONICS, 314 E. Live Oak, Ste. A, Arcadia, CA 91006, Tel: 818-445-5470, TWX: 910-582-3216; FSC No.: 03972; Empl.: 65

Local Sales Offices & Reps

CA	Fullerton, Hawk Assocs.	714-773-4152
CA	Los Altos, Frauman Assocs.	415-941-0660
CA	Westlake Village, Jayess Co.	213-991-0632
TX	Richardson, Scientific Sls. & Svcs.	214-231-6541
WA	Bellevue, Thorson Northwest	206-455-9180

AVA INSTRMN., INC., 8010 Highway 9, Ben Lomond, CA 95005, Tel: 408-336-2281, Telex: 357403 AVA; FSC No.: 61933; Empl.: 6; *Sls. Mgr.:* Allan Hughes

Local Sales Offices & Reps

CA	Encino, King Eng.	213-995-7271
CA	San Jose, Data Rep.	408-279-1212
MA	Andover, PC Associates	617-475-3298
NY	NY, Hartford, PDQ Assocs.	315-768-8167
PA	Huntingdon Valley, Lynbar Group	215-947-3554

AVANTEK, INC., 3175 Bowers Ave., Santa Clara, CA 95051, Tel: 408-496-6710, Telex: 34-6337, TWX: 910-339-9274; Empl.: 2268

Local Distributors

AL	Huntsville, CDI Branch Off.	205-883-7501
AZ	Scottsdale, Spirit Elctrns.	602-998-1533
CA	Los Altos, Pen Stock Co.	415-948-6552
CA	Los Angeles, Sertek, Inc.	213-477-9051
CA	Orange, Sertek, Inc.	714-997-7311
FL	Ft. Lauderdale, Component Distrs.	305-971-4950
IL	Arlington Heights, Peak Distrs.	312-255-0707
IN	Indianapolis, Peak Distrs.	317-247-1316
MD	Beltsville, Applied Specialties	301-595-5393
NC	Raleigh, CDI Branch Off.	919-781-0262

AVCO-ELCTRNS. DIV., 4807 Bradford Dr., Huntsville, AL 35805, Tel: 205-837-6500, TWX: 810-726-2240; Empl.: 700; *Sls. Mgr.:* Jim Pool and David Helms

AVEL-LINDBERG INC., Peacock Alley 116, 1 Padanaram Rd., Danbury, CT 06810, Tel: 203-797-8698, TWX: 710-456-9984; Empl.: 4; *Sls. Mgr.:* Harvey R. Snider

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Off-the-shelf and custom designed transformers for low radiated noise, high efficiency and smaller size and weight. Toroidal transformers in ratings from 15 VA to 1900 VA are offered in the "Budget", open style or encapsulated in a polycarbonate case. The "On-Board" range, PCB styled miniatures, bobbin wound for close card spacing in ratings from 2 VA to 30 VA.

Local Distributors

CT	Wallingford, Sager Elctrl. Supp. Co.	203-265-4600
MA	Hingham, Sager Electrical Supp. Co.	617-749-6700
NY	New York, Martin Audio/Video Corp.	212-541-5900

AVEX ELCTRNS., 1683 Winchester Rd., P.O. Box 1026, Bensalem, PA 19020, Tel: 215-638-3300; FSC No.: 58414; *Sls. Mgr.:* Mike Battery Batley; *Dist. Mgr.:* Mike Batley ....3•1403

AVIBANK MFG., 210 S. Victory Blvd., Burbank, CA 91503, Tel: 818-843-4330, TWX: 910-498-2215; FSC No.: 84256; Empl.: 330; *Sls. Mgr.:* D. Ladin

AVIONIC INSTRS., 943 E. Hazelwood Ave., Rahway, NJ 07065, Tel: 201-388-3500, Telex: 844413; Empl.: 42; *Sls. Mgr.:* Wallace J. Izzo; *Dist. Mgr.:* Wallace J. Izzo ....3•1828, 1829

Local Sales Offices & Reps

EXP	NJ, Rahway, REA Intl. Ltd.	201-382-7100

AVIONICS, Box 200, Niagara-On-Lake, ON , Canada, Tel: 416-468-3632; Empl.: 25

AVTEL
DIVISION OF UNITRON INCORPORATED

AVTEL DIV., UNITRON INC., 2826 W. Kingsley Rd., Dept. G, Garland, TX 75041, Tel: 214-271-4531, Telex: 73-0644; FSC No.: 6130; Empl.: 95; *Sls. Mgr.:* R. L. Beutel ....3•1831, 1832

Local Sales Offices & Reps

CA	Sunland, Unitron (Jim Crevier)	818-352-7348
GA	Byron, Unitron (Joe Joiner)	912-956-2866
PA	Lansdowne, Unitron (Douglas S. Feisler)	215-622-4811

AVX CORPORATION, Box 867, Myrtle Bch., SC 29577, Tel: 803-448-9411, TWX: 810-661-2252; FSC No.: 9K916; *Sls. Mgr.:* John Winn; *Dist. Mgr.:* George Lees ....**1A**•1002, 1010-1014; **1B**•1002, 1008, 1009

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Tempe, Interstate Mktg.	602-244-9050
AR	Little Rock, Beacon Elctrns.	501-224-5449
CA	San Diego, Interstate Mktg.	619-292-8117
CA	San Jose, Quadrep Inc.	408-946-4000
CA	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
CO	Denver, Elcom	303-337-2300
FL	Clearwater, Dyne-a-Mark	813-441-4702
FL	Fort Lauderdale, Dyne-a-Mark	305-771-6501
FL	Maitland, Dyne-a-Mark	305-831-2097
FL	Palm Bay, Dyne-a-Mark	305-727-0192
GA	Atlanta, Beacon Elctrns.	404-256-9640
IL	Highland Park, T.B. Hunter Assocs.	312-433-7000
IN	Ft. Wayne, F.J. Campisano Co.	219-747-2633
IN	Indianapolis, Frank J. Campisano	317-253-7651
IA	Cedar Rapids, Comstrand	319-377-1575
MD	Baltimore, Burgin-Kreh Assocs.	301-265-8500
MA	Lexington, J.E. Boeing Co.	617-862-2500
MI	Grand Rapids, J.L. Montgomery	616-774-9308
MI	Southfield, J.L. Montgomery	313-358-2616
MN	Minneapolis, Comstrand Inc.	612-788-9234
MO	Grandview, Beneke & McCaul	816-765-2998
NJ	Bellmawr, Thomas Assoc.	609-933-2600
NM	Albuquerque, Thorson Co.	505-293-8555
NY	Ithaca, Bob Dean, Inc.	607-257-1111
NY	Melville, Comtronic Assocs.	516-249-0505
NC	Raleigh, Tingen Technical Sales	919-781-1100
OH	Cincinnati, F.J. Campisano Co.	513-574-7111
OH	Cleveland, Frank J. Campisano	216-749-5550
OH	Dayton, Schmidt & Assoc.	513-293-6652
OK	Oklahoma City, Ammon & Rizos	405-942-2552
OR	Hillsboro, Western Tech. Sls.	503-640-4621
PA	Coraopolis, F.J. Campisano Co.	412-264-5151
TX	Austin, Ammon & Rizos Co.	512-454-5131
TX	Dallas, Ammon & Rizos Co.	214-644-5591
TX	Houston, Ammon & Rizos Co.	713-781-6240
UT	Salt Lake City, Elcom, Inc.	801-532-7940
VA	Lynchburg, Burgin-Kreh Assoc.	804-239-2626
WA	Bellevue, Western Tech. Sls.	206-641-3900
WA	Spokane, Western Techn. Sls.	509-922-7600

Local Distributors

AL	Huntsville, R. M. Elctrns.	205-852-1550
AZ	Phoenix, TTI	602-966-1616
AZ	Phoenix, Kierulff Elctrns.	602-243-4101
AZ	Phoenix, Wyle Distr.	602-249-2232
AZ	Tempe, Arrow Elctrns.	910-950-2019
CA	Chatsworth, IEC	213-998-2200
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Chatsworth, IEC Elctrns.	213-998-2200
CA	El Monte, Marshall Elctrns	818-442-7204
CA	El Segundo, Wyle Distribution Grp.	213-322-8100
CA	Hayward, Arrow Dist. Center	415-487-4300
CA	Irvine, Wyle Dist. Gp.	714-863-9953
CA	Irvine, IEC	714-660-1055
CA	Irvine, Marshall Elctrns	714-556-6400
CA	Irvine, Wyle Distr. Grp.	714-863-9953
CA	Los Angeles, Kierulff Elctrns.	213-725-0325
CA	N. Hollywood, T.T.I.	818-982-0201
CA	Rancho Cordous, Wyle Dist. Gp.	916-638-5252
CA	Sacramento, IEC	916-424-5297
CA	San Diego, Kieruff Elctrns.	714-278-2112
CA	San Diego, Wyle Distr.	619-565-9171
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	San Jose, Eric Elctrns.	408-262-1111
CA	San Jose, IEC	408-263-1100
CA	Santa Clara, Wyle Distr.	408-727-2500
CA	Southgate, Cetec Elctrns.	213-773-6521
CA	Sun Valley, Q.C. Components	213-768-6111
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Tustin, Arrow Elctrns.	714-838-5422
CA	Tustin, Kierulff Elctrns.	714-731-5711
CO	Denver, IEC	303-292-6121
CO	Denver, Arrow Elctrns.	303-758-2100
CO	Denver, Kierulff Elctrns.	303-371-6500
CO	Thornton, Wyle Dist. Gp.	303-457-9953
CT	E. Haven, J. V. Elctrns.	203-469-2321
CT	Wallingford, Marshall Elctrns.	203-265-3822
CT	Wallingford, Kierulff Elctrns.	203-265-1115
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Ft. Lauderdale, NRC Elctrns.	305-772-4500
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Orlando, Marshall Elctrns.	305-841-1878
FL	Orlando, T.T.I.	305-859-1000
FL	Palm Bay, Arrow Elctrns.	305-725-1480
FL	St. Petersburg, Kierulff Elctrns.	813-576-1966
GA	Norcross, Kierulff Elctrns.	800-241-0560
GA	Norcross, Marshall Elctrns.	404-923-5750
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Elk Grove, Kierulff Elctrns.	312-640-0200
IL	Lombard, RM Elctrns.	312-932-5150
IL	Schaumburg, Marshall Elctrns.	314-490-0155
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IN	Indianapolis, RM Elctrns.	317-247-9701
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Gaithersburg, Marshall Elctrns.	301-840-9450
MD	Rockville, M.S. Elctrns.	301-340-6400
MA	Wakefield, MCI	617-245-5967
MA	Westboro, Future Elctrns.	617-366-2400
MA	Wilmington, RC Components	617-273-1860
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Grand Rapids, Arrow Elctrns.	616-243-0912
MI	Grand Rapids, RM Elctrns.	616-531-9300
MI	Livonia, Marshall Elctrns.	313-525-5850
MN	Edina, Kierulff Elctrns.	612-941-7500
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Plymouth, Marshall Elctrns.	612-559-2211
MO	Maryland Hgts., Kierulff Elctrns.	314-739-0855
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Clifton, J-Mar Elctrns.	201-772-6400
NJ	Fairfield, Marshall Elctrns.	201-882-0320
NJ	Fairfield, Arrow Elctrns.	201-797-5800
NJ	Marlton, Arrow Elctrns.	609-596-8000
NJ	Mt. Laurel, Marshall Elctrns.	609-234-9100
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Bohemia, TTI	516-567-1500
NY	E. Farmingdale, Tri-Start	516-293-0400
NY	Endwell, Marshall Industries	607-754-1570
NY	Hauppague, Arrow Elctrns.	516-231-1000
NY	Hauppauge, Marshall Industries	516-273-2424
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Liverpool, Arrow Elctrns	315-652-1000
NY	Lynbrook, Patriot	516-599-8881
NY	Melville, Arrow Elctrns.	516-391-1484
NY	Rochester, Marshall Industries	716-235-7620
NY	Rochester, Arrow Elctrns.	716-275-0300
NC	Greensboro, Kierulff Elctrns.	919-852-9440
NC	Raleigh, Kierulff Elctrns.	919-872-8410
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Winston Salem, Arrow Elctrns.	919-725-8711
OH	Akron, Akron	216-762-8818
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Cleveland, Kierulff Elctrns.	216-587-6558
OH	Dayton, Marshall Elctrns.	513-236-8088
OH	Solon, Arrow Elctrns.	216-248-3990
OK	Tulsa, Kierulff Elctrns.	918-252-7537
OK	Tulsa, Arrow Elctrns.	918-665-7700
OR	Tigard, Arrow Elctrns.	503-684-1690
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Philadelphia, Almo Elctrns.	215-698-4000
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Austin, Kierulff Elctrns.	512-835-2090
TX	Dallas, Kierulff Elctrns.	214-343-2400
TX	Dallas, R.M. Elctrns.	214-235-3100
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Ft. Worth, T.T.I.	817-429-1440
TX	Houston, Kierulff Elctrns.	713-530-7030
TX	Richardson, Jaco	214-235-9575
TX	Stafford, Arrow Elctrns.	713-491-4100
UT	N. Salt Lake City, IEC	801-298-1868
UT	Salt Lake City, Arrow Elctrns.	801-539-1135
UT	Salt Lake City, Kierulff Elctrns.	801-973-6913
WA	Bellevue, Arrow Elctrns.	206-643-4800
WA	Bellevue, Wyle Elctrns.	206-453-8300
WA	Bellevue, IEC	206-455-2727
WI	New Berlin, R.M. Elctrns.	414-784-4420
WI	Oak Creek, Arrow Elctrns.	414-764-6600

AXEL ELCTRNS., 134-20 Jamaica Ave., Jamaica, NY 11418, Tel: 212-291-3900, TWX: 710-582-2618; FSC No.: 13058; Empl.: 210; *Sls. Mgr.:* J. Alaimo

AXIAL MAGNETICS, 6600 Whitaker Ave., Van Nuys, CA 91406, Tel: 818-994-3346

AXIOM CORP., 1014 Griswold Ave., San Fernando, CA 91340, Tel: 213-365-9521

AXIS, INC.

AXIS, INC., 7825 Engineer Rd., Ste. 208, San Diego, CA 92111, Tel: 619-560-7737; FSC No.: 9S849; Empl.: 12; *Sls. Mgr.:* Mark J. Prager ....2•1010

Local Sales Offices & Reps

FL	St. Petersburg, Southern Engrg. Assoc.	813-577-7700
IL	Chicago, Fairlines Co.	312-735-2606
MD	Catonsville, Robert Elctrn. Sls.	301-788-2380
MI	Southfield, Infinity	313-557-7230
MN	Eden Prairie, First Rep Co. of Minn.	612-944-2097
MO	St. Louis, Design Solutions	314-961-7170
WA	Bellevue, Olson Ferree & Assocs.	206-883-7792

AYDIN CORP., 700 Dresher Rd., Horsham, PA 19044, Tel: 215-657-7510, Telex: 685 1211, TWX: 510-661-0518; Empl.: 2,000; *Sls. Mgr.:* B. Jack Miller

AYDIN CONTROLS, 414 Commerce Dr., Ft. Washington, PA 19034, Tel: 215-542-7800, Telex: 6851057, TWX: 510-661-0518; Empl.: 533; *Sls. Mgr.:* Joseph J. Taylor

AYDIN MICROWAVE, 75 East Trimble Rd., San Jose, CA 95131, Tel: 408-946-5600, Telex: 4990756, TWX: 910-338-0216; Empl.: 200; *Sls. Mgr.:* Bruce M. Jennings

Local Sales Offices & Reps

VA	Alexandria, Aydin Corp.	703-823-9735

AYDIN MONITOR SYS., 502 Office Center Dr., Ft. Washington, PA 19034, Tel: 215-646-8100, TWX: 510-661-1520; Empl.: 241

AYDIN VECTOR DIV., Box 328, Newtown, PA 18940, Tel: 215-968-4271, TWX: 510-667-2320; FSC No.: 13923; Empl.: 280

BABCOCK ELECTRO-MECHANICAL, INC., Sub. of Electro-Module, Inc., 3535 Harbor Blvd., Costa Mesa, CA 92626, Tel: 714-540-1234, TWX: 910-595-1517; FSC No.: 56623; Empl.: 245; *Sls. Mgr.:* Albin Gudis; *Dist. Mgr.:* Albin Gudis

Local Sales Offices & Reps

CA	Palo Alto, Horne Electro Sales	415-494-6777
TX	Houston, Barry Sls.	713-784-5860

BACH-SIMPSON LTD., 1255 Brydges St., London, ON N5W-2C2, Canada, Tel: 519-452-3200

BACON INDS., 192 Pleasant St., Watertown, MA 02172-2399, Tel: 617-926-2550, TWX: 710-327-6518; FSC No.: 99098; Empl.: 23; *Sls. Mgr.:* R. S. Cass

BAILEY CONTROLS CO., 29801 Euclid Ave., Wickliffe, OH 44092, Tel: 216-585-5800, Telex: 980621, TWX: 216-944-4160; Empl.: 2300; *Sls. Mgr.:* R. A. Purmal; *Dist. Mgr.:* R. C. Wright

BAKER, J. T., CHEMICAL CO., 222 Red School La., Phillipsburg, NJ 08865, Tel: 201-859-2151, TWX: 510-235-2924; Empl.: 1,200; *Sls. Mgr.:* D. J. Calder

BAKER CO., INC., Drawer E - Sanford Airport, Sanford, ME 04073, Tel: 207-324-8773; Empl.: 105

BALLANTINE LABS., 90 Fanny Rd., Boonton, NJ 07005, Tel: 201-335-0900, TWX: 710-987-8380; FSC No.: 50423; Empl.: 90; *Sls. Mgr.:* Joe Deery; *Dist. Mgr.:* Joe Deery ....3•1191

Local Sales Offices & Reps

AZ	Phoenix, Zeus Elctrns.	602-263-6022
CA	Costa Mesa, FLW Inc.	714-751-7512
CA	San Jose, MCH Assocs.	408-246-7330
CA	Van Nuys, FLW Inc.	213-989-5237
CO	Denver, Zeus Elctrns.	303-321-6818
FL	Orlando, Micro Spec, Inc.	305-299-6508
GA	Lawrenceville, Micro Spec, Inc.	404-979-3444
IL	Arlington Hgts., Dytec/Central	312-394-3380
IN	Indianapolis, Dytec/Central	317-247-1316
MA	Reading, Scheinfein Assoc.	617-944-2304
MI	Madison Hgts., WKM Assoc.	313-588-2300
NJ	Elmwood Park, L & M Assocs.	201-797-0441
NM	Albuquerque, Zeus Elctrns.	505-842-6633
OH	Cleveland, WKM Assoc.	216-267-0445
OH	Dayton, WKM Assoc.	513-434-7500
OR	Portland, Westcon	503-283-0132
PA	Andalusia, L & M Assocs.	215-245-6658
PA	Pittsburgh, WKM Assoc.	412-292-2953
SC	Rock Hill, Micro Spec, Inc.	803-366-3015
UT	Salt Lake City, Zeus Elctrns.	801-534-0500
VA	Alexandria, Dyna Rep Co.	703-354-1222

BALL ELECTRONIC DISPLAY DIV, Box 43376, St Paul, MN 55164, Tel: 612-786-8900, TWX: 910-563-3552; Empl.: 500; *Sls. Mgr.:* L. R. Lemke

BALL ELCTRN., Systems Div., 1950 33rd St., Boulder, CO 80302, Tel: 303-441-5400, Telex: 45776; Empl.: 500

BALSTON, 703 Massachusetts Ave., Lexington, MA 02173, Tel: 617-861-7240, Telex: 92-3481; Empl.: 50; *Sls. Mgr.:* J. Alpert

BALZERS OPTICAL GRP., 170 Locke Dr., Marlboro, MA 01752, Tel: 617-481-9860, Telex: 951-562; Empl.: 136; *Dist. Mgr.:* Michael G. Allen

B & B MOTOR & CONTROL CORP., Apple Hill Commons, Burlington, CT 06013, Tel: 203-673-7151, Telex: 14-1484; Empl.: 90; *Sls. Mgr.:* Sam Mandel

Local Sales Offices & Reps

CT	Berlin	203-828-8550
FL	Clearwater	800-845-1020
IL	Chicago	312-681-0089
IN	Indianapolis	317-248-0396
KY	Louisville	502-589-7753
MA	Boston	617-890-4944
NH	Nashua	603-883-1062
NJ	Piscataway	201-572-0500
NY	Baldwin	212-784-1313
NY	Elmira	607-732-6599
NY	Long Island City	212-784-1313
NY	Rochester	716-424-7040
NC	Charlotte	704-375-0577
OH	Cincinnati	513-381-1885
SC	Greenville	803-268-5702
TX	Dallas	214-641-0857
TX	Houston	713-820-7931

B & G PRECISION ELCTRNS., 538 Maple Ave., Doylestown, PA 18901, Tel: 215-348-4413; *Sls. Mgr.:* Eugene R. Bigay; *Dist. Mgr.:* Xavier Garcia

B & K PRECISION PROD. GRP., DYNASCAN, 6460 W. Cortland, Chicago, IL 60635, Tel: 312-889-9087, Telex: 253475; FSC No.: 08098, 18110, 48560, 30678; Empl.: 250; *Sls. Mgr.:* Dennis Hoy ....3•1182, 1198-1202, 1362-1364, 1509

Local Sales Offices & Reps

CA	Irvine, Mike Roth Sls.	714-250-0722
CA	Pleasanton, Moulthrop Sls.	415-463-0450
CO	Louisville, Stan Sliz & Assocs.	303-666-4760
FL	Maitland, Hutto, Hawkins, Peregoy	305-831-2474
GA	Tucker, Maitland K. Smith	404-939-3322
IL	Arlington Hgts., Brainard-Wilson Mktg.	312-437-2700
IN	Carmel, Brainard-Wilson Mktg.	317-844-2800
KS	Shawnee Mission, Lowell-Kangas & Assocs.	913-631-3515
LA	Chalmette, Erickson Sls.	504-271-1976
MD	Perry Hall, Electra-Tech	301-256-2723
MA	Woburn, W & D Marketing	617-935-5610
MI	Southfield, Robert Milsk Co., Inc.	313-354-3310
MN	Minneapolis, HMR, Inc.	612-888-2100
MO	St. Louis, Lowell-Kangas Assoc.	314-821-4050
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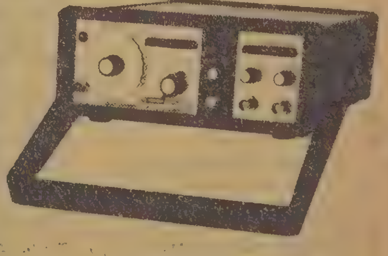

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OH	Cincinnati, BEI Motion Sys. Co.	513-321-1121
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Regional Sales Offices

CA	Irvine	714-474-1200
IN	Richmond	317-983-5200
MA	Framingham	617-872-7846
TX	Dallas	214-788-4300

Local Sales Reps.

AZ	Scottsdale, W. Atkins	602-998-7355
CA	Huntington Beach, E. Kerezsi	714-848-2157
CA	Newark, R. Tribendis	415-490-0838
CA	Northridge, J. Duffin	213-993-8919
CA	Orange, K. Wales	714-750-9066
CA	San Jose, S. Landis	408-723-7117
CA	Tustin, W. Caughlin	714-832-5278
CO	Aurora, S. Groves	303-695-8466
CT	South Bury, L. Kerchief	212-264-8012
FL	Boca Raton, G. Pedigo	305-482-1279
FL	Longwood, J. Vandemark	305-774-0959
GA	Marietta, J. Fienning	404-973-6212
IL	Schaumburg, M. Peterschmidt	312-490-9244
IL	Wheaton, M. Davis	312-653-0695
IN	Indianapolis, L. Brown	317-849-1945
IN	Richmond, J. Daggy	317-962-6103
LA	Kenner, K. Ingram	504-469-9154
MD	Columbia, E. Wunder	301-997-4480
MA	Framingham, A. Harris	617-872-2066
MA	Franklin, S. LaRocco	617-528-1896
MI	Southfield, W. Bryant	313-559-1944
MN	Mound, J. Hughes	612-472-7545
MN	Robbinsdale, J. Stanley	612-522-9183
MO	Clayton, F. Lane	314-725-1488
NY	Northport, LI, L. Thompson	516-754-9038
NY	Rochester, T. Centofonti	716-461-0818
NY	Sunnyside, E. Mammone	212-361-0993
NC	Raleigh, A. Hatcher	919-848-3342
OH	Medina, H. Flanders	216-725-4285
OR	Lake Oswego, D. Clicquennoi	503-638-0271
PA	Norristown, B. Easley	215-272-8044
SC	Columbia, G. Owen	803-781-9739
TX	Austin, M. Mullery	512-345-5204
TX	Dallas, M. McQuistion	214-341-3424
TX	Houston, M. Masucci	713-721-6023
TX	Houston, E. Cheney	713-729-1259
TX	Houston, C. Amonett	713-350-2271
TX	Richardson, D. Berg	214-349-7712
WA	Bellevue, S. Abernethy	206-885-5808
WI	Milwaukee, M. Lucky	414-355-4986

BELDEN, Fiber Optics, 2000 S. Batavia Ave., Geneva, IL 60134, Tel: 312-232-8900, TWX: 910-237-1681

BEL FUSE, 198 Van Vorst St., Jersey City, NJ 07302, Tel: 201-432-0463, TWX: 710-730-5301; Empl.: 225; *Sls. Mgr.:* A. Sutta .... 1A•1454-1465; 1B•1260-1262

Local Sales Offices & Reps

Delay Lines

AL	Huntsville, EMA Inc.	205-830-4030
AZ	Scottsdale, SMS & Assocs.	602-998-0831
CA	Cupertino, Thresum Assocs.	408-996-9889
CA	Escondido, Cirolia Elctrn. Sls.	619-743-3015
CA	Los Angeles, Corcoran	213-823-4589
CO	Boulder, Front Range Mktg.	303-443-4780
CT	Branford, L.J.M. Assocs.	203-488-4244
FL	Altamonte Springs, Semtronics Assocs.	305-831-8233
FL	Clearwater, Semtronic Assocs.	813-461-4675
FL	Fort Lauderdale, Semtronics Assoc.	305-731-2484
IL	Chicago, MGA	312-775-1151
IN	Indianapolis, Insul-Reps	317-842-5203
MA	Wellesley Hills, Sturdy Co.	617-235-2330
MI	Bloomfield Hills, Enco Mktg.	313-642-0203
NJ	East Brunswick, Winch Sls. Assocs.	201-828-4615
NY	East Syracuse, Nycom	315-437-8343
NC	Apex, FBD Sls.	919-362-4091
OH	Cleveland, Jim Finnegan & Co.	216-238-5905
PA	Bala Cynwyd, Friedman & Assocs.	215-667-1838
SC	Mauldin, FBD Sales	803-288-2323
TN	Knoxville, Insul-Reps	615-691-7586
TX	Austin, Oeler & Menelaides	512-453-0275
TX	Dallas, Oeler & Menelaides	214-361-8876
TX	Houston, Oeler & Menelaides	713-772-0730
UT	Salt Lake City, Front Range Mktg.	801-364-6481
VA	Chesapeake, FBD Sls.	804-484-3162
WA	Kent, R & R Assocs.	206-251-5396
PR	Hato Rey, M. Anderson Co.	809-751-2026

Fuses

AL	Huntsville, EMA Inc.	205-830-4030
CA	Los Altos, Landia	415-490-5651
CA	Los Angeles, Corcoran Assoc.	213-823-4589
CA	Huntington Beach, Corcoran Assoc.	714-841-4759
CO	Boulder, Front Range Mkt.	303-443-4780
CT	North Haven, Coakley, Boyd & Abbett	203-239-6217
IL	Chicago, MGA Assoc.	312-775-1151
IN	Indianapolis, Insul-Reps	317-842-5203
MA	Needham Heights, Coakley, Boyd & Abbett	617-444-5470
MI	Bloomfield Hills, ENCO Mktg.	313-642-0203
MN	Minnetonka, Beta Engrg.	612-544-1800
NH	Plaistow, Coakley, Boyd & Abbett	603-382-9234
NM	Albuquerque, Syntech	505-266-7951
NY	Hempstead, Kahgan Sls.	516-538-2300
NC	Cary, FBD Sls.	919-467-7595
PA	Narbeth, Samuel Jeffries Inc.	215-664-8500
SC	Mauldin, FBD Sls.	802-288-2323
TN	Knoxville, Insul-Reps	615-691-7586
UT	Salt Lake City, Front Range Mktg.	801-364-6481
VA	Chesapeake, FBD Sls.	804-484-3162
WA	Kent, R & R Assoc.	206-251-5396

Local Distributors

Delay Lines

CA	Inglewood, Force Elctrns.	213-776-1324; 800-421-5880
CA	San Jose, Force Elctrns.	408-943-1324
NH	Hudson, C & H Elctrns.	603-882-1133

Fuses

AZ	Phoenix, Lion Elctrns.	602-869-9611
CA	City of Industry, Ital Elctrns.	213-968-8515
CA	Costa Mesa, Deco Elctrns.	714-754-1322
CA	Hayward, KEA Elctrns.	415-887-2900
CA	San Diego, Sigma Elctrns.	619-763-0545
CO	Aurora, Jet Elctrn. Supp. Co.	303-364-1000
CT	Norwalk, Cobra Comps.	203-847-6442
FL	Boca Raton, D & R Assocs.	305-395-2341
MA	Woburn, Elctrn. Packaging Comps.	617-935-0400
NH	Hudson, C & H Elctrns.	603-882-1133
NY	Bohemia, Key Comps.	516-567-7500
OH	Columbus, Seneca Fuse	614-895-2631
PA	Cornwells Heights, Reliance Merchandising	215-638-8200
TX	Dallas, Fuses Inc.	214-341-6407
WA	Kent, Shannon Ltd.	206-763-0545

BELL, FLOYD, ASSOCS., INC., 897 Higgs Ave., Columbus, OH 43212, Tel: 614-488-3193, TWX: 810-482-1763; FSC No.: 56493; *Sls. Mgr.:* Tom Shain .... 3•1026-1028

Local Sales Offices & Reps

CA	Pasadena, Paul Nurches Co.	213-681-8957
CA	Redwood City, Hickey Indl. Sls. Corp.	415-368-3849
CO	Denver, Moss Mktg.	303-455-7205
FL	Casselberry, Barrett & Assocs.	305-699-0311
FL	Melbourne, Barrett Assocs.	305-727-2491
FL	Miami, Barrett Assocs.	305-681-4957
FL	Palm Harbor, Barrett Assocs.	813-785-1954
GA	Marietta, Dahlcom Sls.	404-424-8909
IL	Mt. Prospect, Robert Adams Sls. Co.	312-297-8733
KY	Edgewood, ELECCO	606-341-0330
MD	Columbia, Tyler Griffin Co.	301-995-1215
MA	Scituate, New England Area Reps.	617-545-6327
MI	Jenison, R.C. Nordstrom	616-457-5762
MI	Lathrup Village, R.C. Nordstrom	313-559-7373
MN	Minneapolis, A.J. Warner Co.	612-729-7371
NJ	Ocean, P. Saftler Assocs.	516-593-7880
NM	Albuquerque, Moss Mktg.	505-298-4275
NY	Fulton, P. Saftler Assocs.	315-592-7184
NY	Lynbrook, P. Saftler Assocs.	516-593-7880
OH	Cleveland, ROC Assocs.	
OH	Worthington, ROC Assocs.	614-885-1057
OR	Aloha, Elctrn. Comp. Sls.	503-245-2342
PA	Paoli, Tyler Griffin Co.	215-647-1550
TX	Dallas, Jim D. Gray & Assocs.	214-341-7190
UT	Bountiful, Moss Mktg.	801-292-8660
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301

BELL, F. W., INC., 6120 Hanging Moss Rd., Orlando, FL 32807, Tel: 305-678-6900, TWX: 810-853-3115; FSC No.: 18479; *Dist. Mgr.:* Edward S. Wilush .... 3•1194-1197

Local Sales Offices & Reps

CA	Milpitas, Maxim Elctrn. Sls.	408-946-6001
CA	Pasadena, Jim Robins Assoc.	818-795-9118
CO	Denver, Moss Mktg.	303-455-7205
FL	Indian Rock Beach, Par Assoc.	813-596-8841
GA	Atlanta, Par Assoc.	404-448-4181
IL	Downers Grove, Splon Assoc.	312-963-7011
KS	Overland Park, Ramsey Assocs.	913-649-6996
MA	Needham Hgts., Shain Assoc.	617-449-4380
MI	Royal Oak, Dave Ray & Assocs.	313-280-0000
MO	Maryland Hgts., Ramsey Assocs.	314-878-5042
NM	Albuquerque, Moss Mktg.	505-298-4275
NY	White Plains, Cane Tech. Sls.	914-694-9240
OH	Chagrin Falls, RPM Indl. Sls.	216-247-3295
PA	Paoli, T. Griffin Co.	215-644-7710
TX	Carrollton, Seaton Corp.	214-380-0414

Local Distributors

AZ	Phoenix, Jensen Tools & Alloys	602-968-6231
CA	Milpitas, Maxim Elctrn. Sls.	408-946-6001
CA	Pasadena, Jim Robins Assoc.	818-795-9118
CA	Pasadena, Pasadena Elctrns.	213-796-5844
CO	Denver, Moss Mktg.	303-455-7205
FL	Palm Bay, EIL Instrs.	305-725-8300
GA	Atlanta, Process Meas. Co.	404-696-7481
IL	Downers Grove, Splon Assocs.	312-963-7011
IL	Rolling Meadows, Commodore-1	312-394-5441
MA	Needham Hgts., Shain Assocs.	617-449-4380
MO	Maryland Hgts., Ramsey Assocs.	314-878-5042
NY	White Plains, Cane Tech. Sls.	914-694-9240
OH	Chagrin Falls, RPM Indl. Sls.	216-247-3295
OH	Dayton, National Instr. Distrs.	513-435-4503
PA	Paoli, Tyler Griffin Co.	215-644-7710
TN	Chattanooga, Edwin Bohr Elctrns.	615-877-8207
TX	Houston, Quality Instr. Lab.	713-524-0528

BELL & HOWELL/CEC DIV., 360 Sierra Madre Villa, Pasadena, CA 91109, Tel: 213-796-9381, Telex: 67-5415, TWX: 910-582-3205; Empl.: 500

BELL AUDIO SYS., 994 Freeway Drive North, Columbus, OH 43229, Tel: 614-846-2766; Empl.: 20; *Sls. Mgr.:* Thomas A. Curran

BELL CO., INC., 106 Morrow Ave., Box 92E, Trussville, AL 35173, Tel: 205-655-2135; Empl.: 19; *Sls. Mgr.:* R. Bell; *Dist. Mgr.:* Neil H. Bell

J. W. Miller Division
BELL INDUSTRIES

BELL INDS., J. W. Miller Div., 19070 Reyes Ave., P.O. Box 5825, Rancho Dominguez, CA 90224, Tel: 213-537-5200, TWX: 910-346-6740; FSC No.: 76493; Empl.: 55 .... 1A•1224-1229

Local Sales Offices & Reps

AZ	Phoenix, Moore Sls.	602-274-4558
AR	El Dorado, D. Bellew Sls.	501-863-8325
CA	Santa Clara, Logan Sls. Co.	408-496-0660
CO	Denver, Wm. J. Purdy Co.	303-777-1411
FL	Ft. Lauderdale, Hutto-Hawkins-Peregoy	305-971-5750
FL	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
GA	Atlanta, Millar Elctrns.	404-261-6160
HI	Gardena, CA, Bidwell Sls. Assoc.	213-770-0300
IL	Chicago, Ken Levy & Assocs.	312-763-5000
IN	Indianapolis, Elctrn. Reps.	317-894-1414
IN	South Bend, Elctrn. Reps.	219-277-4565
MD	Columbia, Par-Nell Sls. Co.	301-992-5454
MA	N. Scituate, W. A. Hendrickson Co.	617-545-0652
MI	Detroit, Burcaw Co. & Assoc. Inc.	313-533-7700
MI	Wyoming, Burcaw Co. & Assoc. Inc.	616-532-2756
MN	Minneapolis, Electro Mark, Inc.	612-881-3306
MO	Raytown, Marty Taraski Sls. Co.	816-358-1442
NJ	Englewood, Baum & Epstein Assoc.	201-569-7600
NM	Albuquerque, Wm. J. Purdy Co.	505-266-7959
NY	Syracuse, Pl'Tronics, Inc.	315-455-7346
NC	Raleigh, Millar Elctrns.	919-787-9564
OH	St. Marys, T. Shelby & Co.	419-394-3377
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Langhorne, Par-Nell Sls. Co.	215-750-0380
TN	Memphis, D. Bellew Sls.	901-452-1468
TX	Ft. Worth, Chet Wells & Co.	817-284-0261
UT	Salt Lake City, Wm. J. Purdy Co.	801-486-8557
WA	Seattle, Earl & Brown Co.	206-284-1121
EXP	NY, New York, Roburn Agencies	212-989-5939

Local Distributors

AZ	Tempe, Circuit Specialists	602-966-0764
AZ	Tempe, Bell Industries/EDD	602-966-7800
CA	Buena Park, RPS Elctrns.	714-521-5230
CA	Garden Grove, Bell Industries/EDD	714-220-0681
CA	Gardena, Bell Industries/EDD	213-515-1800
CA	Mountain View, Abacus Elctrns.	415-961-1500
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Riverside, Elctrn. Supp.	714-683-7300
CA	San Diego, Bell Industries/EDD	619-268-1277
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	San Jose, Quement Elctrns.	408-998-5900
CA	Sunnyvale, Bell Industries/EDD	408-734-8570
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Denver, Bell Industries/EDD	303-424-1985
CT	Danbury, Pilgrim Elctrns.	203-792-7274
CT	New Haven, Greene-Shaw Co.	203-397-0710
CT	Wallingford, Sager Elctrcl. Supp.	203-265-4600
FL	West Palm Beach, Nurmi Elctrns.	305-684-0320
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Industries/EDD	312-982-9210
IL	Palatine, Ohm/Elctrns, Inc.	312-359-5500
IN	Fort Wayne, Graham Elect./Div. Bell Ind.	219-423-3422
IN	Indianapolis, Graham Elect./Div. Bell Ind.	317-634-8202
IA	Cedar Rapids, Bell Industries/EDD	319-395-0730
LA	New Orleans, Wm. B. Allen Supp.	504-525-8222
MD	Rockville, MS Elctrns.	301-340-6400
MA	Hingham, Sager Elctrcl. Supp.	617-749-6700
MA	Newton, Greene-Shaw Co.	617-969-8900
MN	Minneapolis, Ind. Comps., Inc.	612-831-2666
MO	Saint Louis, Olive Elctrns.	314-426-4500
NJ	Camden, General Radio	609-964-8560
NJ	East Hanover, State Elctrn. Parts	201-887-2550
NM	Albuquerque, Bell Industries/EDD	505-292-2700
NY	Bohemia, Key Comps.	516-567-7500
NY	Buffalo, Summit Elctrns.	716-887-2800
NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Rome, Rome Elctrns.	315-337-5400
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Columbus, Hughes-Peters, Inc.	614-294-5351
OH	Dayton, Bell Industries/Micro-Mil Div.	513-434-8231
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Portland, Bell Industries/EDD	503-241-4115
PA	Allentown, P. A. Peters, Inc.	215-434-5237
PA	Braddock, Leff Elctrns.	412-351-5000
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Willow Grove, Resco Elctrns.	215-659-4575
TN	Chattanooga, Techni-Tronics, Inc.	615-875-5449
TX	Dallas, Wholesale Elctrns./Ind. Div.	214-824-3001
TX	Fort Worth, TTI, Inc.	817-831-0441
TX	Houston, Lenert Co.	713-225-1465
UT	Salt Lake City, Bell Industries/EDD	801-972-6969
VA	Charlottesville, Virginia Radio	804-296-4184
WA	Bellevue, Bell Industries/EDD	206-747-1515
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Milwaukee, Bell Industries/EDD	414-547-8879

BELLOFRAM CORP., A Rexnord Co., 30 Blanchard Rd., Burlington, MA 01803, Tel: 617-272-2100, 800-225-1031, Telex: 94-9457; Empl.: 350; *Sls. Mgr.:* James L. Diegnan; *Dist. Mgr.:* James L. Diegnan

BELL PA PRODS., See Bell Audio Sys.

BELTING INDS. CO. INC., 20 Boright Ave., Kenilworth, NJ 07033, Tel: 201-272-8591, Telex: 138045; Empl.: 125; *Sls. Mgr.:* Harry K. Denaker

Local Sales Offices & Reps

CO	Boulder	303-443-8512
FL	Jacksonville, Quinn Indl. Inc.	904-268-3062
GA	Norcross	404-449-5616
IL	Addison, Eng. Sls. Co.	312-832-8425
MN	St. Paul, Vikeland Sls. Inc.	612-645-4647
NJ	Kenilworth, Belting Inds. Co. Inc.	201-272-8591
NY	Sodus, Warner Woven Belting	315-483-9490

Local Distributors

MI	Detroit, Michiean Indl. Belting Co.	313-584-1652

BEMAN MFG., P.O. Box 370, New Cumberland, PA 17070, Tel: 717-938-1451, TWX: 510-650-3539; Empl.: 300; *Sls. Mgr.:* D. Fortenbaugh

BEMCO, 9908 San Fernando Rd., Pacoima, CA 91331, Tel: 818-899-5296, TWX: 910-496-1520; Empl.: 45; *Sls. Mgr.:* John Riddle; *Dist. Mgr.:* Brian Duggan

BENDIX CORP., Electrical Comps. Div., Sidney, NY 13838, Tel: 607-563-5324, Telex: 932 456, TWX: 510-261-7550; FSC No.: 77820; Empl.: 3000; *Dist. Mgr.:* G. Anderson

BENDIX CORP., Electric Power Div., Hwy. 35, Eatontown, NJ 07724, Tel: 201-542-2000, Telex: 132-444 , TWX: 710-722-6686; FSC No.: 83298; Empl.: 875; *Sls. Mgr.:* H. I. Nadler; *Dist. Mgr.:* Cal Schrum

BENDIX CORP., Electrodynamics Div., 11600 Sherman Way, N. Hollywood, CA 91605, Tel: 818-765-1010, TWX: 910-499-2151; Empl.: 1200

BENDIX CORP., MOTOR COMPS. DIV., See Facet Entprs.

BENDIX CORP., Test Systems Div., Teterboro, NJ 07608, Tel: 201-288-2000, TWX: 710-990-6136; Empl.: 1,077

BENJAMIN ELECTROPRODUCTS, INC., Robins Div., 80 Smith St., Farmingdale, NY 11735, Tel: 516-293-7744, Telex: 12-7908; Empl.: 100

BENSON, INC., 2690 Orchard Parkway, P.O. Box 32059, San Jose, CA 95152-2059, Tel: 408-945-1000, Telex: 176887 BENSON SNJ, TWX: 9103382069 BENSON SNJ; Empl.: 400; *Sls. Mgr.:* Larry Maguire

BENTHOS, INC., Edgerton Dr., N. Falmouth, MA 02556, Tel: 617-563-5917, Telex: 94-0884; Empl.: 110; *Sls. Mgr.:* R. D. Jones

BENTLY NEVADA CORP., P.O. Box 157, Minden, NV 89423, Tel: 702-782-3611, Telex: 354437

BERG, W. M., INC., 499 Ocean Ave., East Rockaway, NY 11518, Tel: 516-599-5010; Empl.: 150; *Sls. Mgr.:* C. Keenan

BERG ELCTRNS., Du Pont Co., 30 Hunter La., Camp Hill, PA 17011, Tel: 800-237-BERG, TWX: 510-650-3538; *Sls. Mgr.:* J. McAluney; *Dist. Mgr.:* P. Raudensky

BERGER-LAHR CORP., Fitzgerald Dr., Jaffrey, NH 03452, Tel: 603-532-7701, Telex: 92-8445; Empl.: 50; *Sls. Mgr.:* Wolfgang Hartert

BERGQUIST, 5300 Edina Ind'l., Minneapolis, MN 55435, Tel: 612-835-2322, TWX: 910-576-2423; FSC No.: 55285; Empl.: 45; *Sls. Mgr.:* Bob Savage

BERGQUIST SWITCH, INC., Bergquist Co., 5300 Edina Indl. Blvd., Edina, MN 55435, Tel: 612-835-2322, TWX: 910-576-2423; *Sls. Mgr.:* Lamar Popp

BNC

DIGITAL DELAY AND LIGHT PULSE GENERATORS

BERKELEY NUCLEONICS CORP., 1198 Tenth St., Berkeley, CA 94710, Tel: 415-527-1121, Telex: 677-1167; Empl.: 30; *Sls. Mgr.:* E. J. Buchs .... **3**•1203

All sales engineering services in the U.S. and Canada are provided by our factory-direct sales staff. For immediate assistance please contact: Sales Department (415) 527-1121.

BERKSHIRE TRANSFORMER CORP., Route 341, Kent, CT 06757, Tel: 203-927-3541

BERK TEK, INC., Box 60, RD 1, Reading, PA 19607, Tel: 215-376-8071, TWX: 510-651-0511; Empl.: 185; *Sls. Mgr.:* P. J. Parrelli; *Dist. Mgr.:* P. J. Parrelli

BERMAR CORP., 6300 Westgate Rd., Raleigh, NC 27612, Tel: 919-821-5993; *Sls. Mgr.:* M. Conland

BA

BERTAN ASSOCIATES INC

BERTAN ASSOCS., 121 New South Rd., Hicksville, NY 11801, Tel: 516-433-3110, TWX: 510-221-2144; FSC No.: 6130; Empl.: 140; *Sls. Mgr.:* Howard Bertan .... **3**•1506, 1507

Local Sales Offices & Reps

AZ	Phoenix, Sigma Engrg. Sls. Co.	602-241-1334
CA	Encino, King-Way Assoc.	213-788-4124
CA	Los Altos, Cain-White & Co.	415-948-6533
CO	Boulder, H. Bass Assocs.	303-530-7509
CT	Madison, Dave Minshall	203-421-4561
FL	DeBary, DJE Assocs.	305-668-6827
GA	Lawrenceville, Electramark	404-963-4793
IL	Arlington Hgts., Coombs Assocs.	312-439-9810
IN	Fort Wayne, Coombs Assocs.	219-747-4017
IA	Cedar Rapids, Coombs Assocs.	319-362-4116
MD	Randallstown, Beacon North	703-591-1300
MI	Farmington, Carter, McCormic & Peirce	313-477-7700
MN	St. Paul, John J. Exon Co.	612-636-5533
MO	Bridgeton, Electro Mechanical Assoc.	314-291-8661
NM	Albuquerque, Thorson Co.	505-293-8555
NY	Fairport, NACO Elctrns. Corp.	716-223-4490
NY	Syracuse, NACO Elctrns. Corp.	315-699-2651
NY	Utica, NACO Elctrns. Corp.	315-732-1801
NC	Raleigh, Barker Assocs.	919-876-0282
OH	Cleveland, Geotronix	216-526-2535
OR	Portland, Showalter Instrs.	503-224-8487
PA	Audubon, Holmes Assocs.	215-666-0636
TX	Dallas, Automated Motion Control	214-340-4192
TX	Denton, Automated Motion Control	817-382-4159
UT	Bountiful, H. Bass Assoc.	801-295-7100
VA	Fairfax, Beacon North	703-591-1300
WA	Bellevue, Showalter Instrs.	206-746-6032
WI	Milwaukee, Coombs Assocs.	414-351-6123

BERTSCH U.S.

BERTSCH U.S., Sycamore Resch. Ctr., 2142F Industrial Ct., Vista, CA 92083, Tel: 619-727-7420; Empl.: 20; *Sls. Mgr.:* S. W. Linko .... **1B**•1132-1134

BEST ELECTRICS DIV., 400 Boren Ave. North, Seattle, WA 98109, Tel: 206-382-1300, TWX: 910-444-2154; Empl.: 8 .... **1B**•1794

Local Sales Offices & Reps

CA	Mountain View, Straube Assocs.	415-969-6060
CO	Westminster, Straube Assocs.	303-426-0890

BETA TRANSFORMER TECHNOLOGY CORP., One Comac Loop, Ronkonkoma, NY 11779, Tel: 516-588-2505

BG ELCTRNS., 30 South St., Mt. Vernon, NY 10551, Tel: 914-664-5591, Telex: 6818048; FSC No.: 33791; Empl.: 36

B-G INSTRUMENTS, P.O. Box 67, Alta Loma, CA 91701, Tel: 714-989-4802, 980-2826, Telex: 910-581-2792; *Sls. Mgr.:* John Baum .... **3**•1071

Local Sales Offices & Reps

WA	Spokane	509-238-4757

B. G. LABORATORIES, INC., 75 Travis Ave., Binghampton, NY 13904, Tel: 607-722-2376

B. H. ELCTRNS., 331 Bremer Bldg., St. Paul, MN 55101, Tel: 612-228-6463, Telex: 297080; FSC No.: 3677; Empl.: 300; *Sls. Mgr.:* Fred LaMarche .... **1A**•2136, 2137

Local Sales Offices & Reps

CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Mateo, Halbar Assocs.	415-349-4700
MN	Osseo, Gaffney Sls. Co.	612-425-5484
NJ	Dunellen, J. A. Maguire	201-752-8480
NY	Syracuse, C & L Sales	315-451-7810
WA	Redmond, Halbar Assocs.	206-882-0990
WI	Theinsville, TFL Assoc.	414-242-6800

B.H. INDS., INC., 5784 Venice Blvd., Los Angeles, CA 90019, Tel: 213-937-4763; Empl.: 6

BICC-VERO ELCTRNS., INC., 171 Bridge Rd., Hauppauge, NY 11788, Tel: 516-234-0400, TWX: 510-227-8890; Empl.: 25; *Sls. Mgr.:* Joseph Lago; *Dist. Mgr.:* Larry Spenceley

Local Sales Offices & Reps

AL	Huntsville, Raycom	205-859-2017
CA	Anaheim, Bicc-Vero Elctrns.	714-630-2030
CT	Milford, Todino Engrg.	203-874-6643
FL	Melbourne, Star-Tec	305-727-2247
GA	Duluth, Raycom	404-446-9015
IL	Ithasca, L-Tec	312-773-2900
IN	Indianapolis, Harrison Blind & Assocs.	317-291-0860
KS	Overland Park, Barnes-Midwest Sls.	913-341-9317
MD	Lutherville, J. A. Dougherty Sls.	301-321-7890
MA	Needham Hgts., Todino Engrg.	617-444-7925
MI	Jackson, Norwood Scroggs	517-750-1170
MN	St. Paul, Proud Inds.	612-646-9428
NM	Albuquerque, Alliance Elctrns.	505-292-3360
NY	Kingston, P.R.M. Elctrns.	914-331-0872
NC	Raleigh, Raycom	919-847-8276
OH	Chesterland, K-T Mktg.	216-729-3588
PA	Hatboro, Rep Force	215-441-4178
TX	Garland, Texport	214-681-1376
TX	Houston, Texport Elctrn. Sls. Co.	713-777-1443
UT	Salt Lake City, Chuck Fields & Assocs.	801-277-4859

Local Distributors

CA	Los Angeles, Dyna Svc.	213-268-8531
CT	Wallingford, Mid-State Elect.	203-265-9900
FL	Dania, Summit Distr.	305-920-6253
IL	Arlington Hgts., Redel Labs	312-253-5000
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
MD	Baltimore, Resco	301-823-0070
MA	Framingham, NOW Elctrns.	617-872-5876
MI	Lansing, Demco Controls	517-321-1700
MI	Madison Heights, McNaughton-McKay Electric Co.	313-399-7500
NJ	Springfield, Route Elctrns.	201-467-0166
NY	Buffalo, Summit Distr.	716-884-3450
NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Rochester, Summit Distr.	716-442-3494
NC	Raleigh, Resco	919-781-5700
OH	Cleveland, Roberts Elctrns.	216-238-1711
OR	Portland, Dunn Elctrns.	503-285-0214
PA	Braddock, Leff Elctrs.	412-351-5000
TX	Houston, City Elctrns.	713-621-1060
WI	Mequon, Taylor Elctrns.	414-241-4321

BICRON ELCTRNS., Box 807, Barlow St., Canaan, CT 06018, Tel: 203-824-5125; Empl.: 100; *Sls. Mgr.:* Peter B. Kent

BIDDLE INSTRUMENTS, A Thorn EMI Co., 510 Township Line Rd., Blue Bell, PA 19422, Tel: 215-646-9200, Telex: 83-4423 BIDDLE PMTG

BIKOR CORPORATION

BIKOR, 1504 W. 228th St., Torrance, CA 90501, Tel: 213-539-6320, TWX: 910-349-6667; Empl.: 50; *Sls. Mgr.:* Dave Jenest .... **3**•1508

Local Sales Offices & Reps

CA	Santa Clara, Electro Venture North	408-727-1553
FL	Orlando, Gra-Mar	305-894-3351
MN	Minnetonka, Chris-Tek	612-934-1334
MO	St. Louis, B & H Assocs.	314-434-4425
NH	Nashua, Bell Controls	603-882-6984
NJ	Haddonfield, Tritek Sls.	609-429-1551
NJ	Hasbrouck Hgts., Comp. Tech. Sls.	201-288-7400
NY	Rochester, Tae-Rep	716-586-8710
OH	Mentor, Depco	216-951-3998
TX	Garland, Tesco	214-681-1376
WA	Kirkland, Electro Venture N.W.	206-823-1708
WI	Brookfield, Sumer	414-784-6641

Local Distributors

CA	Buena Park, RPS Elctrns.	714-521-5230
CA	Burlingame, Rose Elctrn. Distbg. Co.	415-348-2740
NJ	Hasbrouck Hgts., Tory Sls.	201-288-7400

BINDICATOR, P.O. Box 9, 1915 Dove St., Port Huron, MI 48060, Tel: 313-987-2700; *Sls. Mgr.:* Rick Secord; *Dist. Mgr.:* Rick Secord

BIO-IMAGING RESEARCH, #1 Bio-Imaging Plaza, 425 Barclay Blvd., Lincolnshire, IL 60069, Tel: 312-564-3190; *Sls. Mgr.:* J. G. Close

BIOSPHERICAL INSTRS., INC., 4901 Morena Blvd. #1003, San Diego, CA 92117, Tel: 619-270-1315; *Sls. Mgr.:* Dennis Bryan

BIRD, RICHARD H., & CO., INC., 1 Spruce St., Waltham, MA 02154, Tel: 617-894-0160, Telex: 923-441; FSC No.: 17706; Empl.: 50; *Sls. Mgr.:* R.J. Cameron

BIRD ELCTRN., 30303 Aurora Rd., Cleveland, OH 44139, Tel: 216-248-1200, Telex: 706898 Bird Elec. UD; FSC No.: 70998; Empl.: 250; *Sls. Mgr.:* W. L. Yochum; *Dist. Mgr.:* Greg Johns

Local Sales Offices & Reps

CA	Ojai	805-646-7255

BIRTCHER

BIRTCHER CORP., 4501 N. Arden Dr., El Monte, CA 91731, Tel: 818-575-8144, Telex: 4720899 BIRTCHER ELM; Empl.: 200; *Sls. Mgr.:* H. Robert Sproul .... **2**•1015-1017

Local Sales Offices & Reps

AL	Huntsville, Mar-Tec.	205-883-5910
AZ	Scottsdale, Mercury Eng. Sls.	602-949-5054
CA	Brea, M. A. Stolaroff Co.	714-529-0866
CA	Los Angeles, M. A. Stolaroff Co.	213-295-7781
CA	Santa Clara, Nova Tronix	408-243-9530
CO	Broomfield, Connors, Inc.	303-466-9628
FL	Ft. Lauderdale, Hutto-Hawkins-Peregoy	305-971-5750
IL	Rolling Meadows, Heartland Tech. Mktg.	312-577-9222
KS	Mission, Midland Eng. Sls.	913-262-6565
MD	Baltimore, Burgin Kreh Assoc.	301-265-8500
MA	Burlington, Conti-Younger Assoc.	617-273-1582
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
NJ	Haddonfield, Tritek Sls.	609-429-1551
NY	Great Neck, Tylinski Assoc.	516-466-9070
NY	Syracuse, I. A. Hotze Assoc.	315-479-6641
NC	Raleigh, Burgin Kreh Assoc.	919-781-1100
OH	Cincinnati, Jim Finnegan Co.	513-321-6370
OH	Cleveland, Jim Finnegan Co.	216-238-5905
OR	Beaverton, Barrett-Squibb Assoc.	503-644-2550
TX	Dallas, Forner Sales	214-241-2166
VA	Lynchburg, Burgin Kreh Assoc.	804-239-2626
WA	Redmond, Barrett-Squibb Assoc.	206-885-6991

Local Distributors

CA	Manhattan Bch., Prime Electro Prods.	213-379-3642
CA	San Jose, Bisco Industries	408-946-8980

CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CO	Aurora, Jet Elctrns. Supp.	303-364-1000
FL	Dania, Summit Distrs.	305-920-6253
IL	Elk Grove, Dot-Tronics	312-593-0282
MA	Winchester, Rush Inds.	617-729-5800
MN	Minneapolis, Stark Elctrns.	612-322-1325
NY	Bohemia, Car Lac Indl. Sls.	516-567-4200
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Rochester, Summit Elctrns.	716-334-8110
OH	Englewood, Argent Industries	513-836-8633
TX	Ft. Worth, Industrial Elctrns.	817-731-7321
TX	Houston, Solid State Electronics	713-772-8483
WA	Redmond, Murphy Elctrns.	206-881-1234
Can	Mississauga, Ont., Rush Elctrns.	416-677-7280

BISHOP GRAPHICS, INC., 5388 Sterling Center, Westlake Village, CA 91359, Tel: 818-991-2600, Telex: 66-2400 BISHOP WKVG; Empl.: 160; *Sls. Mgr.:* Fred Kern

BIVAR, INC., 4 Thomas, Irvine, CA 92714, Tel: 714-951-8808; FSC No.: 32559; Empl.: 22; *Sls. Mgr.:* E. M. Muldoon .... **2**•1018

Local Sales Offices & Reps

AZ	Mesa, Tempe Assocs.	602-829-1901
CA	San Diego, Qualtronics Co.	619-560-8955
CO	Westminster, D. Barth	303-427-8679
FL	Plymouth, Duay Entprs.	305-889-2249
GA	Peachtree City, Spyraflo	404-487-7600
IL	Chicago, Berndt Assocs. Inc.	312-283-0713
IN	Indianapolis, Wilson Tech. Sls.	317-298-3345
KS	De Soto, Midtec Assocs.	913-441-6565
MA	Newtonville, C. Segel	617-969-6900
MI	Milford, Dodsworth	313-875-5755
MN	Minneapolis, Berndt Assocs.	612-546-2021
MO	Florissant, Midtec Assocs.	314-837-5200
NJ	Berkeley Heights, Cambridge-Allen	201-464-0203
NY	Syracuse, T-Squared Elctrns.	315-463-8592
NC	Bethania, Lee, Ltd.	919-924-8245
OH	Cincinnati, Tri-State Mktg.	513-761-7993
OR	Beaverton, Eclipse Mktg. Grp.	503-642-1661
OR	Portland, Eclipse Mktg. Grp.	503-644-2550
PA	Elkins Park, K. B. Erdman Co.	215-224-1833
TX	Richardson, Draper Co.	214-680-1650
WA	Redmond, Eclipse Mktg. Grp.	206-885-6991
WI	Milwaukee, Berndt Assocs.	414-545-8400

Local Distributors

AZ	Phoenix, Kachina Elctrn. Distr.	602-269-6201
AZ	Phoenix, EKO Sales	602-275-7501
CA	Fountain Valley, Components Ctr.	714-979-0433
CA	Mountain View, Vic/Tal Sls.	415-964-6254
CA	San Diego, Sigma Elctrns.	619-565-2000
CA	Santa Clara, Components Ctr.	408-988-3751
CA	Santa Fe Springs, F T R Fasteners	714-957-0202; 213-946-6464
CA	Temple City, Fastening Sys.	213-579-4600
CA	Westlake Village, R. C. Dudek	213-707-1310
CO	Englewood, Indus. Elctrns.	303-694-9444
CT	Milford, Plastic & Metal Comps. Co.	203-877-2723
GA	Peachtree City, Spyraflo Inc.	404-487-7600
IL	Chicago, Waldom Elctrns.	312-585-1212
IL	Chicago, EMF	800-621-0080
IL	Hillside, Miltex Sls.	312-449-0420
IL	Lisle, Components, Inc.	312-852-7707
MD	Gaithersburg, Capitol Fasteners	301-948-9310
MA	Burlington, Contact East	617-272-5051
MA	Marlboro, Hardware Specialty Co.	617-481-8622
MA	Waltham, Electronic Fasteners	617-890-7780
MA	Winchester, RUSH	617-729-5800
MI	Southfield, LSI Marketing	313-356-7002
MI	Zeeland, Tubergen & Assoc.	616-772-1548
MN	Eden Prairie, S. W. Anderson Co.	612-941-4108
NH	Goffstown, New Hampshire Fasteners	603-497-4151
NH	Londonderry, E.P.E. Corp.	603-669-9181
NJ	Kenilworth, Federated Purchaser	201-376-8900
NY	Central Islip, Domino Components	516-582-3050
NY	Johnson City, Gold Crest Elctrns.	607-797-2380
NY	Long Island City, Empire Fasteners	212-728-3900
NY	Long Island City, Hardware Specialty Co.	212-361-9393
NY	Mt. Vernon, QAR Elctrns.	914-699-2224
NY	Plainview, Tower Fastener Co.	516-349-7670
NC	Raleigh, Century Elctrn. Comps.	919-755-0537
NC	Raleigh, Century Fasteners	919-787-1800
OH	Englewood, Argent Inds.	513-836-8633
OH	Solon, REH/Electra	216-248-1636
OR	Beaverton, Murphy Elctrns.	503-642-2001
OR	Beaverton, Component Resources	503-641-8488
PA	Norristown, Century Elctrns.	215-631-5400
PA	Pittsburgh, Alder-Tronics	412-821-5565
WA	Redmond, Murphy Elctrns.	206-881-1234
WA	Seattle, Pacific Elctrns.	206-575-1050

BIW CABLE SYS., INC., 65 Bay St., Dorchester, MA 02125, Tel: 617-265-2102, Telex: 94-0604; FSC No.: 71102; Empl.: 600; *Sls. Mgr.:* E. McCormick

BLACK & WEBSTER, 281 Winter St., Waltham, MA 02154, Tel: 617-890-9100, Telex: 951102; Empl.: 80

BLACK BOX CORP., Micom Sys., P.O. Box 12800, Pittsburgh, PA 15241, Tel: 412-746-5500, Telex: 510-697-3125; *Sls. Mgr.:* Peter Highberg

BLACKHAWK NETWORKS CORP., 14 N. Parker Dr., P.O. Box 919, Janesville, WI 53545, Tel: 608-752-8701; FSC No.: 12724; Empl.: 10

BLANCK, A. R., CO., Box 249, Rutherford, NJ 07070, Tel: 201-933-2091; Empl.: 6; *Sls. Mgr.:* Dr. A. R. Blanck; *Dist. Mgr.:* Dr. A. R. Blanck

BLATEK INDS., Box 574, Bellefonte, PA 16823, Tel: 814-355-4910; Empl.: 20; *Sls. Mgr.:* Linda C. Feltman .... **1B**•1835

Local Sales Offices & Reps

CA	Burbank, Mo'Dco	213-848-2215
CO	Littleton, McCarthy Co.	303-773-0643
CT	Woodbridge, Elctrn. Mktg.	203-397-1461
IL	Elk Grove Village, Loren Green Assocs.	312-593-0282
MI	Benton Harbor, McNabb & Assocs.	616-925-2166

BLH ELCTRNS., 42 Fourth Ave., Waltham, MA 02254, Tel: 617-890-6700, Telex: 92-3413, TWX: 710-324-0683; FSC No.: 03089; Empl.: 350; *Sls. Mgr.:* D. Erikson

BLILEY ELEC. CO., 2545 W. Grandview Blvd., Erie, PA 16506, Tel: 814-838-3571, TWX: 510-696-6886; FSC No.: 71034; Empl.: 170; *Sls. Mgr.:* H. A. Yocum .... **1A**•1316-1323

Local Sales Offices & Reps

AL	Huntsville, R. W. Mitscher Co.	205-882-6050
CA	Los Angeles, Elsner-Rambo Co.	213-664-2928
CA	Mountain View, Gene C. Woempner Co.	415-964-5454
CT	Hartford, Sturgeon Co.	203-249-7800
FL	Altamonte Springs, R. W. Mitscher Co.	305-788-6844
FL	Boca Raton, R. W. Mitscher Co.	305-482-5649
GA	Lawrenceville, R. W. Mitscher Co.	404-923-3239
MD	Laurel, R. W. Mitscher Co.	301-498-6090
MA	Needham, Sturgeon Co.	617-444-6603
NY	Bainbridge, R. W. Mitscher Co.	607-967-7192
NY	Buffalo, R. W. Mitscher Co.	716-633-7970
NY	N. Syracuse, R. W. Mitscher Co.	315-458-1321
NY	Pittsford, R. W. Mitscher Co.	716-586-4012
NY	Red Hook, R. W. Mitscher Co.	914-758-8375
NY	Rochester, R. W. Mitscher Co.	716-227-0839
NY	West Hempstead, Schmitt Indl. Mktg. Corp.	516-486-3510
NC	Charlotte, R. W. Mitscher Co.	704-598-8644
NC	Raleigh, R. W. Mitscher Co.	919-848-0941
OR	Portland, Dussault & Assocs. Inc.	503-641-8780
TN	Johnson City, R. W. Mitscher Co.	615-929-7258
TX	Richardson, Vector Sls. Co.	214-234-4291
VA	Midlothian, R. W. Mitscher Co.	804-744-4676
WA	Seattle, Dussault & Assocs., Inc.	206-527-5454
EXP	CT, Stamford, Dage Corp.	203-324-3123

BLUE M

BLUE M, A UNIT OF GENERAL SIGNAL, 138th & Chatham Sts., Blue Island, IL 60406, Tel: 312-385-9000, TWX: 910-689-3398; Empl.: 300; *Sls. Mgr.:* H. G. Mathews .... **3**•1173

Local Sales Offices & Reps

AZ	Tempe	602-894-2305
CA	El Monte	818-442-6672
CA	Sunnyvale	408-734-8734
DE	Wilmington	302-478-6983
FL	Winter Park	305-671-6655
GA	Atlanta	404-455-3452
MA	Natick,	617-651-1616
MI	Taylor	313-281-2107
NY	Nanuet	914-623-0900
NY	Syracuse	315-437-0192
NC	Charlotte	704-527-2492
OH	Cincinnati	513-821-6278
OH	Hudson	216-656-1177
TX	Garland	214-272-2509
TX	Houston,	713-778-1146
WA	Seattle	206-763-1030

BLUM, JULIUS & CO., INC., Box 292, Carlstadt, NJ 07072, Tel: 201-438-4600; Telex: 13-3491; Empl.: 40

BMS DATA HANDLING, INC., 12155 Magnolia, Riverside, CA 92503, Tel: 714-359-8820; Empl.: 16; *Sls. Mgr.:* Richard Mestler

BODINE ELEC. CO., 2500 W. Bradley Pl., Chicago, IL 60618, Tel: 312-478-3515, Telex: 25-3646; *Sls. Mgr.:* R. E. Ford .... **1B**•1135

Local Sales Offices & Reps

CA	Los Angeles, C. E. Mello	213-626-9159
CA	San Jose, E. W. Duemmlein	408-243-4800
KS	Shawnee Mission, J. S. Gleeson & Assocs.	913-362-4422
MA	Andover, L. R. Cascino	617-470-0050
MI	Grosse Ile, Steve Cavender	313-676-2724
NY	Massapequa, D. V. Mayorga	516-541-1611
NY	Rochester, Application Specialists	716-586-6226
NY	Syracuse, Application Specialists	315-437-2813
OH	Hudson, J. H. Basten	216-656-4226
OR	Portland, D. E. Johnson	503-246-3131
TX	Richardson, General Power Equip.	214-783-8371
VA	McLean, J. S. Hsia	703-734-1739
EXP	IL., Chicago, Export Dept., Bodine Elec.	312-478-3515

Local Distributors

AL	Mobile, Brownell Electro	205-479-5405
AK	Anchorage, Airport Machinery Co	907-272-0544
AZ	Phoenix, Minarik Elec. Co.	602-233-3000
AR	Fort Smith, Dagwell-Dixie Arkansas	501-646-8028
CA	Carson, Power Trans. Specialties	213-631-7502
CA	Los Angeles, Minarik Elec. Co.	213-624-3161
CA	Mountain View, King Bearing Inc.	415-968-8316
CA	San Diego, Minarik Elec. Co.	619-560-6632
CA	San Jose, Republic Supp. Co.	408-279-2202
CA	San Jose, King Bearing Inc.	408-998-5464
CA	San Leandro, Republic Supp. Co.	415-357-2211
CA	Santa Clara, Minarik Elec. Co.	408-727-0575
CO	Denver, Wazee Elec. Co.	303-892-7004
CT	Berlin, B & B Motor & Control	203-828-8550
CT	Hartford, Machine Drives & Controls	203-728-0403
CT	Norwalk, Machine Drives & Controls	203-846-2007
FL	Miami, Brownell Electro	305-591-3215
FL	Orlando, Brownell Electro	305-843-6770
GA	Hapeville, Brownell Electro	404-762-5181
IL	Chicago, Excel Elec. Svc. Co.	312-421-7220
IL	Chicago, Harris & Lee	312-372-7272
IL	Rockford, Harris & Lee	815-398-0606
IL	St. Charles, Harris & Lee	312-584-5000
IL	Waukegan, Harris & Lee	312-662-0372
IN	Indianapolis, B & B Motor & Control	317-248-0396
IA	Cedar Rapids, Precision Bearing Co.	319-365-5276
IA	Des Moines, Precision Bearing Co.	515-265-9811
KS	Kansas City, Kornfeld Thorp Elec.	913-321-7070
MA	Medford, Empire Elctrl. Co.	617-395-5000
MA	Somerville, Electro Sls. Co., Inc.	617-666-0500
MI	Detroit, Howard Elec. Co.	313-923-0430
MN	Minneapolis, Boustead Elec. & Mfg.	612-544-9131
MO	St. Louis, Zeller Elec. Inc.	314-638-9641
NE	Omaha, Precision Bearing Co.	402-444-3939
NV	Reno, Republic Supp. Co.	702-677-1761
NJ	Cherry Hill, Jos. T. Fewkes & Co.	609-424-5810
NJ	Piscataway, B & B Motor & Control	201-572-0500
NY	Binghamton, K. J. Elec. Corp.	607-772-1760
NY	East Syracuse, K. J. Elec. Corp.	315-437-2826
NY	Long Island City, B & B Motor & Control	212-784-1313
NY	Rochester, B & B Motor & Control	716-424-7040
NC	Charlotte, Mize Co., Inc.	704-375-5761
NC	Charlotte, Brownell Electro	704-597-1270
OH	Cleveland, Reserve Elec. Co.	216-771-5764
OH	Dayton, Thal Mor Assoc., Inc.	513-298-9939
OK	Oklahoma City, Dagwell Dixie Co.	405-232-7671
OK	Tulsa, Southwest Drives, Inc.	918-834-4231
OR	Portland, Campbell Ind. Supp.	503-231-4820
PA	Pittsburgh, Braunlich-Roessie	412-471-6995
SC	Taylors, B & B Motor & Control	803-268-5702
TN	Memphis, Brownell Electro	901-795-8487
TN	Nashville, Tennessee Machinery Co.	615-244-8150
TX	Dallas, Motion Industries	214-351-2211
TX	Fort Worth, Motion Industries	817-335-8131
TX	Houston, Research Designs, Inc.	713-995-8591
TX	Houston, B & B Motor & Control	713-820-7931
TX	Houston, B & B Motor & Control	713-820-7931
VA	Richmond, Ind. Supp.	804-355-8041
WA	Seattle, Industrial Elec.	206-329-3900
WA	Seattle, Campbell Ind. Supp.	206-447-7100
WA	Spokane, Campbell Ind. Supp. Co.	509-828-8288
WA	Tacoma, Campbell Ind. Supp. Co.	206-383-2431
WI	Milwaukee, Trester Svc. Elec.	414-264-8170
WI	New Berlin, Elec. Sls. & Engrg.	414-782-2400

BOEING MICROELECTRONICS, PCB OPNS., M/S: 88-34, Box 24666, Seattle, WA 98124, Tel: 206-773-1083, Telex: 32-9430, TWX: 910-423-1563; Empl.: 120; *Sls. Mgr.:* M.A. Schalk

BOKER'S, INC., 3104 Snelling Ave., Minneapolis, MN 55406, Tel: 612-729-9365

BOMAR CRYSTAL, 201 Blackford Ave., Middlesex, NJ 08846, Tel: 201-356-7787, 800-526-3935, TWX: 710-480-4560; Empl.: 75; *Sls. Mgr.:* Phil Casciano

BOMCO, See MuShield Co.

BONUS-BILT, INC., Hofmann Inds., 1096 Air Way, Glendale, CA 91201, Tel: 818-245-9177, 800-692-8888; Empl.: 100; *Sls. Mgr.:* Robert J. Grimm

BOONTON

BOONTON ELCTRNS. CORP., 791 Route 10, Randolph, NJ 07869, Tel: 201-584-1077, TWX: 710-986-8215 BOONTRONICS; FSC No.: 04901; Empl.: 180; *Sls. Mgr.:* J. Garthwaite ....**3**•1204

Local Sales Offices & Reps

AL	Huntsville, Sci. Devices	205-536-1969
AZ	Phoenix, Aztec Entprs.	602-943-8178
CA	North Hollywood, O'Halloran Assocs.	213-877-0173
CA	Palo Alto, O'Halloran Assocs.	415-326-1493
CO	Littleton, Aztec Entprs.	303-795-0250
CT	Mt. Carmel, Sci. Devices	203-248-9361
FL	Orlando, Sci. Devices	305-841-8180
FL	Shalimer, Sci. Devices	904-651-4407
GA	Marietta, Sci. Devices SE	404-427-8660
IL	Schaumburg, K. W. Meyers	312-882-4808
IN	Indianapolis, K. W. Meyers	317-243-6681
IA	Cedar Rapids, K. W. Meyers	319-363-8987
KS	Overland Park, Ramsey Assoc.	913-649-6996
MD	Silver Spring, Sel-Tronics	301-589-3391
MA	Lexington, R. J. Sickles	617-862-5100
MN	Minneapolis, K. W. Meyers	612-920-7080
MO	Maryland Hgts., Ramsey Assoc.	314-878-5042
NJ	Englewood Cliffs, Sci. Devices	201-871-3916
NM	Albuquerque, Aztec Entprs.	505-262-1688
NY	Rochester, Sci. Devices	716-334-2445
NC	Winston-Salem, Sci. Devices	919-765-5776
OH	Centerville, Micro Sls.	513-433-8171
OH	N. Olmsted, Micro Sls.	216-734-3080
OR	Portland, Sci. Devices	503-292-6934
PA	Melrose Park, R. Meyers	215-224-1663
TX	Austin, Testech	512-327-7033
TX	Houston, Testech	713-956-0837
TX	Richardson, Testech	214-644-5010
UT	Ogden, Aztec Entprs.	801-621-1655
WA	Bellevue, Sci. Devices	206-747-5169
WI	Brookfield, K. W. Meyers	414-784-3790

BORG-WARNER THERMOELECTRICS, BORG-WARNER CORP., See TECA, ThermoElectric Cooling America Corp.

BOSCH, ROBERT, CORP., 2800 S. 25th Ave., Broadview, IL 60153, Tel: 312-865-5200, Telex: 23-5563; *Sls. Mgr.:* Dieter Bloecks; *Dist. Mgr.:* Dave Robson ....**1B**•1310, 1311

10TH Anniversary 1974–1984

BOSCHERT INC., 384 Santa Trinita Ave., Sunnyvale, CA 94086, Tel: 408-732-2440, TWX: 910-339-9241; Empl.: 600; *Sls. Mgr.:* Ed Bennett; *Dist. Mgr.:* Bill Sabetti ....**3**•1510, 1511

Local Sales Offices & Reps

AZ	Scottsdale, Fred Board Assocs.	602-994-9388
CA	Los Alamitos, Santana Sls.	714-827-9100
CA	San Diego, Harvey King	619-566-5252
CA	Santa Clara, Criterion	408-988-6300
CA	Sunnyvale, Boschert	408-732-2440
CO	Aurora, Electrodyne	303-695-8903
FL	Clearwater, Dyne-A-Mark	813-441-4702
FL	Ft. Lauderdale, Dyne-A-Mark	305-771-6501
FL	Maitland, Dyne-A-Mark	305-831-2097
FL	Palm Bay, Dyne-A-Mark	305-727-0192
GA	Atlanta, Elctrn. Mktg.	404-448-1215
GA	Huntsville, Elctrn. Mktg.	205-837-7363
IL	Arlington Hgts., Micro Sls.	312-956-1000
IN	Indianapolis, SAI Mktg.	317-241-9276
IA	Cedar Rapids, Stan Clothier	319-395-0245
MA	Framingham, Eastern Micro	617-620-1616
MI	Brighton, SAI Mktg.	313-227-1786
MN	Minneapolis, Stan Clothier Co.	612-944-3456
MO	St. Louis, Design Solutions	314-961-7170
NJ	Cherry Hill, Datronix	609-424-6622
NJ	Clifton, Boschert	201-478-4659
NM	Albuquerque, Alliance Elctrns.	505-292-3360
NY	Huntington, Morgan Elctrns.	516-549-5180
NC	Raleigh, Elctrn. Mktg.	919-847-8800
OH	Centerville, SAI Mktg.	513-435-3181
OH	Shaker Hgts., SAI Mktg.	216-751-3633
OR	Hillsboro, Olson, Ferree & Assoc.	503-640-9660
SC	Greenville, Elctrn. Mktg.	803-233-4637
TX	Austin, O. M. Sales	512-452-1838
TX	Dallas, O. M. Sales	214-241-3876
TX	Houston, O. M. Sales	713-789-4426
UT	Salt Lake City, Electrodyne	801-486-3801
WA	Bellevue, Olson, Ferree & Assoc.	206-883-7792
WI	Brookfield, Micro Sls.	414-782-1171

Local Distributors

AL	Huntsville, Marshall	205-881-9236
AL	Huntsville, Pioneer/Wash	205-837-9300
AZ	Tempe, Anthem	602-244-0900
AZ	Tempe, Marshall Inds.	602-968-6181
CA	Canoga Park, Marshall Inds.	213-999-5001
CA	Chatsworth, Anthem	213-700-1000
CA	El Monte, Marshall Inds.	213-442-7204
CA	Irvine, Marshall Inds.	714-556-6400
CA	San Diego, Anthem	619-453-9005
CA	San Diego, Marshall Inds.	619-578-9600
CA	San Jose, Anthem	408-946-8000
CA	Sunnyvale, Marshall Inds.	408-732-1100
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Tustin, Anthem	714-730-8000
CO	Denver, Marshall Inds.	303-427-1818
CO	Englewood, Anthem	303-790-4500
CT	Norwalk, Pioneer-Harvey Elctrns.	203-853-1515
CT	Wallingford, Marshall Inds.	203-265-3822
FL	Altamonte Springs, Pioneer/Wash	305-834-9090
FL	Ft. Lauderdale, Pioneer/Wash	305-771-7520
FL	Orlando, Marshall Inds.	305-841-1878
GA	Norcross, Pioneer/Wash	404-448-1711
GA	Norcross, Marshall Inds.	404-923-5750
IL	Elk Grove Vlg., Pioneer-Standard	312-437-9680
IL	Schaumberg, Marshall	312-490-0155
IN	Indianapolis, Pioneer-Standard	317-849-7300
MD	Gaithersburg, Pioneer/Wash	301-948-0710
MD	Gaithersburg, Marshall Inds.	301-840-9450
MA	Burlington, Marshall Inds.	617-272-8200
MA	Lexington, Pioneer-Harvey Elctrns.	617-861-9200
MI	Livonia, Marshall	313-525-5850
MI	Livonia, Pioneer-Standard	313-525-1800
MN	Minnetonka, Pioneer-Standard	612-935-5444
MN	Plymouth, Marshall	612-559-2211
NJ	Fairfield, Marshall Inds.	201-882-0320
NJ	Mt. Laurel, Marshall Inds.	609-234-9100
NJ	Pine Brook, Pioneer-Harvey Elctrns.	201-227-1262
NY	Endwell, Marshall	607-754-1570
NY	Fairport, Pioneer-Harvey Elctrns.	716-381-7070
NY	Hauppauge, Marshall Inds.	516-273-1515
NY	Rochester, Marshall	716-235-7640
NY	Vestal, Pioneer-Harvey Elctrns.	607-748-8211
NY	Woodbury, Pioneer-Harvey Elctrns.	516-921-8700
NC	Charlotte, Pioneer/Wash	704-572-8188
OH	Cleveland, Pioneer-Standard	216-587-3600
OH	Dayton, Marshall	513-236-8088
OH	Dayton, Pioneer-Standard	513-236-9900
OR	Beaverton, Marshall	503-644-5050
PA	Horsham, Pioneer/Wash	215-665-6778
PA	Pittsburgh, Pioneer-Standard	412-782-2300
TX	Austin, Marshall	512-458-5654
TX	Austin, Pioneer-Standard	512-835-4000
TX	Dallas, Pioneer-Standard	214-386-7300
TX	Dallas, Marshall Inds.	214-233-5200
TX	Houston, Pioneer-Standard	713-988-5555
TX	Houston, Marshall Inds.	713-789-6600
UT	Salt Lake City, Bell Inds.	801-972-6969
WA	Bellevue, Marshall Inds.	206-747-9100
WA	Redmond, Anthem	206-881-0850

BOSTON SYSTEMS OFFICE, 469 Moody St., Waltham, MA 02154, Tel: 617-894-7800, TWX: 710-324-0760; Empl.: 60; *Sls. Mgr.:* Francis X. O'Brien; *Dist. Mgr.:* Debra DellaCamera (International)

BOURNS, INC., Resistive Components Group, 1200 Columbia Ave., Riverside, CA 92507, Tel: 714-781-5050, TWX: 910-332-1252; Empl.: 4000; *Sls. Mgr.:* R. A. Sickler; *Dist. Mgr.:* Dennis Lause ....**1A**•1804-1807, 2022-2035

Local Sales Offices & Reps

AL	Huntsville, CSR Elctrns.	205-533-2444
AZ	Phoenix, Shefler-Kahn	602-257-9015
CA	Encino, Great American Rep Co.	213-990-4870
CA	San Diego, SR Elctrns.	619-560-8330
CA	San Jose, QuadRep Inc.	408-946-4000
CA	Tustin, Great American Rep Co.	714-832-8113
CO	Parker, Parker Webster	303-841-4888
FL	Altamonte Springs, Dyne-A-Mark	305-831-2097
FL	Clearwater, Dyne-A-Mark	813-441-4702
FL	Ft. Lauderdale, Dyne-A-Mark	305-771-6501
FL	Palm Bay, Dyne-A-Mark	305-727-0192
GA	Atlanta, CSR Elctrns.	404-396-3720
ID	Boise, Intermountain Technlg.	208-322-5022
IL	Elk Grove Village, John G. Twist Co.	312-593-0200
IN	Carmel, Technlg. Mktg. Corp.	317-844-8462
IN	Ft. Wayne, Technlg. Mktg. Corp.	219-432-5553
IA	Cedar Rapids, REP Assocs. Corp.	319-373-0152
KY	Louisville, Technlg. Mktg. Corp.	502-499-7808
MD	Baltimore, Micro-Comp.	301-247-0400
MA	Lexington, John E. Boeing Co.	617-862-2500
MI	Detroit, Rathsburg Assoc.	313-882-1717
MN	Edina, Mel Foster	612-941-9790
MO	Bridgeton, Centech	314-291-4230
MO	Raytown, Centech	816-358-8100
NJ	Bellmawr, Thomas Assoc.	609-933-2600
NM	Albuquerque, Shefler-Kahn Co.	505-296-0749
NY	Ithaca, B. Dean	607-257-1111
NY	Melville, Comtronic Assocs.	516-249-0505
NY	Wappingers Falls, Bourns	914-297-1180
NC	Raleigh, CSR Electronics	919-878-9200
OH	Richfield, Bear Mktg.	216-659-3131
OK	Oklahoma City, Ammon & Rizos	405-942-2552
OR	Portland, J. J. Backer	503-297-8744
OR	Salem, J. J. Backer	503-362-0717
TX	Austin, Ammon & Rizos	512-454-5131
TX	Dallas, Ammon & Rizos	214-233-5591
TX	Houston, Ammon & Rizos	713-781-6240
UT	Salt Lake City, Parker Webster	801-487-5911
VA	Huddleston, Micro-Comp	301-247-0400
WA	Seattle, J. J. Backer	206-285-1300

Local Distributors

AL	Huntsville, Hall-Mark Elctrns.	205-837-8700
AL	Huntsville, Pioneer/Washington	205-837-9300
AL	Huntsville, Schweber	205-882-2200
AL	Huntsville, Hamilton/Avnet Elctrns.	205-837-7210
AZ	Phoenix, Hall-Mark Elctrns.	602-243-6601
AZ	Phoenix, Cetec Elctrns.	602-272-7951
AZ	Phoenix, Schweber Elctrns.	602-997-4874
AZ	Phoenix, Elctrn. Parts Co.	602-277-7281
AZ	Tempe, Elctrn. Supp.	602-258-4769
AZ	Tempe, Acacia Sls.	602-894-2874
AZ	Tempe, Bell Inds.	602-966-7800
AZ	Tempe, Acacia Sales	303-232-2882
AZ	Tempe, Hamilton/Avnet	602-231-5100
CA	Canoga Park, Schweber Elctrns.	213-999-4702
CA	Chatsworth, Avnet Elctrns.	213-700-2600
CA	Citrus Hts, Hall-Mark Elctrns.	916-443-7282
CA	Compton, Harper S.I.D.	213-979-5090
CA	Costa Mesa, Hamilton Elctrns.	714-641-4100
CA	Costa Mesa, Avnet Elctrns.	213-558-2313
CA	Costa Mesa, Avnet Elctrns.	714-754-6111
CA	Culver City, Hamilton Electro Sls.	213-558-2883/84
CA	Culver City, Hamilton Electro Sls.	213-558-2121
CA	El Segundo, Hall-Mark Elctrns.	213-643-9101
CA	Garden Grove, Bell Inds.	213-444-0301
CA	Gardena, Bell Inds.	213-515-1800
CA	Irvine, Schweber Elctrns.	714-863-0261
CA	Irvine, Cetec Elctrns.	714-250-4141
CA	Irvine, Acacia Sls.	714-549-0954
CA	Irvine, Schweber Elctrns.	714-556-3880
CA	Oakland, Brill Elctrns.	415-834-5888
CA	Riverside, Elctrn. Supp. Corp.	714-787-9220
CA	Roseville, Bell Inds.	916-969-3100
CA	Sacramento, Schweber Elctrns.	916-929-9732
CA	Sacramento, Hamilton/Avnet	916-920-3150
CA	San Diego, Bell Inds.	619-268-1277
CA	San Diego, Acacia Sls.	619-565-4365
CA	San Diego, Hall-Mark Elctrns.	619-268-1201
CA	San Diego, Cetec Elctrns.	619-278-5020
CA	San Diego, Bell Inds.	619-268-1277
CA	San Diego, Elctrn. Supp.	619-278-5020
CA	San Diego, Hamilton/Avnet	619-571-7500
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	Santa Ana, Teknopak	714-558-8840
CA	Santa Clara, Schweber Elctrns.	408-748-4700
CA	Santa Clara, Schweber Elctrns.	408-496-0200
CA	Southgate, Cetec Elctrns.	213-773-6521

CA	Sunnyvale, Acacia Sales	408-745-7200
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Sunnyvale, Hall-Mark Elctrns.	408-773-9990
CA	Sunnyvale, Hamilton/Avnet	408-743-3300
CA	Tustin, Hall-Mark Elctrns.	714-669-0681
CA	Woodland Hills, Avnet Elctrns.	213-884-3322
CO	Denver, Newark Elctrns.	303-757-3351
CO	Englewood, Hall-Mark Elctrns.	303-694-1662
CO	Englewood, Hamilton/Avnet	303-779-9998
CO	Lakewood, Acacia Sales	303-232-2882
CO	Wheat Ridge, Bell Inds.	303-424-1985
CT	Danbury, Hamilton/Avnet	203-797-2856
CT	Danbury, Schweber Elctrns.	203-792-3500
CT	Hamden, Almo Elctrns. Corp.	203-288-6556
CT	Norwalk, Pioneer Standard	203-853-1515
CT	Wallingford, Midan Elctrns.	203-265-2077
FL	Altamonte Springs, Pioneer Standard	305-834-9090
FL	Altamonte Springs, Schweber Elctrns.	305-331-7555
FL	Clearwater, Hall-Mark Elctrns.	813-530-4543
FL	Dania, Summit Distrs.	305-920-6253
FL	Ft. Lauderdale, Hall-Mark Elctrns.	305-971-9280
FL	Ft. Lauderdale, Pioneer/Washington	305-771-7520
FL	Ft. Lauderdale, Hamilton/Avnet	305-971-2900
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Hollywood, Schweber Elctrns.	305-927-0511
FL	Largo, Graham Elctrns.	813-541-4434
FL	Orlando, Hall-Mark	305-855-4020
FL	Orlando, Pioneer/Orlando	305-834-9090
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	St. Petersburg, Hamilton/Avnet	813-576-3930
FL	St. Petersburg, Hall-Mark Elctrns.	813-576-8691
FL	Winter Park, Hamilton/Avnet	305-628-3888
GA	Norcross, Hammond Elctrns.	404-449-1996
GA	Norcross, Pioneer/Washington	404-448-1711
GA	Norcross, Hall-Mark Elctrns.	404-447-8000
GA	Norcross, Schweber Elctrns.	404-449-9170
GA	Norcross, Hamilton/Avnet	404-447-7500
IL	Bensenville, Hamilton/Avnet	312-860-8523
IL	Bensenville, Hall-Mark Elctrns.	312-860-3800
IL	Chicago, Bell Inds.	312-982-9210
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Elk Grove Village, Schweber Elctrns.	312-364-3750
IL	Elk Grove Village, Pioneer Standard	312-437-9680
IL	Palatine, Ohm Electronics	312-359-5500
IL	Peoria, Klaus Radio	309-691-4840
IN	Carmel, Hamilton/Avnet	317-844-9333
IN	Fort Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Indianapolis, Pioneer Standard Elctrns.	317-849-7300
IN	Lafayette, Graham Elctrns.	317-423-5564
IA	Cedar Rapids, Schweber Elctrns.	319-373-1417
IA	Cedar Rapids, Bell Inds.	319-395-0730
KS	Lenexa, Hall-Mark Elctrns.	913-888-4747
KS	Overland Park, Schweber Elctrns.	913-492-2921
KS	Overland Pk., Hamilton/Avnet Elctrns.	913-888-8900
LA	New Orleans, Wm B Allen Supp.	504-525-8222
MD	Baltimore, Radio Elec. Svc. Co.	301-823-0070
MD	Beltsville, Radio Elec. Svc. Co.	202-937-9100
MD	Columbia, Hamilton/Avnet	301-995-3500
MD	Columbia, Hall-Mark Elctrns.	301-796-9300
MD	Gaithersburg, Pioneer/Washington	301-921-0660
MD	Gaithersburg, Schweber Elctrns.	301-840-5900
MD	Rockville, Almo Elctrns. Corp.	301-251-1161
MA	Bedford, Schweber Elctrns.	617-275-5100
MA	Burlington, Lionex Corp.	617-272-9400
MA	Canton, Almo Elctrns. Corp.	617-821-1450
MA	Lexington, Pioneer Standard	617-863-1200
MA	Norwood, Gerber Elctrns.	617-769-6000
MA	Wilmington, RC Comps.	617-273-1860
MA	Woburn, Hall-Mark Elctrns.	617-935-9777
MA	Woburn, Hamilton/Avnet	617-273-7500
MI	Flint, RS Elctrns.	313-762-5800
MI	Grand Rapids, Hamilton/Avnet	616-243-8805
MI	Grand Rapids, RS Elctrns.	616-241-3483
MI	Kalamazoo, RS Elctrns.	616-381-5470
MI	Livonia, Schweber Elctrns.	313-525-8100
MI	Livonia, RS Elctrns.	313-525-1155
MI	Livonia, Hamilton/Avnet	313-522-4700
MI	Livonia, Pioneer Standard Elctrns.	313-525-1800
MI	Roseville, RS Elctrns.	313-779-2450
MI	Wyandotte, RS Elctrns.	313-AV2-5880
MN	Bloomington, Hall-Mark Elctrns.	612-854-3223
MN	Eden Prairie, Schweber Elctrns.	612-941-5280
MN	Edina, Schweber Elctrns.	612-941-5280
MN	Minneapolis, Newark Elctrns.	612-331-6350
MN	Minnetonka, Hamilton/Avnet	612-932-0600
MN	Minnetonka, Pioneer Standard Elctrns.	612-935-5444
MO	Earth City, Schweber Elctrns.	314-739-0526
MO	Earth City, Hamilton/Avnet	314-344-1200
MO	Maryland Hts, Hall-Mark Elctrns.	314-291-5350
NH	Hudson, C&H Elctrns.	603-882-1133
NH	Manchester, Schweber Elctrns.	603-625-2250
NJ	Camden, General Radio	609-964-8560
NJ	Cherry Hill, Hamilton/Avnet	609-424-0110
NJ	Cherry Hill, Hall-Mark Elctrns.	609-424-7300
NJ	Clifton, J-Mar Elctrns.	201-772-6400
NJ	Fairfield, Hall-Mark Elctrns.	201-575-4415
NJ	Fairfield, Hamilton/Avnet	201-575-3390
NJ	Fairfield, Schweber Elctrns.	201-227-7880
NJ	Fairfield, Lionex	201-227-7960
NJ	Pine Brook, Pioneer Std.	201-227-1262
NM	Albuquerque, Elctrn. Parts	505-293-6161
NM	Albuquerque, Bell Inds.	505-292-2700
NM	Albuquerque, Elctrn. Parts Co.	505-293-6161
NM	Albuquerque, Hamilton/Avnet Elctrns.	505-765-1500
NM	Las Cruces, Elctrn. Parts Co.	505-523-4578
NY	Buffalo, Summit Distrs.	716-884-3450
NY	E. Syracuse, Hamilton/Avnet	315-437-2647
NY	Fairport, Pioneer-Harvey	716-381-7070
NY	Hauppauge, Pioneer-Harvey	516-231-9200
NY	Hauppauge, Mast Distrs.	516-273-4422
NY	Hauppauge, Lionex	516-273-1660
NY	Melville, Hamilton/Avnet	516-231-9800
NY	Melville, Hamilton/Avnet	516-454-6000
NY	Rochester, Summit Distrs.	716-334-8110
NY	Rochester, CAM/RPC	716-865-2080
NY	Rochester, Schweber Elctrns.	716-424-2222
NY	Rochester, Hamilton/Avnet Elctrns.	716-475-9130
NY	Ronkonkoma, Hall-Mark Elctrns.	516-737-0600
NY	Vestal, Pioneer Std.	607-748-8211
NY	Westbury, Schweber Elctrns.	516-334-7474
NY	Woodbury, Pioneer-Harvey	516-921-8700
NC	Charlotte, Pioneer/Washington	704-527-8188
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Greensboro, Pioneer/Washington	919-273-4441
NC	Raleigh, Hall-Mark Elctrns.	919-873-0712
NC	Raleigh, Schweber Elctrns.	919-876-0000
NC	Raleigh, Hamilton/Avnet	919-878-0819
NC	Raleigh, Hall-Mark Elctrns.	919-872-6286
NC	Raleigh, Hamilton/Avnet Elctrns.	919-829-8030
OH	Beachwood, Schweber Elctrns.	216-464-2970
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cincinnati, Hall-Mark Elctrns.	513-563-5980
OH	Cleveland, Hamilton/Avnet	216-831-3500
OH	Cleveland, Pioneer Std.	216-587-3600
OH	Cleveland, CAM/Ohio	216-461-4700
OH	Columbus, Graham Elctrns.	614-895-1590
OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Bell Inds.	513-434-8213
OH	Dayton, Schweber Elctrns.	513-439-1800
OH	Dayton, Pioneer Std.	513-236-9900
OH	Dayton, Hamilton/Avnet	513-433-0610
OH	Maumee, RS Elctrns.	419-893-0721
OH	Solon, Hall-Mark Elctrns.	216-349-4632
OH	Westerville, Hall-Mark Elctrns.	614-891-4555
OK	Tulsa, Hall-Mark Elctrns.	918-665-3200
OK	Tulsa, Schweber Elctrns.	918-622-8000
OR	Beaverton, Almac Elctrns.	503-641-9070
OR	Beaverton, Acacia Sls.	503-646-3377
OR	Lake Oswego, Bell Inds.	503-241-4115
OR	Lake Oswego, Hamilton/Avnet Elctrns.	503-635-8831
PA	Horsham, Schweber Elctrns.	215-441-0600
PA	Horsham, Pioneer/Washington	215-674-4000
PA	Horsham, Lionex Corp.	215-443-5150
PA	Lancaster, CAM/RPC	717-392-8141
PA	McKean, Advacom Inc.	814-476-7774
PA	Philadelphia, Almo Elctrns. Corp.	215-698-4000
PA	Pittsburgh, Schweber Elctrns.	412-782-1600
PA	Pittsburgh, CAM/RCP	412-782-3770
PA	Pittsburgh, Almo Elctrns. Corp.	412-931-5990
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PA	Exton, Kiley Elec. Co.	215-363-8550
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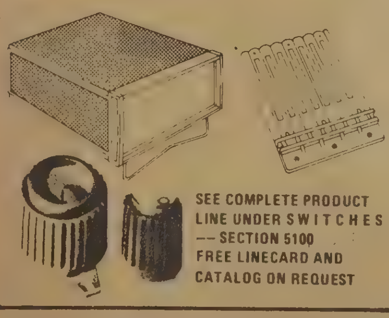

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WA	Seattle, Radar Electric	206-282-2511

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BUD RADIO, 4605 E. 355th St., Willoughby, OH 44094, Tel: 216-946-3200, TWX: 810-427-2604; Empl.: 200; *Sls. Mgr.:* A.N. Haas; *Dist. Mgr.:* Blair Haas

BUDWIG MFG., P.O. Box 829, Ramona, CA 92065, Tel: 619-789-0900

BUEHLER PRODS., P.O. Box A, Hwy. 70 E., Kinston, NC 28501, Tel: 919-522-3101, TWX: 510-924-2474; Empl.: 400; *Sls. Mgr.:* R. B. Davis ....**1B**•1137

BUGGIE H. H./CATON CONNECTOR CORP., 20 Wapping Rd., Kingston, MA 02364, Tel: 617-585-4315, TWX: 710-391-7546; FSC No.: 52196; *Sls. Mgr.:* Daniel J. Galambos ....**2**•1167

Local Sales Offices & Reps

CA	Fullerton, ISI/Mktg.	714-773-0411
TX	Dallas, CCI	214-484-9691

BULOVA SYS. & INSTR., Green Acres Rd., W., Valley Stream, NY 11582, Tel: 516-561-2600, TWX: 510-225-8709; Empl.: 850

BULOVA WATCH CO., See Frequency Control Prods., Inc., American Time Prods. Div.

BUMPER PRODUCTS CORP., 14 King St., P.O. Box 45, Mt. Holly, NJ 08060, Tel: 609-261-8100, 800-541-2500, Telex: 244437 ACTP-UR; *Sls. Mgr.:* Ed Rosenthal ....**2**•1866

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CA	Covina, Arow Fasteners	818-967-6335
CA	Hayward, Arow Fasteners	800-227-2901
CA	San Leandro, Boyd Corp.	415-278-8000
CA	Santa Clara, San Jose Screw Prods.	408-988-3771
CA	Temple City, Fastening Systems	818-579-4600
FL	Tampa, Spencer Prods.	813-877-8276
GA	Atlanta, Georgia Rubber & Supply	404-355-0830
IL	Schaumburg, Engineered Fastener Co.	312-980-4082
IN	Ft. Wayne, Spencer Prods.	219-482-4882
IN	St. John, A.M. Associates	219-365-2100
MA	South Boston, Accurate Fasteners	617-268-8300
MI	Detroit, Tri-West Prods.	313-273-0400
MO	St. Louis, Engineered Fastener Co.	314-434-2888
NY	Buffalo, J.M. Cranz	716-832-3300
NY	Mt. Vernon, S.D. Christie Co.	914-699-7223
OH	Bedford, Spencer Prods.	216-475-8700
OH	Cincinnati, Spencer Prods.	513-771-6821
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TX	Dallas, Wilshire Foam Prods.	214-869-1727
TX	Ft. Worth, Cut-Craft	817-737-8207
WA	Spokane, Boyd Corp.	509-928-7200
WI	Brookfield, Cable Comps.	414-785-1060
Can	Quebec, Simfer Indl. Prod.	515-354-0886

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Local Sales Offices & Reps

CA	Mountain View, Westech Sls.	415-961-1422
CA	Tustin, Sierra Pacific Engrg.	714-731-3411
FL	Casselberry, SEMI	305-695-3334
FL	Ft. Lauderdale, SEMI	305-475-3686
GA	Atlanta, Murphy and Cota	404-875-2525
IL	Des Plaines, Lincoln, Hodges and Assocs.	312-297-3810
IA	Cedar Rapids, Kencotronics	319-364-5288
KS	Mission, Mertens Co.	913-432-9323
MA	Cambridge, R.J.C. Assocs.	617-492-5858
MI	Ferndale, Hilltronics	313-398-5556
MN	St. Paul, Kencotronics	612-645-7717
MO	St. Louis, Mertens Co.	314-993-6600
NJ	Palisades Park, A. P. Technical Sls.	201-461-8875
NY	Albany, Niagara Elec. Sls.	518-869-0130
NY	Buffalo, Niagara Elec. Sls.	716-886-4000
NY	East Syracuse, Niagara Elec. Sls.	315-437-1656
NY	Rochester, Niagara Elec. Sls.	716-271-1223
NC	Burlington, Murphy & Cota	919-584-6450
OH	Cincinnati, Anderson-Bolds, Inc.	513-528-5680
OH	Cleveland, Anderson-Bolds, Inc.	216-229-4700
OH	Worthington, Anderson-Bolds Inc.	614-885-3933
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TX	Houston, William Reese Assocs.	713-682-8149
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WI	Janesville, Antek/Lincoln, Hodges & Assoc.	608-754-4214
WI	Waukesha, Lincoln, Hodges and Assocs.	414-542-3087

Local Distributors

AL	Muscle Shoals, Jones Elctrns., Inc.	205-383-1241
CA	Burlingame, Elec. Control Devices	415-348-0791
CA	Redondo Beach, Elctrl. Power & Controls	213-772-8890
FL	Miami, B & R Elctrns. Supp. Inc.	305-255-4510
FL	Miami, Electro-Standards Labs	305-633-6975
IL	Chicago Heights, Helsel-Jepperson	312-756-5600
MA	Fall River, Broadway Elec. Sls.	617-673-3339
MA	Holyoke, Falcetti & Clark Elec.	413-532-9402
MA	Springfield, Yankee Elec.	413-739-2101
MI	Grand Rapids, S & F Elctrns. Supp.	616-459-0216
MI	St. Clair Shores, Spemco	313-771-2700
MN	Minneapolis, Elctrn. Center Inc.	612-371-5200
NH	Manchester, Cohen Machinery Co. Inc.	603-624-4324
NJ	Fairlawn, Relay Specialties	201-797-3313
NY	Commack, L.I., Schuyler Elec. Ind'l Co.	516-354-5711
NY	Gloversville, Montano Elctrl. Supp.	518-725-3139
NY	Woodside, Switches Unlimited	212-478-5000
NC	Durham, Triangle Elec. Motor	919-596-1333
NC	Gastonia, MJT Elctrns. & Control	704-867-4401
OH	Cincinnati, Richards Elec. Supp.	513-242-8800
PA	Harrisburg, Cumberland Elctrns.	717-233-5883
PA	Philadelphia, Esco Elctrl. Supp.	215-923-6050
RI	Providence, J & H Elec. Co., Inc.	401-421-7840
TX	San Antonio, Sherman Elec. Supp. Inc.	512-224-1001
VA	Roanoke, Peoples Elctrn. Supp.	703-342-8933

BURLEIGH INSTRS., Burleigh Pk., Fishers, NY 14453, Tel: 716-924-9355, Telex: 978379; Empl.: 50; *Sls. Mgr.:* Dr. Gary Forrest; *Dist. Mgr.:* Dr. Gary Forrest

BURLING INSTR., P.O. Box 298, Chatham, NJ 07928, Tel: 201-635-9481; Empl.: 29; *Sls. Mgr.:* Roger Nation

BURNDY/BERCO, 226 Brookside Road, Waterbury, CT , Tel: 203-574-4766

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BURR-BROWN, P.O. Box 11400, Tucson, AZ 85734, Tel: 602-746-1111, Telex: 66-6491, TWX: 910-952-1111; Empl.: 1500; *Sls. Mgr.:* T.W. Fern

Local Sales Offices & Reps

AL	Huntsville, Conley & Assocs.	205-882-0316
CA	San Jose, Burr-Brown Corp.	408-559-8600
CA	Santa Ana, Burr-Brown Corp.	714-835-0712
CA	Westlake Village, Burr-Brown Corp.	818-991-8544
CO	Loveland, Burr-Brown Corp.	303-663-4440
FL	Oviedo, Conley & Assocs.	305-365-3283
IL	Addison, Burr-Brown Corp.	312-832-6520
MA	Needham, Burr-Brown Corp.	617-444-9020
MI	Farmington, Burr-Brown Corp.	313-474-6533
MN	Bloomington, Electronic Sls. Agency	612-884-8291
NY	Clinton, Advanced Comps. Corp.	315-853-6438
NY	Endicott, Advanced Comps. Corp.	607-785-3191
NY	Scottsville, Advanced Comps. Corp.	716-889-1429
NY	Syracuse, Advanced Comps. Corp.	315-699-2671
NC	Winston-Salem, Murcota Corp.	919-722-9445
OH	Chesterfield, K-T Mktg.	216-729-3588
OH	Dublin, Burr-Brown Corp.	614-764-9764
PA	Pittsburgh, K-T Mktg.	412-487-8777
PA	Willow Grove, QED Elctrns.	215-657-5600
TX	Dallas, Burr-Brown Corp.	214-681-5781
TX	Houston, Burr-Brown Corp.	713-988-6546
WA	Bellevue, Burr-Brown Corp.	206-455-2611

BURTON ELECTRICAL ENGINEERING, 111 Maryland Street, El Segundo, CA 90245, Tel: 213-772-1406

BUSSCO ENGRG., 119 Standard St., El Segundo, CA 90245, Tel: 213-322-6580, TWX: 910-348-6295; FSC No.: 29593; Empl.: 87

Local Sales Offices & Reps

AZ	Tempe, Jarko	602-243-4387
CA	Los Angeles, Electrn. Tech. Assoc.	714-998-9241
CA	Santa Clara, Nova-Tronix	408-727-9530
FL	Casselberry, Electrn. Mrktg. Corp.	305-339-7070
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MI	Jackson, Norwood Scroggs Co.	517-750-1170
MN	Bloomington, D.A. Case	612-888-8666
NY	Great Neck, Trionics	516-466-2300
NY	Rochester, B. H. Tollefson Assoc.	716-271-4141
PA	Hatboro, Jacobsen Assoc.	215-674-2937
TX	Dallas, P.J. Scanlon	214-231-4661

BUSSMANN DIV., P.O. Box 14460, St. Louis, MO 63178, Tel: 314-394-2877, Telex: 44 841; Empl.: 3000; *Sls. Mgr.:* George Ockuly; *Dist. Mgr.:* George Ockuly

Local Sales Offices & Reps

AZ	Phoenix, More Sls.	602-274-4558
CA	N. Hollywood, Bassett Sls. Corp.	213-877-7129
CA	Pleasanton, Moulthrop Sls.	415-463-0450
CO	Denver, Lindberg Co.	303-758-9033
FL	Orlando, Cartwright & Bean	305-422-4531
GA	Atlanta, Cartwright & Bean	404-233-2939
IL	Rolling Meadows, Sumer	312-991-8500
IN	Carmel, Mktg. Engrs.	317-872-5665
MA	Braintree, Anderson Sls. Assocs.	617-848-9194
MI	Ferndale, Shalco	313-547-4771
MN	Minnetonka, Gibb Elctrn. Sls.	612-935-4600
MO	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NJ	Englewood, ABS Assocs.	201-871-0020
NY	Syracuse, Paston-Hunter	315-437-2992
OH	Strongsville, Dolfuss-Root & Co.	216-238-0300
TN	Memphis, Cartwright & Bean	901-276-4442
TX	Dallas, J. Y. Schoonmaker Co.	214-349-1650
WA	Bellevue, Vantage Corp.	206-455-3460

BYTEX CORP., 2 California Ave., Framingham, MA 01701, Tel: 617-879-5050, Telex: 951151; Empl.: 80; *Sls. Mgr.:* Ralph W. Lowry

CABLE SYS & ASSEMBLY, 210 Broadway, Everett, MA 02149, Tel: 617-389-7080, TWX: 710-348-1760; FSC No.: 33426; Empl.: 125; *Sls. Mgr.:* A. Armelin Jr.

CABLEWAVE SYSTEMS, INC., 718 North Colony Road, Wallingford, CT 06492, Tel: 203-265-6560

CABLEWAVE SYS., 60 Dodge Ave., North Haven, CT 06473, Tel: 203-239-3311, TWX: 710-465-0244; Empl.: 250

CABOT BERYLCO, Div. Cabot Corp., PO Box 1296, Reading, PA 19603, Tel: 215-921-5000, TWX: 510-651-0677; Empl.: 600; *Sls. Mgr.:* Thomas N. Marks

CABTRON SYS., INC., 200 N. Anets Dr., Northbrook, IL 60062, Tel: 312-498-6090; Empl.: 30; *Sls. Mgr.:* Mike Gober .... 2•1020

Local Sales Offices & Reps

AZ	Tempe, Sierra Tech. Grp.	602-894-2335
CA	San Jose, Warren Assoc.	408-988-7762
CO	Englewood, Sierra Tech. Grp.	303-741-0227
CT	Reading, Meco, Inc.	617-944-6660
MD	Silver Spring, Ansell Engrg.	301-949-1655
MA	Reading, Meco, Inc.	617-944-6660
MI	Livonia, H. Lowell Co.	313-464-2722
MN	St. Paul, Countryman Assocs.	612-645-9151
MO	Kansas City, Prod. Automation	816-737-3030
MO	St. Charles, Prod. Automation	314-441-6600
NJ	Mt. Lakes, N.J. Comps. for Elctrns.	201-334-2921
NM	Albuquerque, Sierra Tech. Grp.	505-294-8408
NY	Syracuse, Ossmann Instrs.	315-437-7052
OH	Cleveland, Geotronix	216-526-2535
OH	Columbus, Geotronix	614-457-8472
PA	Albrightville, Centurion Linear	717-722-0166
TX	Addison, Dunbar Assocs.	214-239-7151

CADDELL-BURNS MFG., 40 E. 2nd St., Mineola, NY 11501, Tel: 516-746-2310; Empl.: 30 .... 1A•1233

CADDELL COIL CORP., 35M Main St., Poultney, VT 05764, Tel: 802-287-4055, Telex: 752092; Empl.: 6; *Sls. Mgr.:* James Caddell

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Local Sales Offices & Reps

OH	Cleveland, Arthur H. Baier Co.	216-461-6161
OH	Dayton, Arthur H. Baier Co.	513-276-4128
OR	Portland, Elctrn. Sources	503-684-0040
WA	Bellevue, Elctrn. Sources	206-451-3500

Local Distributors

TX	Houston, Lenert Co.	713-225-1465

CADILLAC PLASTIC & CHEM., 1221 Bowers St., P.O. Box P-2020, Birmingham, MI 48012, Tel: 313-646-5100, TWX: 810-232-1886; Empl.: 1000

CAELUS MEMORIES, P.O. Box 6297, San Jose, CA 95150

CAI, 550 W. Northwest Hwy., Barrington, IL 60010, Tel: 312-381-2400, Telex: 25-4268, TWX: 910-651-1904; Empl.: 650

CAIG LABS., 1175-0 Industrial Ave., Escondido, CA 92025, Tel: 619-743-7143; Empl.: 10

CALABRO INDS., INC., See UNITRACK Div., Calabro Inds., Inc.

CALCOMP, 2411 W. La Palma Ave., Anaheim, CA 92801, Tel: 714-821-2011, TWX: 910-591-1154; Empl.: 2100; *Sls. Mgr.:* James F. Waltz

CAL CONTROLS INC., 1155 Waukegan Rd., Glenview, IL 60025, Tel: 312-998-5720, Telex: 256293; *Sls. Mgr.:* Alan Bates

CAL CRYSTAL LAB., INC., 1142 N. Gilbert, Anaheim, CA 92801, Tel: 714-991-1580, 800-854-XTAL, TWX: 910-591-1892; *Sls. Mgr.:* Herb Plumhoff

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Local Sales Offices & Reps

AZ	Glendale, Adtek Inc.	602-931-9289
CA	Inglewood, Basic Sys.	213-673-4300
CA	San Diego, Basic Sys.	619-279-9641
CA	Santa Clara, Basic Sys.	408-727-1800
CT	Washington, Tri-Com	203-868-7748
FL	Melbourne, Raycom Inc.	305-259-7988
GA	Duluth, Raycom Inc.	404-446-9015
IL	Skokie, Mar-Con Assocs.	312-675-6450
KS	Shawnee Mission, Midtec Assocs.	913-441-6565
MA	Burlington, Tri-com	617-272-8163
MI	Plymouth, Jay Mktg.	313-459-1200
MN	Eden Prairie, EIC Inc.	612-937-9701
MO	Florissant, Midtec Assocs.	314-837-5200
NY	Clarence, Trott Elctrns.	716-634-8500
NY	White Plains, Cane Techn. Sls.	914-694-9240
NC	Raleigh, Lee Assoc.	919-787-5818
OH	Chesterland, EQS	313-961-3042
PA	Media, W. Reeves Assoc.	215-566-6709
TX	Garland, Carey, McMahill & Zerbe Co.	214-681-1414
TX	Houston, Carey, McMahill & Zerbe Co.	713-771-1500
WA	Bellevue, Topp Engrg. Sls. Co.	206-747-5401

Local Distributors

CA	Inglewood, Basic Sys.	213-673-4300
CA	Pleasant Hill, Calex Mfg. Co.	415-932-3911

CALIBRON INSTRS., 220 Grove St., Waltham, MA 02154, Tel: 617-894-6440; Empl.: 14; *Dist. Mgr.:* W. Burton

CALIFORNIA AVIONICS LABS., Box 701, Palo Alto, CA 94302, Tel: 415-328-7999; Empl.: 5 .... 3•1206

CALIFORNIA DC, 2150 Anchor Ct., Newbury Park, CA 91320, Tel: 805-499-3621, 213-706-8221; Empl.: 100; *Sls. Mgr.:* Peter Gajewski .... 3•1514

Local Sales Offices & Reps

CA	Los Angeles, Porter Company	213-700-0808
CA	San Diego, Power Assocs.	619-275-0641
CA	San Jose, Quad Rep	408-946-4000
MA	Westboro, RJC Associates	617-366-0399
OR	Beaverton, Meritech Sls. Corp.	503-644-0304
PA	King of Prussia, Rivco-January	215-265-5211
TX	Dallas, Technology Sls.	214-380-0200
WA	Spokane, Meritech Sls. Corp.	509-255-9122

CALIFORNIA EASTERN LABS. INC., 3005 Democracy Way, Santa Clara, CA 95050, Tel: 408-988-3500, Telex: 346393, TWX: 171197; Empl.: 85; *Sls. Mgr.:* Jim McAuley; *Dist. Mgr.:* Jim McAuley

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Local Sales Offices & Reps

AL	Huntsville, Saber Assocs.	800-327-0853
AZ	Phoenix, Aztec Ent., Inc.	602-944-9185
CA	Los Alamitos, Sci. Dvcs. West	213-598-7678
CA	Los Altos, Jay Stone Assocs.	415-948-4563
CA	San Diego, Sci. Dvcs. West	619-573-0157
CO	Denver, Aztec Entprs.	303-779-5285
FL	Bradenton, Saber Assocs.	800-432-6288
FL	Melbourne, Saber Assocs.	800-432-6288
GA	Griffin, Saber Assocs.	800-327-0853
IL	Chicago, EIA, Inc.	312-298-2290
IN	Indianapolis, EIA, Inc.	317-257-7231
KS	DeSoto, Midtec Assocs.	913-441-6565
LA	Baton Rouge, SESCO	504-928-4951
MD	Cockeysville, SCI-REP	301-321-1411
MA	Waltham, McBar Assocs.	617-890-0233
MN	Minneapolis, Prairie Assocs.	612-559-7550
MO	Florissant, Midtec Assocs.	314-837-5200
NJ	Englewood Cliffs, Sci. Dvcs. East, Inc.	201-871-3916
NM	Albuquerque, Aztec Entprs.	505-262-1688
NY	Fayetteville, Andrews Co.	315-637-3144
NC	Clayton, Saber Assocs.	800-327-0853
OH	Dayton, Hocker Assocs.	513-298-8638
OK	Tulsa, SESCO	918-622-3868
PA	Springhouse, Sci. Dvcs. East.	215-643-3335
SC	Columbia, Saber Assocs.	800-327-0853
TX	Austin, SESCO	512-892-2490
TX	Dallas, SESCO	214-231-9364
TX	Houston, SESCO	713-999-3510
UT	Ogden, Aztec Ent., Inc.	801-621-1655
VA	McLean, Creative Mktg. Assoc. Ltd.	703-442-9100
WA	Seattle, Datacom Assocs.	206-285-2525

CALIFORNIA MICRO DEVICES, INC., 215 Topaz Street, Milpitas, CA 95035, Tel: 408-263-3214

CALIFORNIA MICROWAVE, 990 Almanor Ave., Sunnyvale, CA 94086, Tel: 408-732-4000, Telex: 35-2016, TWX: 910-339-9231; Empl.: 1200

CALIFORNIA MINICOMPUTER SYS., 5534 Westlawn Ave., Los Angeles, CA 90066, Tel: 213-640-2930, TWX: 910-343-6489; Empl.: 50; *Dist. Mgr.:* R. D. Mowry

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Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Tempe, Delta Elctrn. Sls.	602-224-1601
CA	San Diego, Noo Rep. Tech. Sls.	619-483-4861
CA	Santa Clara, Calmark Corp.	408-984-2618
CO	Littleton, West Mark	303-979-3720
FL	Clearwater, WMM Assoc.	813-461-7074
GA	Atlanta, Remco	404-447-6937
ID	Boise, Quest Mktg.	208-343-9969
IL	Elk Grove, Martec	312-956-8090
KS	DeSoto, Midtec Assoc.	913-441-6565
MA	Westboro, Tech. Mktg. Svcs. Co.	617-366-6655
MN	Minneapolis, Comps. Grp.	612-374-1250
MO	Florissant, Midtec Assoc.	314-837-5200
NH	Windham, Tech. Mktg. Svcs.	603-434-2716
NJ	Madison, Livera-Polk Assoc.	201-377-3220
NY	Cooperstown, Fitzelle Assocs.	607-547-9333
NY	Glen Head, Livera-Polk Assoc.	516-759-9300
NC	Raleigh, Remco	919-847-5079
OH	Cleveland, Comps., Inc.	216-243-9200
OH	Miamisburg, Comps., Inc.	513-866-0661
OR	Beaverton, Quest Mktg.	503-644-8077
PA	Horsham, Dalbrook Corp.	215-441-8380
PA	Pittsburgh, Comps., Inc.	412-824-1600
TX	Richardson, Zonk Assoc.	214-238-7651
WA	Renton, Quest Mktg.	206-223-1541
EXP	San Gabriel, CA, Calmark Corp.	213-287-0451

Local Distributors

AZ	Phoenix, Aero-Space Computer Supps.	602-861-1785
AZ	Phoenix, Scottsdale Tool & Supp.	602-273-7376
CA	Anaheim, Henry Mann West	213-995-3900
CA	Fremont, Terminal Sls. Corp.	415-656-7722
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Torrance, Cypress Elctrns.	213-533-6005
CO	Denver, Solder Tec.	303-922-6214
FL	Longwood, Intertec Comps.	305-834-7777
IL	Elk Grove, Martec Assoc.	312-956-8090
MA	Waltham, Etchomatic	617-893-2020
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PA	Huntingdon Valley, Henry Mann, Inc.	215-355-7200
TX	Dallas, Cypress Elctrns.	214-869-1435
TX	Richardson, Zec Sls.	214-238-7651
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PA	Rydal, Espy Sls.	215-576-0780
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CA	Los Angeles, Universal Comps.	213-641-4255
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CT	Glastonbury, Barton Assoc.	203-633-9417
FL	Boca Raton, Beacon Elctrns.	305-392-3500
FL	Clearwater, Beacon Elctrns.	813-796-2378
FL	Maitland, Beacon Elctrns.	305-647-3498
FL	Melbourne, Beacon Elctrns.	305-724-8010
GA	Atlanta, Beacon Elctrns.	404-256-9640
IL	Elk Grove Vlg., Control Sls.	312-595-2110
IN	Carmel, Technlg. Mktg. Corp.	317-844-8462
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MD	Randallstown, Beacon North	703-591-1300
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MA	Newton Upper Falls, Gerber Sls. Corp.	617-969-2620
MI	Brighton, AP Assocs.	313-229-6550
MN	Minnetonka, Gibb Elctrns.	612-935-4600
MO	Bridgeton, Dy-Tronix	314-731-5799
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OH	Beachwood, Thompson & Assocs.	216-831-6277
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WA	Spokane, LD Elctrns.	509-922-4883
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IN	Ft. Wayne, J&B Engrg.	219-483-2813
IN	Indianapolis, J & B Engrg.	317-842-2681
MA	Needham Hgts., Vanguard Elctrns.	617-449-5578
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IL	Highland Pk., Thomas B. Hunter Assocs.	312-433-7000
NY	Elmont, Crane & Egert Corp.	516-872-0800
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CT	Clinton, Berkshire Elect.	203-669-0752
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IL	Schiller Park, Jim Hannan	312-678-1997
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TX	Dallas, Control Comps.	214-458-8877
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301
WI	Mequon, Wm. Bolles Assoc.	414-241-3320

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MD	Mt. Airy, Lowery & Assoc.	301-831-5827
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MN	Minneapolis, Hei-Lite Sls.	612-861-6051
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OH	Dayton, WKM Associates	513-434-7500
TX	Dallas, Data Mktg.	214-661-0300
VA	McLean, Creative Mktg. Assoc.	703-442-9100
WA	Bellevue, Showalter Instrs.	206-455-4922

CEA DIVISION OF BERKLEONICS, INC., 1 Aerovista Pk., San Luis Obispo, CA 93401, Tel: 805-544-5454, TWX: 910-351-6705; FSC No.: 04932; Empl.: 120; *Sls. Mgr.:* Jerry Satuloff ....3•1515

Local Sales Offices & Reps

CA	Inglewood, Basic Sys. Corp.	213-673-4300
CA	San Diego, Basic Sys. Corp.	619-268-8000
CA	Santa Clara, Basic Sys. Corp.	408-727-1800
FL	Melbourne, Jack McGirr	305-773-4313
IL	Rolling Meadows, Sieger Assocs.	312-991-6161
KS	Wichita, Electro-Mechanical Assocs.	316-682-9433
MD	Wheaton, Brimberg Sls., Inc.	301-792-8661
MA	Dover, George Urban Assocs.	617-329-4068
MI	Farmington Hills, KRW Sls.	614-464-1861
MO	Independence, Electro-Mechanical Assocs.	816-373-8539
NY	Congers, LRC Assocs.	914-268-4435
NY	Liverpool, Precision Sls.	315-451-3480
NY	Pittsford, Precision Sls.	716-381-2821
OH	Columbus, KRW Sls.	614-464-1861
PA	Broomall, Sapinosa Assocs.	215-353-7267
PA	Oakmont, KRW Sls.	614-464-1861
TN	Greenville, Elctrns. Lamons Sls. Co.	615-638-4320
TX	Grapevine, Elctrns. Mktg. Assocs.	817-481-7502
TX	Houston, Elctrns. Mktg. Assocs.	713-498-8120
WA	Lynnwood, IEI Inc.	206-775-3516

CEAG ELEC. CORP., Power Supply Div., 1324 Motor Pkwy., Hauppauge, NY 11788, Tel: 516-582-4422, TWX: 510-227-4904; FSC No.: 57973; *Dist. Mgr.:* G. Roger Preisick

C-E ELGIN ELCTRNS., 5533 New Perry Hwy., Erie, PA 16509-3570, Tel: 814-864-4921, TWX: 510-699-6870; Empl.: 500; *Sls. Mgr.:* J. D. Neff; *Dist. Mgr.:* J. M. Tenglund

CELANESE PLASTICS, 26 Main St., Chatham, NJ 07928, Tel: 201-635-2600; *Sls. Mgr.:* L. F. Bond

CELCO, 70 Constantine Dr., Mahwah, NJ 07430, Tel: 201-327-1123, TWX: 710-988-1018; Empl.: 35; *Sls. Mgr.:* P. S. Christaldi

celesco

CELESCO TRANSDUCER PRODS., INC., 7800 Deering Ave., Canoga Park, CA 91304, Tel: 818-884-6860, Telex: 67 3382, TWX: 910-494-1951; *Sls. Mgr.:* James P. Callahan; *Dist. Mgr.:* James P. Callahan ....1B•1838, 1839

Local Sales Offices & Reps

AK	Soldotna, C. Hillhouse Inc.	907-262-7340
AZ	Tempe, Trembly Assocs.	602-967-2058
CA	Palo Alto, Gado Instr. Sls.	415-961-2222
CA	Westminster, Transducer Sys.	714-840-5357
CO	Denver, Innovative Prods.	303-740-9492
FL	Indian Rocks Beach, PAR Assocs.	813-596-8841
GA	Atlanta, PAR Assocs.	404-391-9117
IL	Hindsdale, I & C Sls.	312-323-8205
LA	Baton Rouge, Charles Instrs.	504-273-3233
MA	Chestnut Hill, Reptek	617-469-3311
MI	Trenton, I & C Sales	313-671-1320
MN	Minneapolis, CMI Corp.	612-566-6930
NV	Las Vegas, Trembly Assocs.	702-739-9770
NJ	Hillsdale, C.B. Assocs.	201-664-6230
NM	Albuquerque, Trembly Assocs.	505-266-8616
NY	Clarence, Trott Elctrns.	716-634-8500
NY	Rochester, Trott Elctrns.	716-586-8251
NC	Charlotte, Par Assocs., Inc.	704-375-9403
OH	Cincinnati, I & C Sales	513-772-3101
OK	Tulsa, Advance Tech. Sls.	918-664-0482
OR	Portland, Pacific N.W. Controls	503-244-3141
PA	Bridgeville, Instrument Svcs.	412-221-3601
PA	Cheltenham, Test Equip. Sls.	215-379-5431
PA	Erie, Instrument Svcs.	814-455-1969
TX	Austin, Advance Tech. Sls.	512-459-1351
TX	Dallas, Advance Tech. Sls.	214-340-1300
TX	Houston, Advance Tech. Sls.	713-440-3888
UT	Salt Lake City, Trembly Assocs.	801-486-5292
WV	Charleston, Instrument Svcs.	304-345-0348

Local Distributors

CA	Ventura, Vacumed	805-644-7461

CELESTION INDS., INC., Kuniholm Dr., Box 521, Holliston, MA 01746, Tel: 617-429-6706, Telex: 948417

CENTENT CO., 3879 S. Main St., Santa Ana, CA 92707, Tel: 714-979-6491; Empl.: 12; *Sls. Mgr.:* A. Freimanis

CENTERFLEX TECHN. CORP., 221 Seventh Ave., P.O. Box 21, Hawthorne, NJ 07507, Tel: 201-423-0505, TWX: 710-988-4147; Empl.: 50; *Sls. Mgr.:* S. C. Kellner

CENTIGRAM CORP., 155A Moffett Park Dr., Sunnyvale, CA 94086, Tel: 408-734-3222, Telex: 171-994; *Sls. Mgr.:* Leonard H. Magnuson; *Dist. Mgr.:* Paul W. Masters

CENTRALAB, INC., A North American Philips Co., 4561 Colorado Blvd., Los Angeles, CA 90039, Tel: 818-240-4880, TWX: 910-497-2282

CENTRALAB, INC., A North American Philips Co., 2566 Northwestern Ave., McClure Pk., West Lafayette, IN 47906, Tel: 317-463-2536, TWX: 810-342-1889

CENTRALAB, INC., A North American Philips Co., Hwy. 20 W., P.O. Box 858, Ft. Dodge, IA 50501, Tel: 515-573-1300, TWX: 910-520-2493

CENTRALAB, INC., A North American Philips Co., 7158 Merchant Ave., El Paso, TX 79915, Tel: 915-779-3961, TWX: 910-964-1311

CENTRALAB, INC., A North American Philips Co., 5855 N. Glen Park Rd., Milwaukee, WI 53209, Tel: 414-228-7380, TWX: 910-262-3083; Empl.: 5000; *Sls. Mgr.:* F. Funk; *Dist. Mgr.:* R. Booker

CENTRAL DATA CORP., 1602 Newton Dr., Champaign, IL 61820, Tel: 217-359-8010, Telex: 910-245-0787; *Sls. Mgr.:* N. E. Mac Gregor

CENTRAL MICROWAVE CO., Alpha Inds., Inc., 20 Sylvan Rd., Woburn, MA 01801, Tel: 617-935-5150, Telex: 949436, TWX: 710-393-1236; FSC No.: 17540; *Sls. Mgr.:* Jim Caldwell

CENTRE ENGRG., 2820 E. College Ave., State College, PA 16801, Tel: 814-237-0321, TWX: 510-670-3517; Empl.: 425; *Sls. Mgr.:* H.D. Shirey

CENTRONIC INC., 5 Eastmans Rd., Parsippany, NJ 07054, Tel: 201-233-7200, Telex: 138275; FSC No.: 7P396; Empl.: 300; *Sls. Mgr.:* Tony Green ....1B•1212, 1213

Local Sales Offices & Reps

AZ	Tempe, Griot Assocs.	602-968-4428
CA	Corona del Mar, Griot Assocs.	714-675-5090
CA	El Segundo, Griot Assocs.	213-322-8383
CA	Los Altos, Griot Assocs.	415-941-2533
CA	Santa Clara, Griot Assocs.	408-727-2880
FL	Melbourne Bch., Millett Assocs.	305-725-5055
GA	Roswell, Electro Comp Sls.	404-993-4253
IL	Chicago, Coomb Assocs.	312-298-4830
MA	Concord, Nortech. Engrg. Sls.	617-259-0032
MI	Jackson, Norwood Scroggs Co.	517-750-1170
MN	Minneapolis, Intl. Sls.	612-831-8423
NY	Commack, RC Engrg.	516-543-3325
OR	Beaverton, Griot Assocs.	503-646-5627
PA	Glenside, Koebert & Assocs.	215-887-2310

CENTURY DATA SYS., Xerox Corp., 1270 N. Kraemer Blvd., Anaheim, CA 92806, Tel: 714-632-7500, Telex: 655437; Empl.: 901; *Sls. Mgr.:* Richard Brechtlein; *Dist. Mgr.:* Don Wilder

Local Distributors

NY	Westbury, Schweber Elctrns.	516-334-7474

Ceramaseal

CERAMASEAL, Box 25, New Lebanon Center, NY 12126, Tel: 518-794-7800, Telex: 14-5442; FSC No.: 07601; Empl.: 80; *Sls. Mgr.:* Gene D. Sawin ....2•1168

Local Sales Offices & Reps

AZ	Phoenix, Wadsworth/Bryant	602-275-7366
CA	Atherton, Wadsworth/Bryant	415-321-3619
CA	Hacienda Hgts., Wadsworth/Bryant	213-330-5592
CO	Golden, J. F. Hurlbut Co.	303-279-7796
IL	Mt. Prospect, Automation Equip. Co.	312-398-7550
KS	De Soto, Midtec Assocs.	913-441-6565
MD	Baltimore, R. A. Wafer Assoc.	301-744-1133
MA	Boston, P-J Engrg. Sls.	617-783-0510
MO	Florissant, Midtec Assocs.	314-837-5200
NY	Rochester, Canavan-Scanlon Assoc.	716-424-1830
NY	Syracuse, Canavan-Scanlon Assoc.	315-437-1271
NC	Charlotte, JWL Assoc.	704-523-3001
PA	Feasterville, Knowles Assocs.	215-322-7100
PA	Pittsburgh, Kurt J. Lesker Co.	412-892-2996
TN	Knoxville, C. E. Fox	615-522-4404
TX	Richardson, Spectra Sls.	214-234-3600
WA	Seattle, J. B. Jolly, Inc.	206-938-4166

CERAMIC MAGNETICS, INC., 87 Fairfield Rd., Fairfield, NJ 07006, Tel: 201-227-4222, Telex: 138 730; Empl.: 50

CERA-MITE CORP., 1327 Sixth Ave., Grafton, WI 53024, Tel: 414-377-3500

CERMETEK MICROELECTRONICS INC., 1308 Borregas Ave., Sunnyvale, CA 94089, Tel: 408-734-8150, TWX: 910-379-6931; Empl.: 130; *Sls. Mgr.:* Ken Archbold

Local Sales Offices & Reps

AZ	Scottsdale, Dar-C, Inc.	602-948-2240
CA	Garden Grove, Elsco Elctrns.	714-891-4621
CA	San Diego, Earle Assoc.	619-278-5441
CA	San Jose, H.T.S.	408-279-2443
CO	Denver, D/Z Assocs.	303-429-9369
FL	Boca Raton, Lawrence Assocs.	305-368-7373
GA	Doraville, K & E Assocs.	404-448-7025
IL	Barrington, OMNI Elctrn. Mktg.	312-381-9087
IN	Indianapolis, SAI Mktg.	317-241-9276
IA	Des Moines, Beams Co.	515-255-1148
MI	Ann Arbor, R. L. Rowe & Assocs.	313-995-8711
MN	Bloomington, Smiley Scott Assoc.	612-888-5551
NM	Albuquerque, Syntech	505-266-7951
NY	Great Neck, MOS Assoc.	516-487-3966
OK	Tulsa, Cunningham Comps. Corp.	918-492-0390
OR	Beaverton, E.S. Chase	503-641-4111
PA	L.J. Kairys, Coraopolis	412-331-6100
TX	Houston, Cunningham Co.	713-461-4197
UT	Salt Lake City, D/Z Assocs.	801-268-2876
WA	Bellevue, E.S. Chase	206-453-0765

Local Distributors

AL	Huntsville, RM Elctrns.	205-852-1550
AZ	Phoenix, R.V. Weatherford	602-272-7144
CA	Glendale, R.V. Weatherford	213-849-3451
CA	Sunnyvale, R.V. Weatherford	408-738-8694
CO	Denver, R.V. Weatherford	303-428-6900
CT	Orange, Milgray	203-795-0711
FL	Winter Park, Milgray	305-647-5747
GA	Atlanta, Milgray	404-393-9666
IL	Lombard, RM Elctrns.	312-932-5150
IN	Indianapolis, RM Elctrns.	317-247-9701
KS	Overland Park, Milgray	913-236-8800
MD	Rockville, Milgray	301-468-6400
MA	Burlington, Milgray	617-272-6800
MI	Wyoming, RM Elctrns.	616-531-9300
NJ	Marlton, Milgray	609-983-5010
NY	Farmingdale, Milgray	516-391-3000
OH	Cleveland, Milgray	216-447-1520
TX	Dallas, R.V. Weatherford	214-931-7333
WA	Seattle, R.V. Weatherford	206-575-1340
WI	New Berlin, RM Elctrns.	414-784-4420

CES ELCTRNS., 2968 Avenue Z, Brooklyn, NY 11235; Empl.: 20

CETA CORP., 160 S. Whisman Rd., Bldg. F, Mountain View, CA 94041, Tel: 415-969-5927, TWX: 910-379-5065; Empl.: 25; *Sls. Mgr.:* Tom Levenhagen ....3•1516

CETEC RAYMER, 7315 Fulton Ave., No. Hollywood, CA 91605, Tel: 213-875-0423; Empl.: 50; *Sls. Mgr.:* Jean Hurst

CGIS, A COMSAT CO., 7701 N. Lamar Blvd., Austin, TX 78752, Tel: 512-451-7938; Empl.: 150; *Sls. Mgr.:* Jack Johannsen

CGTI, 2 Windward Ave., White Plains, NY 10605, Tel: 914-949-3719, TWX: 710-568-1305; Empl.: 270; *Sls. Mgr.:* G. N. Snider

CHABIN CORP., 890 Fortress St., Chico, CA 95926, Tel: 916-891-6410, TWX: 910-536-1001; *Sls. Mgr.:* Peter Tunis

CHADWICK-HELMUTH, 4601 N. Arden Dr., El Monte, CA 91731, Tel: 213-575-6161, Telex: 194-271; Empl.: 75; *Sls. Mgr.:* John Beach

CHA INDUSTRIES, 3565 Haven Avenue, Menlo Park, CA 94025, Tel: 415-363-8011, Telex: 334426; *Sls. Mgr.:* Jack Patten

CHALCO ENGRG., 15126 S. Broadway, Gardena, CA 90248, Tel: 213-FA1-0121, TWX: 910-346-7026; Empl.: 95

CHAMPLAIN CABLE, PO Box 7, Winooski, VT 05404, Tel: 802-655-2121, TWX: 510-299-0018; FSC No.: 05973; Empl.: 425; *Sls. Mgr.:* J. Brooks

CHANNEL INDS., 839 Ward Dr., Santa Barbara, CA 93111, Tel: 805-967-0171, Telex: 658416; Empl.: 75

CHAPMAN CORP., P.O. Box 10700, Portland, ME 04104, Tel: 207-773-4726; Empl.: 60; *Dist. Mgr.:* Elizabeth Angell

Local Sales Offices & Reps

AZ	Phoenix, Pamela Hopkins Assocs.	602-252-7119
AR	El Dorado, Indl. Controls Assocs.	501-862-2051
CA	Pico Rivera, Application Reps.	213-692-7761
CA	San Jose, Domar Group	408-268-6804
IL	Elgin, J.H.S. & Assocs.	312-741-9070
MD	Baltimore, Advanced Packaging	301-358-9444
MA	Brookline, Harman Assocs.	617-232-6687
NY	Pittsford, Noeth-Honsinger	716-585-9002
NY	Smithtown, T & K Sls.	516-724-3456
NC	Charlotte, Motion Techn.	704-525-9855
OH	Reynoldsburg, Goodwin Entprs.	614-866-0168
OR	Portland, Fry Controls	503-226-2620
PA	Downingtown, Web Access.	215-269-6511
WI	Cedarburg, R. E. Norene & Assocs.	414-377-5440

CHARTPAK, 1 River Rd., Leeds, MA 01053, Tel: 413-584-5446; Empl.: 195

CHASSIS-TRAK, P.O. Box 39100, Indianapolis, IN 46239, Tel: 317-897-7000, Telex: 27-2169; FSC No.: 06666; Empl.: 190; *Sls. Mgr.:* H. L. Crouch ....2•1032, 1033

Local Sales Offices & Reps

AL	Huntsville, Hughes Assoc.	205-533-9108
AZ	Phoenix, Snyder Engr.	602-279-2010
CA	Fullerton, Groh Assocs.	714-738-7105
CA	Mountain View, G. Woempner	415-964-5454
CO	Boulder, R. F. Mayo Assoc.	303-499-2155
CT	Waterbury, Coakley, Boyd & Abbett	617-444-5470
FL	Lighthouse Point, J. Krutek & Assoc.	305-941-6544
GA	Atlanta, Hughes Assoc.	404-252-7486
IL	Glencoe, Howard Benjamin Assoc.	312-835-0150
IN	Noblesville, Century Elctrns.	317-849-2026
KS	Shawnee Mission, Lowell, Kangas & Assoc.	913-631-3515
MA	Needham, Coakley, Boyd & Abbett	617-444-5470
MI	Plymouth, J. Plass Assocs.	313-455-8262
MN	Bloomington, Northport Engrg.	612-854-5556
MS	Corinth, Hughes Assoc.	601-287-2915
MO	St. Louis, Lowell, Kangas & Assocs.	314-821-4050
NH	Plaistow, Coakley, Boyd & Abbett	617-444-5470
NJ	Mountainside, Henry G. Richter	201-233-4615
NY	Fayetteville, H. G. Richter	315-637-6713
NC	Raleigh, Hughes Assoc.	919-782-2065
OH	Cleveland, Components	216-243-9200
OH	Miamisburg, Components	513-866-0661
OK	Tulsa, Advance Tech. Sls.	918-664-0482
PA	Doylestown, Monterio Assoc.	215-345-5855
TN	Morristown, Hughes Assoc.	615-587-2433
TX	Austin, Advance Tech. Sls.	512-459-1351
TX	Dallas, Advance Tech. Sls.	214-340-1300
TX	Houston, Advance Tech. Sls.	713-440-3888
WA	Olympia, Bergford Assoc.	206-866-2001
EXP	IN, Indianapolis, General Devices	317-897-7000

CHATHAM CONTROLS, 33 River Rd., Chatham, NJ 07928, Tel: 201-635-8892; FSC No.: 04814; Empl.: 11

CHATSWORTH DATA CORP, Cablemaster Div., 20710 Lassen St., Chatsworth, CA 91311, Tel: 818-341-9200; Empl.: 65; *Sls. Mgr.:* Hank Boehm ....3•1208

Local Sales Offices & Reps

MD	Silver Spring, A.R.A. Elctrns.	301-565-2585
MA	Waltham, W. M. Hague	617-899-5600
OH	Cleveland, Triad Assoc	216-248-3350
PA	Glenside, A.R.A. Elctrns.	215-887-5250
VA	Richmond, A.R.A. Elctrns.	804-285-9309
WA	Lynnwood, Sys. Specialists	206-775-6603

CHATSWORTH DATA CORP, Impact-o-Graph Div., 20710 Lassen St., Chatsworth, CA 91311, Tel: 213-341-3000; Empl.: 50 ....3•1208

CHEM-MIXX CORP., 55 North St., Medford, MA 02155, Tel: 617-395-7270; Empl.: 9; *Sls. Mgr.:* Allen Swartz

Local Sales Offices & Reps

CA	South Gate, A. G. Barstow Co.	213-569-8125
GA	Lilburn, Georgia Airtech	404-925-3084
IN	Lawrence, American Indl.	317-897-9900
MN	Edina, Adhesive Sys. Technig.	612-944-7999
MO	Maryland Hgts., T. B. Moore Co.	314-434-6844
PA	Pittsburgh, Kurt J. Lesker Co.	412-892-2996

CHEMTRONICS INC., 681 Old Willets Path, Hauppauge, NY 11788, Tel: 516-582-3322, Telex: 968567; FSC No.: 21267; Empl.: 40; *Sls. Mgr.:* Louis Friedman; *Dist. Mgr.:* Scott Friedman

CHERRY ELECTRICAL PRODS. CORP., 3623 Sunset Ave., Waukegan, IL 60087, Tel: 312-578-3500, TWX: 910-235-1572; Empl.: 2000; *Sls. Mgr.:* Robert Terwall; *Dist. Mgr.:* George Seyk ....1B•1551-1563, 1758, 1764-1769

Local Sales Offices & Reps

AL	Huntsville, CSR Elec.	205-533-2444
AZ	Phoenix, O'Donnell Assocs. S.W.	602-944-9542
CA	Palo Alto, Abbott Engrg. Co.	415-968-2265
CA	San Diego, O'Donnell Assocs.	619-578-1645
CA	Torrance, O'Donnell Assocs.	213-539-9664
CO	Boulder, Front Range Mktg.	303-443-4780
CT	North Haven, Coakley, Boyd & Abbett	203-239-6217
FL	Coral Springs, CBC Elctrns.	305-755-1111
FL	Longwood, CBC Elctrns.	305-831-5380
GA	Atlanta, CSR Elctrns.	404-396-3720
IL	Waukegan, Cherry Elec. Prod. Corp.	312-578-3500
IN	Ft. Wayne, Menze Sls.	219-747-5616
IA	Cedar Rapids, Dy-Tronix	319-377-8275
MA	Needham Hgts., Coakley, Boyd & Abbett	617-444-5470
MI	Grand Rapids, Miltimore Sls.	616-942-9721
MI	Novi, Miltimore Sls.	313-349-0260
MI	Southfield, Cherry Elec. Prod.	313-358-5588
MN	St. Paul, Cahill, Schmitz & Cahill	612-646-7217
MO	Bridgeton, Dy-Tronix	314-731-5799
MO	Independence, Dy-Tronix	816-373-6600
NH	Plaistow, Coakley, Boyd & Abbett	617-444-5470
NJ	Pitman, Colrud Corp.	609-589-5866
NY	Rochester, Elcom Sls.	716-385-1400
NY	Syracuse, Elcom Sls.	315-685-8245
NY	W. Hempstead, Schmitt Indl. Mktg. Corp.	516-486-3510
NC	Mathews, CSR Elctrns.	704-847-1927
NC	Raleigh, CSR Elctrns.	919-878-9200
OK	Broken Arrow, Genzel Sales & Assoc.	918-258-8656
OR	Portland, Jas. J. Bacher Co.	503-297-8744
OR	Salem, Jas. J. Bacher Co.	503-362-0717
TX	Austin, Bonser-Philhower Sales	512-346-9186
TX	Houston, Bonser-Philhower Sales	713-531-4144
TX	Richardson, Bonser-Philhower Sales	214-234-8438
UT	Salt Lake City, Front Range Mktg.	801-364-6481
WA	Seattle, Jas. J. Bacher Co.	206-285-1300
WI	Wauwatosa, Larsen Assocs.	414-258-0529

Local Distributors

AL	Birmingham, Ack Radio Supp. Co.	205-322-0588
AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Phoenix, Cetec Elctrns.	602-277-7951
AZ	Phoenix, Elctrn. Parts	602-277-7281
AZ	Temple, Fisher-Brownell	602-967-1464
AR	Little Rock, Carlton-Bates	501-562-9100
CA	Alhambra, Fisher-Brownell	213-289-0255
CA	Chatsworth, Diplomat Westates Elctrns.	213-341-4411
CA	Costa Mesa, Diplomat Westates Elctrns.	714-549-8401
CA	Oakland, Brill Elctrns.	415-834-5888

CA	San Diego, Fisher-Brownell	619-560-8545
CA	San Diego, Diplomat Westates Elctrns.	619-292-5693
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	Santa Clara, Fisher-Brownell	408-988-6041
CA	Southgate, Cetec Elctrns.	213-773-6521
CA	Sunnyvale, Diplomat Westates Elctrns.	408-744-1555
CO	Denver, Denver Wintronics	303-431-7161
CO	Denver, Integrated Elect.	303-292-6121
CT	Wallingford, Midan Elect.	203-265-2077
FL	Ft. Lauderdale, KSM Elctrns.	305-971-5900
FL	Miami, ESL Elctrn. Distrs.	305-633-6973
GA	Atlanta, KSM Elctrns.	404-458-2013
GA	Atlanta, Ack Radio Supp. Co.	404-351-6340
IL	Bensenville, Diplomat Elctrns.	312-595-1000
IL	Champaign, Klaus Radio	217-356-1896
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Palatine, OHM Elctrns.	312-359-5500
IL	Wheeling, Hawk Elctrns.	312-459-4030
IN	Indianapolis, Graham Elec.	317-634-8202
IN	Indianapolis, Genesis Elctrn.	317-637-5571
IN	South Bend, Genesis Elctrns.	219-287-2911
IA	Cedar Rapids, Advent Elctrn.	319-363-0221
KS	Edwardsville, C. Tennant Sons & Co.	913-441-1801
KY	Louisville, P. I. Burks Co.	502-589-3960
MD	Savage, Pyttronic Ind.	301-792-0780
MA	Billerica, A. W. Mayer Co.	617-229-2255
MA	Needham, Cronin Elect.	617-449-5000
MI	Clawson, Empire Elctrns.	313-435-0460
MI	Farmington Hills, Star-Tronic Distr.	313-477-7586
MI	Livonia, Rep-Tron Elctrns.	313-525-2700
MN	Minneapolis, Stark Elctrns.	612-332-1325
MO	Kansas City, Walters Radio Supp.	316-531-7015
MO	St. Charles, Finnigan Elctrns.	314-946-6201
NJ	Bellmawr, Mid-Atlantic Elec.	609-931-5303
NJ	Clifton, J-Mar Elec., Inc.	201-772-6400
NM	Albuquerque, Elctrn. Parts	505-293-6161
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Mt. Vernon, QAR Ind'l. Elctrn. Sls.	914-699-2224
NY	Rochester, Rochester Radio & Supp. Co.	716-454-7800
NY	Woodbury, C. Tennant Sons & Co.	516-364-9070
NC	Cary, Powell Elctrns.	919-467-1212
NC	Winston-Salem, Kirkman Elctrn.	919-722-9131
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cleveland, Selectronics	216-621-5080
OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Esco Elect.	513-226-1133
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Portland, Radar Elctrns.	503-232-3404
OR	Portland, Tekelectric Control	503-246-5451
PA	Montgomeryville, Pyttronic Ind.	215-643-2850
TX	Dallas, Wallace Elec. Co.	214-340-0400
TX	Houston, Solid State Elctrns. Co.	713-772-8483
TX	Irving, Solid State Elctrns. Co.	214-438-5700
TX	San Antonio, Sherman Elctrns. Supp.	512-224-1004
TX	Stafford, Southwest Elect.	713-491-4900
UT	Salt Lake City, Standard Supp. Co.	801-486-3371
UT	Salt Lake City, Diplomat Elctrns.	801-486-4134
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Seattle, Radar Elctrns.	206-282-2511
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	New Berlin, R. M. Wisconsin	414-784-4420

CHERRY SEMICONDUCTOR CORP, 2000 S. County Trail, East Greenwich, RI 02818, Tel: 401-885-3600; Empl.: 200

CHESSELL CORP., Penns Trail, Newtown, PA 18940, Tel: 215-968-0660, Telex: 83-1701; Empl.: 50; *Sls. Mgr.:* D. Neal .... **3**•1383

Local Sales Offices & Reps

AZ	Phoenix, Southwest Controls, Inc.	602-267-1171
CA	Fountain Valley, Yardley Instrs.	714-963-1000
CO	Lakewood, Loritz Controls	303-232-7803
FL	Orlando, Datarep, Inc.	305-843-5224
GA	Roswell, Cascade Controls	404-998-1027
HI	Honolulu, Aloha Assocs.	808-941-1574
IL	Des Plaines, Chessell Corp.	312-699-0529
IN	Ft. Wayne, Domino Unltd.	219-747-5621
KY	Louisville, Control Prods. Co.	502-452-2611
LA	Baton Rouge, Rise Inc.	504-766-4645
MA	Waltham, Techn. Entprs.	617-890-5300
MI	Royal Oak, Satullo Co.	313-549-3910
MN	Minneapolis, The Mark Co.	612-920-6280
MO	St. Louis, Adelphi, Inc.	314-821-1232
NV	Reno, Applied Indl. Controls Corp.	702-356-7401
NM	Albuquerque, Southwest Controls, Inc.	505-884-6202
NY	Rochester, Cascade Control Corp.	716-385-1410
NY	White Plains, MIT Sls.	914-946-5077
NC	Matthews, Johnston, Inc.	704-847-3107
OH	Dayton, P. J. Navin Co.	513-434-8940
OH	Willoughby, P. J. Navin Co.	216-255-1411
OK	Tulsa, Dave Allert Co.	918-743-7705
PA	Murrysville, Data Acquisition	412-327-8979
TN	Knoxville, George C. Paris	615-966-2141
TX	Arlington, Pan-Tech Controls Co.	817-640-3232
TX	Burleson, Chessell Corp.	817-572-4392
TX	Houston, Process Instruments, Inc.	713-893-3310
UT	Midvale, Bee and Tee Controls	801-566-7722
VA	Richmond, Advance Control Equip. Co.	804-270-7182
WA	Bellevue, Topp Engrg. Sls. Corp.	206-747-5400
WI	Brookfield, BII, Inc.	414-786-1980

Local Distributors

CA	Pasadena, J. Arthur Moore CA, Inc.	213-793-1145
DE	Newark, G. W. Smith Assocs.	302-738-7308
IL	Hinsdale, Envirocom Controls	312-920-8610
TX	Houston, Total Instrs.	713-488-2333

CHESTER CABLE, Oakland Ave., Chester, NY 10918, Tel: 914-469-2141, TWX: 510-249-4813; *Sls. Mgr.:* William R. Dungan

CHESTERFIELD PRODS., 37 Midland Ave., Elmwood Park, NJ 07407, Tel: 201-797-9655; Empl.: 35; *Sls. Mgr.:* M. Perry .... **1A**•1586

Local Sales Offices & Reps

CA	Palo Alto, J M Assocs.	415-857-1260
FL	Winter Haven, Heimendinger	813-294-5815
MD	Towson, Holden Engrg.	301-823-3763
MA	Framingham, Bengal Assocs.	617-877-2639
MA	Randolph, Bengal Assocs.	617-961-4120
NJ	Elmwood Park, L & M Assocs.	201-797-0441
NY	New York, L & M Assocs.	212-243-6155
PA	Andalusia, L & M Assocs.	215-245-6658
TX	Richardson, Carl Tinch Sls. Co.	214-231-1322

CHICAGO CONDENSER CORP., 2900 West Chicago Ave., Chicago, IL 60622, Tel: 312-227-7070

CHICAGO LASER SYSTEMS, INC., 4034 N. Nashville Ave., Chicago, IL 60634, Tel: 312-282-2710, Telex: 206-647; *Sls. Mgr.:* Bernard Alpiner, V.P.

CHICAGO LOCK CO., 4311 W. Belmont Ave., Chicago, IL 60641, Tel: 312-282-7177, Telex: ITT 4994023; Empl.: 426; *Sls. Mgr.:* Don Meisinger; *Dist. Mgr.:* Dale N. Padjen .... **1B**•1564

Local Sales Offices & Reps

CA	Oceanside, Sales Engineer	619-726-9499

CHICAGO SWITCH, INC., 1714 N. Damen, Chicago, IL 60647, Tel: 312-489-5500, TWX: 910-221-5252; Empl.: 250; *Sls. Mgr.:* R. Schmidt; *Dist. Mgr.:* R. Scrivner

CHLORIDE ELECTRO NETWORKS, Maple St., Caledonia, NY 14423, Tel: 716-538-4421, TWX: 510-254-0422; FSC No.: 08715; Empl.: 625; *Sls. Mgr.:* J. Joseph Cowan

Local Sales Offices & Reps

CA	San Jose, Power Supply Specialists	408-980-1677
CA	Santa Clara, Electroventure	408-727-1553
CO	Black Forest, Alan Lupton Assocs.	303-495-4707
CT	Canton, Bell Controls	203-693-8926
FL	Orlando, Perrott Assoc.	305-275-1132
IL	Downers Grove, Richmar Elctrns.	312-968-0118
NH	Nashua, Bell Controls	603-882-6984
NY	Rochester, Alan Lupton Assocs.	716-482-7700
TX	Dallas, Advance Techn. Sls.	214-340-1300

CHOMERICS, INC., 77 Dragon Ct., Woburn, MA 01888, Tel: 617-935-4850, TWX: 710-393-0173; Empl.: 500; *Sls. Mgr.:* Kevin A. Dunne

CHORUS DATA SYSTEMS, P.O. Box 810, 27 Proctor Hill Rd., Hollis, NH 03049, Tel: 603-465-7100; *Sls. Mgr.:* Bruce Monk

CHR INDS., 407 East St., P.O. Box 1911, New Haven, CT 06509, Tel: 203-777-3631, TWX: 710-465-0264; Empl.: 116

CHRISLIN INDS., 31352 Via Colinas, Westlake Village, CA 91361, Tel: 213-991-2254, TWX: 910-494-1253; Empl.: 38; *Sls. Mgr.:* John Ross; *Dist. Mgr.:* John Ross

CHRISTIANSEN RADIO INC., 1950 San Remo, Laguna Beach, CA 92651, Tel: 714-497-1506; Empl.: 9

CHRISTIE, S. D., ASSOCS. INC., 693 Locust St., Mt. Vernon, NY 10552, Tel: 212-597-1773, 914-699-7223; Empl.: 8; *Sls. Mgr.:* Sam D. Christie

CHRISTIE
ELECTRIC CORP.

CHRISTIE ELEC. CORP., 20665 Manhattan Pl., Torrance, CA 90501, Tel: 213-320-0808, TWX: 910-349-6260; FSC No.: 02294; Empl.: 200 .... **3**•1517

Local Sales Offices & Reps

AZ	Phoenix, PLS Assocs.	602-246-6614
CA	Tustin, John Franek Co.	714-832-0290
CO	Englewood, PLS Assocs.	303-773-1218
FL	Orlando, Newco & Assocs.	305-422-7700
GA	Lithia Springs, Newco, Inc.	404-941-6077
MD	Laurel, CSDS	301-490-3800
MA	Needham, Shain Assocs.	617-449-4380
MO	St. Louis & Grandview, Harris-Hanson	816-763-6200; 314-432-3611
NJ	Hohokus, Hansen & Hughes	201-652-7055
NM	Albuquerque, Fry Gates Inc.	505-262-1525
NC	Charlotte, Newco, Inc.	704-527-7070
OH	Chesterland, EQS Systems	216-729-2222
PA	Philadelphia, Technical Instr. Sls. Co.	215-836-2222
SC	Florence, Newco, Inc.	803-662-4878
TX	Richardson, Carl Tinch Sls. Co.	214-231-1322
TX	Richardson, C. Tinch	214-231-1322
UT	Midvale, PLS Assocs.	801-566-0671

CHROMALOX INSTRS. & CONTROLS, 100 Heil-Quaker Blvd., Lavergne, TN 37086, Tel: 615-793-7561, Telex: 55-5129; Empl.: 110; *Sls. Mgr.:* John Cox

CHROMATICS, 2558 Mountain Indl. Bldg., Tucker, GA 30084, Tel: 404-493-7000, TWX: 810-766-8099; *Sls. Mgr.:* Donald K. McKinney

CHRONO-LOG CORP., 2 W. Park Rd., Havertown, PA 19083, Tel: 215-853-1130, Telex: 831579; Empl.: 20; *Sls. Mgr.:* David Biberman .... **3**•1074

Local Sales Offices & Reps

CA	Los Angeles, Western Sci. Mktg.	213-628-8023
CA	San Diego, Western Sci. Mktg.	619-565-6699
CT	Southboro, J. J. Wild	203-264-9494
IL	Deerfield, Deerfield Sys., Inc.	312-948-8494
MA	Needham, J. J. Wild, Inc.	617-449-5600
MI	Detroit, Comtel Instrs.	313-358-2505
MO	St. Louis, Engrg. Services	314-997-1515
NH	Merrimack, J. J. Wild	603-424-4717
NJ	Union, Friedman Assocs., Inc.	201-964-6200
NY	Albany, Ossmann Instrs.	518-374-8560
NY	Rochester, Ossmann Instrs.	716-442-6990
NY	Syracuse, Ossmann Instrs.	315-437-7052
OH	Cleveland, Comtel Instrs.	216-442-8080
OH	Columbus, Comtel Instrs.	614-876-8305
PA	Pittsburgh, Comtel Instrs.	412-922-5720
VA	Arlington, H. J. Heffernan Co.	703-522-6666
WA	Seattle, Hood Engrg. Sls.	206-453-9375

CHRONOMITE LABS, 21011 S. Figueroa St., Carson, CA 90745, Tel: 213-320-9452; Empl.: 15

CHURCHILL CORP., 344 Franklin St., Melrose, MA 02176, Tel: 617-665-4700; FSC No.: 94867; Empl.: 30; *Sls. Mgr.:* W. Schermerhorn

CIMCO WIRE & CABLE, INC., See Pirelli Cimco

CINCH, See TRW Connector Div.

CINCINNATI ELCTRNS., 2630 Glendale Milford Rd., Cincinnati, OH 45241, Tel: 513-563-6000, Telex: 21-4452, TWX: 810-464-8151; FSC No.: 80045; Empl.: 1300; *Sls. Mgr.:* W. E. Wood

CINCINNATI ELECTROSYS., 469 Wards Corner Rd., Loveland, OH 45140, Tel: 513-831-4347; *Sls. Mgr.:* J. C. Privett

CINCINNATI SUB-ZERO PRODS., 2612 Gilbert Ave., Cincinnati, OH 45206, Tel: 513-751-8810, Telex: 214390 SUBZERO CIN; Empl.: 69; *Sls. Mgr.:* George Molenaar .... **3**•1175

CIPHER DATA PRODS., INC., P.O. Box 85170, San Diego, CA 92138, Tel: 619-578-9108, TWX: 910-335-1251; Empl.: 1100; *Dist. Mgr.:* Ruth Lewellyn

CIPRICO INC., 2405 Annapolis La., Plymouth, MN 55441, Tel: 612-559-2034; *Sls. Mgr.:* Stu Reile .... 3•1075

Local Sales Offices & Reps

AL	Birmingham, Southeastern First Rep.	205-967-7082
AZ	Scottsdale, Frontier Technlg.	602-998-4438
CA	Los Alamitos, Gemini Assocs.	213-594-9618
CA	North Hollywood	213-846-2633
CA	San Diego	619-268-1181
CA	San Jose, Data Rep	408-279-1212
CA	Sepulveda	213-891-1000
CA	Sunnyvale, Diamond Point Intl.	408-730-1187
CO	Aurora, Electrodyne	303-695-8903
FL	Kissimmee, Southeastern First Rep.	305-846-1306
FL	Melbourne, Southeastern First Rep	305-259-6373
FL	N. Palm Beach, Southeastern First Rep.	305-844-3658
HI	Honolulu, Sam O. Hirota.	808-535-9971
IL	Elmhurst, First Rep	312-530-2450
IN	Indianapolis	317-844-4175
KS	Prairie Village, Panatek	913-362-3349
MD	Silver Spring, L. G. White	301-434-1555
MA	Norwood, Northeast Peripherals.	617-769-9110
MI	Farmington Hills, Carter, McCormic & Peirce	313-477-7700
MN	Edina, Micro Resources	612-830-1454
NH	Londonderry, Ciprico	603-434-8909
NJ	Springfield, Gebhardt Marketing	201-376-4415
NY	New Hartford, PDQ Assocs.	315-768-8167
NY	W. Seneca, PDQ Assocs.	716-674-7816
NC	Southport, Southeastern First Rep.	919-457-4526
OH	Cleveland, Diamond Point Intl.	216-238-0200
OH	Cleveland, Pete Kovachy	216-779-5100
OH	Englewood	513-836-0951
OR	Portland, Northwest Mktg. Assoc.	503-297-2581
PA	Jenkintown, Monument Technical Assocs.	215-884-3737
PA	Pittsburgh	412-372-4415
TX	Austin, Microlog.	512-327-7033
TX	Houston, Microlog.	713-956-0837
TX	Richardson, Microlog.	214-644-5010
UT	Salt Lake City, Electrodyne.	801-486-3801
WA	Bellevue, Northwest Mktg. Assoc.	206-455-5846

CIRCLE ELECTRONICS, A Division of F-Dyne Elctrns., 3501 Electronics Way, W. Palm Beach, FL 33407, Tel: 305-844-1310; *Sls. Mgr.:* John Strickland

CIRCUIT ASSEMBLY CORP., 18 Thomas St., Irvine, CA 92714, Tel: 714-540-5490, TWX: 910-595-1971; FSC No.: 52072; Empl.: 275; *Sls. Mgr.:* William E. Corr

CIRCUITS, INC., 59 Deming Rd., Berlin, CT 06037, Tel: 203-828-3526; Empl.: 90

CIRCUIT STRUCTURES LAB., Div. D-Cemco Inc., 3200 N. San Fernando Blvd., Burbank, CA 91504, Tel: 818-849-6341, TWX: 970-498-2228; Empl.: 4

CIRCUIT TECHN., 160 Smith St., Farmingdale, NY 11735, Tel: 516-293-8686, TWX: 510-224-6555; Empl.: 400

CIRTECH, 15237 Cherry St., Stanley, KS 66223, Tel: 913-681-2801, TWX: 910-749-6806; FSC No.: 5915; Empl.: 75; *Sls. Mgr.:* John P. Parr

CITEL, INC., 3060 Raymond St., Santa Clara, CA 95050, Tel: 408-727-6562, TWX: 910-338-0540; *Sls. Mgr.:* Paul Macdonald

CLAIREX ELCTRNS., 560 S. 3rd Ave., Mt. Vernon, NY 10550, Tel: 914-664-6602, Telex: 137308; Empl.: 230 .... 1B•1214-1217

Local Sales Offices & Reps

AL	Huntsville, K & E Assocs.	205-883-9720
CA	El Toro, Clairex Elctrns.	714-768-4561
CA	Sunnyvale, Schwerin & Merrill Inc.	408-735-7900
GA	Doraville, K & E Assocs.	404-448-7025
IL	Chicago, Berndt Assoc.	312-283-0713
IN	Carmel, Berndt Assoc.	317-884-0114
KS	Overland Park, Advanced Techn. Sls.	913-492-4333
MD	Silver Springs, Youth Assoc. Inc.	301-598-5740
MA	Bolton, Clairex	617-779-2780
MI	Ferndale, Hilltronics	313-398-5556
MN	Minneapolis, H.M.R.	612-920-8200
MO	St. Louis, A.T.S. Inc.	314-227-4448
NJ	Ridgefield, Rical	201-945-5250
NY	Seaford, Abbott Assoc.	516-781-5256
NC	Raleigh, Crossroads Elect. Assoc.	919-362-4099
OH	Cleveland, Geotronix	216-526-2535
OH	Trotwood, Geotronix Inc.	513-854-5939
PA	Media, W. Reeves	215-566-6709

TX	Austin, J. B. Guenther	512-258-0004
TX	Dallas, J. B. Guenther	214-691-8500
WA	Seattle, H. Levinson	206-323-5100
WI	Milwaukee, Berndt Assoc.	414-545-8400
EXP	NJ, Oradell, Sylvan Ginsbury	201-261-3200

Local Distributors

CA	Culver City, EV Roberts	213-870-9561
CA	Industry City, Ital Elctrn. Sls.	714-990-0922
CA	Santa Clara, Western Electromotive	408-985-0908
CT	Wallingford, Sager Elctrns.	203-265-4600
FL	Miami, Elctrn. Equip.	305-871-3500
IL	Chicago, Bell Indus.	312-982-9210
IN	Indianapolis, Graham Elctrns.	317-634-8486
MD	Rockville, All American Transistor	301-251-1205
MA	Hingham, Sager Elctrns.	617-749-6700
MA	Norwell, Bordewieck Eng. Sls.	617-659-4915
MI	Ann Arbor, Wedemeyer Elctrn.	313-665-8611
MN	Minneapolis, Stark Elctrns.	612-332-1325
MO	St. Louis, Van Sickle Radio Elect.	314-621-5000
NJ	Mt. Laurel, D.F. Assocs.	609-234-5324
NY	Buffalo, Summit Distr.	716-884-3450
NC	Charlotte, Dixie Elctrns.	704-377-4348
OH	Columbus, Hughes Peters	614-294-5351
OK	Tulsa, Altair	918-665-0523
SC	Columbia, Dixie Radio	803-779-5332
TN	Knoxville, Dixie Elctrns.	615-938-4131
TX	Houston, Altair	713-462-2410
TX	Richardson, Altair	214-231-5166
WA	Seattle, Radar Elec.	206-282-2511
Can	Willowdale, Ont., Electro Sonic	416-494-1666

CLARE RELAYS

CLARE DIVISION, General Instrument Corp., 3101 W. Pratt Blvd., Chicago, IL 60645, Tel: 312-262-7700, Telex: 25-3775; Empl.: 2400; *Sls. Mgr.:* S. N. Horowitz; *Dist. Mgr.:* S. N. Horowitz .... 1B•1288, 1312-1316

Local Sales Offices & Reps

AL	Huntsville, Clare Div., Genl. Instr. Corp.	205-883-9130
AZ	Phoenix, Clare Div., Genl. Instr. Corp.	602-997-7448
AZ	Scottsdale, Summit Sls.	602-998-4850
AR	Ft. Smith, Electro-Related Prods.	501-452-4030
CA	Irvine, J. V. Earley & Assocs.	714-833-1806
CA	San Diego, SR Electronics	619-560-8330
CA	San Jose, Ruppert Sls. & Engrg.	408-998-8717
CT	Yalesville, Kanan Assocs.	203-265-2404
CT	Yalesville, Kanan Assocs.	203-265-2404
FL	Chuluota, R. I. Smith Assocs.	305-365-8077
FL	Chuluota, R. I. Smith Assocs.	305-365-8077
FL	Ft. Lauderdale, R. I. Smith Assocs.	305-772-5100
FL	Largo, R.I. Smith Assocs.	813-581-1492
IL	Des Plaines, Clare Div., Genl. Instr. Corp.	312-981-0630
IL	Rolling Meadows, Sumer, Inc.	312-991-8500
IN	Indianapolis, Schank Elctrn. Mktg.	317-842-6204
KS	Overland Park, Thomas L. Dowell & Assocs.	913-648-7373
MD	Ellicott City, Doss Elctrns.	301-465-1336
MA	Reading, Kanan Assocs.	617-944-8484
MA	Woburn, Clare Div. Genl. Instr. Corp.	617-938-0666
MN	Eden Prairie, Aldridge Assocs. Inc.	612-944-8433
MO	St. Louis, Thomas L. Dowell & Assocs.	314-849-4234
NJ	Palisades Park, Janco Technlg. Inc.	201-941-4008
NC	Raleigh, Zucker Assocs. Inc.	919-782-8433
OH	Columbus, Baehr, Greenleaf & Assoc.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assoc.	513-439-0724
OH	Lakewood, Baehr, Greenleaf & Assoc.	216-221-9030
OR	Hillsboro, Western Tech. Sls.	503-640-4621
PA	Erdenheim, Omni Sls.	215-233-4600
TX	Dallas, Electra Reps	214-387-3594
TX	Houston, Electra Reps	713-530-2208
WA	Bellevue, Western Tech. Sls.	206-641-3900
WA	Spokane, Western Tech. Sls.	509-922-7600
WI	Brookfield, Sumer Inc.	414-784-6641

CLARKE-HESS COMM. RESCH. CORP., 17 West 17th St., New York, NY 10011, Tel: 212-255-2940, Telex: 971308 RAPID NYK ATT: CH, TWX: 710-582-2292 RAPID NYK ATT: CH; FSC No.: 34423; Empl.: 14

CLAROSTAT MFG., Washington St., Dover, NH 03820, Tel: 603-742-1120, TWX: 510-297-4455; FSC No.: 12697; Empl.: 600; *Sls. Mgr.:* H. E. Taylor

CLARY CORP., Precision Instrs. Div., 320 W. Clary Ave., San Gabriel, CA 91776, Tel: 818-287-6111, TWX: 910-589-3369; Empl.: 50; *Sls. Mgr.:* Steven M. Spilker .... 3•1842

CLAUSS CUTLERY CO., Box 667, Fremont, OH 43420, Tel: 419-332-7344; Empl.: 175

CLEAN ROOM PRODS., 56 W. Penataquit Ave., Bay Shore, NY 11706, Tel: 516-968-8282, Telex: 645151; Empl.: 52; *Sls. Mgr.:* Florence Gaconnier

CLEMENS MFG., 630 So. Berry Rd., St. Louis, MO 63122, Tel: 314-961-7228; Empl.: 3

CLEVELAND CRYSTALS, Box 17157, Euclid, OH 44117, Tel: 216-486-6100, TWX: 810-421-8031; FSC No.: 8K400; Empl.: 40; *Sls. Mgr.:* L. R. Shiozawa

CLEVELAND MICA CO., 1360 Hird Ave., Lakewood, OH 44107, Tel: 216-226-1360; Empl.: 50

CLIFTON PRECISION, Marple at Broadway, Clifton Hgts., PA 19018, Tel: 215-622-1000, TWX: 510-669-9782; FSC No.: 86197; Empl.: 1000; *Sls. Mgr.:* J. Gum .... 1B•1139

Local Sales Offices & Reps

AZ	Phoenix, Clifton Precision	602-242-0910
CA	Cupertino, Clifton Precision	408-996-7507
CA	San Clemente, Clifton Precision	714-492-6904
CA	Woodland Hills, Clifton Precision	818-347-0603
CO	Aurora, Midwest Meridian	303-341-7550
FL	Longwood, Boetto Corp.	305-331-1771
IL	Elk Grove Village, Midwest Meridian	312-640-9540
IA	Cedar Rapids, Midwest Meridian	319-365-6561
MA	W. Newton, Larcom Inc.	617-244-2053
MN	Prior Lake, Midwest Meridian	612-447-8222
MO	Maryland Hgts., Midwest Meridian	314-878-4441
NY	Greenlawn, Reflex Elctrn.	516-549-1888
OH	Fairborn, Midwest Meridian	513-879-7100
OR	Beaverton, Ravencraft	503-646-9261
PA	Clifton Heights, Eastern Sls.	215-622-1000
TX	Ft. Worth, Midwest Meridian	817-654-2132

CLIMATRONICS, 140 Wilbur Pl., Bohemia, NY 11716, Tel: 516-567-7300, Telex: 971329; Empl.: 46

CLINTON ELCTRNS., 6701 Clinton Rd., Rockford, IL 61111, Tel: 815-633-1444, Telex: 257-484; *Sls. Mgr.:* Jerry C. Garrett

CLIPLITE, See Visual Communications

CMC INSTR. DIV., Connecticut microComputer Inc., 36 Del Mar Dr., Brookfield, CT 06804, Tel: 203-775-4595, TWX: 710-456-0052; *Sls. Mgr.:* Shirley Fletcher

CML MACARR DIV., Marine Electric RPD, Inc., 666 Pacific St., Brooklyn, NY 11217, Tel: 212-857-2400, Telex: 12-5327; FSC No.: 00062; Empl.: 100; *Sls. Mgr.:* Gary Mandell .... 3•1843-1845

Local Sales Offices & Reps

MI	Detroit, Bill Teplitz Associates	216-439-3265
NJ	Parlin, Fred Romer Assocs.	201-721-4137
OH	Cincinatti, Bill Teplitz Associates	513-481-1648
OH	Cleveland, Bill Teplitz Associates	216-439-3265

COAST COIL CO., 5333 W. Washington Blvd., Los Angeles, CA 90016, Tel: 213-936-6188; Empl.: 50

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COMPUTER
POWER INC.

COMPUTER POWER, 124E W. Main St., High Bridge, NJ 08829, Tel: 201-735-8000, Telex: 847481; FSC No.: 3643; Empl.: 145; *Sls. Mgr.:* George A. Ardolino; *Dist. Mgr.:* Stanley A. Smith, Jr. .... **3**•1847

Local Sales Offices & Reps

AL	Huntsville, Col-Ins-Co	305-423-7615, 800-327-6600
AZ	Scottsdale, Williams-Assocs.	602-947-4297

CA	Inglewood, Basic Sys. Corp.	213-673-4300
CA	San Diego, Basic Sys. Corp.	619-279-9641
CA	Santa Clara, Basic Sys. Corp.	408-727-1800
CO	Commerce City, Williams-Assocs.	303-289-5647
CT	New Milford, Power Assocs.	800-421-0011
FL	Coral Springs, Col-Ins-Co	800-432-4480, 305-423-7615
FL	Largo, Col-Ins-Co.	305-423-7615, 800-432-4480
FL	Orlando, Col-Ins-Co	305-423-7615, 800-432-4480
GA	Atlanta, Col-Ins-Co	800-327-6600, 404-491-9395
IL	Chicago, SEA, Inc.	312-255-4820
IN	Indianapolis, SEA, Inc.	317-846-2591
KY	Louisville, SEA, Inc.	502-228-5401
LA	Baton Rouge, Col-Ins-Co	800-327-6600, 305-423-7615
MD	Linthicum, K-D Assoc.	301-859-5151
MA	N. Chelmsford, Power Assocs.	617-251-7756
MI	Farmington Hills, CMP Inc.	313-477-7700
MN	Minneapolis, SEA, Inc.	612-425-4455
NJ	Marlton, Linden C.E. Kite	201-925-1899
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	Binghamton, Tae Rep., Inc.	607-772-6952
NY	Buffalo, A. Cosentino Entprs.	716-876-4172
NY	Huntington, C. E. Kite	516-266-2808
NY	Rochester, TAE-REP, Inc.	716-586-8710
NC	Raleigh, Col-Ins-Co	800-327-6600, 305-423-7615
OH	Cleveland, CMP Inc.	216-779-5100
OH	Englewood, CMP Inc.	513-836-0951
PA	Conshohocken, TEDCO	215-825-6450
PA	Monroeville, CMP Inc.	412-372-4415
SC	Greenville, Col-Ins-Co	800-327-6600, 305-423-7615
TN	Knoxville, Col-Ins-Co	800-327-6600, 305-423-7615
TX	Garland, TESCO	214-681-1376
TX	Houston, TESCO	713-777-1443
UT	Salt Lake City, Williams-Assocs.	801-485-6511
WA	Edmonds, Power Sources Unltd.	206-784-3336
WI	Milwaukee, SEA, Inc.	414-784-9379

Local Distributors

AZ	Phoenix, Keystone Electro Sls.	602-995-3005
CA	Hayward, Elsar	415-887-8550
FL	Homossassa, Bunts Auto Elec.	904-795-0069
FL	Orlando, Veytec	305-859-7340
GA	Atlanta, Encore Lodging	404-953-1724
GA	Atlanta, Corporate Data Sys.	404-952-3376
IL	Deerfield, Electrocon	312-948-0320
MA	Cohasset, Emergency Ltg. & Sys.	617-383-6500
MA	Framingham, Total Power Corp.	617-237-2024, 2025
MA	Sharon, Adcour Assocs.	617-784-8123
NJ	Bridgeton, Penn M & G Elec. Supp.	609-451-2291
NJ	Cherry Hill, UHR Electric Supply Co.	609-795-4504
NJ	Linden, Registration Electric	516-266-2808
NY	Amherst, Standard Elctrns.	716-691-3801
NY	Orchard Park, Park Electric Supply, Inc.	716-662-7070
OK	Oklahoma City, Smith Ltg. Sls., Inc.	405-521-0093
OK	Tulsa, Computer Power of OK	918-252-5406
PA	Coatesville, Penn Elec. Supp. Co.	215-647-5552
PA	Doylestown, Penn Electric Supply Co.	215-673-4450
PA	Philadelphia, Penn Electric Supply Co.	215-471-1111
TX	Austin, Computerfixx	512-282-3472
WA	Seattle, Miller Elec.	206-248-1102
EXP	Santurce, Electronic Power Systems	809-727-7960, 1062

COMPUTER PRODUCTS™
POWER CONVERSION

COMPUTER PRODS. INC., Power Conversion Grp., 2981 Gateway Dr., Pompano Bch., FL 33069-4803, Tel: 305-974-5500, TWX: 510-956-3098; FSC No.: 62125; Empl.: 700; *Sls. Mgr.:* Martin L. Gross; *Dist. Mgr.:* Dale T. Raveny .... **3•**1438, 1518

Local Sales Offices & Reps

AL	Huntsville, Electro-Mech Sls. Engrg.	205-533-2100
AZ	Tempe, Elec-Com Assocs.	602-967-8644
CA	Danville, Power Conversion Grp.	415-837-8593
CA	Folsom, Manco	916-985-0370
CA	Santa Clara, Manco	408-496-6611
CO	Parker, Parker Webster Co.	303-841-4888
FL	Coral Springs, EPM Corp.	305-755-5387
GA	Atlanta, Electro-Mech Sls. Engrg.	404-447-6478
ID	Boise, Intermountain Technlg.	208-322-5022
IL	Des Plaines, Janus, Inc.	312-298-9330
IL	Glenview, Power Conversion Grp.	312-998-6715
IN	Indianapolis, Fred A. Dorsey & Assocs.	317-842-0060
KS	Overland Park, J. F. Guernsey Co.	913-381-2225
KY	Louisville, Fred A. Dorsey & Assocs.	502-426-3540
MD	Baltimore, Professional Reps.	301-653-3600
MA	Woburn, Power Conversion Grp.	617-933-0237
MI	Livonia, Lowell Wendt Mktg.	313-464-2722
MN	Bloomington, Smiley Scott Assocs.	612-888-5551
MO	Florissant, J. F. Guernsey Co.	314-921-5720
NJ	Englewood, Tecnimat	201-569-4200
NM	Albuquerque, Elec-Com Assocs.	505-898-6101
NY	Fayetteville, Power Unltd.	315-637-5291
NY	Lewiston, Power Unltd.	716-285-3295
NC	Raleigh, Electro-Mech Sls. Engrg.	919-851-8165
OH	Cleveland, Geotronix	216-526-2535
OH	Trotwood, Geotronix	513-854-5939
OK	Bixby, MGR Elctrns.	918-369-5186
OR	Portland, Power Sources Unltd.	503-292-0820
PA	Ambler, Denco	215-542-9876
TN	Nashville, Electro-Mech Sls. Engrg.	615-885-0073
TX	Austin, MGR Elctrns.	512-250-0926
TX	Dallas, MGR Elctrns.	214-238-5246
UT	Salt Lake City, Parker Webster	801-266-9939
VA	Charlottesville, Professional Reps.	804-971-9650
WA	Lynnwood, Power Sources Unltd.	206-743-6641

Local Distributors

CA	Milpitas, Power Systems Distrs.	408-946-8300
CA	N. Hollywood, B. J. Wolfe Entprs.	213-877-5518
MD	Columbia, Aztech Elctrs.	301-995-1760
MA	Wilmington, RC Comps.	617-273-1860
MI	Livonia, LWC Distrs.	313-464-7700
OK	Tulsa, Norvell Elctrns.	918-663-1247
TX	Austin, Norvell Elctrns.	512-458-8106
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	Houston, Norvell Elctrns.	713-777-1666
Can	Concord, Ontario, Kaytronics	416-669-2262
Can	Kanata, Ontario, Kaytronics	613-592-6606
Can	Surrey, British Columbia, Kaytronics	604-581-7611
Can	Ville St. Pierre, Quebec, Kaytronics	514-367-0101

COMPUTER SYSTEM ASSOCS., 7562 Trade St., San Diego, CA 92121, Tel: 619-566-3911; Empl.: 8; *Sls. Mgr.:* Chuck Bennett

COMPUTER TALK, INC., Box 148, Morrison, CO 80465, Tel: 303-697-5485; Empl.: 20

Local Sales Offices & Reps

MN	St. Paul, Imtech, Inc.	612-646-7340

COMPUTER TERMINAL SYS., 89 Arkay Drive, Hauppauge, NY 11788, Tel: 516-435-2916, Telex: 291411, 291413, TWX: 510-224-6050; FSC No.: 33948; Empl.: 120; *Sls. Mgr.:* K. Oliver

COMPUTERVISION CORP., 201 Burlington Rd., Bedford, MA 01730, Tel: 617-275-1800

COMPUTERWISE, 4006 E 137th Terr., Grandview, MO 64030, Tel: 816-765-3330; Empl.: 20; *Sls. Mgr.:* William W. Brown; *Dist. Mgr.:* William W. Brown

COMPUTROL DIV. KIDDE AUTOMATED SYS., INC., 15 Ethan Allen Hwy., Ridgefield, CT 06877, Tel: 203-544-9371, Telex: 643358; Empl.: 85; *Sls. Mgr.:* Chuck Brewer

COMPUTYPE, INC., 2285 W. County Road "C", St. Paul, MN 55113, Tel: 612-633-0633, 800-328-0852, TWX: 910-563-3699

comstron

COMSTRON CORP., 200 E. Sunrise Hwy., Freeport, NY 11520, Tel: 516-546-9700, TWX: 510-225-3699; Empl.: 97; *Sls. Mgr.:* Stephen B. Rosenfield .... **1A•**1325-1327, 1588; **3•**1210, 1211

Local Sales Offices & Reps

AZ	Phoenix, Odyssey 1	602-246-8846
CA	Anaheim, Blair Assocs.	714-635-1350
CA	San Diego, Interstate Mktg. Assocs.	714-292-8117
CA	Sunnyvale, Applied Sys.	408-773-0616
CA	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
CO	Castle Rock, Odyssey I	303-688-3555
FL	Altamonte Springs, Dyne-A-Marr Corp.	305-831-2097
FL	Clearwater, Dyne-A-Marr Corp.	813-441-4702
FL	Fort Lauderdale, Dyne-A-Mark Corp.	305-944-5031
FL	Ft. Lauderdale, Reynolds & Assocs.	305-581-6611
FL	Melbourne, Reynolds Assocs.	305-259-7000
FL	Palm Bay, Dyne-A-Marr Corp.	305-727-0192
FL	St. Petersburg, Reynolds & Assocs.	813-360-1484
GA	Acworth, Reynolds & Assocs.	404-451-9558
GA	Marietta, Comstron/Southeast	404-973-3325
IL	Arlington Heights, Dytec Cen.	312-394-3380
IN	Indianapolis, Dytec Cen.	317-247-1316
KS	Lenexa, Dytec South	913-888-0215
MA	Lexington, Lancer Assocs.	617-861-1720
MI	Madison Hts., WKM Assocs.	313-588-2300
MN	St. Paul, Dytec North	612-645-5816
MO	Maryland Hts., Dytec South	314-569-2990
NJ	Englewood Cliffs, Sci. Devices East	201-871-3916
NM	Albequerque, Odyssey 1	505-265-6645
NY	Wantagh, Bytec Reps.	516-781-7400
NC	Spring Hope, Reynolds & Assocs.	305-259-7000
OH	Dayton, WKM Assocs., Inc.	513-434-7500
OH	Independence, WKM Assocs.	216-524-5930
PA	Pittsburgh, WKM Assocs., Inc.	412-892-2953
PA	Spring House, Sci. Devices East	215-643-3335
TX	Dallas, Marcom	214-351-4532
TX	Richardson, Sci. Devices, S.W.	214-231-8106
VA	McLean, Creative Mktg. Assocs.	703-442-9100
WA	Vancouver, Ray Over Sls.	206-695-6179

COMTECH MICROWAVE CORP., Comtech Corp., 63 Oser Ave., Hauppauge, NY 11788, Tel: 516-435-4646, Telex: 971403 COMMIC HAUP; FSC No.: 61381; *Sls. Mgr.:* M. Javits

COM/TECH SYSTEMS, 505 Eighth Ave., New York, NY 10018, Tel: 212-594-5377; Empl.: 9

COMTEC INFOR. SYS., INC., 53 John St., Cumberland, RI 02864, Tel: 401-724-8500, TWX: 710-387-1171; Empl.: 75; *Sls. Mgr.:* R. A. Hamilton

CONCORD DATA SYSTEMS, 303 Bear Hill Rd., Waltham, MA 02154, Tel: 617-890-1394, Telex: 95-1793; Empl.: 90

Local Sales Offices & Reps

CA	Santa Ana, Concord Data Sys.	714-541-4974
IL	Wilmette, Concord Data Sys.	312-251-8336

CONCORD ELCTRNS., 30 Great Jones St., Dept. JE, New York, NY 10012, Tel: 212-777-6571, TWX: 710-581-4930; Empl.: 225; *Sls. Mgr.:* Josie Wheaton .... **2•**1170-1243

CONDENSER PRODS., P.O. Box 997, Brooksville, FL 33512, Tel: 904-796-3561; Empl.: 26; *Sls. Mgr.:* Pat K. Johnson

CONDITIONING SEMICONDUCTOR DEVICES, Box 2116, Wayne, NJ 07470, Tel: 201-335-6723, Telex: 219023; FSC No.: 60644; Empl.: 20; *Sls. Mgr.:* A. G. Zimmerly; *Dist. Mgr.:* Jill Mullen

CONDOR INC.
D.C. POWER SUPPLIES

CONDOR, 201 Flynn Rd., Camarillo, CA 93010, Tel: 805-484-2851, 800-235-5929; Empl.: 220; *Sls. Mgr.:* Fred Adams .... **3•**1519-1534

Local Sales Offices & Reps

AL	Huntsville, Pen-Tech	205-881-9298
AZ	Phoenix, O'Donnell Assoc.	602-944-9542
CA	Inglewood, Basic Systems Corp.	213-673-4300
CA	Irvine, Basic Systems Corp.	714-999-0300
CA	San Diego, Basic Systems Corp.	619-268-8000
CA	Santa Clara, Basic Systems Corp.	408-727-1800
CO	Denver, R. Marketing	303-455-5360
FL	Casselberry, Pen-Tech	305-645-3444
FL	Deerfield Beach, Pen-Tech	305-421-4989
GA	Marietta, Pen-Tech	404-424-1931
IL	Schaumberg, Engrg. Prods.	312-882-7640
IN	Greenfield, Engrg. Prods.	317-894-7156
IA	Coralville, Engrg. Prods.	319-354-5344
MD	Wheaton, Brimberg Sls.	301-946-2670
MA	Wayland, Daner Hayes Inc.	617-655-0888
MN	Edina, Engrg. Prods.	612-835-9022
NJ	Bellmawr, TAI	609-933-2600; 215-627-6615
NY	Yonkers, Sonkin Assoc.	914-968-7736
NC	Greensboro, Pen-Tech	919-852-6000
OH	Dayton, Thompson Assoc.	513-435-7733
PA	Mars, Thompson Assoc.	412-776-6495
TX	Dallas, Seaton Corp.	214-380-0414
UT	N. Salt Lake City, R. Marketing	801-298-2631
WA	Bellevue, Al Smith Co.	206-746-6770

Local Distributors

CA	Inglewood, Basic Systems Corp.	213-673-4300
CA	Irvine, Basic Systems Corp.	714-999-0300

CA	San Diego, Basic Systems Corp.	619-268-8000
CA	Santa Clara, Basic Systems Corp.	408-727-1800
IL	Schaumberg, Engrg. Prods.	312-882-7640
MD	Wheaton, Brimberg Sls.	301-946-2760
MI	Madison Heights, McNaughton-McKay	313-399-7500
MN	Edina, Engrg. Prods.	612-835-9022
NY	Yonkers, Kintronics	914-968-8282
Intl	Belgium, Mulder-Hardenburg	031-680032
Intl	Denmark, Danika Supply	09-432122
Intl	England, Gresham/Powerdyne	(025-672)4246
Intl	Finland, Oy Ferrado AB	0-550002
Intl	France, AK Electronique	01-5755353
Intl	Holland, Mulder-Hardenburg BV	023-319184
Intl	Norway, Powerbox AS	02-535-837
Intl	Sweden, Power Box AB	0518-11920
Can	Canada, Duncan Inst. Ltd.	416-742-4448

CONDOR PACIFIC INDS., INC., 8053 Deering Ave., Canoga Park, CA 91304, Tel: 818-347-8331, Telex: 65-1442; Empl.: 40

CONDOR SYSTEMS, INC., 2605 S. Winchester Blvd., Campbell, CA 95008, Tel: 408-866-5900, Telex: 184819 Systems SANTA; FSC No.: 62065; *Sls. Mgr.:* Dick Keenly; *Dist. Mgr.:* Ed Brown

CONDUCTIVE RUBBER TECHNLG., 1235 Coast Village Rd., Santa Barbara, CA 93108, Tel: 805-969-5805, Telex: 658-305; *Sls. Mgr.:* Robert Webb

Distributor

CONECTRIX, INC., 376 E. Gunderson St., Carol Stream, IL 60188, Tel: 312-653-1460 .... 1B•1742

CONFORMING MATRIX, Box 5126, Pt. Pl. Sta., Toledo, OH 43611, Tel: 419-729-3777; Empl.: 35

CONKLIN INSTR. CORP., West Rd., Pleasant Valley, NY 12569, Tel: 914-635-2136; Empl.: 65

Local Sales Offices & Reps

CA	Santa Ana, Craig Martin & Assoc.	714-556-1106
CT	Bethel, Gemini Elctrn. Sls.	203-748-5506
GA	Newnan, Dolan Assocs.	404-251-1102
NJ	Kinnelon, R.J. Alvarez, Inc.	201-838-5641
OH	Howard, Denman Assocs.	614-397-6240
WA	Redmond, Control Q	206-881-7440

CONNECTICUT HARD RUBBER CO., See CHR Inds.

CONNECTICUT MICROWAVE CORP., 106 Powder Mill Rd., Box 389, Canton, CT 06019, Tel: 203-693-4247; FSC No.: 50974; Empl.: 16; *Sls. Mgr.:* S. T. Urbank

CONNECTOR CORP., 6025 N. Keystone Ave., Chicago, IL 60646, Tel: 312-539-3108, TWX: 910-221-6059 .... 2•1244, 1245

CONNECTOR INDS. OF AMER., 639 N. Wayne, Cincinnati, OH 45215, Tel: 513-733-3680; FSC No.: 32076; Empl.: 35

Local Sales Offices & Reps

AZ	Phoenix, Southwest e/m Engrg.	602-944-1521
CA	Anaheim, Libratronix	714-534-7073
CT	Branford, W. McCoy Co.	203-488-2012
IL	Chicago, D. Dolin Sls. Co.	312-286-6200
IN	Greenwood, Valentine & Assocs.	317-888-2260
MI	Birmingham, Forand Sls. Co.	313-644-0087
MN	Bloomington, J. G. Twist	612-835-2120
NY	N. York, ABS Assoc.	201-871-0020
PA	Hatboro, Jacobsen Assocs.	215-674-2937
TX	Dallas, Kruvand Assocs.	214-691-4592

CONNOR-WINFIELD CORP., 109 Turner Ct., POB L, W. Chicago, IL 60185, Tel: 312-231-5270, TWX: 910-230-3231; FSC No.: 21022; Empl.: 35; *Sls. Mgr.:* John Hoag .... **1A**•1329-1332

Local Sales Offices & Reps

CA	Los Altos, Frauman Assocs.	415-941-0660
CA	Westlake Village, C.D.H. Assocs.	213-707-1970

CONOLOG CORP., 5 Columbia Rd., Somerville, NJ 08876, Tel: 201-722-8081

CONRAC CORP., System Comps. Div., 1700 S. Mountain Ave., Duarte, CA 91010, Tel: 213-359-9141, Telex: 96-5978; Empl.: 200; *Sls. Mgr.:* Albert N. Caputo

CONRAC DIV., Conrac Corp., 600 N. Rimsdale Ave., Covina, CA 91722, Tel: 213-966-3511, Telex: 67-0437; Empl.: 450

CONSELL, 463 Payne Dr., Cheshire, CT 06410, Tel: 203-272-6837; Empl.: 3; *Sls. Mgr.:* A. R. Aikman

CONSOLIDATED CONTROLS, 15 Durant Ave., Bethel, CT 06801, Tel: 203-743-6721, Telex: 969615, TWX: 710-456-0446; FSC No.: 02750; Empl.: 650; *Sls. Mgr.:* A.F. Jakubauskas

Consolidated
electronic wire & cable

CONSOLIDATED ELECTRONIC WIRE & CABLE CORP., 11044 King St., Franklin Park, IL 60131, Tel: 312-455-8830, TWX: 910-227-1705; FSC No.: 73612; Empl.: 57; *Sls. Mgr.:* Karl Rankin; *Dist. Mgr.:* Steve Boynton .... 2•2021-2075

Local Sales Offices & Reps

AL	Birmingham, Hollingsworth & Still	205-822-2846
AR	Little Rock, Erickson Sls., Inc.	501-225-7379
CA	San Jose, O'Donnell & Assoc.	408-263-6500
CO	Parker, Parker-Webster Co.	303-841-4888
FL	Orlando, Hollingsworth & Still	305-859-9423
GA	Norcross, Hollingsworth & Still	404-447-1700
IL	Highland Park, Bramsky Sls. Co.	312-433-2375
IN	Indianapolis, Green Sls. Co.	317-291-2232
KS	Prairie Village, R. W. Kunz & Assocs.	913-648-3535
KY	Louisville, K W Elctrn. Sls.	502-451-1860
KY	Louisville, Green Sls. Co.	502-241-1212
LA	Chalmette, Erickson Sls. Inc.	504-271-1976
MD	Kensington, Forti Assocs.	301-949-1706
MA	Southboro, KSA of New England	617-485-9432
MI	Detroit, Burcaw Co. & Assoc.	313-533-7700
MI	Wyoming, Burcaw Co. & Assoc.	616-532-2756
MN	Edina, Monroe-Hanna	612-925-5700
MO	St. Louis, R. W. Kunz & Assocs.	314-966-4977
NJ	East Orange, Willgold Sls. Corp.	201-678-7700
NM	Albuquerque, Trembly & Assoc.	505-266-8616
NY	Rochester, Warren Kaufman & Assoc.	716-266-2728
NY	Schenectady, Warren Kaufman & Assocs.	518-374-0749
NC	Kernersville, Hollingsworth & Still	919-996-4622
OH	Dayton, KW Elctrn. Sls.	513-890-2150
OH	Shaker Heights, KW Elctrn. Sls.	216-491-9177
OH	Worthington, K W Elctrn. Sls.	614-888-0483
OK	Oklahoma City, Erickson Sls. Inc.	405-682-2947
OR	Troutdale, Comtec Int'l.	503-661-4308
PA	Allison Park, K W Elctrn. Sls.	412-487-4300
PA	Philadelphia, Samuel K. MacDonald, Inc.	215-545-1205
TX	Dallas, Erickson Sls. Inc.	214-739-5833
UT	Salt Lake City, Parker-Webster Co.	801-266-9939
UT	Salt Lake City, Cleveland Entprs. of Colorado	801-355-8424
VA	Vinton, Forti Assocs.	703-345-2505
WA	Bellevue, Comtec, Intl.	206-453-1189
WI	Cedarburg, Branksy Sls. Co.	414-377-6837
EXP	NY, Plainview, Morhan Exporting	516-293-5582

Local Distributors

AL	Huntsville, Pioneer/Huntsville	205-837-9300
AZ	Tucson, Elctrn. City	602-622-1173
CA	Concord, Pacific Radio Supp.	415-682-4700
CA	Costa Mesa, Marvac Elctrns.	714-540-3280
CA	Fullerton, Garden Elctrns.	714-526-7882
CA	Redwood City, HDB Elctrns.	415-368-1388
CT	Wallingford, Midan Elctrns.	203-265-2077
FL	Ft. Lauderdale, Pioneer/Florida	305-771-7520
GA	Atlanta, Wholesale Ind'l. Elctrns.	404-447-8431
HI	Honolulu, Electrical Equip.	808-533-3884
IL	Peoria, Klaus Radio, Inc.	309-691-4840
IL	Wheeling, Hawk Elctrns.	312-459-4030
IA	Cedar Rapids, Deeco, Inc.	319-365-7551
KY	Florence, URI Elctrns.	606-371-4423
LA	New Orleans, L. F. Gaubert	504-822-7272
MD	Gaithersburg, Pioneer/Washington	301-921-0660
MA	Norwook, Emtel	617-769-9500
MI	Grand Rapids, SF Elctrns.	616-459-0216
MO	Maryland Heights, L-Comp	314-291-6206
NH	Manchester, Yankee Elctrn. Supp.	603-625-9746
NJ	East Hanover, State Elctrns. Parts	201-887-2550
NJ	Kenilworth, Federated Purchaser	201-272-0505
NY	Bohemia, Key Comps.	516-567-7500
NY	Buffalo, Genesee Radio Parts	716-873-9661
NY	Rochester, Goldcrest Elctrns.	716-266-2728
NC	Greenville, Pair Elctrns.	919-756-2292
OH	Cincinnati, URI Elctrns.	513-761-4030
OH	Dayton, Pioneer/Dayton	513-236-9900
OR	Beaverton, Acacia Sls.	503-646-3377
PA	Allentown, Lehigh Elctrn. Comps.	215-433-3045
SC	Charleston, Wholesale Ind'l. Elctrns.	803-722-2634
WA	Seattle, Radar Elec. Co.	206-282-2511
WI	Appleton, Appleton Radio Supp.	414-734-5767
EXP	Plainview, Morhan Exporting	516-293-5582

CONSOLIDATED PRODUCTS CORP., P.O. Box 67, Idyllwild, CA 92349, Tel: 714-659-2183

CONSOLIDATED RESISTANCE CO. AMERICA, 222 Lake Ave., Yonkers, NY 10701, Tel: 914-YO3-5900; Empl.: 20

CONSOLINK CORP., Lestronics, Inc., 1840 Industrial Cir., Longmont, CO 80501, Tel: 303-651-2014, TWX: 910-320-0786; *Sls. Mgr.:* Lisa Estabrooks; *Dist. Mgr.:* Lisa Estabrooks

CONSUMERTRONICS, 2011 Crescent Dr., Alamogordo, NM 88310, Tel: 505-434-0234; Empl.: 5; *Sls. Mgr.:* Laurie Laurencia

CONTACT, INC., 5 Elm Ave., Hudson, NH 03051, Tel: 603-883-7708; FSC No.: M07015; Empl.: 11; *Sls. Mgr.:* T. Foresta; *Dist. Mgr.:* R. Reid

CONTACT EAST, 7 Cypress Dr., Burlington, MA 01803, Tel: 617-272-5051; *Sls. Mgr.:* Kai Juel

contact **Contact Electronics Inc.**

CONTACT ELECTRONICS INC., 30 Plymouth St., Fairfield, NJ 07006, Tel: 201-575-7660, 800-221-1451, Telex: 130-216; Empl.: 50; *Sls. Mgr.:* Thomas E. Bodnar; *Dist. Mgr.:* Thomas E. Bodnar .... 2•1169

Local Sales Offices & Reps

CA	Santa Clara, Contact Elctrns. Inc.	408-988-5400
CA	Simi Valley, Tri Electro Sls.	805-583-5124
CT	Mystic, JMG	203-572-9448
FL	Orlando, Over & Over	305-857-4057
GA	Norcross, Over & Over	404-449-6205
IL	Chicago, KGA Engrg.	312-477-8181
IN	Indianapolis, J & W Sales	317-842-3740
MD	Glendale, Electromate, Inc.	301-262-2702
MA	Norwood, JMG	617-762-5333
MI	Farmington Hills, Willis Trombley & Son	313-553-2200
MN	Fridley, Teskey & Assocs.	612-571-0876
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NJ	Mountainside, Henry G. Richter	201-233-4615
NY	Fayetteville, Henry G. Richter	315-637-6713
NC	Charlotte, Over & Over	704-527-3070
OH	Cleveland, Pressler-Weissinger Co.	216-333-7977
OR	Tigard, Electronic Sources	503-684-0040
TN	Antioch, Over & Over	615-834-0140
TX	Dallas, Blackburn Assocs.	214-692-8885
TX	Houston, Blackburn Assocs.	713-463-1354
WA	Bellevue, Elctrn. Sources	206-451-3500

Local Distributors

CA	Irvine, Ratel Elctrns.	213-637-0839
CA	Mountain View, Cornett Elctrns.	415-969-5420
CA	Mountainview, Target Elctrns.	415-961-1170
CA	S. San Francisco, Peters de Laet	408-727-9440
CA	San Jose, Ratel Elctrns.	408-946-4300
IL	Mt. Prospect, Magnuson Elctrns.	312-956-0700
MD	Beltsville, Applied Specialties Inc.	301-792-2211
MD	Frederick, Digital Sys. Inc.	301-694-9355
MA	Burlington, JV Elctrns. of Boston	617-273-4300
MA	Middleboro, Glynn Elctrns.	617-947-4262

NJ	Berlin, GCI	609-768-6767
NJ	Frenchtown, Sintec Co.	201-996-4093
NJ	Hanover, State Elctrns.	201-887-2550
NY	Hauppauge, LI, Broadline Elctrns.	516-231-4100
NY	New York, Knickerbocker Annunciator	212-964-6258
OR	Lake Oswego, Moore Elctrns.	503-684-3100
OR	Wilsonville, Zepher Indus.	503-682-2929
TX	Stafford, Southwest Elctrns., Inc.	713-491-4900
WA	Seattle, Zepher Indus.	206-241-1980

CONTEL INFO. SYS., INC., Continental Tel. Corp., 130 Steamboat Rd., Great Neck, NY 11024, Tel: 516-829-5900; Empl.: 450

CONTINENTAL DATA SYS., 131 N. Ludlow St., Dayton, OH 45402, Tel: 513-222-8626; Empl.: 4

CONTINENTAL ELECTRONICS MFG. CO., P.O. Box 270879, Dallas, TX 75227, Tel: 214-381-7161, Telex: 73-398; FSC No.: 52151; *Sls. Mgr.:* R. L. Floyd, Domestic Broadcast

CONTINENTAL RESOURCES, INC., 175 Middlesex Tpke., Bedford, MA 01730, Tel: 617-275-0850, TWX: 710-326-0833; Empl.: 275; *Sls. Mgr.:* Michael Mattleman ....3•1212

Local Sales Offices & Reps

CA	Carson	213-638-0454
CA	Santa Clara	408-727-9870
FL	Orlando	305-855-9544
IL	Bensenville	312-860-5991
MD	Gaithersburg	301-948-4310
NJ	Scotch Plains	201-654-6900
TX	Dallas	214-458-7616

CONTINENTAL SPECIALTIES CORP., See Global Specialties Corp.

CONTOURS, INC., P.O. Box 1041, Middletown, CT 06457, Tel: 203-347-5694; FSC No.: 033501; *Sls. Mgr.:* Richard M. Nokes

CONTRAVES GOERZ CORP., 610 Epsilon Dr., Pittsburgh, PA 15238, Tel: 412-967-7700, Telex: 86-6237, TWX: 710-664-2082; FSC No.: 51261; *Sls. Mgr.:* Henry M. Voss; *Dist. Mgr.:* Ronald L. Ekas

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Local Sales Offices & Reps

AZ	Phoenix, Power Specialists	602-996-4100
CA	Los Alamitos, Power Specs.	213-594-9418
CA	Redwood City, Ault Assocs.	415-367-1710
MD	Baltimore, Scientific Assocs.	301-321-1411
MA	Needham, Shain Assoc.	617-449-4380
MI	Southfield, Comtel Instrs.	313-358-2505
NJ	Cherry Hill, Scientific Reps.	609-482-0059
OH	Cleveland, Comtel Instrs.	216-442-8080
OH	Dayton, Comtel Instrs.	513-298-7573
PA	Chalfont, Eastern Scientific Marketing	215-822-6503
PA	Pittsburgh, Comtel Instrs.	412-922-5720
VA	Fairfax, Scientific Assocs.	703-385-0600

CONTROL DATA CORP., P.O. Box O, Minneapolis, MN 55440, Tel: 1-800-828-8001 Operator 82, In Minnesota 612-921-4400; Empl.: 56,000

CONTROL ELCTRNS. CO., INC., 107-B Allen Blvd., Farmingdale, NY 11735, Tel: 516-694-0125; FSC No.: 95924; Empl.: 60; *Sls. Mgr.:* Harold Goldstein; *Dist. Mgr.:* Jack Leonard ....1A•1467-1469

Local Sales Offices & Reps

CA	Sherman Oaks, R.T. Assocs.	213-788-7588
FL	Melbourne, VPI	305-727-3305
FL	Tampa, VPI	813-832-2041
IL	Chicago, Electro-Tech Mktg. Assoc.	312-588-4535
MD	Ellicott City, VPI	301-461-2525
MA	W. Medway, J. Gallagher	617-533-7292
MN	Fridley, Teskey & Assocs.	612-571-0876
PA	Montgomery, VPI	215-474-3200
TX	Dallas, Texas Avionics Co.	214-363-6324
EXP	FL, Hallandale, Emec	305-925-6366

CONTROL ENGRG., INC., 1686 Riverdale St., West Springfield, MA 01089, Tel: 413-781-1330; Empl.: 7; *Sls. Mgr.:* Mark Kimball

CONTROL EQUIP. CORP., 171 Lincoln St., Lowell, MA 01851, Tel: 617-459-0573; Empl.: 10

CONTROLEX/EANCO, See Fincor

CONTROL INDS. INC., 530 Burnside Ave., Inwood, NY 11696, Tel: 212-471-9800; Empl.: 40

CONTROLLED ENVIR. EQUIP. CORP., 3 Delta Drive, Westbrook, ME 04092, Tel: 207-854-9126; Empl.: 5; *Sls. Mgr.:* R. D. Peck

CONTROLLED POWER COMPANY

CONTROLLED POWER CO., 1955 Stephenson Hwy., Troy, MI 48084, Tel: 313-528-3700, TWX: 810-232-3401 ....3•1814, 1848-1853

CONTROL MODULE, 380 Enfield St., Enfield, CT 06082, Tel: 203-745-2433, Telex: 643167; Empl.: 160; *Sls. Mgr.:* Peter C. DiMaria

CONTROL-O-MATION, INC, 7300 W. Huron River Dr., Dexter, MI 48130, Tel: 313-426-3935; Empl.: 72; *Sls. Mgr.:* Richard Lundy

CONTROL PRODUCTS, INC., 280 Ridgedale Ave., E. Hanover, NJ 07936, Tel: 201-887-9400; FSC No.: 81901; Empl.: 62; *Sls. Mgr.:* J. R. Nile

CONTROL PRODS., Devar Inc., P.O. Box 589, Bridgeport, CT 06601, Tel: 203-368-6751, Telex: 96-4234; Empl.: 80; *Sls. Mgr.:* T. W. Tomasko

CONTROL PRODS. DIV., Amerace Corp., 2330 Vauxhall Rd., Union, NJ 07083, Tel: 201-964-4400, Telex: 13-8978, TWX: 710-985-4687; FSC No.: 3L154; Empl.: 275; *Sls. Mgr.:* J. Cooper ....3•1125

Local Sales Offices & Reps

AL	Hoover, Control Prods. Agency	205-320-6197
AZ	Phoenix, Mercury Engrg. Sls.	602-244-0123
CA	Los Altos, J. Wilhoit Co.	415-961-3660
CA	San Diego, J. C. Henberger Co.	619-292-5772
CA	Tustin, Schoenbachler-Dobson Co.	714-544-1888
CO	Denver, C. Beabout Co.	303-244-3151
CT	Glastonbury, Tulimieri Assocs.	203-659-3531
FL	Deerfield Pk., Brandel-Stephens	305-427-8558
FL	Orlando, B. Stephens Co.	305-425-3202
GA	Atlanta, Control Prods. Div.	404-296-3115
HI	Miliani Town, H. C. Burgess	808-623-3118
IL	Algonquin, Control Prods. Div.	312-358-2840
IL	Woodridge, Control Prods. Div.	312-358-2840
IA	Des Moines, Jerry L. Shumway & Assocs.	515-285-0704
KS	Overland Park, Arehart-Barnds-Rains Sls. Co. (Buchanan Prods. Only)	913-649-9270
MD	Mount Airy, Strayton Assocs.	301-831-7007
MA	Norwell, Control Prods. Div.	617-659-4474
MI	Troy, George R. Peters Assoc.	313-362-1220
MN	Minneapolis, Harold Mercer Co.	612-933-7111
MS	Jackson, Welch & Doby, Inc.	601-932-5534
MO	Bridgeton, Dy-Tronix, Inc.	314-731-5799
MO	Independence, Dy-Tronix, Inc.	816-373-6600
NJ	Dunellen, Control Prods. Div.	201-964-4400
NM	Sandia Park, Sun Sls.	505-281-3373
NY	Camillus, Ontec	315-672-5626
NY	Manhasset, Control Prods. Div.	516-627-8809
NY	Rochester, Ontec	716-464-8636
NY	Wappinger Falls, Ontec	914-462-7188
NC	Greensboro, Hile Assocs.	919-288-1500
OH	Mentor, Control Prods. Div.	216-543-4233
OH	West Chester, Control Prods. Div.	513-777-2472
OR	Portland, Syscom	503-644-2505
PA	Pittsburgh, Control Prods. Div.	412-761-0581
PA	Willow Grove, Cusick Elec. Sls.	215-659-6666
TX	Bedford, Reynolds Assoc., Inc.	817-267-5635
TX	Houston, Control Prods. Div.	713-984-8128
WA	Bellevue, Syscom Sls.	206-641-5080
WV	Huntington, Lilly Electrical Sls.	304-523-3441
WI	Wauwatosa, Control Prods.	414-377-0800

CSI CONTROL SCIENCES INCORPORATED

CONTROL SCIENCES, INC., 9509 Vassar Ave., Chatsworth, CA 91311, Tel: 818-709-5510, Telex: 36-44-12 INTR; FSC No.: 53317; Empl.: 14; *Sls. Mgr.:* Rhod Zimmerman ....3•1146-1148

Local Sales Offices & Reps

CA	Sunnyvale, Koosen Tech. Sls.	408-249-5858
CO	Boulder, Herb Bass Assocs.	303-499-7509
FL	Orlando, Gra-Mar Inc.	305-894-3351
IL	Rolling Meadows, KMA Sales	312-398-5300
IN	Ft. Wayne, J & B Engrg.	219-483-2813
MN	St. Paul, Northstar Motion & Control	612-770-5311
MO	Peculiar, PEM Sales	816-884-4784
MO	St. Louis, PEM Sales	314-427-7200
NY	Victor, A & D Devices	716-924-9171
OH	Cleveland, Geotronix	216-526-2535
OH	Columbus, Geotronix	614-457-8472
PA	Media, Homer Smith Sls.	215-543-2434
PA	Pittsburgh, Raystan/Symcon	412-734-1185
TX	Ft. Worth, Rick McDonald Assoc.	817-429-4272
TX	Richardson, McDonald Assocs.	214-238-1858
WA	Bellevue, Poggi Assocs.	206-454-2026
WI	Milwaukee, KMA	414-259-1771

CONTROLS PROTOELECTRIC, 1 Memorial Dr., Cambridge, MA 02142, Tel: 617-864-8000; *Sls. Mgr.:* S. L. Davis

CONTROLS UNLIMITED, INC., 1895 Blase-Nemeth Rd., Painesville, OH 44077, Tel: 216-354-4111; Empl.: 35

CONTROL TECHNOLOGY CO., 41-16 29th St., Long Island City, NY 11101, Tel: 212-361-2133; FSC No.: 14545; Empl.: 35; *Sls. Mgr.:* H. Cooper ....3•1930, 1931

Local Sales Offices & Reps

CA	Claremont, W. Roth & Assocs.	714-621-1019

CONVER CORP., 10629 Bandley Dr., Cupertino, CA 95014, Tel: 408-255-0151, TWX: 910-338-2036; *Sls. Mgr.:* Matthew Winston

CONVERSION EQUIP. CORP., 1620 So. Sunkist, Anaheim, CA 92806, Tel: 714-634-9698; *Sls. Mgr.:* Mark Kato; *Dist. Mgr.:* Mark Kato

CONVERTER CONCEPTS INC

CONVERTER CONCEPTS, INC., Industrial Pkwy., Pardeeville, WI 53954, Tel: 608-429-2144, TWX: 910-280-2630; Empl.: 75; *Sls. Mgr.:* Michael J. Schoenwald; *Dist. Mgr.:* Michael J. Schoenwald .... **3**•1536-1539

Local Sales Offices & Reps

AZ	Phoenix, Thor Engrg.	602-437-1463
CA	Goleta, The Thorson Co.	805-964-8751
CA	Hayward, Pacific Mktg.	415-887-1620
CA	Signal Hill, The Thorson Co.	213-595-0361
FL	Clearwater, Perrott Assocs.	813-443-5214
FL	Orlando, Perrott Assoc.	305-298-7748
FL	Sunrise, Perrott Assocs.	305-792-2211
IL	Rolling Meadows, KMA Sales	312-398-5300
MA	Natick, Wayland Engrg. Sls.	617-655-6080
MN	Minneapolis, Jos-co/Melius	612-861-3343
NY	Syracuse, Pi-Tronics	315-455-7346
OH	Dayton, Bradcor	513-294-5477
OH	Euclid, Bradcor Elctrns.	216-261-0888
PA	Glenside, Koebert Assoc.	215-887-2310
TX	Garland, Tesco	214-681-1376
TX	Houston, Tesco	713-777-1443
WA	Linnwood, Power Sources Unltd.	206-784-3336
WI	Milwaukee, KMA Sales	414-259-1771

CONVEX CORP., P.O. Box 17225, Dulles Intl. Airport, Washington, DC 20041, Tel: 703-661-8900; Empl.: 24

COOL-AMP CONDUCTO-LUBE CO., 8621 S.W. 17th Ave., Portland, OR 97219, Tel: 503-244-2230; Empl.: 5; *Sls. Mgr.:* Audrea Dick

COONER WIRE CO., 9186 Independence Ave., Chatsworth, CA 91311, Tel: 818-882-8311; *Sls. Mgr.:* Steven W. Smith .... **2**•2076-2081

COOPER GROUP, PO Box 30100, Raleigh, NC 27622, Tel: 919-781-7200, Telex: 579497; *Sls. Mgr.:* J.J. Barrese

CO-ORD SWITCH DIV., LVC Inds., Inc., 23 Hanse Ave., Freeport, NY 11520, Tel: 516-868-1900; *Sls. Mgr.:* P. Parnicas

COORS PORCELAIN, 600 Ninth St., Golden, CO 80401, Tel: 303-278-4000, Telex: 45593; Empl.: 1700

COOSOL, 3013 Harbor Blvd., Costa Mesa, CA 92626, Tel: 714-545-2216; Empl.: 20; *Sls. Mgr.:* Aram Solomonian; *Dist. Mgr.:* Aram Solomonian

CORBY INDS. INC., P. O. Box 2838, Allentown, PA 18001, Tel: 215-433-1412, Telex: 847318 CORBYUHL; Empl.: 22; *Sls. Mgr.:* Glenn M. Matz; *Dist. Mgr.:* Lewis S. Walters

CORCOM, INC., 1600 Winchester Rd., Libertyville, IL 60048, Tel: 312-680-7400, TWX: 910-684-3269; FSC No.: 05245; Empl.: 1000 .... **1A**•1589

Local Sales Offices & Reps

AL	Huntsville, Robert O. Whitesell	205-883-5110
AZ	Phoenix, I.S.D.S.	602-971-6250
CA	Los Angeles, I.S.D.S.	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, I.S.D.S.	619-571-1544
CA	Santa Ana, I.S.D.S.	714-973-2162
CA	Woodland Hills, I.S.D.S.	213-883-7130
CO	Arvada, Straube Assocs.	303-426-0890
CT	Madison, Conti-Younger Assocs.	203-245-1136
FL	Clearwater, E.I.R. Inc.	813-531-5990
FL	Fern Park, E.I.R. Inc.	305-830-9600
FL	Plantation, E.I.R. Inc.	305-581-6905
FL	Plantation, E.I.R. Inc.	305-791-8243
ID	Boise, Cascade Comps.	208-343-9886
IL	Rolling Meadows, Sumer, Inc.	312-991-8500
IN	Ft. Wayne, Robert O. Whitesell	219-432-5591
IN	Indianapolis, Robert O. Whitesell	317-359-9283
IN	Kokomo, Robert O. Whitesell	317-457-9127
KS	Overland Park, K & H Sls.	913-642-9564
KY	Louisville, Robert O. Whitesell	502-426-7696
MD	Ellicott City, Marketing Technlg.	301-465-5944
MA	Burlington, Conti-Younger Assocs.	617-273-1582
MI	Grand Rapids, Robert O. Whitesell	616-942-5420
MI	Southfield, Robert O. Whitesell	313-559-5454
MI	St. Joseph, Robert O. Whitesell	616-983-7337
MN	Edina, Mel Foster Co.	612-941-9790
NM	Albuquerque, Straube Assocs.	505-292-0428
NY	Endicott, Noeth-Honsinger Assocs.	607-754-3214
NY	Manhasset, Win-Cor Elctrn. Sls.	516-627-9474
NY	Pittsford, Noeth-Honsinger Assocs.	716-586-9002
NC	Raleigh, Zucker Assoc.	919-782-8433
OH	Cincinnati, Robert O. Whitesell	513-521-2290
OH	Cleveland, Robert O. Whitesell	216-447-9020
OH	Columbus, Robert O. Whitesell	614-888-9396
OH	Dayton, Robert O. Whitesell	513-298-9546
OK	Hillsboro, Cascade Comps.	503-640-4714
PA	Pittsburgh, Robert O. Whitesell	412-963-6161
PA	Trevose, Professional Svc. Assoc.	215-245-0513
TN	Greenville, Robert O. Whitesell	615-639-6154
TX	Austin, K & H Sls.	512-258-8841
TX	Plano, K & H Sls.	214-423-6520
UT	Salt Lake City, Straube Assocs.	801-263-2640
VA	Lynchburg, Marketing Technlg.	804-384-6459
WA	Seattle, Cascade Comps.	206-433-1113
WI	Brookfield, Sumer, Inc.	414-784-6641

Local Distributors

AL	Huntsville, Pioneer	205-837-9300
AZ	Phoenix, Cetec Elctrns.	602-272-7951
CA	Canoga Park, Marshall Ind.	213-999-5001
CA	Chatsworth, Diplomat Elctrns.	213-341-4411
CA	Costa Mesa, Diplomat Elctrns.	714-549-8401
CA	Irvine, Marshall Ind.	213-443-3724
CA	San Diego, Marshall Ind.	619-578-9600
CA	San Diego, Cetec Elctrns.	619-278-5020
CA	San Diego, Diplomat Elctrns.	619-292-5693
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	South Gate, Cetec Elctrns.	213-773-6521
CA	Sunnyvale, Marshall Ind.	408-732-1100
CA	Sunnyvale, Diplomat/Westland	408-734-1900
CO	Denver, Marshall Ind.	303-427-1818
CO	Englewood, Diplomat Elctrns.	303-740-8300
CT	Danbury, Diplomat Elctrns.	203-797-9674
CT	E. Haven, J.V. Elctrns.	203-469-2321
FL	Clearwater, Diplomat Elctrns.	813-443-4515
FL	Ft. Lauderdale, Pioneer	305-771-7520
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Orlando, Pioneer	305-834-9090
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Atlanta, Marshall Ind.	404-923-5750
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Elk Grove Village, Pioneer/Chicago	312-437-9680
IL	Palatine, OHM Elctrns.	312-359-5500
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Indianapolis, Pioneer	317-849-7300
MD	Baltimore, Resco	301-823-0070
MD	Beltsville, Resco/Washington	301-937-9100
MD	Gaithersburg, Pioneer	301-921-0660
MD	Savage, Pyttronic Inds.	301-792-0780
MA	Burlington, Marshall Ind.	617-272-8200
MA	Newton, Greene Shaw	617-969-8900
MA	Norwood, Gerber Elctrns.	617-769-6000
MI	Livonia, Pioneer	313-525-1800
MI	Livonia, R.S. Elctrns.	313-525-1155
MN	Minneapolis, Newark Elctrns.	612-331-6350
MN	Minnetonka, Pioneer/Twin Cities	612-935-5444
MN	St. Paul, Gopher Elctrns.	612-483-3322
MO	St. Louis, Olive Elctrns.	314-426-4500
NJ	Bellmawr, Mid Atlantic Elctrns. Corp.	609-931-5303
NJ	Totowa, Diplomat Elctrns.	201-785-1830
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Melville, Diplomat Elctrns.	516-454-6334
NY	Mt. Vernon, QAR Indl. Elctrn. Sls.	914-699-2224
NY	Rochester, Summit Distrs.	716-334-8110
NY	Rochester, Rochester Radio Supp.	716-454-7800
NC	Greensboro, Hammond Elctrns.	919-275-6391
OH	Cleveland, Pioneer	216-587-3600
OH	Dayton, Pioneer	513-236-9900
OR	Beaverton, Almac Elctrns.	503-641-9070
PA	Montgomeryville, Pyttronic Inds.	215-242-6700
PA	Philadelphia, Almo Elctrns. Corp.	215-698-4000
PA	Pittsburgh, Pioneer	412-782-2300
SC	Columbia, Dixie Elctrns.	803-779-5332
TX	Allen, Prime Distrbg. Co.	214-231-0170
TX	Austin, Pioneer	512-835-4000
TX	Dallas, Pioneer	214-386-7300
TX	Ft. Worth, TTI	817-831-0441
TX	Houston, Pioneer	713-988-5555
UT	Salt Lake City, Diplomat/Alta Land	801-486-4134
WA	Bellevue, Almac Stroum Elctrns	206-643-9992
WI	Milwaukee, Marsh Elctrns.	414-475-6000

CORNELL-DUBILIER ELECTRONICS, 150 Avenue "L", Newark, NJ 07105, Tel: 201-589-7500, Telex: 03-8366; FSC No.: 14655; Empl.: 3000. *Sls. Mgr.:* A. Cavuto

CORNELL-DUBILIER ELECTRONICS, Div. of Federal Pacific Electric Co., 1605 East Rodney French Blvd., New Bedford, MA 02744, Tel: 617-996-8561

CORNELL-DUBILIER ELCTRNS., Wayne Interchange, Plaza 1, Wayne, NJ 07470, Tel: 201-256-2000; *Sls. Mgr.:* A. Cavuto

CORNING GLASS WORKS, Main Plant, MS 2136, Corning, NY 14831, Tel: 607-974-4102, Telex: 932-499; Empl.: 30000; *Sls. Mgr.:* B. J. Lanahan

CORNING GLASS WORKS, Corning Elctrns., Houghton Pk., Bldg. A-2, Corning, NY 14830, Tel: 607-974-9000, Telex: 932481; Empl.: 8000; *Sls. Mgr* Ben S. Williams; *Dist. Mgr.:* Lyle E. Pirnie

CORNING GLASS WORKS, Memory Prods. Dept., 3900 Electronic Dr., Raleigh, NC 27604, Tel: 919-876-1100, TWX: 510-928-1840; Empl.: 17; *Sls. Mgr.:* A. Greenlaw

CORNING GLASS WORKS, Telecomm Prods. Dept., BH-5, Corning, NY 14830, Tel: 607-974-9000, Telex: 932498; Empl.: 28,000

CORNING MEDICAL & SCIENTIFIC, See Corning Glass Works, Corning Elctrns.

CORTEC, INC., 15811 Chemical La., Huntington Bch., CA 92649, Tel: 714-897-2529; Empl.: 35

CORTRON DIV., 400 W. Grand Ave., Elmhurst, IL 60126, Tel: 312-279-9110, TWX: 910-254-0154; Empl.: 300; *Sls. Mgr.:* Jim Powers

COSAR, 3121 Benton St., Garland, TX 75042, Tel: 214-276-9487, 800-527-1207, Telex: 730-764; FSC No.: 20891; Empl.: 50; *Sls. Mgr.:* Jerry Jarka

COSMO PLASTICS CO., 3239 W. 14th St., Cleveland, OH 44109, Tel: 216-861-5594, TWX: 810-421-8444; Empl.: 500; *Sls. Mgr.:* B. Gordon

COTO CORPORATION, 55 DuPont Drive, Providence, RI 02907, Tel: 401-943-2686, TWX 710-381-8016; Empl.: 200; *Sls. Mgr.:* W. Poisson .... **1B**•1324-1330

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
CA	Lomita, Component Mktg. Assoc.	213-326-1460
CA	San Diego, D Squared Sls.	619-560-6266
CA	Saratoga, Testco Inc.	408-253-1900
CO	Denver, Spectrum Sls.	303-696-1601
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Downers Grove, Richmar Elctrns.	312-968-0118
IN	W. Lafayette, Richmar Elctrns.	317-846-6383
NY	Melville, Jarms Assoc.	516-752-0404
NC	Cary, Montgomery Mktg.	919-467-6319
OR	Portland, Ecco Mktg.	503-254-5588
PA	Ardmore, Manreps	215-649-6300
TX	Plano, Richmar Elctrns.	214-867-8224
WA	Seattle, Ecco Mktg.	206-364-0200
WA	Spokane, Ecco Mktg.	509-926-9950
WI	Butler, Richmar Elctrns.	414-781-1730

Local Distributors

Intl	England, Surrey, Rhopoint	08833-OX-7988

COTRONICS, 3379 Shore Pkwy., Brooklyn, NY 11235. Tel: 212-646-7996; Empl.: 15; *Sls. Mgr.:* Alan Marks

COUNTIS INDS., 2670 Lockheed Way, Carson City, NV 89701, Tel: 702-882-6123; Empl. 12; *Sls Mgr* T J. Countis; *Dist. Mgr.:* T. J. Countis

CPS INC., 110 Wolfe Rd., Sunnyvale, CA 94086, Tel: 408-738-0530, Telex: 35-7450; FSC No.: 31640; Empl.: 80; *Sls. Mgr.:* Rick Ross .... **3**•1540

Local Sales Offices & Reps

MA	Burlington, Intersell	617-273-3844
NY	Great Neck, Industron Assocs.	516-487-2620

CRAIG SYS., 360 Merrimack St., Lawrence, MA 01842, Tel: 617-688-6961, TWX: 710-342-0765; FSC No.: 81902; Empl.: 300; *Sls. Mgr.:* Edwin C. Simas; *Dist. Mgr.:* Edwin C. Simas

CRAMER INC., 625 Adams St., Kansas City, KS 66105, Tel: 913-621-6700, TWX: 910-743-6856; Empl.: 200; *Sls. Mgr.:* Thomas R. Hyland

CRAMER COIL & TRANSFORMER CO., INC., 1121 15th Ave., Grafton, WI 53024, Tel: 414-377-7040; Empl.: 65; *Sls. Mgr.:* Philia G. Hayes

CRAMER DIVISION, Conrac Corporation, Mill Rock Rd., Old Saybrook, CT 06475, Tel: 203-388-3574, Telex: 966-453; Empl.: 250; *Sls. Mgr.:* Mktg. Mgr. J. H. Moor; *Dist. Mgr.:* E. Latourette

Local Sales Offices & Reps

CA	Anaheim, Spectrum Assocs.	714-630-6977
CA	Palo Alto, Mollard Mktg.	415-961-0456
CA	Placentia, Spectrum Assocs.	714-996-9400
CA	San Carlos, Electronic Engrg. Assoc., Inc.	415-593-2189
CA	Santa Clara, Held & Mollard	408-727-2050
IL	Elk Grove, Martec Assocs.	312-956-8090
IL	Glen Ellyn, Cramer Sls. Office	312-858-5166
IN	Indianapolis, Tech Sls. & Mktg., Inc.	317-849-6612
MI	Detroit, J.C. Hofstetter Co.	313-533-7788
MI	Farmington Hills, Anderson Elctrns., Inc.	313-553-7600
MN	St. Paul, Skor Inc.	612-426-1160
NM	Albuquerque, Vic Myers Assocs., Inc.	505-884-6878
NY	East Syracuse, Application Specialists Inc.	315-437-2813
NY	Rochester, Application Specialists Inc.	716-586-6226
OH	Dayton, RDP Corp.	513-253-6175
OH	Medina, J. C. Hofstetter	216-241-4880
PA	Bromall, White/Whiddett	215-353-6343
PA	Pittsburgh, Wainwright Tech. Sls.	412-487-5055
PA	Willow Grove, Jacabson-Rodger Assoc. Inc.	215-657-4300
TX	Austin, Sesco Inc.	512-892-2490
WA	Mercer Island, Andersen Assocs.	206-232-0484

CREATIVE PACKAGING CO., 1202 Kentucky Ave., Indianapolis, IN 46285

CRESTRON ELEC., 101 Broadway, Cresskill, NJ 07626, Tel: 201-894-0660

CRESTRONICS DIV., Applied Electro Technlg., Int., 2220 S. Anne St., Santa Ana, CA 92704, Tel: 714-556-6570, TWX: 910-595-1797; FSC No.: 52797; Empl.: 25; *Dist. Mgr.:* D. Dore

CROMEMCO, 280 Bernardo Ave., Mountain View, CA 94043, Tel: 415-964-7400, TWX: 910-379-6988; Empl.: 500; *Sls. Mgr.:* Tom Keating; *Dist. Mgr.:* Tom Keating

CROMPTON INSTRS., 1562 Parkway Loop, Units A & B, Tustin, CA 92680, Tel: 714-731-2333, Telex: 69-2309; FSC No.: 53498; *Sls. Mgr.:* J. Berger

CROMPTON INSTRS., 2763 Higgins Rd., Elk Grove Village, IL 60007, Tel: 312-593-1107, Telex: 28-0540; *Sls. Mgr.:* Tony A. Pitt

CROSS ELCTRNS., 100 Commonwealth Dr., Warrendale, PA 15086, Tel: 412-776-1591; Empl.: 35

CROSSPOINT
THE LIGHTED DISPLAY DIVISION
INFO-LITE CORPORATION

CROSSPOINT, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, Tel: 201-941-4455; FSC No.: FSCM 52116; Empl.: 13; *Sls. Mgr.:* Joseph M. Cartelli; *Dist. Mgr.:* Joseph M. Cartelli ..... **1B**•1574

Local Sales Offices & Reps

CA	No. Hollywood, Crown Elctrns.	213-877-3550
CA	Redwood City, Caltronic Assocs.	415-365-2545
CT	Weston, CJA Assoc.	203-226-4317
FL	St. Petersburg, R. L. Matus & Assocs.	813-896-4133
GA	Buford, R. L. Matus & Assocs.	404-945-2946
IL	Lake Zurich, L & B Assocs.	312-438-7917
MI	Brighton, Michigan Mktg. & Sls.	313-229-6218
NJ	Wayne, GT Assocs.	201-694-6040
NY	Syracuse, Lenard Co.	315-479-9191
OH	Cleveland, A.S.A.	216-662-6080
OH	Dayton, Mohawk Intronics	513-434-8873
TX	Dallas, Glidden Electro Equip.	214-341-0610
TX	Houston, Glidden Electro Equip.	713-681-1415

CROUSE HINDS/SEPCO CORP., 1200 Kennedy Rd., Windsor, CT 0695, Tel: 203-683-4300

CROUZET CONTROLS, INC., 1083 State Pkwy., Schaumburg, IL 60195, Tel: 312-843-2200, Telex: 206 297; Empl.: 14; *Sls. Mgr.:* Ben Delcourt ..... **1B**•1140, 1332, 1333, 1575

Local Sales Offices & Reps

AZ	Phoenix, Motion Technology.	602-991-1782
CA	Anaheim, Motion Technology	714-777-4259
CA	Chatsworth, Motion Technology.	818-993-3762
CA	San Jose, Motion Technology	408-932-0990
CA	San Rafael, Motion Technology	415-459-2171
CO	Denver, Control Agency	303-936-6641
FL	Tamarac, Davmik Sls.	305-920-2222
GA	Stone Mountain, DTM, Inc.	404-962-2530
IL	Roselle, Michael J. Koepke Assoc.	312-980-1575
IA	Des Moines, Jack Davidson Co.	515-263-8478
MA	Wellesley, Electro Kinetics	617-235-9415
MI	Royal Oak, Dave Ray & Assocs.	313-280-0000
MN	Minneapolis, Jos-Co/Melius.	612-861-3343
MO	St. Charles, C-F Electronics, Sales	314-946-8500
NY	Fairport, Tac Sls.	716-425-1070
NY	Syosset, Motion Control Sls.	516-921-5656
NC	Tryon, Halliday & Assoc.	704-894-8205
OH	Cincinnati, Tom Mulligan & Assocs.	513-574-1932
OH	Columbus, Tom Mulligan Co.	614-457-2242
PA	Bensalem, William D. Staats Co.	215-639-5231
TX	Dallas, Automated Motion Control	214-340-4192
UT	Salt Lake City, Control Agency	801-328-4305
WA	Bellevue, Sea Inc.	206-883-4999
WA	Vancouver, Sea Inc.	206-573-5161

Local Distributors

CA	Burlingame, Elec. Control Devices	415-348-0791
CA	Los Angeles, Master Distr.	213-452-1229
FL	Pembroke Pines, Donza Intl.	305-987-1122
IL	Chicago, Excel Elec.	312-421-7220
IL	Wheeling, Hawk Elctrns.	312-459-4030
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Vonnegut Indl. Prods.	317-899-8800/8877
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Bettendorf, Custom Controls Ltd.	319-335-4787
MA	Wellesley, Electro-Mechanical Distr.	617-235-1565
MI	Comstock Park, Mor Elec.	616-784-1121
MI	Grand Rapids, S-F Electronics	616-459-0216
MI	Royal Oak, George Instr. Co.	313-280-1111
MN	St. Paul, Powermation	612-645-0781
NE	Omaha, Lakeland Engrg.	402-734-2600
NJ	Edison, Howman Applied Control Prods.	201-797-3313
NJ	Fair Lawn, Relay Specialties	201-797-3313
NJ	W. Trenton, Electronic Serv. Div. (Roller Bearing Co. of America)	609-882-7400
NY	Commack, Monarch Comps.	516-499-1770
NC	Asheville, Electric Supply Co.	704-255-8899
NC	Gastonia, J.M.T. Elctrn. Supp.	704-867-4401
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
ND	Bismarck, Border States Elec.	701-258-6060
OH	Cincinatti, Hughes-Peters.	513-351-2000
OH	Cleveland, Reserve Elec. Co.	216-771-5764
OH	Columbus, Hughes-Peters.	614-294-5351
OH	Dayton, Duellman Elctrns.	513-461-5010
OK	Tulsa, Radio.	918-587-9123
OR	Portland, Mill & Power Specialties	503-228-7621
PA	Allentown, P. A. Peters.	215-434-5237
PA	Philadelphia, Herbach & Rademan	215-426-1700
SC	Greenville, Holder Elec. Supp.	803-271-7111
TN	Chattanooga, Curle Elctrns.	615-266-4728
TX	Ft. Worth, Swieco.	817-335-6521
WA	Kent, Motors & Controls Corp.	206-872-8010
WA	Seattle, Eicher-Richards Co.	206-523-7888
WI	Waukesha, Powermation	414-542-2868

CROVEN CRYSTALS, 500 Beech St., Whitby, ON L1N 5S5, Canada, Tel: 416-668-3324, TWX: 610-384-2750; FSC No.: 00809; Empl.: 250; *Sls. Mgr.:* R. McCormick ..... **1A**•1346

Local Sales Offices & Reps

AZ	Mesa, Sedco Sls.	602-835-6281
CA	San Mateo, Melvin Sls.	415-349-7444
CA	Van Nuys, R.L. Assocs.	213-782-7826
FL	Palm Bay, Spartech Assocs.	305-727-8045
GA	Smyrna, Spartech Assocs.	404-432-3644
MA	Milton, Naton Assoc.	617-698-0670
MO	Blue Springs, Chesco	816-229-1404
MO	St. Charles, Chesco	314-946-6677
NJ	Cherry Hill, Harry J. White	609-428-4544
NY	Melville, Carnes Assocs.	516-694-1600
OH	Englewood, Clayton-Ellier Co.	513-836-3556
TX	Arlington, W. Pat Fralia	817-640-9101
VA	Springfield, Tech Reps Inc.	703-569-6868
WI	Mequon, Artmor Ltd.	414-241-4040

CRYDOM DIVISION, Int'l. Rectifier, 1521 Grand Ave., El Segundo, CA 90245, Tel: 213-322-4987, Telex: 67-4660, TWX: 910-348-6283; Empl.: 100; *Sls. Mgr.:* John Deith; *Dist. Mgr.:* Bob Arnstein

CRYOMAGNETICS, INC., 795 Oak Ridge Tpk., Oak Ridge, TN 37830, Tel: 615-482-9551; *Sls. Mgr.:* R. M. Ennis, Jr.

CRYSTALOID ELCTRNS., Box 628, Hudson, OH 44236, Tel: 216-655-2429, Telex: 241-244; Empl.: 130; *Sls. Mgr.:* Sharon Werstler ..... **1B**•1031

CRYSTEK CORP, P.O. Box 06135, Ft. Myers, FL 33906, Tel: 813-936-2109, TWX: 510-951-7448; FSC No.: 13454; Empl.: 2500

CSI Capacitors

CSI CAPACITORS, CSI Technlgs., 810 Rancheros Dr., San Marcos, CA 92069, Tel: 619-747-4000, Telex: 697832; FSC No.: 10026; Empl.: 50; *Sls. Mgr.:* H. R. Smith ..... **1A**•1021

Local Sales Offices & Reps

AZ	Tempe, Cleveland Entprs. of AZ	602-820-1127
CA	San Jose, Silicon Valley Sls.	408-286-7510
CA	Tarzana, High Voltage Sls.	213-881-9194
FL	Orlando, Glenn Tech. Sls. Co.	305-299-8700
IL	Chicago, Esco Assocs.	312-763-0800
KY	Louisville, K. W. Electronic Sls.	512-451-1860
MA	Framingham, Sullivan Tech. Sls.	617-620-0195
NJ	Leonia, Peter E. Schmitt Co.	201-944-2806
NM	Albuquerque, Cleveland Entprs.	505-265-7893
NY	Cazenovia, S. T. Woolard	315-655-8145
OH	Dayton, K. W. Electronic Sls.	513-890-2150
PA	Washington Crossing, DVS Company	215-493-4642
TX	Dallas, Cunningham Comps. Corp.	214-233-4303
TX	Houston, Cunningham Comps. Corp.	713-461-4197

C-TEK
INCORPORATED

C-TEK INC., 4 Railroad Ave., Wakefield, MA 01880, Tel: 617-246-1720, Telex: 882485; Empl.: 15; *Sls. Mgr.:* John Vanaman ..... **3**•1126, 1127

Local Sales Offices & Reps

CO	Boulder, Measurement Conslts. of CO	303-499-7506
CT	Ansonia, R. H. Sturdy Co.	203-734-2186
MA	Waltham, Calibron Instrs.	617-894-6440
MA	Wellesley Hills, R. H. Sturdy Co.	617-235-2330
MI	Southfield, Fred H. Gehrke & Assocs.	313-559-5363
MN	St. Paul, Northstar Motion & Control	612-770-5311
NY	Clarence, Trott Elctrns.	716-634-8500
NY	Pittsford, Trott Elctrns.	716-586-8251
NY	Syosset, Motion Control Sls.	516-921-5656
NC	Charlotte, Jake Rudisill Assocs.	704-377-6901
NC	Charlotte, Trott Elctrns.	704-376-2237
PA	Carnegie, N. H. Andrews Co.	412-279-5335
VA	Richmond, Jake Rudisill Assocs.	804-320-0201
WA	Seattle, Eicher-Richards Co.	206-523-7888

CTI-CRYOGENICS, 266 Second Ave, Waltham, MA 02254, Tel: 617-890-9400, Telex: 92-3442; Empl.: 350; *Sls. Mgr.:* R. A. Bryce

CTS® CORPORATION*

CTS CORP., 905 North West Blvd., Elkart, IN 46514, Tel: 219-293-7511, TWX: 810-294-2167; Empl.: 6,800; *Dist. Mgr.:* J. C. Wells

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Phoenix, Compass Mktg. & Sls.	602-266-5400

CA	Pleasanton, CTS Corp.	415-462-6635
CA	South Pasadena, CTS Corp.	213-682-1137
CO	Denver, ELCOM	303-337-2300
CT	North Haven, CompRep Assocs.	203-239-9762
FL	Altamonte Springs, Electrocomp Assocs.	305-331-0173
FL	Deerfield Beach, Electrocomp Assocs.	305-429-0802
FL	Melbourne, Electrocomp Assocs.	305-242-0621
FL	St. Petersburg, Electrocomp Assocs.	813-327-9677
GA	Norcross, Interep Assocs.	404-449-8680
IL	Addison, CTS Corp.	312-543-5021
IN	Indianapolis, Elctrn. Reps.	317-894-1414
IA	Cedar Rapids, Seltec Sls. Corp.	319-393-1114
KS	Overland Park, Advanced Tech. Sls.	913-642-6675
MD	Baltimore, Professional Reps.	301-653-3600
MA	Westwood, CompRep Assocs.	617-329-3454
MI	Grand Rapids, J. L. Montgomery Assocs.	616-774-9308
MI	Southfield, J. L. Montgomery Assocs.	313-358-2616
MN	Minneapolis, Robert W. Marshall Co.	612-929-0457
MO	St. Louis, Advanced Tech. Sls.	314-227-4448
NM	Albuquerque, Compass Mktg. & Sls.	505-292-7377
NY	E. Syracuse, Nycom	315-437-8343
NY	Jamaica, S-J Sales Assocs.	212-291-3232
NC	Raleigh, Zucker Assocs.	919-782-8433
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
OH	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assocs.	513-439-0724
OK	Tulsa, Southern States Mktg.	918-665-8338
PA	Mars, Baehr, Greenleaf & Assocs.	412-776-2151
PA	Trevose, P.S.A. Inc.	215-245-0513
TN	Greeneville, Interep Assocs.	615-639-3491
TX	Austin, Southern States Mktg.	512-452-9459
TX	Houston, Southern States Mktg.	713-558-4900
TX	Richardson, Southern States Mktg.	214-238-7500
UT	Salt Lake City, ELCOM	801-532-7940
WA	Bellevue, SD-R² Prods. & Sls.	206-747-9424
EXP	Elkhart, Indiana, CTS Corp.	219-293-7511
PR	Mayaguez, CompRep de Puerto Rico	809-832-9529

CTS CORPORATION, Asheville Division, P.O. Box 100, Skyland, NC 28776, Tel: 704-684-6451, TWX: 510-935-0059; *Sls. Mgr.:* T. B. Haney

CTS® CORPORATION*
BERNE DIVISION

CTS OF BERNE, 406 Parr Rd., Berne, IN 46711, Tel: 219-589-3111, TWX: 810-323-1580; Empl.: 975; *Sls. Mgr.:* James A. Long ....**1A**•1836-1844, 2036

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Phoenix, Compass Mktg. & Sls.	602-266-5400
CA	Pleasanton, CTS Corp.	415-462-6635
CA	South Pasadena, CTS Corp.	213-682-1137
CO	Denver, ELCOM	303-337-2300
CT	N. Haven, CompRep Assocs.	203-239-9762
FL	Ft. Lauderdale, Electrocomp Assocs.	305-491-4141
FL	Melbourne, Electrocomp Assocs.	305-242-0621
FL	St. Petersburg, Electrocomp Assocs.	813-327-9677
GA	Norcross, Interep Assocs.	404-449-8680
IL	Addison, CTS Corp.	312-543-5021
IN	Elkhart, CTS Corp.	219-293-7511
IA	Cedar Rapids, Seltec Sls. Corp.	319-393-1114
KS	Overland Park, Advanced Tech. Sls.	913-492-4333
MD	Baltimore, Professional Reps.	301-653-3600
MA	Westwood, CompRep Assocs.	617-329-3454
MI	Grand Rapids, J. L. Montgomery Assocs.	616-774-9308
MI	Southfield, J. L. Montgomery Assocs.	313-358-2616
MN	Minneapolis, Robert W. Marshall Co.	612-929-0457
MO	St. Louis, Advanced Tech. Sls.	314-227-4448
NJ	Haddonfield, Tritek Sls.	609-429-1551
NM	Albuquerque, Compass Mktg. & Sls.	505-292-7377
NY	E. Syracuse, Nycom	315-437-8343
NY	Jamaica, S-J Sales Assocs.	212-291-3232
NC	Raleigh, Zucker Assocs.	919-782-8433
OH	Cincinnati, Baehr, Greenleaf & Assocs.	513-891-3827
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
OH	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assocs.	513-439-0724
OR	Beaverton, SD-R² Prods. & Sls.	503-641-7377
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
TN	Knoxville, Interep Assocs.	615-584-0191
TX	Addison, Southern States Mktg.	214-248-8600
TX	Austin, Southern States Mktg.	512-452-9459
TX	Houston, Southern States Mktg.	713-988-0991
UT	Salt Lake City, ELCOM	801-532-7940
VA	Charlottesville, Professional Reps.	804-977-0031
WA	Bellevue, SD-R² Prods. & Sls.	206-747-9424
PR	Mayaguez, CompRep de Puerto Rico	809-832-9529

Local Distributors

AL	Huntsville, Hall-Mark/Huntsville	205-837-8700
AL	Huntsville, RM Electronics Co.	205-852-1550
AZ	Phoenix, R. V. Weatherford Co.	602-272-7144
AZ	Tempe, Bell Inds.	602-966-7800
AZ	Tempe, Marshall Inds.	602-968-6181
CA	Burlingame, Rose Elctrns.	415-348-2740
CA	Canoga Park, Marshall Inds.	213-999-5001
CA	Chatsworth, Arrow/Los Angeles	213-701-7500
CA	El Monte, Marshall Inds.	213-442-7204
CA	Gardena, Bell Inds.	213-515-1800
CA	Glendale, R. V. Weatherford Co.	213-849-3451
CA	Hayward, Allied Elctrns.	415-487-5250
CA	Hayward, Arrow/Primary West	415-487-4300
CA	Irvine, Marshall Inds.	714-556-6400
CA	Irvine, Ratel/Irvine	714-549-8611
CA	Los Angeles, Western Electromotive	213-820-3777
CA	Newport Beach, Arrow/Newport Beach	714-851-8961
CA	San Diego, Marshall Inds.	619-578-9600
CA	San Diego, Western Electromotive/Intercon	619-271-4511
CA	San Diego, R. V. Weatherford Co.	619-695-1700
CA	San Diego, Arrow/San Diego	619-565-4800
CA	San Jose, Ratel/San Jose	408-946-4300
CA	Santa Clara, Western Electromotive	408-985-7411
CA	Sunnyvale, Arrow/Sunnyvale	408-745-6600
CA	Sunnyvale, Bell Inds.	408-734-8570
CO	Denver, Integrated Elctrns. Co.	303-534-6121
CO	Denver, Arrow/Denver	303-758-2100
CO	Englewood, R. V. Weatherford Co.	303-428-6900
CO	Englewood, Industrial Elctrns.	303-694-9444
CO	Lakewood, Ratel/Denver	303-232-8830
CT	Wallingford, Arrow/Wallingford	203-265-7741
CT	Wallingford, Midan Elctrns.	203-265-2077
CT	Wallingford, Marshall Inds.	203-265-3822
FL	Dania, Summit Distrs.	305-920-6253
FL	Ft. Lauderdale, Arrow/Ft. Lauderdale	305-971-7160
FL	Ft. Lauderdale, Hall-Mark/Ft. Lauderdale	305-971-9280
FL	Longwood, MRP Micro Elctrns.	305-331-8787
FL	Orlando, Hall-Mark/Orlando	305-855-4020
FL	Orlando, Marshall Inds.	305-841-1878
FL	Palm Bay, Arrow/Palm Bay	305-725-1480
GA	Norcross, Arrow/Norcross	404-449-8252
GA	Norcross, Hall-Mark/Norcross	404-447-8000
IL	Bensenville, Hall-Mark/Elk Grove Vlg.	312-860-3800
IL	Chicago, Bell Inds.	312-982-9210
IL	Elgin, Allied Elctrns.	312-697-8200
IL	Lombard, RM Electronics Co.	312-932-5150
IL	Schaumburg, Arrow/Schaumburg	312-893-9420
IN	Indianapolis, RM Electronics Co.	317-247-9701
IN	Indianapolis, Arrow/Indianapolis	317-243-9353
KS	Lenexa, Hall-Mark/Kansas City	913-888-4747
MD	Baltimore, Hall-Mark/Baltimore	301-796-9300
MD	Baltimore, RESCO/Baltimore	301-823-0070
MD	Baltimore, Arrow/Baltimore	301-247-5200
MD	Beltsville, RESCO/Washington	301-937-9100
MA	Newton, Greene-Shaw Co.	617-969-8900
MA	Woburn, Time Elctrns.	617-935-8080
MA	Woburn, Arrow/Boston	617-933-8130
MI	Ann Arbor, Arrow/Ann Arbor	313-971-8220
MI	Grand Rapids, Arrow/Grand Rapids	616-233-0912
MI	Grand Rapids, RM Electronics Co.	616-531-9300
MI	Kalamazoo, RS Electronics	616-381-5470
MI	Livonia, RS Electronics	313-525-1155
MN	Bloomington, Hall-Mark/Minneapolis	612-854-3223
MN	Edina, Arrow/Edina	612-830-1800
MN	Minneapolis, Industrial Comps.	612-831-2666
MN	Plymouth, Marshall Inds.	612-559-2255
MO	Maryland Heights, Hall-Mark/St. Louis	314-291-5350
MO	St. Louis, Arrow/St. Louis	314-567-6888
MO	St. Louis, Olive Elctrns.	314-426-4500
NE	Lincoln, Scott Elctrn. Supp.	402-466-8221
NE	Omaha, Scott Elctrn. Supp.	402-734-6750
NJ	Cherry Hill, Hall-Mark/New Jersey	215-355-7300
NJ	Fairfield, Arrow/New Jersey	201-575-5300
NJ	Fairfield, Marshall Inds.	201-882-0320
NJ	Moorestown, Arrow/Moorestown	215-928-1800
NJ	Nutley, Vantage Comps.	201-667-1840
NM	Albuquerque, Arrow/Albuquerque	505-243-4566
NM	Albuquerque, Bell Inds.	505-292-2700
NY	Buffalo, Summit Distrs.	716-884-3450
NY	East Syracuse, Marshall Inds.	315-432-0644
NY	Endwell, Marshall Inds.	607-754-1570
NY	Farmingdale, Arrow Elctrns.	516-694-6800
NY	Farmingdale, Arrow Intl.	516-694-6800
NY	Hauppauge, Fairmont Elctrn. Sls.	516-231-3313
NY	Hauppauge, Arrow/Long Island	516-694-6800
NY	Jamaica, Archer Indl. Dist.	212-291-3232
NY	Liverpool, Arrow/Syracuse	315-652-1000
NY	Mount Vernon, QAR Electronics	914-699-2224
NY	Rochester, Arrow/Rochester	716-275-0300
NY	Rochester, Marshall Inds.	716-235-7620
NY	Rochester, Rochester Radio Supp.	716-454-7800
NY	Rochester, Summit of Rochester	716-334-8110
NY	Rome, Rome Elctrns.	315-337-5400
NC	Raleigh, Hall-Mark/Raleigh	919-832-4465
NC	Raleigh, Arrow/Raleigh	919-876-3132
NC	Raleigh, RESCO/Raleigh	919-781-5700
NC	Winston-Salem, Arrow/Winston-Salem	919-725-8711
OH	Centerville, Arrow/Dayton	513-435-5563
OH	Cincinnati, Arrow/Cincinnati	513-761-5432
OH	Dayton, Marshall Inds.	513-236-8088
OH	Highland Heights, Hall-Mark/Cleveland	216-473-2907
OH	Solon, Arrow/Solon	216-248-3990
OH	Westerville, Hall-Mark/Columbus	614-891-4555
OK	Tulsa, Hall-Mark/Tulsa	918-665-3200
OR	Lake Oswego, Moore Elctrns.	503-635-8823
PA	McKean, Advacom	814-476-7774
PA	Monroeville, Arrow/Pittsburgh	412-351-4000
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Philadelphia, TRW Elctrns. Supp.	215-922-8900
TX	Addison, Captronics/Dallas	214-980-0123
TX	Austin, Arrow/Austin	512-835-4180
TX	Austin, Captronics/Austin	512-459-4328
TX	Dallas, Arrow/Dallas	214-386-7500
TX	Dallas, R. V. Weatherford Co.	214-980-1110
TX	Dallas, Hall-Mark/Dallas	214-341-1147
TX	Fort Worth, Allied Elctrns.	817-336-5401
TX	Houston, R. V. Weatherford Co.	713-688-7406
TX	Stafford, Southwest Elctrns.	713-491-4900
TX	Stafford, Arrow/Houston	713-491-4100
UT	Salt Lake City, Standard Supply Co.	801-486-3371
UT	Salt Lake City, Bell Inds.	801-972-6969
WA	Bellevue, Arrow/Seattle	206-643-4800
WA	Seattle, Zepher Elctrn. Sls. Corp.	206-241-1980
WA	Seattle, R. V. Weatherford Co.	206-575-1340
WA	Seattle, Western Electromotive	206-575-1910
WI	Oak Creek, Arrow/Wisconsin	414-764-6600
WI	Oak Creek, Hall-Mark/Oak Creek	414-761-3000

CTS ELECTRONICS CORP., PASO ROBLES DIV., Electromechanical Gp., 500 Linne Rd., Paso Robles, CA 93446, Tel: 805-238-0350, TWX: 910-351-6796; *Sls. Mgr.:* Jack Bell; *Dist. Mgr.:* Bob Tarkenton ....**1B**•1576-1580

CTS FABRI-TEK, INC., Connector Div., 9210 Science Center Dr., Minneapolis, MN 55428, Tel: 612-533-3533, TWX: 910-576-2717; Empl.: 300; *Sls. Mgr.:* John B. McKee ....**2**•1246-1248

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Phoenix, Compass Mktg.	602-266-5400
CA	South Pasedena, CTS Corp.	213-682-1137
CO	Denver, ELCOM, Inc.	303-337-2300
CT	Danbury, CTS Corp.	203-743-3681
FL	Ft. Lauderdale, Electrocomp Assocs.	305-491-4141
GA	Norcross, Interep	404-449-8680
IL	Addison, CTS Corp.	312-543-5021
IN	Indianapolis, Elctrn. Rep.	317-894-1414
IA	Cedar Rapids, Seltec	319-393-1114
MD	Baltimore, Pro Representatives	301-653-3600
MI	Southfield, J. L. Montgomery	313-358-2616
MN	Minneapolis, S & R Sls.	612-559-3090
NY	Jamaica, S. J. Assocs.	212-291-3232
NY	Pittsford, Kirby Mktg.	716-248-8750
NC	Raleigh, Zucker Assocs.	919-782-8433
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
OK	Tulsa, Southern States Mktg.	918-665-8338
OR	Portland, SD-R⅜¢2 Prods.	503-297-8677
PA	Trevose, PSA, Inc.	215-245-0513
TN	Knoxville, Interep Assocs.	615-584-0191
TX	Dallas, Southern States Mktg.	214-238-7500
TX	Houston, Southern States Mktg.	713-558-4900
UT	Salt Lake City, ELCOM, Inc.	801-532-7940
VA	Charlottesville, Pro Representatives	804-977-0031
WA	Bellevue, SD-R² Prods. & Sls.	206-747-9424

CTS FABRI-TEK, INC., 6900 Shady Oak Rd., Eden Prairie, MN 55344, Tel: 612-941-9100, TWX: 910-576-2913; FSC No.: 21542; Empl.: 1400; *Sls. Mgr.:* Bruce Richardson

CTS KNIGHTS, 400 Reimann Ave., Sandwich, IL 60548, Tel: 815-786-8411, TWX: 910-642-0860; Empl.: 500; *Sls. Mgr.:* Larry Barbary; *Dist. Mgr.:* Larry Barbary ....**1A**•1333-1345

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Phoenix, Compass Mktg. & Sls.	602-266-5400
CA	Pleasanton, CTS Corp.	415-462-6635
CA	S. Pasadena, CTS Corp.	213-682-1137
CO	Denver, Elcom	303-337-2300
CT	North Haven, CompRep Assocs.	203-239-9762

FL	Deerfield Beach, Electrocomp Assocs.	305-429-0802
FL	Melbourne, Electrocomp Assocs.	305-242-0621
FL	St. Petersburg, Electrocomp Assocs.	813-327-9677
GA	Norcross, Interep Assocs.	404-449-8680
IL	Addison, CTS Corp.	312-543-5021
IN	Indianapolis, E.R.I.	317-894-1414
IA	Cedar Rapids, Seltec Sls. Corp.	319-393-1114
KS	Overland Park, Advanced Tech. Sls.	913-642-6674
MD	Baltimore, Pro Rep	301-653-3600
MA	Westwood, CompRep Assocs.	617-329-3454
MI	Grand Rapids, J. L. Montgomery Assocs.	616-774-9308
MI	Southfield, J. L. Montgomery Assocs.	313-358-2616
MN	Minneapolis, Robert W. Marshall Co.	612-929-0457
MO	St. Louis, Advanced Tech. Sls.	314-227-4448
NM	Albuquerque, Compass Mktg. & Sls.	505-292-7377
NY	E. Syracuse, Nycom	315-437-8343
NY	Jamaica, S-J Sales Assocs.	212-291-3232
NC	Raleigh, Zucker Assocs.	919-782-8433
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
OH	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assocs.	513-439-0724
TN	Greeneville, Interep Assocs.	615-639-3491
TX	Austin, Southern States Mktg.	512-452-9459
TX	Houston, Southern States Mktg.	713-558-4900
TX	Richardson, Southern States Mktg.	214-238-7500
UT	Salt Lake City, Elcom	801-532-7940
WA	Bellevue, SD-R² Prods. & Sls.	206-747-9424

CTS MICROELECTRONICS, INC., 1201 Cumberland Ave., W. Lafayette, IN 47906, Tel: 317-463-2565, TWX: 810-342-1882; Empl.: 505; *Sls. Mgr.:* David C. Anderson .... **1A**•1646-1651

Refer to CTS Corp. for distributor & sales office information

CTS HALEX, 1202 McGaw Ave., Irvine, CA 92714, Tel: 714-556-2850, TWX: 910-595-2648; Empl.: 70; *Sls. Mgr.:* Gene P. Markley

Refer to CTS Corp for distributor & sales office information.

CTS METAL PRODS., Jose Division, 660 Lenfest Rd., San Jose, CA 95113, Tel: 408-251-1600, Telex: 910-997-8006; Empl.: 500; *Sls. Mgr.:* Ed King; *Dist. Mgr.:* Charles Nadler

CUESTA SYSTEMS, INC., 3440 Roberta Ct., San Luis Obispo, CA 93401, Tel: 805-541-4160; *Sls. Mgr.:* David V. Dickey

CUPLEX, INC., 1500 E. Hwy. 66, Garland, TX 75040, Tel: 214-276-0333, TWX: 910-860-5098; *Sls. Mgr.:* Grady C. Young

CURRENTECHNOLOGY CORP., 135 Prestige Pk. Circle, E. Hartford, CT 06108, Tel: 203-289-6831, TWX: 710-425-6063; *Sls. Mgr.:* Bob Ramage

CURTIS ELECTRO DEVICES, INC., Box 4090, Mountain View, CA 94040, Tel: 415-964-3846; Empl.: 12; *Sls. Mgr.:* J. Curtis

CURTIS INDS., 8000 West Tower Ave., Milwaukee, WI 53223, Tel: 414-354-1500, TWX: 910-262-3035; Empl.: 160

CURTIS

CURTIS INSTRS., INC., 200 Kisco Ave., Mt. Kisco, NY 10549, Tel: 914-666-2971, TWX: 710-571-2163; FSC No.: 18530; Empl.: 95; *Sls. Mgr.:* Rhoda McDonald .... **3**•1128

Local Sales Offices & Reps

AZ	Phoenix, O'Donnell Assoc.	602-944-9542
CA	Burlingame, Polach & Bensinger	415-697-2525
CA	Seal Beach, Texel Engrg.	213-596-9411
CO	Littleton, Grifco	303-795-1989
FL	Longwood, NSL Assocs.	305-629-5226
IL	La Grange Park, Bierhaus Sls.	312-354-5100
IN	Ft. Wayne, Aktron Sls.	219-747-3650
MA	Brookline, Harman Assocs.	617-232-6687
MN	Minnetonka, S. J. Collins	612-933-7661
NY	Manhasset, WinCor Elctrn. Sls. Corp.	516-627-9474
NY	Syracuse, C & L Sales	315-451-7810
OH	Chagrin Falls, K. F. Naverz	216-338-8450
PA	Media, W. Reeves Assocs.	215-566-6709
TX	Dallas, Etron Corp.	817-430-8422
WA	Lynnwood, Blum & Assocs.	206-775-6656
WI	Milwaukee, Bierhaus Sls.	414-963-0318

CUSHMAN ELCTRNS., 2450 N. 1st St., San Jose, CA 95131, Tel: 408-263-8100, TWX: 810-338-0556; Empl.: 400; *Sls. Mgr.:* Harris Fuller

CUSTOM CABLE, 242 Butler, Westbury, NY 11590, Tel: 516-334-3600; Empl.: 13; *Sls. Mgr.:* J. Michelman; *Dist. Mgr.:* D. Pollack

CUSTOM COIL & TRANSFORMER CO., Box 2369, Zanesville, OH 43701, Tel: 614-452-6973, TWX: 810-238-2629; Empl.: 80

CUSTOM CONNECTOR, 1738 E. 30th St., Cleveland, OH 44114, Tel: 216-241-1679; Empl.: 36; *Sls. Mgr.:* Larry Weider .... **2**•1249

Local Sales Offices & Reps

CA	Mountain View, Westech Sls.	415-961-1422
CT	Glastonbury, Barton Assoc.	203-633-9417
FL	Longwood, Vic Murray & Assoc.	305-831-0877
IL	Arlington Hgts., Langdon Engrg.	312-364-0830
MD	Baltimore, Haacke Assoc.	301-889-7875
MA	Waban, Barton Assoc.	617-965-8590
NC	Charlotte, J.W.L. Assoc.	704-523-3001
WI	Shorewood, Werking Ind. Sls.	414-964-2225

CUSTOM CONTROL SYS., 21 E. Canon Perdido St., Santa Barbara, CA 93101, Tel: 805-965-7577; Empl.: 2; *Sls. Mgr.:* Fred Winter

CUSTOM ELCTRNS., Browne St., Oneonta, NY 13820, Tel: 607-432-3880, TWX: 510-241-8292; FSC No.: 23280; Empl.: 100; *Sls. Mgr.:* D. Hathaway

CUSTOM PRODS. GRP., Sys. Dev. Corp.-A Burroughs Co., P.O. Box 517, Paoli, PA 19301, Tel: 215-648-2241, Telex: 215-647-9961, TWX: 510-668-7243; *Sls. Mgr.:* Spiro Greenwood; *Dist. Mgr.:* Joseph Benn

CUSTOM SCI. INSTRS., 13 Wing Dr., Cedar Knolls, NJ 07927, Tel: 201-538-8500, Telex: 25-4328; Empl.: 20; *Sls. Mgr.:* Henry J. Bultman, Jr.

CUTLER HAMMER GRP., EATON CORP., Aerospace Controls/Systems Div., 2074 Whitfield Ave. East, Sarasota, FL 33578, Tel: 813-758-7726

CUTLER-HAMMER, INC., SHALLCROSS RESISTOR PRODS., See Shallcross, Inc.

CUTLER-HAMMER PRODS., See Eaton Corp./Cutler-Hammer Prods.

CVC PRODS., 525 Lee Rd., Rochester, NY 14603, Tel: 716-458-2550, Telex: 97-8269; Empl.: 160; *Sls. Mgr.:* Steven Rothstein

CYBERNETIC MICRO SYS., P.O. Box 3000, 3000 Hwy. 84, San Gregorio, CA 94074, Tel: 415-726-3000, Telex: 171-135 Attn: CYBERNETICS; *Sls. Mgr.:* K. Moty

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CYBERNETIC MICRO SYSTEMS packs onto a single chip the intelligence and power of a board-level peripheral controller. These user-programmable chips control such devices as LCDs, motors, printers, waveforms, process monitors, parallel/serial interface, networks, etc, and include general purpose programmable controllers. Volume custom versions considered.

CYBERSONIC CORP., Box 38, Glenside, PA 19038, Tel: 215-885-1734, Telex: 83-4753; Empl.: 11; *Sls. Mgr.:* Norman Rivers

Local Distributors

CA	Los Angeles, Automation Sys. & Svcs.	213-776-2424
MA	Wellesley Hills, Electro-Mechanical Distr.	617-235-1565
MI	Royal Oak, D. T. Randall Assocs.	313-546-5707
MN	St. Paul, Power/Mation Div.	612-645-0781
OH	Cincinnati, A.T.R. Distrbg.	513-574-8500
OH	Cleveland, Adcor Engrg.	216-238-3915
WI	Waukesha, Power/Mation	414-542-2868

CYBERSYSTEMS, INC., 7540 South Memorial Pkwy., Huntsville, AL 35802, Tel: 205-883-4410; FSC No.: 66; Empl.: 25; *Sls. Mgr.:* Mike Long

CYBER SYS., INC., 2031 E. Cerritos Ave., Anaheim, CA 92806, Tel: 714-722-2051, Telex: 692-375; *Sls. Mgr.:* Charles Muhle

CYCLO-TRONICS, INC., 1345 N. Old Rand Rd., Wauconda, IL 60084, Tel: 312-526-0800; Empl.: 10

CYTEC CORP., 107 N. Washington St., E. Rochester, NY 14445, Tel: 716-381-4740; *Sls. Mgr.:* Harry Turner .... **3**•1213

Local Sales Offices & Reps

FL	Osprey, Dick Ridgewell Co.	813-966-4401
MA	Burlington, Tritek	617-272-4550
NY	Frankfort, Kapital Sls.	315-896-4225

DABURN ELCTRNS. & CABLE, 70 Oak St., Norwood, NJ 07648, Tel: 201-768-5400, TWX: 710-991-9856; FSC No.: 25706; *Sls. Mgr.:* Randy Hibshman .... **2**•2083-2093

Local Sales Offices & Reps

AR	Little Rock, Leo Barker	501-835-0978
CA	Anaheim, Galaxie Sales	714-752-1580
CA	Redwood City, Hickey Ind'l. Sls.	415-368-3840
FL	Casselberry, HA Inc.	305-695-8592
FL	Coral Springs, H A Inc.	305-752-7520
IL	Elgin, Marican Sls.	312-888-2207
IN	Indianapolis, Sukup & Cox	317-253-5501
MA	No. Scituate, W. A. Hendrickson	617-545-0652
MN	Minneapolis, RIL Sls.	612-786-5713
NY	Fairport, Paul Arness Assoc.	716-223-4923
NY	N.Y.C., Robt. Smith Assoc.	212-541-4885
NY	Plainview, R. Smith Assoc.	516-681-3155
OH	Cinn, John Olsen Co.	513-574-7711
OH	Goshen, John Olsen Co.	513-722-1497
OR	Beaverton, R & R Assocs.	503-644-8077
PA	King of Prussia, Freedman-Malta	215-337-9211
PA	Pittsburgh, John Olsen Co.	412-279-2550
TX	Richardson, Eagle Marketing	214-238-5383
VA	Arlington, Howard Golonpaul & Assoc.	703-525-5898
WA	Kent, R & R Assocs.	206-251-5396

DADEN ASSOCS., 23011 Moulton Pkwy., Ste. A12, Laguna Hills, CA 92653, Tel: 714-770-1522, TWX: 910-596-1324; FSC No.: 57032; Empl.: 21; *Sls. Mgr.:* Dennis Hook

DAICO INDUSTRIES, INC.

DAICO INDS., INC., Box 5225, Compton, CA 90224, Tel: 213-631-1143, TWX: 910-346-6741; FSC No.: 28983; Empl.: 115; *Sls. Mgr.:* James Adamson .... **1A**•1692-1703

Local Sales Offices & Reps

AZ	Phoenix, Faser Tech. Sls.	602-948-4404
CA	Los Altos, Cain-White & Co.	415-948-6533
CA	Los Angeles, Midwin & Olifson	213-838-3455
CA	San Diego, Midwin & Olifson, Inc.	619-571-0177
FL	Palm Bay, Spartech Assocs.	305-727-8045
GA	Smyrna, Spartech Assocs.	404-432-3644
IL	Mt. Prospect, Cain-Forlaw Co.	312-253-3578
ME	Ogunquit, Micronic Assocs.	617-933-2121
MD	Burtonsville, Eastern Instrmn.	301-384-8500
NY	Hartsdale, Spectrum Sls.	914-472-8600
OH	Lancaster, Cain-Forlaw Co.	614-654-4800
PA	Newtown Square, SWR Assocs.	215-353-6711
TX	Dallas, McDonald Assocs.	214-238-1858
TX	Ft. Worth, McDonald Assocs.	817-429-4272

DAI-ICHI SHOJI OF AMER., INC., 150 Fifth Ave., New York, NY 10011, Tel: 212-691-9050, Telex: 429120 DSANY; Empl.: 3; *Sls. Mgr.:* A. Takayama .... **1A**•1064; **1B**•1583; **2**•1254

DALE®

DALE ELECTRONICS, INC., Columbus Div., Box 609, 2064 12th Ave., Columbus, NE 68601, Tel: 402-564-3131, TWX: 910-626-8314; FSC No.: 91637; Empl.: 2800; *Sls. Mgr.:* Darrel Smejkal; *Dist. Mgr.:* Jerry Jilek .... **1B**•1032-1034

Local Sales Offices & Reps

AL	Huntsville, JWL Assoc.	205-536-8410
AZ	Tempe, Dale Elctrns. Sls.	602-966-0291
CA	Los Alamitos, Reed Elctrn. Mktg.	213-598-6676
CA	Redwood City, J. S. Heaton Co.	415-367-9000
CA	San Diego, Reed Elctrn. Mktg.	619-452-1456
CO	Loveland, Dale Elctrns. Sls.	303-667-7500

CT	West Hartford, Kaelber & Mack, Inc.	203-667-4514
FL	Lake Park, Graham Assocs.	305-622-4049
FL	Melbourne, Graham Assocs.	305-773-6631
FL	Winter Garden, Graham Assocs.	305-656-9369
GA	Marietta, JWL Assoc.	404-429-8010
IL	Chicago, Indl. Reps.	312-647-7755
IN	Fort Wayne, Scott Elctrns.	219-484-7865
IN	Indianapolis, Scott Elctrns.	317-897-9976
KS	Shawnee Mission, Dale Sls.	913-432-9140
MD	Millersville, Tri-Mark	301-987-9103
MA	Wakefield, Howard C. Jappe Co.	617-245-9359
MI	Plymouth, Jay Mktg. Assoc.	313-459-1200
MN	Bloomington, Merrill Franklin Co.	612-854-9446
NJ	Fairlawn, Kaelber & Mack	201-797-7782
NJ	Oakland, Kaelber & Mack, Inc.	201-337-4520
NY	Commack, Kaelber & Mack	516-499-2924
NY	Ithaca, Dale Elctrns. Sls.	607-272-6212
NC	Charlotte, JWL Assoc.	704-523-3001
NC	Raleigh, JWL Assocs.	919-787-4826
OH	Cincinnati, Scott Elctrns.	513-791-2513
OH	Cleveland, Scott Elctrns.	216-473-5050
OH	Dayton, Scott Elctrns. Inc.	513-294-0539
OH	Reynoldsburg, Scott Elctrns.	614-863-1281
OR	Beaverton, LD Elctrns.	503-649-6177
PA	Horsham, TMI	215-441-4300
PA	Pittsburgh, Scott Elctrns.	412-963-6116
TX	Dallas, E. F. Aymond Co.	214-826-7620
TX	Houston, E. F. Aymond Co.	713-880-8229
TX	San Antonio, E. F. Aymond Co.	512-366-1526
VA	Lynchburg, Tri-Mark	804-528-0681
WA	Snohomish, LD Elctrns.	206-568-0511
WA	Spokane, LD Elctrns.	509-922-4883
WI	Milwaukee, Indl. Reps.	414-259-0965

Local Distributors

AL	Huntsville, Hamilton/Avnet	205-837-7210
AZ	Tempe, Acacia Sls. Inc.	602-894-2874
AZ	Tempe, T.T.I., Inc.	602-966-1616
AZ	Tempe, Hamilton/Avnet	602-231-5100
AZ	Tempe, Shelley Elctrns.	602-894-2058
CA	Chatsworth, Avnet Elctrns.	818-700-2600
CA	Chatsworth, Shelly Elctrns.	818-998-3333
CA	Costa Mesa, Avnet Elctrns.	714-754-6111
CA	Costa Mesa, Hamilton Electro Sls.	714-641-4100
CA	Culver City, Hamilton Electro Sls.	213-558-2121
CA	Huntington beach, Inductor Supp. Inc.	714-891-4524
CA	Irvine, Acacia Sls.	213-971-2428
CA	N. Hollywood, T.T.I., West	213-982-0201
CA	Sacramento, Hamilton/Avnet	916-925-2216
CA	San Diego, Acacia Sls. Inc.	619-565-4365
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Diego, Hamilton/Avnet	619-571-7510
CA	San Jose, T.T.I., Inc.	408-943-9155
CA	San Jose, Shelley Elctrns.	408-942-9111
CA	Sunnyvale, Acacia Sls.	408-745-7200
CA	Sunnyvale, Hamilton/Avnet	408-734-3355
CO	Boulder, Shelley Elctrns.	303-442-2718
CO	Commerce City, Waco Elctrns.	303-289-4743
CO	Denver, Newark Elctrns.	303-757-3351
CO	Englewood, Hamilton/Avnet	303-779-9998
CO	Lakewood, Acacia Sls. Inc.	303-232-2882
CT	Danbury, Hamilton/Avnet	203-797-2800
CT	Stratford, Electro/Comp.	203-375-5811
FL	Ft. Lauderdale, Newark Elctrns.	305-587-2372
FL	Ft. Lauderdale, Hamilton/Avnet	305-971-2900
FL	Largo, Lodan Elctrns.	813-586-2851
FL	Orlando, T.T.I., II	305-859-1000
FL	Palm Beach Gardens, Legri S. Resistor	305-845-7101
FL	St. Petersburg, Hamilton/Avnet	813-576-3930
FL	Winter Park, Hamilton/Avnet	305-628-3888
GA	Norcross, Hamilton/Avnet	404-447-7507
IL	Bensenville, Hamilton/Avnet	312-860-7700
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Ind.	312-982-9210
IL	Crystal Lake, Sub-Sem	815-459-4139
IL	Palatine, Ohm Elctrns.	312-359-5500
IN	Carmel, Hamilton/Avnet	317-844-9333
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Graham Elec.	317-634-8202
IA	Cedar Rapids, Deeco, Inc.	319-365-7551
KS	Overland Park, Hamilton/Avnet	913-888-8900
KS	Wichita, RSC Elec.	316-267-5213
MD	Baltimore, RESCO	301-823-0070
MD	Columbia, Hamilton/Avnet	301-995-3500
MA	Billerica, A. W. Mayer Co.	617-229-2255
MA	Waltham, Sterling Elctrns.	617-894-6200
MA	Woburn, T.T.I.	617-938-8800
MA	Woburn, Hamilton/Avnet	617-273-7500
MI	Grand Rapids, S-F Elctrn. Supp.	616-459-0216
MI	Grand Rapids, Newark Elec.	616-241-6681
MI	Grand Rapids, Hamilton/Avnet	616-243-8805
MI	Livonia, R-S Elctrns.	313-525-1155
MI	Livonia, Hamilton/Avnet	313-522-4700
MI	Livonia, Reptron Elctrns.	313-525-2700
MI	Oak Park, Newark Elec.	313-967-0600
MN	Minneapolis, Stark Elctrns.	612-332-1325
MN	Minnetonka, Hamilton/Avnet	612-932-0600
MO	Earth City, Hamilton/Avnet	314-344-1200
NJ	Cherry Hill, Hamilton/Avnet	609-424-0100
NJ	Cranford, G.S.I. Elec.	201-272-6400
NJ	Fairfield, Hamilton/Avnet	201-575-3390
NJ	Kenilworth, Federated Purchaser	201-272-0505
NJ	Springfield, Newark Elctrns.	201-376-9500
NM	Albuquerque, Hamilton/Avnet	505-765-1500
NY	Bohemia, L.I., T.T.I., New York	516-567-1500
NY	Buffalo, Summit Dist.	716-884-3450
NY	E. Syracuse, Hamilton/Avnet	315-437-2641
NY	Endwell, A.S.I. Elctrns.	607-754-3823
NY	Farmingdale, Command Elctrns.	516-293-1212
NY	Hauppauge, Fairmont	516-231-3313
NY	Melville, Hamilton/Avnet	516-454-6060
NY	Rochester, Simcona Elctrns.	716-328-3230
NY	Rochester, Hamilton/Avnet	716-475-9130
NY	Rockville Centre, Midway Indl.	516-293-6800
NY	Rome, Rome Elctrns.	315-337-5400
NY	Valley Stream, L&S Elctrns.	516-561-2474
NY	W. Hempstead, March Elctrns.	516-486-6511
NC	Raleigh, Hamilton/Avnet	919-878-0810
NC	Raleigh, RESCO	919-781-5700
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Cleveland, Pioneer Standard	216-587-3600
OH	Cleveland, Hamilton/Avnet	216-831-3500
OH	Cleveland, W. M. Pattison Supp.	216-441-3000
OH	Columbus, Camelot/Ohio	614-294-7169
OH	Dayton, Hamilton/Avnet	513-433-0610
OH	Dayton, Stotts-Friedman Co.	513-298-5555
OH	Dayton, Pioneer Standard	513-236-9900
OH	Lima, LRP Elctrns.	419-228-1220
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Beaverton, Acacia Sls.	503-646-3377
OR	Lake Oswego, Hamilton/Avnet	503-635-8831
OR	Portland, Radar Elec.	503-232-3404
PA	McKean, Advacom	814-476-7774
PA	Philadelphia, Herbach & Rademan	215-426-1700
PA	Pittsburgh, CAM/RPC	412-782-3770
PA	Reading, Barbery Elctrns.	215-376-7451
PA	York, E.C.I., Inc.	717-843-8971
TX	Austin, Hamilton/Avnet	512-837-8911
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Ft. Worth, T.T.I., Inc.	817-831-0441
TX	Houston, Hamilton/Avnet	713-780-1771
TX	Houston, Lenert Co.	713-225-1465
TX	Houston, Sterling Elctrns.	713-627-9800
TX	Irving, Hamilton/Avnet	214-659-4111
UT	Salt Lake City, Hamilton/Avnet	801-972-2800
WA	Bellevue, Hamilton/Avnet	206-453-5844
WA	Seattle, Radar Elec.	206-282-2511
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	New Berlin, Hamilton/Avnet	414-784-4510

DALE®

DALE ELECTRONICS, INC., El Paso Div., P.O. Box 26950, El Paso, TX 79926, Tel: 915-592-3253; FSC No.: 91637; Empl.: 272; *Sls. Mgr.:* Douglas Wagenknecht; *Dist. Mgr.:* Jerry Jilek ...1A•1846-1868

Refer to Dale Electronics, Inc., Columbus, NE for sales office and distributor information.

DALE®

DALE ELECTRONICS, INC., Norfolk Div., 2300 Riverside Blvd., Norfolk, NE 68701, Tel: 402-371-0080, TWX: 910-623-0163; FSC No.: 91637; Empl.: 1200; *Sls. Mgr.:* Jim Filips; *Dist. Mgr.:* Jerry Jilek ...1B•1800, 1801

Refer to Dale Electronics, Inc., Columbus, NE for sales office and distributor information.

DALE®

DALE ELECTRONICS, INC., Tempe Div., 1155 W. 23rd St., Tempe, AZ 85282, Tel: 602-967-7874, TWX: 910-950-1943; FSC No.: 22929; Empl.: 139; *Sls. Mgr.:* Mike Brown; *Dist. Mgr.:* Jerry Jilek ...1A•1348, 1349

Refer to Dale Electronics, Inc., Columbus, NE for sales office and distributor information.

DALE®

DALE ELECTRONICS, INC., Yankton Div., E. Hwy. 50, Box 180, Yankton, SD 57078, Tel: 605-665-9301, TWX: 910-668-3605; FSC No.: 09969; Empl.: 400; *Sls. Mgr.:* Irvin Sterner; *Dist. Mgr.:* Jerry Jilek ...1A•1234-1242, 2139-2150; 2•1250-1253

Refer to Dale Electronics, Inc., Columbus, NE for sales office and distributor information.

DALE WESTERN THERMISTOR DIVISION, See Dale Norfolk Division

DAMON/ELCTRNS. DIV., 80 Wilson Way, Westwood, MA 02090, Tel: 617-449-0800, TWX: 710-348-6722; Empl.: 90; *Sls. Mgr.:* Edward J. Doherty ...1A•1347

Local Sales Offices & Reps

AZ	Phoenix, Sanford Sls. Assocs.	602-957-3570
CA	N. Hollywood, Jewett Co.	213-789-8103
CA	Palo Alto, Waldman Assocs.	415-961-4100
DC	Washington, Stemler Assocs.	301-944-8262
FL	Melbourne, Repcom	305-254-1877
MD	Baltimore, Stemler Assocs.	301-944-8262
MA	Waltham, Del Tech Sls.	617-890-1020
NJ	Cherry Hill, Stemler Assocs.	609-966-4070
NJ	Hackensack, T.M.A. Assoc.	201-342-4008
NY	Cazenovia, S. T. Wollard Co.	315-655-8145
TX	Ft. Worth, El-Tec Sls.	817-268-2896

D & B POWER, INC.

D & B POWER, INC., 204 N. Fehr Way, Bayshore, NY 11706, Tel: 516-586-5955; FSC No.: 54337; Empl.: 25; *Sls. Mgr.:* Peggy Brock ...3•1542, 1543

Local Sales Offices & Reps

CA	Los Altos, Schwerin Merrill	415-961-0913
CA	Pasadena, Electro Mecha. Instrs.	213-795-7193
NY	East Setauket, Edgerton Elctrn.	516-751-7089

D & L SALES CO. INC., 296 Preakness Ave., Paterson, NJ 07502, Tel: 201-684-8223/8224; Empl.: 10

DANIELS MFG. CORP., 6103 Anno Ave., Orlando, FL 32809, Tel: 305-855-6161, Telex: 564321; FSC No.: 5120, 5180; Empl.: 150

DAN-L INC., 229 Laurel Rd., E. Northport, NY 11731, Tel: 516-757-8000; FSC No.: 28327; Empl.: 22

DANMAR INDS., 9705 Lurline Ave., Chatsworth, CA 91311, Tel: 818-882-7979/5280; FSC No.: 31690; Empl.: 6; *Sls. Mgr.:* Mukund Patel

DANTEL, 2991 N. Argyle Ave., Fresno, CA 93727, Tel: 209-292-1111, Telex: 35-5457; FSC No.: 56960; Empl.: 110; *Sls. Mgr.:* Peter Normandin

DANTRONICS, INC., 3175 Hafner Ct., St. Paul, MN 55112, Tel: 612-484-2108; Empl.: 22

DASH, STRAUS & GOODHUE, INC., 593 Massachusetts Ave., Boxboro, MA 01719, Tel: 617-263-2662; Empl.: 7; *Sls. Mgr.:* Ira Barry

DATA, INC., 7702 Emerald Ave., Box 2071, Ft. Collins, CO 80525, Tel: 303-493-1222; Empl.: 3; *Sls. Mgr.:* Sharon Shilling; *Dist. Mgr.:* Sharon Shilling

D.A.T.A., INC., Cordura Co., P.O. Box 26875, San Diego, CA 92126, Tel: 619-578-7600, TWX: 910-322-1340; Empl.: 39

DATA CAPTURE TECHNOLOGY, 5436-F South Mingo Rd., Tulsa, OK 74146, Tel: 918-627-7521, Telex: 796355; *Sls. Mgr.:* Gary DeShazer

DATA CHECK CORP., 10070 Willow Creek Rd., San Diego, CA 92131, Tel: 619-578-0101, TWX: 910-335-1596; FSC No.: 55792; *Sls. Mgr.:* Al Agent

DATACHRON INC., 3186 J Airway Ave., Costa Mesa, CA 92626, Tel: 714-751-2211, Telex: 678401; FSC No.: 56259; Empl.: 16; *Sls. Mgr.:* Clyde Davis

DATACOM, INC., Box 278, Ft. Walton Beach, FL 32548, Tel: 904-244-6121, TWX: 510-730-7693; Empl.: 50

dataCon

DATACON, INC., 60 Blanchard Rd., Burlington, MA 01803, Tel: 617-273-5800, Telex: 951651; Empl.: 400; *Sls. Mgr.:* John A. Marshall ....3•1923

Local Sales Offices & Reps

CA	Chatsworth, DataCon	818-700-0600
CA	Mountain View, DataCon	415-967-5700
CA	Santa Clara, DC Electronics	408-980-1199
CO	Lakewood, Christee - Meade Co.	303-232-0287
FL	Orlando, Mackay Smith & Assoc.	305-277-1513
GA	Decatur, DataCon	404-373-1212
GA	Norcross, Mackay Smith	404-449-7444
IL	Lisle, W. G. Controls	312-963-5954
IL	Schaumburg, DataCon	312-529-7690
IN	Fort Wayne, Hoyle Assocs.	219-485-6433
MA	Burlington, DataCon	617-273-5800
MA	Newton Upper Falls, Anchor Engrg.	617-964-6205
MN	St. Paul, Countryman Assoc.	612-645-9151
MO	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NY	Bohemia, DataCon	516-589-1100
NC	Cary, Mackay Smith	919-467-5400
OH	Centerville, Micro Sls. Corp.	513-433-8171
PA	Newtown Square, Hagy Assocs.	215-459-0504
TN	Chattanooga, Mackay Smith	615-899-6951
TX	Bedford, DataCon	817-540-1479
TX	Richardson, Lear Assoc.	214-231-5388

DATA-CONTROL SYS., Commerce Dr., Box 860, Danbury, CT 06810, Tel: 203-743-9241, TWX: 710-456-0376; FSC No.: 08539; Empl.: 87

DATA CONVERSION, See Analogic Corp., Data Conversion Prods. Grp.

DATACOPY CORP., 1215 Terra Bella Ave., Mountain View, CA 94043, Tel: 415-965-7900, Telex: 701994 DATACOPY UO; *Sls. Mgr.:* Charles Joseph

data delay devices, inc.®

DATA DELAY DEVICES, 385 Lakeview Ave., Clifton, NJ 07011, Tel: 201-772-1106, TWX: 710-989-7008; Empl.: 38 .... 1A•1471-1482, 1592

Local Sales Offices & Reps

CA	El Toro, Martronix	714-855-6397
CA	Mountain View, Weseloh/Swanson	415-961-0565
TX	Dallas, West & Assocs.	214-661-9400

Local Distributors

CA	Mountain View, Target Elctrns.	415-961-1170

DATA-DESIGN LABS., P.O. Box 711, 7925 Center Ave., Cucamonga, CA 91730, Tel: 714-987-2511; Empl.: 1300; *Sls. Mgr.:* J. F. Nicholson, Exec. Vice Pres. (Operations)

DATA DEVICE CORP., See ILC Data Device Corp.

DATA DISPLAY PRODUCTS, Box 91072, Los Angeles, CA 90009, Tel: 213-674-5940, Telex: 664690; FSC No.: 15513; Empl.: 20; *Sls. Mgr.:* William F. Million

DATADYNE, Box 247, King of Prussia, PA 19406, Tel: 215-666-5751; FSC No.: 53032; Empl.: 23; *Sls. Mgr.:* James Riggs

DATA GENERAL, 4400 Computer Dr., Westboro, MA 01581, Tel: 617-366-8911, Telex: 920-329, TWX: 710-390-1217; Empl.: 14,750; *Sls. Mgr.:* Frank Keaney

DATA INSTRUMENTS INC., 4 Hartwell Pl., Lexington, MA 02173, Tel: 617-861-7450, TWX: 200081; Empl.: 250; *Sls. Mgr.:* Ernest C. Lutfy .... 1B•1840

Local Sales Offices & Reps

AZ	Mesa, RLS	602-892-9329
CA	Riverside, Jim Mitchell	714-684-6404
CA	San Carlos, Elctrn. Engrg. Assocs.	415-593-2189
CO	Boulder, Herb Bass Assocs.	303-530-7509
HI	Honolulu, Aloha Assocs.	808-941-1574
IL	Addison, John O'Keefe	312-628-6041
MA	Swampscott, John Snow	617-592-0511
MO	Kansas City, Delltron Co.	816-436-6445
MO	St. Louis, Delltron Co.	314-869-4779
NJ	Stockholm, Jim Musumeci	201-492-9097
NM	Las Cruces, SOTA-COM	505-523-4480
NC	Charlotte, B. A. Robinson Co.	704-527-4537
OH	Olmstead Falls, Ken Schleger	216-871-9047
TX	Dallas, Griffin Sls.	214-234-5013
UT	Bountiful, Herb Bass Assocs.	801-295-7100
WA	Bellevue, S.E.A. Sls.	206-883-4999
WA	Vancouver, S.E.A. Sls.	206-573-5161

DATA I/O CORP., 10525 Willows Rd. N.E., C-46, Redmond, WA 98052, Tel: 206-881-6444, Telex: 15-2167; Empl.: 400

DATAK CORP., 65 Seventy-First St., Guttenberg, NJ 07093, Tel: 201-869-2200; *Sls. Mgr.:* Theresa Pflueger ....2•1090, 1759, 2095

Local Sales Offices & Reps

CA	Burlingame, Polach & Bensinger	415-697-2525
CA	West Covina, Don Forth Assocs.	213-919-2322
CO	Broomfield, Conners Co.	303-466-9628
FL	Bradenton, T. G. & Assocs.	813-753-5632
FL	Pompano, T.G. and Assocs.	305-781-8328
GA	Roswell, Henry W. Phillips Co.	404-992-3070
IL	Wheaton, Archie Joyner Assocs.	312-665-6662
IN	Indianapolis, Sukup & Cox	317-253-5501
MD	Annapolis, Pecore Assocs.	301-267-0328
MI	East Detroit, Jack M. Thorpe Co.	313-779-6363
MN	Minneapolis, Kodo Assoc.	612-881-1255
MO	Raytown, Marty Taraski Sls.	816-358-1442
NJ	Teaneck, Steve Fisher Sls.	201-837-1200
NY	Rochester, Warren Kaufman & Assoc.	716-266-2728
NC	Matthews, Henry W. Phillips Co.	704-882-2878
OH	Jamestown, Landro Edwards Sls.	513-675-2059
PA	Library, Landro Edwards Sls.	412-854-5727
RI	Coventry, Adams-McGregor	401-821-1320
RI	Lincoln, Adams-McGregor	401-726-1300
TX	Dallas, J & J Sls. Co.	214-328-9739
WA	Edmonds, McLaughlin Mktg.	206-743-1161

Local Distributors

AL	Birmingham, Forbes Distrbg.	205-251-4104
AK	Anchorage, Alaska Elecs. Sply.	907-563-3774
AZ	Phoenix, Tri-Tek	602-995-9352
AZ	Tempe, Circuit Specialists	602-966-0764
CA	Berkeley, Al Lasher's Elect.	415-843-5915
CA	Canoga Park, Sandy's Elect.	213-346-8353
CA	El Cerrito, Trumbull Co.	415-525-7242
CA	Fullerton, Orvac Elect.	714-871-1020
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	San Jose, Quement Elctrns.	408-998-5900
CO	Lakewood, D.H. Crump & Co.	303-936-4407
CT	Greenwich, Wise Comps.	203-531-4880
CT	Hartford, Hatry Elect.	203-527-1881
CT	Wallingford, Tron Town U.S.A.	203-237-5598
FL	Miami, Elctrn. Equip.	305-871-3500
FL	Orlando, Orlando Frame & Art	305-896-7191
FL	St. Petersburg, Knapp of Florida	813-392-0406
GA	Atlanta, Ack Elctrn. Supp.	404-351-6340
HI	Honolulu, Honolulu Elect.	808-949-5564
IL	Berwyn, B-B & W Inc.	312-749-1710
IL	Mt. Prospect, Tri-State Elect.	312-255-0600
IL	Niles, Joseph Elect.	312-297-4200
IL	Northbrook, Reproduction Specialists	312-564-0404
IN	Ft. Wayne, Graham Elect.	219-423-3422
IN	Indianapolis, Graham Elect.	317-634-8202
IA	Cedar Rapids, Deeco, Inc.	319-365-7551
KS	Wichita, RSC	316-267-5213
KY	Louisville, Peerless Elect.	502-637-7674
LA	Lafayette, Ralph's	318-233-0105
LA	New Orleans, Radio Parts Inc.	504-581-5959
MD	Baltimore, A S I Elect.	301-265-5100
MD	Baltimore, RESCO Elctrns.	301-823-0070
MD	Rockville, Capitol Radio Whlsrs.	301-881-2270
MA	Hingham, Sager Electrical Sply.	617-749-6700
MA	Lynn, Land Elctrns. Supp.	617-592-2220
MA	Norwood, Gerber Elect.	617-769-6000
MI	Flint, Shand Elctrns.	313-743-8940
MI	Livonia, Norwest Elect.	313-261-4551
MN	Minneapolis, Acme Elctrns.	612-338-4754
MO	Kansas City, Elctrn. Sply.	816-931-0250
MO	St. Louis, Olive Elctrn.	314-426-4500
MO	St. Louis, Van Sickle	314-621-5000
MO	St. Louis, Gateway Elect.	314-427-6116
NE	Lincoln, Scott Elect. Sply.	402-466-8221
NV	Las Vegas, Hurley Elect.	702-384-5666
NV	Reno, Elect. Distr. Co.	702-323-2766
NH	Dover, American Radio	603-742-6800
NH	Hudson, C & H Elect.	603-882-1133
NJ	Edison, William Elctrns. Supp.	201-985-3700
NY	Buffalo, Summit Distributor	716-887-2800
NY	Hauppauge, Broadline Elctrns.	516-231-4100
NY	Long Island City, H. L. Dalis, Inc.	212-361-1100
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Cincinnati, URI Elect.	513-761-4030
OH	Columbus, Hughes-Peters	614-294-5351
OK	Oklahoma City, Trice Wholesale	405-524-4411
OR	Beaverton, Norvac Elect.	503-644-1025
OR	Portland, Portland Radio Sply.	503-228-8647
PA	Braddock, Leff Elctrns.	412-351-5000
PA	Philadelphia, A.C. Radio	215-462-9379
PA	Reading, Barbey Elctrns.	215-376-6116
PA	Willow Grove, Resco	215-659-4575
RI	Providence, W. Dandreta & Co.	401-861-2800
SC	Charleston, Wholesale Industrial Elecs.	803-722-2634
TN	Memphis, Bluff City Distr.	901-345-9500
TX	Dallas, Electrotex Elect. Corp. of TX	214-234-0433
TX	El Paso, Ideal Indl. Elec. Sply.	915-779-6647
TX	Houston, Gateway Elctrns.	713-978-6575
UT	Salt Lake City, Kimball Elect.	801-328-2075
VA	Arlington, Arlington Elect. Whlse.	703-524-2412
VA	Norfolk, Priest Elctrns.	804-855-0105
WA	Seattle, Radar Elect. Co.	206-282-2511
WV	Charleston, Elctrn. Materials Corp.	304-344-3577
WI	Milwaukee, Indl. Elctrns.	414-276-1212

DATA-MATCH CORP., 3810 Oakcliff Ind. Ct., Doraville, GA 30340, Tel: 404-441-0408; *Sls. Mgr.:* Charles L. Frazier III

DATAMETRICS CORP., Defense Products Div., 7630 Gloria Ave., Van Nuys, CA 91406, Tel: 818-989-3840, TWX: 910-495-2009; FSC No.: 19059; Empl.: 150; *Sls. Mgr.:* Jim Foti

datametrics DRESSER

DATAMETRICS • DRESSER INDS., INC., 340 Fordham Road, Wilmington, MA 01887, Tel: 617-658-5410, TWX: 710-347-7672; Empl.: 175; *Sls. Mgr.:* A. W. Siff .... 1B•1841

Local Sales Offices & Reps

AZ	Phoenix, Motion Technology	602-991-1782
CA	Anaheim, Motion Technology	714-777-4259
CA	Chatsworth, Motion Technology	818-993-3762
CA	San Jose, Motion Technology	408-923-0990
CA	San Raphael, Motion Technlg.	415-459-2171
CO	Englewood, Integrated Motion Sys.	303-762-1817
CT	Guilford, Gem Sls.	203-453-5424
IL	Rolling Meadows, KMA Sls.	312-398-5300
MI	Lamont, Xanthus	616-677-3103
MI	Troy, Xanthus	313-528-2000
MN	Minneapolis, Trask Engrg.	612-537-2434
NH	Salem, Gem Sls.	603-893-0009
NJ	Williamstown, Precision Motion Sls.	609-629-4757
NY	Clark Mills, KLM-Garner	315-853-6126
NY	Glen Cove, Precision Motion Sls.	516-676-1645
NY	N. Syracuse, KLM-Garner	315-458-6214
NY	Pittsford, KLM-Garner	716-381-8350
NC	Charlotte, MacKay, Smith & Assocs.	704-372-1188
OH	Chagrin Falls, K. F. Nauerz	216-338-8450
OH	West Chester, Fehrco	513-777-4248
TX	Dallas, Automated Motion Control	214-340-4192
TX	Denton, Automated Motion Control	817-382-4159
WA	Bellevue, Al Smith Co.	206-746-6770
WA	Vancouver, Al Smith Co.	206-892-9912
WI	Milwaukee, KMA Sls.	414-259-1771

DATA PLUS, INC., 7205E Lockport Pl., Lorton, VA 22079, Tel: 800-368-3747, Telex: 901878; Empl.: 20; *Sls. Mgr.:* George E. Pritz

DATAPOINT CORP., Peripheral Operations Division, 686 West Maude Avenue, Sunnyvale, CA 94086, Tel: 408-732-7330, TWX: 910-339-9244; Empl.: 500

DATAPOWER, INC., 3328 West First St., Santa Ana, CA 92703, Tel: 714-775-2000, Telex: 683323, TWX: 910-595-1560; *Sls. Mgr.:* William O. Fordiani

Local Sales Offices & Reps

CA	Santa Clara	408-986-8322
MA	Chelmsford	617-256-2287

DATA POWER, See Beaver Labs

DATA PRECISION CORPORATION, Electronics Ave., Danvers, MA 01923, Tel: 617-246-1600, Telex: 921819; FSC No.: 51692; Empl.: 260; *Sls. Mgr.:* John P. Kelly, William Sapankevych; *Dist. Mgr.:* John Kelly ...... 3•1214, 1215

Local Sales Offices & Reps

AL	Huntsville, Saber Assocs.	305-724-0920; 800-327-0853
AZ	Phoenix, Odyssey I	602-246-8846
CA	Carson, Amasco	213-516-8561
CA	Sunnyvale, Amasco	408-733-8690
CO	Castle Rock, Odyssey I	303-688-3555
FL	Melbourne, Saber Assocs.	305-724-0920; 800-327-0853
GA	Griffin, Saber Assocs.	305-724-0920; 800-327-0853
MD	Rockville, Elctrn. Mktg. Assn.	301-881-5300
MA	Danvers, John D. Seney	617-246-1600; 603-668-1096
MI	Northville, Donald C. Pickren	313-349-0233; 312-685-4544
MN	Chanhassen, Elctrn. Instr. Consit.	612-445-7056
MO	Kansas City, E.I.R. Co.	816-452-7030
MO	Leasburg, E.I.R. Co	314-895-4100
NJ	Cedar Grove, KLS Assocs.	201-785-4450
NM	Albuquerque, Odyssey I	505-265-6645
NY	Frankfort, Kapital Instr. Sls.	207-774-6266; 800-492-8011
NC	Clayton, Saber Assocs.	305-724-0920; 800-327-0853
PA	Pittsburgh, Staples Assn.	412-881-5990
PA	Plymouth Meeting, Elctrn. Mktg. Assn.	215-248-5050; 215-828-7400
SC	Columbia, Saber Assocs.	305-724-0920; 800-327-0853
TX	Georgetown, Richard Morgenstern	512-869-1507
WA	Bellevue, Sls. & Engrg. Assn.	206-883-4999
WA	Vancouver, Sls. & Engrg. Assn.	206-573-5161

Local Distributors

AL	Huntsville, Pioneer Instrs.	205-837-9300
AL	Mobile, Brownell-Instr. & Cntrl.	205-479-5404
AZ	Phoenix, Metermaster	602-437-1425
AR	Morrilton, Tri-State Instr. Lab.	501-354-1849
CA	Arcadia, Shafer Engrg. Svc.	213-445-4127
CA	Canoga Park, G.A.G. Entprs.	213-998-6500
CA	Long Beach, Meas. Assoc.	213-433-0977
CA	Los Angeles, Metermaster	213-685-4340
CA	Los Angeles, E.I.L. Instrs.	213-685-7020
CA	Palo Alto, Metermaster	415-968-0313
CA	San Diego, Instr. Engrs.	619-268-8344
CA	San Diego, Metermaster	619-560-4841
CA	Santa Clara, RGB Electro. Indl.	408-980-1300
CO	Denver, E.I.L. Instrs.	303-534-4160
CO	Englewood, BETA	303-779-4494
CT	Middletown, E.I.L. Instrs.	203-346-6646
FL	Hialeah, Kimball Elec. Labs.	305-822-5792
FL	Orlando, Brownell-Instr. & Cntrl.	305-843-6770
FL	Palm Bay, E.I.L. Instrs.	305-725-8300
GA	Atlanta, Brownell Electro	404-762-5181
IL	Bridgeview, E.I.L. Instrs.	312-430-2292
IL	Elk Grove Village, Dot-Tronics, Div. of Loren Green Assoc.	312-593-0282
IL	Elk Grove Village, Pioneer Standard	312-437-9680
IL	Elk Grove Village, Metermaster	312-593-8650
IL	Niles, Joseph Elctrns.	312-297-4200
IL	Oak Park, Pacific Indicator	312-383-0220
IN	East Chicago, Acro Elec.	219-397-8681
IN	Indianapolis, Pioneer Standard	317-849-7300
IN	Indianapolis, E.I.L. Instrs.	317-545-1373
IN	Indianapolis, Loren Green Assocs.	317-293-9827
KY	Louisville, Peerless Elec. Equip.	502-637-7674
LA	Baton Rouge, Ind. Elec. Supply	504-357-4249
LA	Kenner N.O., Breard Gardner	504-466-3401
LA	New Orleans, Ind. Instr. Works	504-733-8355
MD	Gaithersburg, Pioneer Instrs.	301-921-0660
MD	Sparks, E.I.L. Instrs.	301-771-4800
MA	Burlington, Contact East	617-272-5051
MA	Burlington, E.I.L. Instrs.	617-272-9450
MA	Woburn, Brownell Electro	617-935-7820
MI	Ferndale, Ram Meter	313-398-6767
MI	Flint, R.S. Elctrns.	313-762-5800
MI	Grand Rapids, R.S. Elctrns.	616-241-3483
MI	Kalamazoo, R.S. Elctrns.	616-381-5470
MI	Livonia, Pioneer Standard	313-525-1800
MI	Livonia, R.S. Elctrns.	313-525-1155
MI	Roseville, R.S. Elctrns.	313-779-2450
MI	Wyandotte, R.S. Elctrns.	313-282-5880
MN	Minneapolis, Loren Green Assocs.	612-571-6666
MO	St. Louis, Instr. & Control Sls.	314-535-5760
NJ	Edison, Brownell Electro	201-287-2030
NJ	Ocean, Rag Elctrns.-East	201-544-0666
NY	Clarence, Trott Elctrns.	716-634-8500
NY	Hauppauge, E.I.L. Instrs.	516-231-6333
NY	New York, Brownell Electro	212-691-1171
NY	New York, Advanced Elctrns.	212-730-7030
NY	Pittsford, Trott Elctrns.	716-586-8251
NY	Rochester, R. Baker Elctrns.	716-586-9164
NY	Rochester, E.I.L. Instrs.	716-424-5750
NC	Charlotte, Brownell Electro	704-597-1270
NC	Charlotte, Trott Elctrns.	704-376-2237
NC	Greensboro, Pioneer Instr.	919-273-4441
NC	Raleigh, Lee Assoc. of the Carolinas	800-822-8888
OH	Cleveland, Pioneer Instr.	216-587-3600
OH	Dayton, E.I.L. Instrs.	513-435-2134
OH	Dayton, Pioneer Instr.	513-236-9900
OH	Dayton, Natl. Instr.	513-435-4503
OH	Maumee, R.S. Elctrns.	419-893-0721
OK	Oklahoma City, Huston-De Pue Labs	405-235-5469
OR	Beaverton, Eicher Richards	503-221-1123
OR	Medford, Branom Instrs.	503-772-3187
OR	Portland, Branom Instrs.	503-283-2555
PA	Horsham, Pioneer Instr.	215-674-4000
PA	Philadelphia, Sunshine Sci.	215-673-5600
PA	Pittsburgh, E.I.L. Instrs.	412-731-5230
PA	Pittsburgh, Pioneer Instr.	412-782-2300
TN	Knoxville, Brownell-Electro	615-966-3441
TN	Memphis, Brownell-Electro	901-795-8483
TN	Nashville, Brownell-Electro	615-889-8230
TX	Dallas, E.I.L. Instrs.	214-931-1236
TX	Dallas, R.E. Davis Co.	214-653-1041
TX	Dallas, Pioneer Instr.	214-386-7300
TX	Garland, Metermaster	214-271-5671
TX	Houston, Quality Instrs.	713-524-0528
TX	Houston, E.I.L. Instrs.	713-271-3100
VA	Alexandria, E.I.L. Instrs.	703-354-4330
VA	Richmond, Metermetrics	804-275-1431
VA	Vienna, Elctrn. Equip. Bank	703-938-3350
VA	Virginia Beach, E.I.L. Instrs.	804-499-3746
WA	Seattle, Eicher Richards	206-523-7888
WA	Seattle, E.I.L. Instrs.	206-762-0880
WA	Seattle, Branom Instrs.	206-762-6050

DATAPROBE, 110 Palisades Blvd., Palisades Park, NJ 07650, Tel: 201-947-9500, Telex: 642-165; Empl.: 12

Local Sales Offices & Reps

AZ	Scottsdale, Westorn Sade	602-998-9585
CA	Los Angeles, Mark Assocs.	216-641-1840
NH	Concord, Concord Communications Inc.	603-228-8627
TX	Seabrook, Q Max Inc.	713-474-2233
VA	Falls Church, Data Comm. Sys.	703-241-7803

DATAPRODUCTS, 6200 Canoga Ave., Woodland Hills, CA 91365, Tel: 213-887-8000, Telex: 67-4734; Empl.: 4300; *Sls. Mgr.:* James B. Towell; *Dist. Mgr.:* L. Bowne

DATA PRODS. NEW ENGLAND, Barnes Park N. Caller Box 30, Wallingford, CT 06492, Tel: 203-265-7151, TWX: 710-476-3427

DATAPROFITS CORP., 2260 Distributors Dr., Indianapolis, IN 46241; Empl.: 5

DATARAM CORP., Princeton-Highstown Rd., Cranbury, NJ 08512, Tel: 609-799-0071, TWX: 510-685-2542; Empl.: 225; *Sls. Mgr.:* John F. Gilligan

Local Sales Offices & Reps

AL	Huntsville, Col-Ins Co.	800-327-6600
AZ	Phoenix, Cherry Assocs.	602-242-1922
CA	Irvine, Dataram Corp.	714-261-1622
CA	Mountain View, Thorson West	415-964-9300
CO	Denver, Westek Data Prods.	303-232-2250
FL	Orlando, Col-Ins-Co.	800-432-4480
GA	Atlanta, Col-Ins-Co.	800-327-6600
IL	Oak Brook, Dataram Corp.	312-789-3710
LA	Baton Rouge, Col-Ins-Co.	800-327-6600
MD	Rockville, Technical Sls. Assocs.	301-340-0600
MA	Waltham, Dataram Corp.	617-891-7090
MN	Eden Prairie, First Rep Co. of Minnesota	612-944-2097
NJ	Haddonfield, G. L. Williams Assocs.	609-428-6060
NM	Sante Fe, Unique Sys. Electronics Inc.	505-984-0262
NY	Rochester, RG Engrg.	716-442-5631
NC	Raleigh, Col-Ins-Co.	800-327-6600
OH	Columbus, SelTech Mktg.	614-451-3865
SC	Greenville, Col-Ins-Co.	800-327-6600
TN	Knoxville, Col-Ins-Co Inc.	800-327-6600
TX	Austin, Thorson Southwest	512-451-7527
TX	Dallas, Thorson Southwest	214-233-5744
TX	Houston, Thorson Southwest	713-771-3504

DATA RAY CORP., 8401 Baseline Rd., Boulder, CO 80303, Tel: 303-494-4444; FSC No.: 303-494-8107; *Sls. Mgr.:* Jerry Garrett

DATA RENTALS/SLS., INC, P. O. Box 3257, Culver City, CA 90230, Tel: 213-559-3822; Empl.: 51; *Sls. Mgr.:* Steven Beaver

DATAROYAL, 235 Main Dunstable Rd., Nashua, NH 03061, Tel: 603-883-4157, TWX: 710-228-1077; *Sls. Mgr.:* George Bouchard

DATA SIGNAL CORP., 149 California St., Newton, MA 02158, Tel: 617-926-5080

DATASPAN SYSTEMS INC., 120 W. Palisades Blvd., Palisades Park, NJ 07650, Tel: 201-461-3337; *Sls. Mgr.:* Sy Weiss

DATA SPECIALTIES, INC., 3455 Commercial Ave., Northbrook, IL 60062, Tel: 312-564-1800, Telex: 206230; Empl.: 110; *Sls. Mgr.:* John H. Kindsvater, Jr.

DATA TECH, DIV. OF PENRIL CORP., 3110 W. Segerstrom, Santa Ana, CA 92704, Tel: 714-546-7160, TWX: 910-595-1570; Empl.: 125; *Sls. Mgr.:* James K. Way; *Dist. Mgr.:* James K. Way

DATATEX CORP., 10935 S. Wilcrest Dr., Houston, TX 77099, Tel: 713-495-3100; Empl.: 100; *Sls. Mgr.:* Glenn Messerschmitt; *Dist. Mgr.:* K. Pelletier

DATATRAN LABS, P.O. Box 384, Sussex, NJ 07461, Tel: 914-856-4313; Empl.: 18; *Sls. Mgr.:* Richard E. Johnson

DATA TRANSLATION, 100 Locke Dr., Marlboro, MA 01752, Tel: 617-481-3700, Telex: 4430109; Empl.: 110; *Sls. Mgr.:* Andrew Davis

DATATRON, INC., 2942 Dow Ave., Tustin, CA 92680, Tel: 714-544-9970, TWX: 910-595-1589; Empl.: 125

"Refer to Shelly Assocs. Datatron Inc. for Sales Office and distributor information"

DATATRONIC SYSTEMS CORP., Computer Sciences Div., P.O. Box 44128, Panorama City, CA 91402, Tel: 818-988-5290; Empl.: 150

DATAWARE SYS. LEASE, INC., 30 Bay St., Staten Island, NY 10301, Tel: 212-447-4911, Telex: 421394, TWX: 710-588-6738; *Sls. Mgr.:* Ben Welwart

DATAWEST, 7333 E. Helm Dr., Scottsdale, AZ 85260, Tel: 602-948-3280, TWX: 910-950-1289; Empl.: 25; *Sls. Mgr.:* Jim Buckley

DATEC, INC., 200 Eastowne Dr., Ste. 116, Chapel Hill, NC 27514, Tel: 919-929-2135; Empl.: 75; *Sls. Mgr.:* Albert J. Jenks, Jr.

DA-TECH CORP., 92 Steamwhistle Dr., Ivyland, PA 18974, Tel: 215-322-9410; *Sls. Mgr.:* Bradford W. Bentz

DATEL, 11 Cabot Blvd., Mansfield, MA 02048, Tel: 617-339-9341, Telex: 95-1340, TWX: 710-346-1953; Empl.: 650; *Sls. Mgr.:* H. Batchelder ... 3•1076, 1105, 1150-1152, 1323, 1545

Local Sales Offices & Reps

AZ	Phoenix, Tech. Sales	602-246-1614
CA	Santa Ana, Datel	714-835-2751
CA	Sunnyvale, Datel	408-733-2424
CO	Denver, Cleveland Entprs. of Colo.	303-751-3252
CT	Hamden, JBL Assocs.	203-281-3161
FL	Coral Springs, H. A. Inc.	305-752-7520
HI	Honolulu, Adtech.	808-941-0708
IL	Elmhurst, Sector Engrg. Sls.	312-530-7850
IN	Indianapolis, Sector Engrg. Sls.	317-842-1120
IA	Davenport, Ensco-Rep, Inc.	319-386-6600
KS	Overland Park, Ensco-Rep, Inc.	913-381-7557
MA	Mansfield, Datel	617-339-9341
MI	Livonia, Electro Sls. Assoc.	313-474-7320
MN	Minneapolis, J.R. Assoc.	612-559-5673
MO	Maryland Heights, Ensco-Rep, Inc.	314-423-3935
NJ	Perth Amboy, Astrorep, Inc.	201-826-8050
NM	Albuquerque, Cleveland Entprs.	505-265-7893
NY	Babylon, Astrorep	516-422-2500
NY	Liverpool, R & D Assocs.	315-457-0100
NC	Winston-Salem, Comp. Concepts	919-765-3484
OH	Cleveland, Instrmn. Sys.	216-845-8800
OH	Dayton, Instrmn. Sys.	513-294-2838

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OR	Aloha, Hood Engrg.	503-642-3591
PA	Pittsburgh, Instrmn. Sys.	412-243-1111
TX	Carrollton, Tech. Mktg.	214-387-3601
TX	Houston, Tech. Mktg.	713-777-9228
UT	Salt Lake City, Cleveland Entprs. of Colo.	801-355-8424
VA	Arlington, H. J. Heffernan	703-522-6666
WA	Bellevue, Hood Engrg. Co.	206-453-9375
WI	Milwaukee, Sector Engrg. Sls.	414-352-8280

DATOTEK, INC., 13740 Midway Rd., Dallas, TX 75234, Tel: 214-233-1030, Telex: 73-0558; Empl.: 130; *Sls. Mgr.:* T. Peddicord

DATRON INSTRS., INC., 3401 SW 42nd Ave., Stuart, FL 33497, Tel: 305-283-0935, Telex: 525724; Empl.: 120

Local Sales Offices & Reps

AL	Huntsville, Scientific Dvcs.	205-536-1969
AZ	Phoenix, Zeus Elctrns.	602-263-6022
CA	Redondo Beach, Ward Davis Assoc.	213-973-7772
CA	San Diego, Ward Davis Assoc.	714-292-1000
CA	Santa Clara, Ward Davis Assoc.	408-245-3700
CO	Denver, Zeus Elctrns.	303-321-4246
CT	North Haven, Pat Jenks Assoc.	203-239-6201
FL	Orlando, Sci. Devices	305-841-8180
IL	Rolling Meadows, Commodore-I	312-394-5441
MA	Woburn, Pat Jenks Assoc.	617-938-0488
MN	St. Paul, Dytec/North, Inc.	612-645-5816
NJ	Pennsauken, Sci. Reps.	609-662-5222
NY	Fayetteville, D B Assocs.	315-446-0220
NY	Great Neck, R T I	516-829-3770
NC	Winston-Salem, Sci. Dvcs.	919-765-5776
OH	Chesterland, EQS Sys.	216-729-2222
OR	Beaverton, Northwest Test & Meas.	503-646-9966
TX	Richardson, Spectra Sls.	214-234-3600
UT	Salt Lake City, Zeus Elctrns.	801-534-0500
VA	McLean, Creative Mktg. Assocs.	703-442-9100
WA	Redmond, Northwest Test & Meas.	206-881-8857

DATRON

DATRON SYS., 20700 Plummer St., Chatsworth, CA 91311, Tel: 818-882-9616, TWX: 910-494-2787; FSC No.: 32255; Empl.: 150

Local Sales Offices & Reps

AZ	Scottsdale, Territorial Mktg.	602-994-8665
CA	Santa Barbara, Kannard Engrg., Inc.	805-492-5678
CO	Colorado Springs, Don Rondeau	303-599-3698
MD	Beltsville, Applied Engrg. Conslts.	301-953-2808
MA	Lexington, Eugene Delfino Co.	617-862-1118
NJ	Holmdel, Douglas Conslts.	201-741-5666
NY	Manlius, Quality Comps.	315-682-8885
TX	Garland, Carey, McMahill & Zerbe	214-681-1414

DATTILO ELECTRONICS, 11621 Electron Dr., Louisville, KY 40299, Tel: 502-267-4446; Empl.: 32

DATUM, STORAGE PRODS. DIV., 1363 State College Blvd., Anaheim, CA 92806, Tel: 714-533-6333, TWX: 910-592-1289; FSC No.: 31160; Empl.: 350; *Sls. Mgr.:* Roger Evans

Datum inc

DATUM INC., Timing/Aacom Divisions, 1363 S. State College Blvd., Anaheim, CA 92806, Tel: 714-533-6333, Telex: 4722045 (Intl.), TWX: 910-592-1289; FSC No.: 31160; Empl.: 280; *Sls. Mgr.:* Charles Neumann ..... 3•1154, 1155

Local Sales Offices & Reps

AL	Huntsville, Lee Assocs.	205-533-5896
AZ	Scottsdale, BFA Corp.	602-994-5400
CA	Anaheim, Datum	714-533-6333
CA	San Diego, M. Ficken	619-292-9392
CA	Santa Clara, Ward/Davis Assocs.	408-245-3700
CO	Denver, BFA Corp.	303-777-8070
CT	Mt. Carmel, Scientific Devices-New England	203-248-9361
FL	Fort Walton Beach, RAM-Z	904-862-2700
FL	Sarasota, RAM-Z	813-957-4900
FL	Sebastion, RAM-Z	305-388-0784
IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-293-5437
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
MA	Waltham, Daner-Hayes	617-894-7290, 800-225-8760
MA	Waltham, Scientific Devices-New England	617-890-2252
MI	New Berlin, Marsland	414-786-6611
MI	Plymouth, Daner-Hayes	313-464-4520
MI	Plymouth, Micro Sls. Corp.	313-459-1670
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	St. Louis, Marsland Assocs.	314-991-1399
NJ	Haddonfield, G. L. Williams Assocs.	609-428-6060
NM	Albuquerque, BFA Corp.	505-292-1212
NM	Las Cruces, BFA Corp.	505-524-9693
OH	Centerville, Micro Sls. Corp.	513-433-8171
OH	No. Olmsted, Micro Sls. Corp.	216-734-3080
OK	Tulsa, Data Mktg. Assocs.	918-496-1457
PA	Pittsburgh, Microsales	412-471-0105
TX	Austin, Data Mktg. Assocs.	512-451-5174
TX	Dallas, Data Mktg. Assocs.	214-661-0300
TX	El Paso, BFA Corp.	915-542-1762
TX	Houston, Data Mktg. Assocs.	713-780-2511
TX	San Antonio, Data Mktg. Assocs.	512-342-3031
UT	Salt Lake City, BFA Corp.	801-466-6522
VA	McLean, Creative Mktg. Assocs.	703-442-9100
WA	Seattle, Comptronics	206-284-4842

DAVEN COMPONENTS GRP., See Armtec Inds., Inc., Daven Comps. Grp.

DAVIDSON ELCTRN. DEV. CO., 113 E. 13th St., Erie, PA 16512, Tel: 814-453-7547, Telex: 914-529; Empl.: 27

DAVIES, HARRY, MOLDING CO., 4920 Bloomingdale Ave., Chicago, IL 60639, Tel: 312-622-8966; FSC No.: 72512; Empl.: 140; *Sls. Mgr.:* Leo A. Sera; *Dist. Mgr.:* Leo A. Sera

Local Sales Offices & Reps

AZ	Mesa, Littrell Western Sls.	602-838-7300
AR	Little Rock, L. E. Offutt Co.	501-225-8192
CA	Belmont, Littrell Western Sls. Inc.	415-592-3346
CA	Monterey Park, Littrell Western Sls.	213-261-0164
CO	Wheat Ridge, Christensen Sls.	303-423-8833
CT	Hartford, Sturgeon Co.	203-249-7800
FL	Pinellas Park, Carpenter Assoc.	813-546-8296
IL	Chicago, Druse Corp.	312-745-9073
IN	Noblesville, McCaw Sls.	317-877-5300
IA	Cedar Rapids, Clancey Co.	319-365-7141
IA	Des Moines, Clancey Co.	515-278-1331
KS	Shawnee Mission, Clancey Co.	913-432-4550
MA	Needham Heights, P. R. Sturgeon Co.	617-444-6603
MI	Detroit, Bishop-Strek & Co.	313-538-0595
MN	Bloomington, Clague Sls. Corp.	612-944-7982
MO	St. Louis, Clancey Co.	314-225-0800
NY	Wading River, Rywel Sls.	516-929-4884
NC	Matthews, Anthom, Inc.	704-847-7363
OH	Westlake, Foley Co.	216-871-8830
OR	Lake Oswego, Tri-Rep	503-635-4760
PA	Erie, H. De Paulis	814-838-7874
PA	Paoli, W. G. Walker	215-627-8146
TN	Brentwood, L. E. Offutt Co. Inc.	615-373-2951
TN	Memphis, L. E. Offutt Co.	901-396-3320
TX	Dallas, L. T. Greenwood	214-522-8718
WI	Milwaukee, Clague Sls.	414-272-1951

DAVIS, J. W., & CO., P.O. Box 26177, Dallas, TX 75226, Tel: 214-651-7341; Empl.: 42

DAVIS ELEC. CO., Box 38, Cape Girardeau, MO 63701, Tel: 314-335-5547; Empl.: 40

DAVONG SYSTEMS, INC., 217 Humboldt Ct., Sunnyvale, CA 94089, Tel: 408-734-4900, Telex: 176386; *Sls. Mgr.:* Donna Barry; *Dist. Mgr.:* Frank Jordan

DAYCO CORP., 333 W. First St., Dayton, OH 45402, Tel: 513-226-5927, Telex: 288219, TWX: 810-459-1822; Empl.: 10000

DAY-LIGHT DISPLAY CORP., 4 Barnet Rd., P.O. Box 694, Pine Brook, NJ 07058, Tel: 201-575-1045; FSC No.: 57736; Empl.: 14; *Sls. Mgr.:* P. Schneider

DAYTRONIC CORP., 2589 Corporate Pl., Miamisburg, OH 45342, Tel: 513-866-3300, TWX: 810-473-2978; Empl.: 109; *Sls. Mgr.:* John A. Perkins

D-B-DEVELOPMENTS, 7709 Kilbourne Rd., Rome, NY 13440, Tel: 315-339-1265; Empl.: 3

D-CEMCO, INC., 3200 N. San Fernando Blvd., Burbank, CA 91504, Tel: 213-849-6341, TWX: 910-498-2228; Empl.: 30

Local Sales Offices & Reps

AL	Decatur, Tenn Tech Inc.	205-350-0630
AZ	Scottsdale, Gleason Sls. Co.	602-946-3992
CA	Los Altos, Frauman Assoc.	415-941-0660
CA	San Diego, Hill & Assoc.	619-560-6368
CO	Longmont, Piper Sls. Co.	303-651-2378
FL	Maitland, Delmac Sls.	305-423-7562
IN	Fort Wayne, Jim Finnegan & Co.	219-747-9525
MA	Marlboro, O.K. Engrg. Co.	617-481-6400
MN	Minneapolis, Bitronics Sls.	612-835-7744
NJ	Fort Lee, Necco	201-461-2789
NJ	Jenkintown, Arnold Assoc.	215-742-0600
OH	Cincinnati, Jim Finnegan & Co.	513-931-1686
OH	Cleveland, Jim Finnegan & Co.	216-238-5905
OR	Portland, Jud LeBrun Co., Inc.	503-244-6805
PA	Jenkintown, Arnold Assoc.	215-742-0600
TX	Austin, Stevens Sls. Co.	512-250-5104
TX	Dallas, Stevens Sls.	214-350-2476
UT	Salt Lake City, Piper Sls. Co.	801-268-8707
VA	Reston, Boyle Assocs.	703-620-9558

DCI, INC., 720 E. Dennis, Olathe, KS 66061, Tel: 913-782-5672; FSC No.: 58677; Empl.: 9; *Sls. Mgr.:* William D. Cook ..... 3•1324

Local Sales Offices & Reps

AZ	Phoenix, J. Smith & Assoc.	602-267-0981
CA	San Diego, Windsor Dynamics	714-452-1891
CA	Sherman Oaks, Windsor Dynamics	213-990-4173
CA	Woodside, N-S Assoc.	415-854-4870
CO	Colorado Springs, J. Smith & Assoc.	303-597-5343
CT	Tolland, R. G. Assoc.	203-875-4201
FL	Melbourne, EME^3	305-259-2711
GA	Stone Mountain, Zelco	404-498-2181
IL	Chicago, Commodore I	312-394-5441
IN	Indianapolis, Commodore I	317-636-3318
KS	Shawnee Mission, Vertec	913-677-3200
MA	Danvers, R. G. Assocs.	617-777-3199
MI	Detroit, Michigan Valve & Fitting	313-884-9415
MN	Minneapolis, Trask Engrg.	612-537-2434
MO	St. Louis, Vertec	314-394-6242
NJ	Wayne, Ramapo	201-839-6767
NM	Albuquerque, J. Smith & Assoc.	505-265-3406
NY	Latham, L-Tron	518-785-5032
NC	Charlotte, Zelco	704-523-2961
OH	Columbus, R. D. Cloon Assoc.	614-459-2890
PA	Radnor, Roberts Engrg. Sls.	215-688-6525
TX	Richardson, Meas. Sys. & Sls.	214-644-4954

DEAK TECHNOLOGY, INC., Sainte Claire Plaza, 1121 Boyle Rd., Pittsburgh, PA 15241, Tel: 412-341-2245; *Sls. Mgr.:* David Thornburg ..... 3•1216

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DEARBORN
FOR WIRE CABLE INSULATION

DEARBORN WIRE & CABLE CO., 9299 Evenhouse Ave., Rosemont, IL 60018, Tel: 312-696-1000, TWX: 910-253-0343; Empl.: 80 ..... 2•2096-2101

Local Sales Offices & Reps

CA	Chino, Dearborn West	714-591-9393
CA	San Diego, OHM Spun Elctrns.	619-695-8102
CO	Littleton, Advanced Technlg. Mktg.	303-979-8420
FL	Orlando, Admiral Sls.	305-352-0046
GA	Atlanta, Beacon Assocs.	404-256-9640
IL	Chicago, LGS Sls.	312-456-9616
IL	Wilmette, Joel Wasserman Assocs.	312-256-3566
IN	Indianapolis, Elctrn. Reps.	317-894-1414
MA	Clinton, F. J. Coleman & Co.	617-368-0116
MI	Southfield, R. C. Merchant & Co.	313-354-4300
MI	St. Joseph, R. C. Merchant & Co.	616-983-7378
MN	Golden Valley, Ambassador Indl. Mktg.	612-542-8437
MO	St. Charles, Buckman & Assocs.	314-946-6201
NJ	Livingston, Accurate Wire & Cable	201-533-0103
NJ	Medford, Jack McCoy, Inc.	609-953-0770
NY	Fairport, Net Sls.	716-467-4538
OH	Richfield, Bear Mktg.	216-659-3131
PA	Downington, Jack McCoy, Inc.	215-363-0350
TN	Memphis, Electronic Sls. Co.	901-682-2281
VA	Lynchburg, Mechanical Assocs.	804-237-6286
WA	Everett, Huntley Assocs.	206-353-1833

Local Distributors

AL	Huntsville, Chase Elctrns.	205-536-0738
AL	Madison, S.E.A. Wire and Cable	205-772-9616
CA	Chatsworth, Sonic Wire	213-701-0565
CA	Inglewood, Newark Elctrns.	213-678-0441
CO	Denver, Newark Elctrns.	303-757-3351
FL	Altamonte Springs, Royce Elctrns.	305-869-4700
FL	Ft. Lauderdale, Pacer Elctrns.	305-462-0902
FL	Ft. Lauderdale, Simcona Elctrns.	305-485-4455
IL	Bloomington, K. L. Tannehill	612-881-6700
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Elk Grove Village, GBL/Goold Elctrns.	312-593-3220
IL	Northbrook, Classic Comps.	312-272-9650
IL	Palatine, Ohm Elctrns.	312-359-5500
IN	Carmel, Altex	317-848-1323
IN	Evansville, Hutch & Sons	812-425-7201
IN	Indianapolis, Genesis Elctrns.	317-637-5571
IA	Cedar Rapids, Deeco	319-365-7551
LA	New Orleans, Radio Parts	504-581-5959
MI	Grand Rapids, R. M. Electrns.	616-531-9300
MI	Grand Rapids, SF Elctrns.	616-459-0216
MI	Livonia, RS Elctrns.	313-525-1155
MI	Oak Park, Newark Elctrns.	313-967-0600
MN	Bloomington, K. L. Tannehill	612-881-6700
MN	Bloomington, Berquist Corp.	612-835-2322
MN	Bloomington, NWR Elctrns.	612-854-7329
MN	Hibbing, NWR Elctrns.	218-262-5228
MN	Minneapolis, Newark Elctrns.	612-331-6350
MO	St. Charles, Finnigan Elctrns.	314-946-6201
NJ	Dover, Electro Spec	201-361-6300
NJ	E. Brunswick, Brothers Elec.	201-238-2200
NJ	W. Collingswood Hgts., The Edge Supp.	609-456-3955
NM	Albuquerque, Walker Elctrn. Supp.	505-247-2288
NY	Binghamton, Help Elctrns.	607-729-3528
NY	Elmira, CAC Elec. Supp.	607-734-1696
NY	Fairport, Pacer Elctrns.	716-377-0462
NY	Rochester, Simcona Elctrns.	716-328-3230
NY	Troy, Trojan Elctrn. Supp.	518-274-4481
OH	Akron, Akron Elctrn. Supp.	216-762-8818
OH	Valley View, Newark Elctrns.	216-447-8860
PA	Harrisburg, Pyttronics	717-236-8001
PA	McKean, Advacom	814-476-7774
TX	Austin, R.S.I.	512-834-2015
TX	Dallas, Shearson Elec.	214-340-3094
TX	Garland, Newark Elctrns.	214-487-8144
TX	Houston, Newark Elctrns.	713-782-4800
UT	Salt Lake City, RA-ELCO	801-487-0571
VA	Charlottesville, Virginia Radio Supp.	804-296-4184
VA	Lynchburg, Components Unltd.	804-237-6286
WA	Seattle, Carlyle Tech. Sls.	206-575-6750
WI	Milwaukee, Marsh Elctrns.	414-475-6000

DECC DIV., See Helionetics, Inc., DECC Div.

DECISION DATA COMPUTER CORP., 100 Witmar Rd., Horsham, PA 19044

DECOM SYS., 340 Rancheros Dr., San Marcos, CA 92069, Tel: 619-744-1002, TWX: 910-322-1758; FSC No.: 55744; Empl.: 44; *Sls. Mgr.:* G. F. Tremain

Local Sales Offices & Reps

AL	Lake Guntersville, Kelley Sys. Corp.	205-582-8677
CA	Los Angeles, L. L. Stoakes, Inc.	213-640-2178
CA	Palo Alto, Egbert Engrg.	415-326-1387
CA	San Diego, L. L. Stoakes, Inc.	619-452-1600
CO	Boulder, Grady Moore Assocs.	303-494-3351
FL	Sarasota, S. Bass Assocs.	813-922-9538
IN	Indianapolis, Loren Green Associates	317-293-9827
KS	Shawnee Mission, Techn. Sls. Assocs.	913-888-3330
MD	Severna Park, Delmarva, Ltd.	301-647-8007
MA	Bedford, Claflin Assocs.	617-275-7428
MO	St. Louis, Techn. Sls. Assocs.	314-725-5361
NM	Albuquerque, Grady Moore Assocs.	505-262-1416
PA	Huntingdon, Rabal Assocs.	215-947-4825
EXP	CA, San Marcos, Decom Sys.	619-744-1002

DE COURSEY ENGRG. LAB., 11828 W. Jefferson, Culver City, CA 90230, Tel: 213-EX7-9668; Empl.: 7

DEGUSSA, Rte. 46 & Hollister, Teterboro, NJ 07608, Tel: 201-288-6500, Telex: 134610, TWX: 710-990-6143; FSC No.: 630673043; *Sls. Mgr.:* Paul M. Silberman

DEK, INC., 3480 Swenson Ave., St. Charles, IL 60174, Tel: 312-377-2575, Telex: 297284 DEK UR; Empl.: 115; *Sls. Mgr.:* L. R. Pappone

Local Distributors

AZ	Tempe, Waltronics Sls.	602-967-1020
CA	Riverside, Elctrn. Supp.	714-683-7300
CA	Santa Clara, Waltronic Sls.	408-727-1200
IL	Addison, L-Comp	312-628-1400
MD	Hanover, Vertex-Mid Atlantic	301-796-5000
MA	No. Wilbraham, Indl. Comps. Corp.	413-596-3854
MI	Lavonia, Camelot Elctrns.	313-427-8660
MN	St. Paul, Arden Indl. Prods.	612-483-6681
MO	Maryland Heights, L-Comp	314-291-6200
NJ	East Orange, Willgold Sls. Corp.	201-678-7700
NJ	Kenilworth, Federated	201-272-0505
NY	Farmingdale, Vertex Elctrns.	516-293-9880
OH	Columbus, Elctrn. Mktg.	614-299-4161
PA	Philadelphia, Phila. Elctrns.	215-568-7400
TN	Paris, Southern States Indl. Sls.	901-642-0885
TX	Crowley, Service Assocs.	817-297-4604
TX	Dallas, Wholesale Elctrn.	214-824-3001
TX	Ft. Worth, Ft. Worth Wire & Cable	817-332-8252
UT	Ogden, Grimes Mktg.	801-546-4029
WI	Waukeshaw, Cable Comps.	414-785-1060

DELBERT BLINN CO., Box 2007, Pomona, CA 91766, Tel: 714-629-3900; Empl.: 10 .... **1A**•2093

Local Sales Offices & Reps

CA	San Carlos, Baytronic's	415-588-0958
MD	Baltimore, Callas Elctrns.	301-744-7711
NY	Commack, Kaelber & Mack	516-499-2924
WA	Woodinville, W. J. Stulgis Co.	206-486-8539

Local Distributors

MN	Minneapolis, Stark Elctrns.	612-332-1325

DELCO WIRE & CABLE, INC., 257 Rittenhouse Cir., Bristol, PA 19007, Tel: 215-785-0511, Telex: 06-964523, TWX: 510-667-0968; *Sls. Mgr.:* T. Blick

DEL ELCTRNS. CORP., 250 E. Sandford Blvd., Mt. Vernon, NY 10550, Tel: 914-699-2000, TWX: 710-562-0130; FSC No.: 01378; Empl.: 180 .... **1A**•2151; **3**•1546, 1547

Local Sales Offices & Reps

AZ	Tempe, Trembly Assocs.	602-967-2058
CA	Pasadena, A-F Sales Engrg.	213-681-5631
CA	San Carlos, Winco Sls.	415-592-0357
CO	Lakewood, Trembly Assocs.	303-233-9544
IL	Elmhurst, Scott Assocs.	312-279-5681
MA	Burlington, TriTek	617-272-4550
MI	Dearborn, Pitcher-Poulin	313-582-5450
NV	Las Vegas, Trembly Assocs.	702-739-9770
NM	Albuquerque, Trembly Assocs.	505-266-8616
NY	Smithtown, T & K Sales	516-724-3456
OK	Tulsa, Barry Sales	918-749-7775
OR	Portland, Syscom Sls., Inc.	503-644-2505
PA	Ardmore, Martin Assoc.	215-649-6332
TX	Houston, Barry Sales	713-784-5860
TX	Richardson, Barry Sales	214-234-0255
UT	Salt Lake City, Trembly Assocs.	801-486-5292
WA	Bellevue, Syscom Sls., Inc.	206-641-5080

DELEVAN DIV., American Precision Inds. Inc., 270 Quaker Rd., E. Aurora, NY 14052, Tel: 716-652-3600, Telex: 91-293; FSC No.: 99800; Empl.: 400; *Sls. Mgr.:* R. Nareau .... **1A**•1243

Local Sales Offices & Reps

AL	Huntsville, Conley & Assocs.	205-882-0316
AZ	Phoenix, Toward Engrg.	602-955-3193
CA	Culver City, Bestronics	213-870-9191
CA	El Toro, Delevan	714-768-5522
CA	Freemont, Advanced Technlg. Sls.	415-651-0123
CA	Irvine, Bestronics	714-261-7233
CA	San Diego, Bestronics	619-452-5500
CA	Woodland Hills, Bestronics	213-704-5616
CO	Aurora, High Tech Assocs.	303-695-1990
FL	Boca Raton, Conley & Assocs.	305-395-6108
FL	Oviedo, Conley & Assocs.	305-365-3283
FL	Tampa, Conley & Assocs.	813-885-7658
GA	Doraville, Conley & Assocs.	404-447-6992
IL	Downers Grove, Momak Sls.	312-963-6400
IN	Fort Wayne, Walter W. Bieberich	219-432-2537
IN	New Albany, Walter W. Bieberich	812-945-3187
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
KS	Parker, S. W. Wollard	913-898-6552
MD	Lutherville, D. A. Dougherty Sls. Co.	301-321-7890
MA	Boston, P. J. Engrg. Sls. Co.	617-924-5950
MN	Mendota Hgts., G-II Sls.	612-454-3086
NJ	Bellmawr, TAI	609-933-2600
NJ	Parlin, Martech Assocs.	201-721-2200
NY	Endicott, Tech-Mark	607-748-7473
NY	Manhassett, Martech Assocs.	516-627-1151
NY	Mendon, Tech-Mark	716-624-3840
NY	Whitesboro, Tech-Mark	716-624-3840
NC	Raleigh, Conley & Assoc.	919-876-9862
OH	Beachwood, Electronic Salesmasters	216-831-9555
TX	Irving, Kite Elctrn. Sls. Co.	214-438-9336
WI	Milwaukee, Momak Sls.	414-963-1590

Local Distributors

CA	Chatsworth, IEC	213-998-2200
CA	Glendale, R. V. Weatherford	213-849-3451
CA	Santa Clara, WDG/Santa Clara	408-727-2500
FL	West Palm Beach, Nurmi Elctrn. Supp. Co.	305-686-8553
IN	South Bend, Genesis Elctrns.	219-287-2911
MD	Sauage, Pyttronics Inds. Inc.	301-792-0780
MA	Boston, P. J. Engrg. Supp.	617-783-0510
NJ	New Brunswick, Brothers Elctrns.	201-238-2200
NY	Bohemia, Car-Lac	516-567-4200
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Farmingdale, Milgray/New York	516-420-9800
PA	Norristown, Century Elctrn. Comp.	215-631-5400
TX	Dallas, R. V. Weatherford Co.	214-931-7333
TX	Fort Worth, Patco Supply	817-429-8596
Can	Burnaby B.C., R-A-E Indl. Elctrns. Ltd.	604-291-8866
Can	Don Mills, Ontario, Saynor Elctrns. Ltd.	416-445-2347
Can	Montreal, Quebec, Prelco Elctrns. Ltd.	514-389-8051
Can	Pointe-Claire Quebec, Future Elctrn.	514-694-7710

DELTA DESIGN, 5775 Kearny Villa Rd., San Diego, CA 92123, Tel: 619-292-5000, TWX: 910-335-1215; Empl.: 150; *Sls. Mgr.:* Bob Williams

DELTA ELECTRONIC CONTROLS CORP. (DECC), See Helionetics, Inc., DECC Div.

DELTA ELECTRONIC IND. USA, Delta Elctrn. Ind. Co. Ltd., 3401 Investment Blvd., Ste. 5, Hayward, CA 94545, Tel: 415-785-5231, 415-785-5235, Telex: 4992342 DELTAITTHY; Empl.: 1000; *Sls. Mgr.:* Bruce Cheng; *Dist. Mgr.:* Bruce Cheng .... **1A**•1590, 1591

Local Sales Offices & Reps

AL	Huntsville, Technlg. Mktg. Assocs. Inc.	205-883-7893
AZ	Scottsdale, Summit Sls.	602-998-4850
CA	Mountain View, Taarcom Inc.	415-960-1550
CA	National City, Tri-Electro Sls.	619-470-1564
CA	Simi Valley, Tri-Electro Sls.	805-583-5124
CO	Aurora, Mountain View Mktg. Ltd.	303-360-9641
CT	Waterbury, Compak	203-755-5629
CT	Wethersfield, Compak	203-563-4784
FL	Atlanta, Technlg. Mktg. Assocs., Inc.	404-257-0374
FL	Melbourne, Technlg. Mktg. Assocs., Inc.	305-254-2554
FL	Orlando, Technlg. Mktg. Assocs., Inc.	305-857-3760
FL	Pompano Beach, Technlg. Mktg. Assocs., Inc.	305-942-0774
IL	Chicago, United Prods. Co.	312-631-1122
IN	Indianapolis, Electronic Sls. & Engrg., Inc.	317-849-4260
IA	Cedar Rapids, Palatine Engrg. & Sls. Inc.	319-365-8071
KS	Mission, Palatine Engrg. & Sls. Inc.	913-831-0555
KS	Wichita, Palatine Engrg. & Sls. Inc.	316-262-1020
MD	Baltimore, Burgin-Kreh Assocs. Inc.	301-265-8500
MA	Woburn, Compak	617-938-8580
MA	Woburn, Mascon Inc.	617-938-8950
MN	Edina, Monroe Hanna	612-925-5700
MO	Hazelwood, Palatine Engrg & Sls.	314-839-0800
NJ	Kenilworth, Ventronics	201-272-9262
NC	Charlotte, Robert W. Chapman & Co.	704-525-2421
NC	Greensboro, Robert W. Chapman & Co.	919-282-0740
NC	Raleigh, Robert W. Chapman & Co.	919-782-2624
OK	Tulsa, Advance Tech. Sls., Inc.	918-664-0482
OR	Portland, Jas. J. Backer & Co.	503-297-8744
OR	Salem, Jas. J. Backer & Co.	503-362-0717
SC	Greenville, Robert W. Chapman & Co.	803-288-8821
SC	W. Columbia, Robert W. Chapman & Co.	803-256-0072
TX	Austin, Advance Tech. Sls., Inc.	512-459-1351
TX	Dallas, Advance Tech. Sls., Inc.	214-340-1300
TX	Houston, Advance Tech. Sls., Inc.	713-440-3888
UT	Murray, Mountain View Mktg.	801-261-4867
VA	Lynchburg, Burgin-Kreh Assocs., Inc.	804-239-2626
WA	Seattle, Jas. J. Backer Co.	206-285-1300
PR	San Juan, Electronic Tech. Sls.	809-790-1300

Local Distributors

CA	Mountain View, Cornett Elctrns.	415-969-5420
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Torrance, Cypress Elctrns.	213-533-6005
IL	Chicago, UPCO Distrs., Ltd.	312-631-1122
IA	Cedar Rapids, Bergquist Co.	319-366-8733
MA	Wellesley Hills, Target Elctrn. Supp., Inc.	616-235-2545
MN	Minneapolis, Bergquist Co.	612-835-2322

DELTA ELCTRNS., 145 Fayette St., Winston-Salem, NC 27101, Tel: 919-725-4122; Empl.: 45; *Sls. Mgr.:* L. E. Hancock

DELTA ELECTRONICS MFG. CORP., 416 Cabot St., Beverly, MA 01915, Tel: 617-927-1060

DELTA PRODS., Box 1147, Grand Junction, CO 81501, Tel: 303-242-9000; Empl.: 35; *Sls. Mgr.:* K. D. Braa

DELTA WIRE & CABLE CO., P.O. Box 833, 1900 Marquette, North Chicago, IL 60064, Tel: 312-473-4990; Empl.: 12; *Sls. Mgr.:* Mike Golden; *Dist. Mgr.:* Matt Coleman

DELTROL CONTROLS, 2745 S. 19th St., Milwaukee, WI 53215, Tel: 414-671-6800; Empl.: 300 ....**1B**•1334, 1335, 1482, 1483

Local Sales Offices & Reps

CA	Canoga Park, Cummings & Assocs.	213-340-6035
CA	Santa Clara, Cummings & Assocs.	408-247-8656
CO	Denver, Cummings & Assocs.	303-455-6860
CT	Marion, Sands Co.	203-628-4363
FL	Lighthouse Point, J. Krutek & Assocs.	305-941-6544
HI	Honolulu, Aloha Assocs.	808-941-1574
IN	Indianapolis, Nationwide Comps.	317-872-7207
MD	Woodbine, Naudain Assocs.	301-252-5378
MI	Farmington Hills, W. R. Hummon & Assocs.	313-474-0661
MN	St. Paul, Kencotronics	612-645-7717
MO	Ellisville, Weisler & Assocs.	314-394-4543
MO	Kansas City, Weisler & Assocs.	816-421-1679
NJ	Marlton, Naudain Assocs.	609-235-1801
NY	Babylon, Astrorep.	516-422-2500
NY	Rochester, Omni Sls.	716-473-3340
NC	Charlotte, JWL Assocs.	704-364-3177
OH	Willoughby, Nationwide Comp. Reps.	216-946-3226
OR	Portland, Cummings & Assocs.	503-761-4411
PA	Philadelphia, Naudain & Assoc.	609-235-1801
TX	Garland, R. May Assocs.	214-276-5214

Local Distributors

AL	Montgomery, Southern Controls	205-277-5030
AZ	Phoenix, Elctrns. Parts Co.	602-277-7281
AR	Little Rock, Carlton-Bates Co.	501-562-9100
CA	Anaheim, Electro Comps. Distrs.	714-634-0222
CA	Buena Park, Control Design	714-521-5040
CA	Canoga Park, C & A Elctrns.	213-340-6022
CA	Los Angeles, Electric Switches	213-664-2125
CA	Los Angeles, Electro Comps. Distrs.	213-264-7100
CA	Mt. View, Corrnett Elctrns.	415-969-5420
CA	Pasadena, Dow Radio Co.	213-793-1195
CA	San Jose, Consolidated Parts	408-263-9521
CA	Tustin, Western Switches	714-731-4333
CO	Colorado Springs, Centennial Elctrns.	303-633-4666
CO	Denver, Integrated Elctrns.	303-534-6121
CO	Denver, Fistell's Elctrn. Supp.	303-629-1312
CO	Englewood, Industrial Elctrns.	303-771-2632
CO	Grand Junction, Radio & Elctrns. Supp.	303-243-3346
CT	Danbury, Pilgrim Elctrns.	203-792-7274
FL	Altamore Springs, Control Des.	305-788-3220
FL	Ft. Lauderdale, Peerless Radio Corp.	305-566-5966
FL	Ft. Lauderdale, SE Elctrns.	305-563-4131
FL	Jacksonville, Mitchell Elctrns.	904-356-8427
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	Tampa, Leader Elctrns. Distrs.	813-870-3315
GA	Atlanta, Georgia Control Ctr.	404-876-8833
GA	Atlanta, A-C Equip.	404-451-2747
ID	Boise, Kimball Elctrns.	208-342-3559
ID	Pocatello, Kimball Elctrns.	208-232-2201
IL	Chicago, Otto Frankenbush	312-647-0755
IL	Elk Grove Village, GBL	312-593-3222
IL	Genoa, Control Design	815-784-6515
IL	Rosemont, Advent Elctrns.	312-295-4210
IN	Indianapolis, Advent Elctrns.	317-297-4910
IN	Indianapolis, Warren Radio Co.	317-634-5566
IN	Indianapolis, Control Design	317-788-4559
IN	Lafayette, CWY Elctrns.	317-447-4617
IA	Cedar Rapids, Iowa Radio Supp.	319-364-6154
IA	Davenport, Warren Radio	319-322-5301
IA	West Des Moines, Ramco Co.	515-225-6933
KS	Kansas City, Kornfield Thorp Elec.	913-321-7070
KS	Topeka, Carroll Radio	913-234-6677
KY	Ashland, Ashland Elec. Co.	606-324-4107
KY	Bowling Green, Randolph, Hale & Meredith	502-781-1460
KY	Louisville, Peerless Elctrn. Equip.	502-637-7677
KY	Paducah, Warren Radio Co.	502-442-4367
LA	Shreveport, Indl. Elec. Supp.	318-222-9459
MA	Brighton, Interstate Elctrns. Equip.	617-782-9000
MA	Newton Upper, Instock Prods.	617-964-6200
MA	Wakefield, Lorcor Elec.	617-246-1903
MI	Augusta, Great Lakes Elec.	616-731-4156
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Flint, Michigan Elctrns.	313-232-6550
MI	Flint, Roth Elec. Supp.	313-234-8661
MI	Kalamazoo, Warren Radio	616-381-4203
MN	Minneapolis, Control Design	612-721-6555
MO	Kansas City, Western Extralite	816-421-8404
MO	St. Louis, Van Sickle Radio Elctrns.	314-621-5000
MO	St. Louis, Control Design	314-426-3150
NJ	Edison, William Elctrns. Supp.	201-985-3700
NJ	Fairlawn, Relay Specialties	201-797-3313
NY	Farmingdale, Ramtronix	516-752-1272
NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Hempstead, Elctrn. Equip. Co.	516-895-5757
NY	Jamestown, Warren Radio	716-484-1141
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Rochester, Masline Elctrns.	716-546-5373
NC	Raleigh, SE Elec.	919-828-2311
ND	Grand Forks, Border States	701-772-3477
OH	Cincinnati, United Radio	513-761-4030
OH	Columbus, McJunkin Corp.	614-294-3711
OH	Toledo, Warren Radio Supp.	419-248-3364
OH	Wickliffe, Gateway Elctrns.	216-944-8565
OK	Ardmore, Ardmore Elec. Supp.	405-223-3571
OR	Eugene, Portland Elec. & Plumbing	503-243-6885
OR	Eugene, North Coast Elec. Co.	503-343-7701
OR	Portland, Portland Elec. & Plumbing Co.	503-243-6832
OR	Portland, Dunn Elec.	503-285-0214
PA	Erie, REM Elctrns.	814-453-5626
PA	Malvern, Control Design	215-296-0150
PA	Philadelphia, Anco Elec.	215-468-5544
PA	Philadelphia, Lindley Elec.	215-329-7005
SC	Greenville, Hammond Elec.	803-233-4421
TN	Chattanooga, Curle Elctrns.	615-266-4728
TN	Memphis, Warren Radio	901-274-2460
TX	Dallas, Dallas Instrs.	214-394-1180
TX	Dallas, Watson Elec. Supp.	214-742-8441
TX	Dallas, Control Design	214-358-1441
TX	Dallas, J & S Elec.	214-681-1394
TX	El Paso, Midland Specialty	915-533-9555
TX	Lubbock, R & R Elec. Co.	806-765-7727
TX	San Antonio, Blackburn Drives Controls	512-349-2621
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
VA	Ashland, Hermitage Distrs.	801-328-2075
VA	Staunton, Southern Elec.	703-886-6218
WI	Manitowac, Englewood Elec.	414-684-6653
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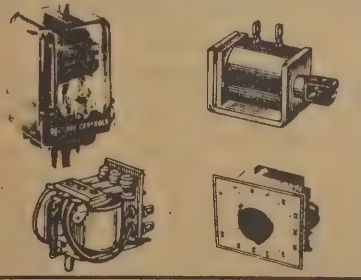

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NC	Raleigh, Cartwright & Bean	919-781-6560
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OH	Shaker Hgts., K.W. Elctrn. Sls.	216-491-9177
OH	Worthington, K.W. Elctrn. Sls.	614-888-0483
OR	Tigard, Elctrn. Sources	503-684-0040
PA	Allison Park, K.W. Elctrn. Sls.	412-487-4300
PA	Broomall, L.D. Lowery	215-528-5170
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TN	Memphis, Cartwright & Bean	901-276-4442
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TX	Houston, Tesco	713-777-1443
UT	Salt Lake City, Comp. Prods. Sls.	801-262-0000
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WI	Milwaukee, D. Dolin Sls.	414-482-1111

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CA	Sunnyvale, Time Elect.	408-734-9888
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IL	Northbrook, Classic Comps. Supp.	312-272-9650
IL	Palatine, OHM Elctrns.	312-359-5500
IL	Peoria, Klaus Radio & Elect.	309-691-4840
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IN	Indianapolis, Graham Elctrn.	317-634-8202
IN	South Bend, Genesis Elctrn.	219-287-2911
KY	Louisville, P.I. Burks	502-589-3960
LA	Lafayette, Ralph's of Lafayette	318-234-4507
LA	New Orleans, Southern Radio Supp.	504-524-2343
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MD	Rockville, Capitol Radio Whlsrs.	301-881-2270
MA	Hingham, Sager Elec. Supp.	617-749-6700
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MA	Wilbraham, Ind'l. Comps.	413-596-3854
MI	Ann Arbor, Wedemeyer Elctrn. Supp.	313-665-8611
MI	Livonia, RS Elctrns.	313-525-1155
MI	Oak Park, Newark Elctrn.	313-967-0600
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NE	Lincoln, Scott Elctrn. Supp.	402-466-8221
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NJ	Pennsauken, Resco Elctrns.	609-662-4000
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NY	Elmsford, Ancar Elctrns. Supp.	914-592-7100
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OH	Cincinnati, URI Elctrns.	513-761-4030
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OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Dayton, Pioneer/Dayton	513-236-9900
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LA	Mandeville, W. A. Brown Instrs., Inc.	504-626-9701
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NY	Utica, Naco Elctrns. Corp.	315-732-1801
NC	Durham, W. A. Brown Instrs., Inc.	919-683-1580
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PA	Pittsburgh, WKM Assocs., Inc.	412-892-2953
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DIGITAL EQUIP., One Iron Way, Marlborough, MA 01752

DIGITAL GRAPHIC SYS., 935 Industrial Ave., Palo Alto, CA 94303, Tel: 415-856-2500; *Sls. Mgr.:* Robert Pickthorn

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WA	Edmonds, Power Sources	206-784-3336

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IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-924-3568
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
KS	Shawnee, Marsland Assocs.	913-631-5400
MI	Southfield, Comtel-Instr.	313-358-2505
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	St. Louis, Marsland Assocs.	314-878-2402
NJ	Cherry Hill, Sci. Reps.	609-482-0059
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OH	Dayton, Comtel-Instr.	513-298-7573
PA	Pittsburgh, Comtel-Instr.	412-922-5720
TX	Houston, Adaptive Controls	713-995-9791
UT	Salt Lake City, Meas. Conslts.	801-364-3174
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AR	Little Rock, Beacon Elctrn. Assoc.	501-224-5449
CA	Anaheim, Westrep	213-404-3881, 714-527-2822
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, Westrep	408-988-8833
CO	Littleton, Omega, Ltd.	303-798-7040
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Clearwater, Beacon Elec. Assoc.	813-796-2378
FL	Ft. Lauderdale, Beacon Elec. Assocs.	305-491-1054
FL	Maitland, Beacon Elec. Assocs.	305-647-3498
FL	Melbourne, Beacon Elec. Assoc.	305-724-8010
GA	Atlanta, Beacon Elctrns. Assoc.	404-256-9640
IL	Elk Grove Village, Carlson Elctrn. Sls.	312-956-8240
IN	Ft. Wayne, R. O. Whitesell & Assoc.	219-432-5591
IN	Indianapolis, R. O. Whitesell & Assoc.	317-359-9283
IN	Kokomo, R. O. Whitesell & Assoc.	317-457-9127
IA	Des Moines, The Beams Co.	515-255-1148
KS	Shawnee Mission, The Beams Co.	913-631-0300
KY	Louisville, R. O. Whitesell & Assoc.	502-426-7696
MD	Silver Spring, Marktron	301-460-6100
MD	Timonium, Marktron	301-252-7111
MA	Burlington, Kitchen & Kutchin	617-229-2660
MI	Grand Rapids, R. O. Whitesell & Assoc.	616-942-5420
MI	Southfield, R. O. Whitesell & Assoc.	313-559-5454
MI	St. Joseph, R. O. Whitesell & Assoc.	616-983-7337
MO	St. Louis, The Beams Co.	314-569-1060
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NJ	Hasbrouck Hgts., Comp-Tech Sls.	201-288-7400
NY	New York, Comp-Tech Sls.	516-593-2628
NY	Rochester, Ossmann Comp. Sls.	716-424-4460
NY	Syracuse, Ossmann Comp. Sls.	315-455-6611
NC	Greensboro, Beacon Elctrns. Assoc.	919-275-9997
NC	Raleigh, Beacon Elec. Assoc.	919-787-0330
OH	Cincinnati, R. O. Whitesell & Assoc.	513-521-2290
OH	Cleveland, R. O. Whitesell & Assoc.	216-447-9020
OH	Columbus, R. O. Whitesell & Assoc.	614-888-9396
OH	Dayton, R. O. Whitesell & Assoc.	513-298-9546
OR	Beaverton, Barrett-Squibb & Assoc.	503-642-1661
PA	Pittsburgh, R. O. Whitesell & Assoc.	412-963-6161
TX	Dallas, Allied Comps.	214-238-0408
TX	Houston, Allied Comps.	713-988-1600
TX	Hurst, Allied Comps.	817-589-0456
TX	Round Rock, Allied Comps.	512-244-1166
UT	Riverton, Omega, Ltd.	801-254-6723
VA	Charlottesville, Marktron	301-460-6100
WA	Redmond, Barrett-Squibb & Assoc.	206-885-6991
WI	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

Local Distributors

AL	Huntsville, Powell Elec.	205-539-2731
AL	Huntsville, Comp. Distrs.	205-883-7501
AZ	Phoenix, BeSwitched	602-275-4805
AZ	Tempe, Powell Elctrns.	602-967-7538
AR	Little Rock, Comp. Distrs.	501-227-6278
CA	Cerritos, El-Com	213-404-2961
CA	Fullerton, Pyramid	714-773-0781, 213-691-0561
CA	San Diego, El-Com	619-578-0900
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Santa Clara, Pyramid Elec.	408-727-9810
CO	Denver, CSID, Inc.	303-292-9594
CT	Hamden, Impact Elctrns.	203-281-1331
FL	Ft. Lauderdale, Comp. Distrs.	305-971-4950
FL	Ft. Lauderdale, Powell Electr./Fla.	305-972-4300
GA	Norcross, Comp. Distrs.	404-441-3320
IL	Mt. Prospect, Magnuson Elctrns.	312-956-0700
IN	Indianapolis, Graham Elec.	317-634-8202
IN	Indianapolis, Pioneer/Indiana	317-849-7300
IN	Indianapolis, Magnuson Elctrns.	317-247-5108
MD	Columbia, Powell Electr.	301-621-4070
MD	Timonium, Zebra Elec.	301-252-6576
MA	Canton, Impact Sls. Co.	617-821-1500
MA	West Borough, Powell Electrns.	617-336-6100
MI	Livonia, Pioneer/Michigan	313-525-1800
MI	St. Clair Shores, Specialties Mfg.	313-771-2700
MN	St. Paul, Magnuson Elec.	612-227-8495
NJ	Hasbrouck Hgts., Tory Sls.	201-288-5656
NJ	Pompton Plains, Zebra Elec.	201-839-9040
NY	Rochester, Modutex Corp.	716-647-9700
NC	Cary, Powell Elec.	919-467-1212
NC	Raleigh, Comp. Distrs.	919-834-9465
OH	Cleveland, Pioneer-Cleveland	216-587-3600
OH	Columbus, Elctrns. Mktg. Corp.	614-299-4161
OH	Dayton, Pioneer/Dayton	513-236-9900
OK	Tulsa, Norvell Elctrns.	918-663-1247
OR	Beaverton, Shannon, Ltd.	503-644-8077, 800-426-4615
OR	Wilsonville, Zepher Elec. Sls. Corp.	503-682-2929; 800-547-1853
PA	Philadelphia, Powell Electr.	215-365-1900
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
TX	Austin, Norvell Elctrns.	512-458-8106
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	Houston, Norvell Elctrns.	713-777-1666
TX	Houston, Pioneer/Houston	713-988-5555
TX	Irving, Powell Elctrns.	214-258-6841
WA	Kent, Shannon, Ltd.	206-763-0545
WA	Seattle, Zepher Elec. Sls. Corp.	206-241-1980; 800-562-5057
WI	Mequon, Taylor Electrns.	414-241-4321

DILLON, W. C., & CO., 2320 Airport Blvd., Santa Rosa, CA 95401, Tel: 707-527-5555; Empl.: 99

DIMCO-GRAY, 8200 S. Suburban Rd., Dayton, OH 45459, Tel: 513-433-7600, Telex: 288-367; Empl.: 150; *Sls. Mgr.:* R. Cramer

DIONICS, 65 Rushmore St., Westbury, NY 11590, Tel: 516-997-7474, TWX: 510-222-0974; Empl.: 85; *Sls. Mgr.:* Mel Geffner

DIO-REY

THE LIGHTED DISPLAY DIVISION
INFO-LITE CORPORATION

DIO-REY, Div. of Info-Lite, 422 Cliff St., Fairview, NJ 07022, Tel: 201-941-4455; FSC No.: FSCM 52116; Empl.: 13; *Sls. Mgr.:* Joseph M. Cartelli; *Dist. Mgr.:* Joseph M. Cartelli ....**1B**•1040-1047; **3**•1159

Local Sales Offices & Reps

CA	No. Hollywood, Crown Elctrns.	213-877-3550
CA	Redwood City, Caltronic Assocs.	415-365-2545
CT	Weston, CJA Assoc.	203-226-4317
FL	St. Petersburg, R. L. Matus & Assocs.	813-896-4133
GA	Buford, R. L. Matus & Assocs.	404-945-2946
IL	Lake Zurich, L & B Assocs.	312-438-7917
MI	Brighton, Michigan Mktg. & Sls.	313-229-6218
NJ	Wayne, GT Assocs.	201-694-6040
NY	Syracuse, Lenard Co.	315-479-9191
OH	Cleveland, A.S.A.	216-662-6080
OH	Dayton, Mohawk Intronics	513-434-8873
TX	Dallas, Glidden Electro Equip.	214-341-0610
TX	Houston, Glidden Electro Equip.	713-681-1415

DISC INSTRS., 102 E. Baker St., Costa Mesa, CA 92626, Tel: 714-979-5300, TWX: 910-595-1987; Empl.: 175; *Sls. Mgr.:* D. Jolliff

Local Sales Offices & Reps

AZ	Phoenix, R.A. Mayes Co.	602-279-5243
CA	Costa Mesa, Disc Instrs.	714-979-5300
CA	Costa Mesa, Disc Instrs.	714-979-5300
CA	San Jose, Disc Instrs.	408-977-3019
CO	Denver, R.A. Mayes Co.	303-893-2264
FL	Casselberry, Hilco, Inc.	305-695-6208
GA	Dunwoody, Hilco, Inc.	404-393-1771
KS	De Soto, Midtec Assocs.	913-441-6565
MI	Troy, Disc Instr.	313-649-1340
MI	Troy, Disc Instrs.	313-649-1340
MN	Edina, J. H. Hanson Co.	612-893-9960
MO	Florissant, Midtec Assoc.	314-837-5200
NM	Albuquerque, R.A. Mayes Co.	505-292-2330
NC	Charlotte, Hilco, Inc.	813-422-3908
OR	Portland, Controltek Sls. Ltd.	503-641-0877
RI	Providence, Disc Instr.	401-438-6000
SC	Mount Pleasant, Hilco, Inc.	803-883-9633
TX	Richardson, Meas. Sys. & Sls. Inc.	214-644-4954

DISPLAY DEVICES, Box 667, Encinitas, CA 92024, Tel: 619-753-0113; FSC No.: 26107

DISPLAY INTERFACE CORP., 525 Boston Post Rd., P.O. Box 250, Milford, CT 06460, Tel: 203-877-7661; *Sls. Mgr.:* Leigh H. Hickcox

DISPLAYS, INC., Mifflin Countey Indl. Pk., Rte. 4, Box 6AAA, Lewistown, PA 17044, Tel: 717-242-2541, Telex: 842540; Empl.: 50

Local Sales Offices & Reps

AZ	Phoenix, Finn-Pat Co.	602-954-0301
CA	San Diego, Power Assoc.	619-275-0641
CA	Torrance, Cutlass Elctrns.	213-324-7360
MA	Weston, Bay Colony Reps.	617-899-8800

DISPLEX, INC., Alexander Place, Glen Cove, NY 11542, Tel: 516-671-4400, Telex: 640 476, TWX: (Northills Gove); Empl.: 12; *Sls. Mgr.:* Bill Adikes; *Dist. Mgr.:* Peter Reuter ....**3**•1860

Local Sales Offices & Reps

CA	Gardena, Bidwell Sls.	213-532-7305
CA	Westlake Village, WEW Entprs.	213-707-1551
IL	Elmhurst, First Rep Co.	312-530-2450
MD	Wheaton, Brimberg Sls.	301-946-2670
MA	Needham, Addelco Corp.	617-444-4754
NY	Great Neck, F & F Metro	516-482-4080
OH	Cleveland Heights, Seltech	614-451-3868
OH	Columbus, Seltech	614-451-3865
OR	Portland, Belusko & Co.	503-222-4279
TN	Nashville, Computer Power Corp.	615-366-1703
PR	Casuas, Micro-Tech Sys & Controls.	809-783-0100

DISTRIBUTED COMPUTER SYS., 223 Crescent St., Waltham, MA 02154, Tel: 617-899-6619, TWX: 710-324-6476; Empl.: 32; *Sls. Mgr.:* Garry Stephens

DISTRIBUTED LOGIC CORP. (DILOG), 12800-G Garden Grove Blvd., Garden Grove, CA 92643, Tel: 714-534-8950, Telex: 681399; FSC No.: 95-3205555; Empl.: 105; *Sls. Mgr.:* Dennis Edwards; *Dist. Mgr.:* Dennis Edwards

Local Sales Offices & Reps

CA	Garden Grove	714-534-8950
NJ	Red Bank	201-530-0044

Distributor

DISTRIBUTOR SPECIALISTS, 632 Santa Monica Blvd., Santa Monica, CA 90401, Tel: 213-393-9666 .... p.700

DIVERSIFIED CASE CO., Ellis Ave., Off. 2, Whitesboro, NY 13492, Tel: 315-736-3028; *Sls. Mgr.:* John Fitzsimmons

DIVERSIFIED ELECTRONICS, INC.

DIVERSIFIED ELCTRNS., INC., Indl. Controls Div., 119 N. Morton Ave., Evansville, IN 47711, Tel: 812-426-2806; Empl.: 55; *Sls. Mgr.:* James M. Kellum .... **1B**•1336

Local Sales Offices & Reps

CA	Danville, Stuart Assocs.	415-837-8197
CA	Signal Hill, California Electro Sls. Co.	213-595-7427
CO	Denver, Empire Elctrl. Sls.	303-744-1776
FL	Leesburg, Diversified Elctrns.	800-874-0619
GA	Atlanta, Grady Duckett	404-451-3529
ID	Boise, Doran Sales Assocs., Inc.	208-343-9969
IL	Des Plaines, Antek/Lincoln, Hodges & Assocs.	312-297-0885
IN	Seymour, Diversified Elctrns. Inc.	812-522-1481
IA	Bettendorf, Weisler & Assocs.	319-344-0566
MD	Fulton, S. Jefferies	301-792-7452
MA	Wayland, Gilman Assocs.	617-358-7571
MO	Ellisville, Weisler & Assocs.	314-394-4543
MO	Kansas City, Weisler & Assocs.	816-421-1679
NY	Great Neck, Frank Tylinski Co.	516-466-9070
NC	Charlotte, Sentry Power	704-535-1774
OH	Cleveland, Syntron, Inc.	216-572-2848
OH	Cleveland, Arthur Baier	216-461-6161
OH	Dayton, Arthur Baier	513-276-4128
OR	Forest Grove, Doran Sls. Assoc.	503-357-3333
PA	Narberth, S. A. Jefferies	215-664-8500
TX	Houston, Weisler & Assocs.	713-467-1847
UT	Salt Lake City, Conely Engrg. Co.	801-972-5923
WA	Green Acres, Doran Sls. Assocs., Inc.	509-922-2317
WA	Redmond, Doran Sls.	206-855-1885
WI	Janesville, Antek Mktg. Assocs.	608-754-4214

Local Distributors

AL	Birmingham, MG Elctrns. & Equip., Co., Inc.	205-328-4525
AL	Mobile, Specialty Distrg. Co.	205-344-0450
AR	Rogers, Evans Elec. Motor Centers	501-636-0721
CA	Cathedral City, Consolidated Elec.	714-328-1131
CA	Danville, Cal-West Supp.	415-837-8245
CA	Fresno, Electric Motor & Supp.	209-233-1155
CA	Long Beach, Mag-Trol/Long Beach, Inc.	213-435-3451
CA	N. Hollywood, Associated Terminals & Cont.	213-875-0344
CA	Palm Springs, Lake Service	619-328-1163
CA	Palo Alto, Elctrl. Matls., Inc.	415-494-0400
CA	Redondo Beach, Elctrl. Power & Controls, Inc.	213-772-8890
CA	South El Monte, Walton Electrical Controls, Inc.	213-442-4610
CO	Denver, Control Comps, Inc.	303-371-2727
CO	Golden, Utility Control & Equip. Co.	303-425-1990
DC	Washington, Wesco	202-833-5250
FL	Ft. Lauderdale, Graybar Elec.	305-523-1453
FL	Ft. Myers, Con. Elec. Supp. Co.	813-332-1515
FL	Jacksonville, Graybar Elec.	904-356-7611
FL	Lakeland, A-A Elec.	813-665-6941
FL	Largo, Graybar Elec.	813-535-6460
FL	New Port Richey, Pasco Elec. Sup.	813-842-8405
FL	Orlando, Consolidated Elec.	305-849-6532
FL	St. Petersburg, Graybar Elec.	813-822-3851
FL	Tallahassee, Graybar Elec.	904-222-5332
FL	W. Palm Beach, Nurmi Elctrn. Supp., Inc.	305-686-8553
GA	Albany, Specialty Distrbg. Co., Inc.	912-435-1711
GA	Athens, Specialty Distrbg. Co., Inc.	404-548-1334
GA	Atlanta, Dapco, Inc.	404-458-6341
GA	Atlanta, Specialty Distrbg. Co., Inc.	404-873-2521
GA	Augusta, Specialty Distrbg. Co., Inc.	404-722-1526
GA	Brunswick, Specialty Distrbg. Co., Inc.	912-265-1927
GA	College Park, Specialty Distrbg. Co., Inc.	404-763-3828
GA	Columbus, Specialty Distrbg. Co., Inc.	404-327-7414
GA	Macon, Specialty Distrbg. Co., Inc.	912-743-5421
GA	Marietta, Specialty Distrbg. Co., Inc.	404-422-4333
GA	Norcross, A-A Electric	404-449-8670
GA	Savannah, Specialty Distrbg. Co., Inc.	912-234-1684
GA	Savannah, Graybar Elec.	912-232-1121
GA	Valdosta, Specialty Distrbg. Co., Inc.	912-242-4910
ID	Coeur d'Alene, R. C. Worst & Co., Inc.	208-664-2133
ID	Idaho Falls, Electrical Supp.	208-523-2800
ID	Pocatello, Electrical Supp.	208-233-1362
ID	Rexburg, Electrical Supp.	208-356-7282
IL	Bloomingdale, Seversen Engrg.	312-529-0501
IL	Fairfield, Precision Elec. Co.	618-842-7000
IL	Mt. Prospect, Legend Elctrl. Sls.	312-952-0090
IN	Evansville, Hutch & Son, Inc.	812-425-7201
IN	Indianapolis, Genesis Elec.	317-637-5571
IN	Vincennes, Valley Elec.	812-882-7860
KS	Salina, American Elec.	913-823-2248
KY	Louisville, Peterson Elec. Supp. Co., Inc.	502-491-5010
KY	Louisville, Peerless Elec.	502-637-7677
KY	Louisville, E & H Elec.	502-587-0991
MD	Baltimore, Infinity Sys., Inc.	301-358-8500
MD	Baltimore, Wesco	301-327-4300
MD	Salisbury, Wesco	301-742-2193
MN	Minneapolis, Texa Minn Prods.	612-861-2900
MO	St. Louis, United Elec. Supp.	314-771-5555
NE	McCook, American Elec.	308-345-3414
NE	Omaha, West Dodge Elec.	402-393-8071
NH	Manchester, Graybar Elec.	603-624-4341
NJ	Audubon, Universal Elctrns. Supp. Co.	609-547-3430
NJ	Collingswood, Universal Supp.	609-854-2220
NJ	E. Rutherford, A-A Elec.	201-777-5477
NJ	Fairlawn, Relay Specialties	201-797-3313
NY	Long Island, Graybar Elec.	212-392-2000
NY	Maybrook, Air Power House	914-457-3113
NY	Whitestone, Power Electro Supp. Co., Inc.	212-767-1447
NC	Charlotte, Southern Elec. Svc. Co.	704-372-4832
NC	Charlotte, Wesco	704-377-3471
NC	Gastonia, J. M. T. Elec.	704-867-4401
NC	Huntersville, Scott Equip. Co.	704-875-1611
NC	Jacksonville, Rapp Prods.	919-374-1754
OH	Cincinnati, Wesco	513-542-4300
OH	Cleveland, Milner Elec.	216-361-0300
OK	Oklahoma City, Evans Elec. Motor Centers	405-631-1344
OK	Tulsa, Evans Elec. Motor Centers	918-587-1566
OK	Tulsa, Cooper Supp. Co.	918-628-1500
OR	Albany, Pepco	503-926-7755
OR	Bend, North Coast Elec. Co., Inc.	503-382-6211
OR	Coos Bay, North Coast Elec. Co., Inc.	503-267-2145
OR	Coos Bay, Pepco	503-269-5011
OR	Eugene, North Coast Elec. Co., Inc.	503-343-7701
OR	Eugene, Pepco	503-484-7309
OR	Klamath Falls, North Coast Elec. Co., Inc.	503-884-4171
OR	Medford, North Coast Elec. Co., Inc.	503-772-7131
OR	Medford, Pepco	503-779-6311
OR	Portland, North Coast Elec. Co., Inc.	503-228-5111
OR	Portland, Pepco	503-243-7820
OR	Tualatin, North Coast Elec. Co., Inc.	503-620-3910
PA	Bala-Cyn-Wyd, Wesco	215-581-9314
PA	Erie, Wesco	814-454-8191
PA	Johnstown, Wesco	814-536-8761
PA	Monroeville, Wesco	412-325-1300
PA	Philadelphia, Mechanical Specialties, Inc.	215-331-5555
PA	Philadelphia, Wesco	215-238-4500
PA	Pittsburgh, Wesco	412-255-4290
PA	York, Wesco	717-843-0891
SC	Columbia, J. W. Vaughn Co.	803-779-2690
SC	Greenville, Shealy Elctrl. Whlsrs.	803-242-6880
TN	Chattanooga, Specialty Distrbg. Co., Inc.	615-267-9531
TX	Ft. Worth, Swieco, Inc.	817-335-6521
TX	Houston, Commercial Equip.	713-237-8682
TX	Huntsville, Hedco	713-224-4771
TX	Midland, Energy Sys., Inc.	915-694-9657
TX	Waco, Smith Pump Co.	817-776-0377
TX	Wichita Falls, Evans Elec. Motor Centers	817-723-7466
UT	S. Salt Lake, Engineered Control Sys., Inc.	801-487-6226
VT	White River Jct., Arrow Elctrns., Inc.	802-295-3193
VA	Alexandria, Calvert-Jones Co., Inc.	703-370-5850
VA	Chantilly, Engineered Svcs., Inc.	703-471-6310
VA	Danville, Wesco	804-826-6730
VA	Hampton, Wesco	804-826-6730
VA	Lynchburg, Wesco	804-845-0948
VA	Norfolk, Wesco	804-625-7451
VA	Petersburg, Wesco	804-732-1222
VA	Richmond, Wesco	804-353-7353
VA	Roanoke, Wesco	703-344-3271
WA	Kennewick, Pepco	509-586-3168
WA	Longview, North Coast Elec. Co., Inc.	206-423-1550
WA	Moses Lake, Inland Elctrl. Supp. Co.	509-765-1251
WA	Renton, Pepco	206-251-5055
WA	Richland, Wesco	509-783-1397
WA	Spokane, North Coast Elec. Co., Inc.	509-922-1317
WA	Spokane, Power Pump & Elec. Supp.	509-534-5616
WV	Beckley, Wesco	304-252-8633
WV	Bluefield, Wesco	304-325-6151
WV	Bridgeport, Wesco	304-624-6311
WV	Charleston, Wesco	304-768-1293
WV	Parkersburg, Wesco	304-485-6541
WI	Cedarburg, A-A Elec.	414-377-7500
WI	Green Bay, Climatic Control Co., Inc.	414-336-4060
WI	Madison, Climatic Control Co., Inc.	608-273-1717
WI	Milwaukee, Climatic Control Co., Inc.	414-259-9070
WI	Monroe, Precision Drive & Control, Inc.	608-328-5600
WY	Casper, Wesco	307-266-3740
WY	Gillette, Wesco	307-687-0014
Intl	St. Thomas, Power Sys., Inc.	809-776-0217
PR	Bayamon, Jenson Protective Devices	809-798-3264

DIVERSIFIED TECHNLG., P.O. Box 748, Ridgeland, MS 39157, Tel: 601-856-4121, Telex: 585326, TWX: 810-966-2626; Empl.: 65; *Sls. Mgr.:* Bill Long; *Dist. Mgr.:* Bill Long

DIXON INDS., 386 Metacom Ave., Bristol, RI 02809, Tel: 401-253-2000, Telex: 927706

DIXSON
INSTRUMENTS

DIXSON, INC., INSTRUMENT DIV., Box 1449, Grand Junction, CO 81502, Tel: 303-242-8863, TWX: 910-929-6991; Empl.: 250; *Sls. Mgr.:* Ray Carlson .... **3**•1325

Local Sales Offices & Reps

AL	Birmingham, Sesco-Birmingham	205-988-8304
AZ	Phoenix, Finn-Pat Co. Inc.	602-954-0301
CA	El Segundo, Varigon Assocs.	213-322-1120
CA	Santa Clara, Ross Mktg.	408-988-811
CO	Grand Junction, Dixson Instrs.	303-242-8863
CT	Hamden, Pond Technical Sales	203-281-0005
FL	North Palm Beach, Sesco-Miami	305-832-0770
GA	Atlanta, Sesco-Atlanta	404-458-6423
IL	Bartlett, JJS Mktg. Svcs.	312-830-1670
LA	Baton Rouge, Sesco-Baton Rouge	504-928-4951
ME	W. Buxton, Pond Tech. Sls.	207-637-2200
MA	Waltham, Pond Tech. Sls.	617-890-5535
MI	Swartz Creek, JJS Mktg. Svcs.	313-635-7305
MN	Chanhassen, Elctrn. Instr. Cnslts.	612-445-7056
NY	Mt. Vernon, Sonkin Assocs.	914-668-9809
NY	North Syracuse, Naco Electronics	315-699-2651
NC	Cary, Sesco-Raleigh	918-467-7482
NC	Charlotte, Sesco-Charlotte	704-535-4920
OH	Dayton, Instrmn. Sys. Inc.	513-294-2838
OK	Tulsa, Sesco-Tulsa	918-622-3868
OR	Portland, Instr. Representatives Assoc.	503-245-6103
PA	King of Prussia, FLW of PA, Inc.	215-337-4343
PA	Pittsburgh, Instrmn. Sys. Inc.	412-243-1111
TX	Austin, Sesco-Austin	512-892-2490
TX	Dallas, Sesco-Dallas	214-231-9364
TX	Houston, Sesco-Houston	713-999-3510
WA	Seattle, Instr. Representatives Assoc.	206-762-0707

DMA SYS., 601 Pine St., Goleta, CA 93117, Tel: 805-683-3811; *Sls. Mgr.:* Don M. Minami

DOCUMATION, Box 1240, Melbourne, FL 32901, Tel: 305-725-5500, TWX: 510-959-6286; Empl.: 2800; *Sls. Mgr.:* K. Nelson; *Dist. Mgr.:* D. Carson

D. O. INDUSTRIES, 317 E. Chestnut St., E. Rochester, NY 14445, Tel: 716-385-4920, Telex: 200802; FSC No.: 716-381-7032; *Sls. Mgr.:* Gerard Morio

DOLAN-JENNER INDS., Box 1020, Woburn, MA 01801, Tel: 617-935-7444, Telex: 95-5439, TWX: 710-350-7544; Empl.: 120; *Sls. Mgr.:* S. Futran; *Dist. Mgr.:* S. Futran

DOLCH LOGIC INSTRS., 3052 Orchard Dr., San Jose, CA 95134, Tel: 408-998-5730, TWX: 910-338-2023; *Sls. Mgr.:* Ken Pine

DOLPH, JOHN C., CO., New Rd., Monmouth Junction, NJ 08852, Tel: 201-329-2333; *Sls. Mgr.:* J. E. Rooze

DONGAN ELECTRIC MFG. CO., 2987 Franklin St., Detroit, MI 48207, Tel: 313-964-3500

DONTECH INC., 601-606 Airport Indl. Blvd., Doylestown, PA 18901, Tel: 215-348-5010, Telex: 685 1155 DONTK; *Sls. Mgr.*: John Kinard

DORAN MFG. CO., 2851 Massachusetts Ave., Cincinnati, OH 45225, Tel: 513-681-5424; Empl.: 40; *Sls. Mgr.*: Russ DeMar

DORMAN BOGDONOFF CORP., Corp. Center, Willow Pond, Andover, MA 01810, Tel: 617-470-0001, Telex: 710-347-0333; *Sls. Mgr.*: Charles P. Centore

DORMEYER INDS., 3418 N. Milwaukee, Chicago, IL 60641, Tel: 312-283-4000, TWX: 910-221-3831; Empl.: 900; *Sls. Mgr.*: Larry D. Harney; *Dist. Mgr.*: Lynn Masukevich

DOTRONIX, 160 First St. SE, New Brighton, MN 55112, Tel: 612-633-1742, TWX: 910-563-3541; Empl.: 80; *Sls. Mgr.*: L. R. Lemke

Local Sales Offices & Reps

CA	Gilroy, Dotronix	408-848-2499
CA	Upland, Vidtek	714-985-6030
IL	Arlington Hts., Dotronix	312-577-6105
MA	Burlington, Conti-Younger Assoc.	617-273-1582
MN	New Brighton, Dotronix	612-633-1742
TX	Dallas, MGR	214-238-5246

DOUGLAS ELCTRNS., 718 Marina Blvd., San Leandro, CA 94577, Tel: 415-483-8770

DOUGLAS RANDALL, 6 Pawcatuck Ave., Pawcatuck, CT 02891, Tel: 203-599-2075, Telex: 6814060; Empl.: 125; *Sls. Mgr.*: N. Paulson ....**1B**•1337-1345

Local Sales Offices & Reps

AZ	Tempe, Trembly Assoc.	602-967-2058
CA	Anaheim, Galaxie Sls. Int'l.	714-752-1580
CA	Oakland, Powermatic Assoc.	415-635-6825
CA	San Diego, Qualtronics	619-560-8955
CO	Lakewood, Trembly Assoc.	303-233-9544
CT	Mystic, JMG Inc.	203-572-9448
FL	Maitland, Ellis & Assoc.	305-645-1101
GA	Lilburn, W. A. Stancil	404-923-2416
IL	Chicago, Ropek-Cahill-Vogt	312-631-0070
MD	Oxon Hill, Schoeplein & Co.	301-292-1701
MA	Norwood, JMG, Inc.	617-762-5333
MI	Southfield, Fred H. Gehrke & Assoc.	313-559-5363
MN	Osseo, Gaffney Sls. Co.	612-425-5484
MO	Kansas City, Delltron Co. Inc.	816-436-6445
MO	St. Louis, Delltron Co.	314-869-4779
NV	Las Vegas, Trembly Assoc.	702-739-9770
NJ	Morristown, Andrews & Andrews	201-569-8800
NM	Albuquerque, Trembly Assoc.	505-266-8616
NY	Huntington, Andrews & Andrews	516-692-8686
NY	Rochester, J. G. Welch Assoc.	716-244-1100
NY	Syracuse, C. W. Floring & Assoc.	315-478-2149
NC	Raleigh, Leigh Sls.	919-872-1484
OH	Cleveland, Geotronix Mktg. Assoc.	216-526-2535
OH	Columbus, Geotronix Mktg. Assoc.	614-457-8472
OH	Trotwood, Geotronix, Inc.	513-854-5939
OR	Beaverton, Caruso & Northcutt	503-646-4973
PA	Glenside, Elcom	215-885-1715
TX	Dallas, Paramount Controls	214-341-4561
UT	Salt Lake City, Trembly Assoc.	801-486-5292
WA	Bellevue, Caruso & Northcutt	206-454-9699

Local Distributors

CA	Chatsworth, Mil-Comm Dist.	213-998-3111
CA	S. San Francisco, Steven Engrg.	415-588-9200
MA	Middleboro, Glynn Elect.	617-947-4262
OH	Cleveland, Alpha Corp.	216-526-3716
TX	Houston, Butler & Land	713-464-4662
EXP	Jerusalem, Efraim Ben Yakir	
Intl	London, England, Kynmore Eng.	01-839-2371

DOW CHEMICAL CO., 2020 Dow Center, Midland, MI 48640, Tel: 517-636-1000, Telex: 227455, TWX: 810-266-9490; Empl.: 53,300

DOW CORNING

DOW CORNING CORP., Box 1767, Midland, MI 48640-0994, Tel: 517-496-4000, Telex: 227450, TWX: 810-266-9006; Empl.: 5800 ....**2**•1080, 1081

Local Sales Offices & Reps

CA	Irvine	714-261-0800
CA	Santa Clara	408-988-1177
GA	Atlanta	404-256-2626
IL	Chicago	312-671-3100
MA	Boston	617-965-1010
MI	Detroit	313-553-0400
NJ	Parsippany	201-267-0440
NC	Greensboro	919-275-9708
OH	Beachwood	216-464-2330
TX	Dallas	214-661-0702

Local Distributors

AL	Birmingham, Brownell Electro	205-322-3374
AL	Mobile, Brownell Electro	205-479-5405
AZ	Tempe, K. R. Anderson	602-829-1898; 800-538-8712
CA	Santa Ana, K. R. Anderson Co.	714-549-1343; 800-672-1858
CA	Sunnyvale, K. R. Anderson Co.	408-736-6730; 800-538-8712
CO	Commerce City, Waco Elctrns.	303-289-4743; 800-525-0811
CT	Hartford, Brownell Electro	203-278-9000
FL	Miami, Brownell Electro	305-592-2636
FL	Orlando, Brownell Electro	305-843-6776
GA	Atlanta, Prehler Inc.	404-447-5540
IL	Chicago, Prehler Inc.	312-384-6100; 800-621-4177
MD	Linthicum, Brownell Electro	301-636-3626; 800-492-1734
MA	Woburn, Brownell Electro	617-935-7820
MN	Bloomington, Prehler Inc.	800-621-4177
MO	Bridgeton, Crown Distrbg.	314-731-3001; 816-373-6604
MO	Independence, Crown Distrbg.	816-373-6604; 314-731-3001
NJ	Livingston, Robert McKeown Co.	201-992-0700; 800-631-1125
NM	Albuquerque, Waco Elctrns.	505-268-2409; 800-525-0811
NY	New York, Brownell Electro	212-924-6000
NY	Rochester, Wolcott-Park	716-342-3120
NC	Charlotte, Brownell Electro	704-597-1270
NC	Raleigh, Brownell Electro	919-876-6524
OH	Middleburg Hgts., Prehler Electrical Insul. Co.	216-243-5510
PA	Bridgeville, Brownell Electro	412-221-0074
PA	Trevose, Brownell Electro	215-364-1400
TN	Knoxville, Brownell Electro	615-966-3441
TN	Memphis, Brownell Electro	901-795-8483
TN	Nashville, Brownell Electro	615-885-1302
TX	Dallas, Specialized Prods. Co.	214-358-4663
TX	Houston, Specialized Prod. Co.	713-789-6610
UT	Salt Lake City, Waco Elctrns.	801-485-6511; 800-525-0811
VA	Norfolk, Brownell Electro	804-582-8121
WV	Princeton, Brownell Electro	304-487-1477
WI	Milwaukee, Ellsworth Corp.	414-352-1230

DowKey®
Division of Kilovac Corporation

DOW KEY DIV., KILOVAC CORP., Box 4422-EM, Santa Barbara, CA 93103, Tel: 805-684-4560, TWX: 910-336-1141; FSC No.: 00471; Empl.: 130; *Dist. Mgr.*: Jack Dysart ....**1B**•1346, 1347

Local Sales Offices & Reps

AZ	Tempe, Gassner & Clark	602-968-9037
CA	Mountain View, Peninsula Tech. Sls.	415-965-3636
CA	West Lake Village, Hy-Tech Sls.	213-991-7491
FL	Melbourne, Saber Assocs., Inc.	305-724-0920
IL	Schaumburg, Gassner & Clark	312-882-8608
IA	Cedar Rapids, H. R. Brown Sls. Co.	319-366-0635
MD	Beltsville, Applied Engrg. Conslts.	301-792-2211
MA	Lowell, Matrix Sls., Inc.	617-458-2096
MN	St. Paul, De Beck	612-635-4649
MO	Kansas City, EIR Co.	816-452-7030
MO	Kansas City, EIR Co.	816-452-7030
MO	Leasburg, EIR Co.	314-895-4100
NM	Albuquerque, Data Handling	505-884-0284
NY	Cazenovia, S. T. Woolard Co.	315-655-8145
NY	Melville, Metro-Mics	516-433-3333
NY	Rochester, Lamb	716-323-1250
NC	Clayton, Saber Assocs.	305-724-0920
OH	Cincinnati, Delta Sls.	513-271-5444
OK	Tulsa, Norcom, Inc.	918-832-7747
OR	Portland, Components West	503-643-5588
PA	Paoli, Tyler Griffin	215-647-1550
TX	Austin, Norcom, Inc.	512-451-2757
TX	Dallas, Norcom, Inc.	214-386-4888
TX	Houston, Norcom, Inc.	713-778-0392
WA	Redmond, Components West	206-885-5880

Local Distributors

CA	Los Angeles, Henry Radio	213-820-1234
CA	Sacramento, Zackit	916-446-3131
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	San Jose, Quement	408-998-5900
CA	Santa Monica, Distr. Specialists	213-393-9666
IN	Indianapolis, Graham Elctrns.	317-634-8202
LA	New Orleans, Southern Radio Supp.	504-524-2343
MD	Rockville, Capitol Radio Wholesalers	301-792-2827; 301-881-2270
MA	Plainville, Teknis, Inc.	617-695-3591
NM	Albuquerque, Walker Radio	505-247-2288
TX	Ft. Worth, Allied Elctrns.	817-336-5401
WI	Milwaukee, Amateur Elctrn. Radio Supp.	414-442-4200

DRACON DIV., See Harris Corp., Dracon Div.

DRAKE, R. L., CO., 540 Richard St., Miamisburg, OH 45342, Tel: 513-866-2421, Telex: 28-8017; *Sls. Mgr.*: M. Brubaker

DRANETZ TECHNOLOGIES, INC., 1000 New Durham Rd., CN-91, Edison, NJ 08818, Tel: 201-287-3680, Telex: 499-7808, TWX: 710-997-9553; FSC No.: 23207; Empl.: 230; *Sls. Mgr.*: A. Orlacchio ....**3**•1218

Local Sales Offices & Reps

AL	Huntsville, Kemp Instrs.	205-837-4304
AZ	Scottsdale, Barnhill Assoc.	602-947-7841
CA	Pasadena, Jim Robins & Associates	213-795-9118
CA	Redondo Beach, Ward/Davis Assocs.	213-643-6977
CA	San Diego, Wheelock Associates	619-454-3473
CA	San Diego, Ward/Davis Assocs.	619-292-1000
CA	Santa Clara, Ward/Davis Associates, Inc.	408-245-3700
CO	Englewood, Barnhill Assoc.	303-779-3600
CT	Mount Carmel, Sci. Devices	203-248-9361
FL	Orlando, Datarep	305-843-5224
GA	Atlanta, Kemp Instrs.	404-452-8050
IL	Chicago, Memeco Sls. & Svc. Corp.	312-228-9555
IL	Elk Grove Village, Loren Green Assocs.	312-593-0282
IN	Indianapolis, Memeco Sls. & Svc. Corp.	317-356-8098
IN	Indianapolis, Loren Green Assocs.	317-293-9827
KS	Shawnee, Atech	913-268-9644
LA	Baton Rouge, Barnhill Assoc.	504-924-6826
LA	Lafayette, Kemp Instrs.	318-269-9452
MD	Rockville, Elctrn. Mktg. Assocs.	301-881-5300
MA	Waltham, Sci. Devices	617-890-2252
MI	Brighton, Stress Analysis Svcs.	313-632-6110
MI	Farmington, Carter, McCormic & Peirce	313-477-7700
MN	Edina, Carvel Engrg. & Sls. Co.	612-835-7929
MN	Minneapolis, Loren Green Assoc.	612-571-6666
MN	Minneapolis, Arjay Sls.	612-854-4972
MO	Raytown, Power Specialties	816-353-6550
MO	St. Louis, Atech	314-576-2884
NE	Lincoln, Harry Ferris Co.	402-464-6148
NJ	Lodi, SDM Rep.	201-368-0123
NM	Albuquerque, Barnhill Assoc.	505-299-7658
NY	Rochester, SDM Rep.	716-247-8770
NC	Charlotte, Baesel & Assocs.	704-375-1044
OH	Cleveland, Carter, McCormic & Peirce	216-779-5100
OH	Dayton, Stress Analysis Svcs.	513-263-8036
OH	Englewood, Carter, McCormic & Peirce	513-836-0951
OH	Medina, Stress Analysis Svcs.	216-725-7733
OR	Portland, Topp Engrg. Sls.	503-244-7265
PA	Monroeville, Carter, McCormic & Peirce	412-372-4415
PA	Pittsburgh, Russell F. Clark Co.	412-242-9500
PA	Plymouth Meeting, Elctrn. Mktg. Assoc.	215-828-7400
TX	Austin, Barnhill Assoc.	512-451-0217
TX	Houston, Barnhill Assoc.	713-688-9971
TX	Richardson, Barnhill Assoc.	214-231-2573
UT	Murray, Barnhill Assoc.	801-262-3000
WA	Bellevue, Topp Engrg. Sls.	206-747-5400

DRAWN METAL PRODUCTS, 6143 W. Howard St., Niles, IL 60648, Tel: 312-647-8941; Empl.: 60; *Sls. Mgr.*: Tom Amundson

DREEFS SWITCH INC., 3782 Hawthorn Ct., Waukegan, IL 60085, Tel: 312-662-7667, 800-323-9605, Telex: 703784; Empl.: 45; *Sls. Mgr.*: E. L. Magiera; *Dist. Mgr.*: E. L. Magiera ......**1B**•1585-1587

Local Sales Offices & Reps

CA	Costa Mesa, Electro Mech Sls.	714-642-2390
CA	San Diego, Electro Mech Sls.	714-642-2390
CA	Sunnyvale, Schwerin Merrill	408-735-7900
IL	Oak Brook, MSL & Assocs.	312-655-8977
IL	Waukegan, Dreefs Switch Inc.	800-323-9605
MN	Minneapolis, Robert W. Marshall Co.	612-929-0457
MO	Bridgeton, Centech Inc.	314-291-4230
MO	Raytown, Centech Inc.	816-358-8100
NY	Fulton, P. Saftler Assocs.	315-592-7184
NY	Lynbrook, P. Saftler Assocs.	516-593-7880
OH	Cincinnati, Jim Finnegan Co.	513-931-1686
OH	Cleveland, Jim Finnegan Co.	216-238-5905
OH	Toledo, Jim Finnegan Co.	419-865-5306
OR	Portland, Controltek, Sls.	503-641-0877

TX	Austin, Precision Technlg.	512-250-0201
TX	Richardson, Precision Technlg.	214-234-8071
WI	Milwaukee, Badgerep Inc.	414-258-6630

Local Distributors

CA	San Jose, Cypress Elctrns.	408-945-8400; 800-538-5112
CA	Torrance, Cypress Elctrns.	213-530-1900
IL	Wheeling, Hawk Elctrns.	312-459-4030
TX	McKinney, Sun Belt Elctrns.	214-542-1432
Can	Concord, Ontario, Astec Comp.	416-669-4022

DRESSEN-BARNES ELCTRNS., 1600 E. Valencia Dr., Fullerton, CA 92631, Tel: 714-871-3020, TWX: 910-592-1256; FSC No.: 89321; Empl.: 220; *Sls. Mgr.:* B. Guy

DRESSER INDS., 1505 Elm St., Dallas, TX 75201, Tel: 214-746-6000, Telex: 73-2489, TWX: 910-861-4136; Empl.: 55,000

DUKANE CORP., Communications Sys. Div., 2900 Dukane Dr., St. Charles, IL 60174, Tel: 312-584-2300, Telex: 720426; Empl.: 700; *Sls. Mgr.:* Jack Hollis; *Dist. Mgr.:* Jack Hollis

DUMONT ELCTRNS., See Thomson-CSF Comps. Corp., DuMont Div.

DUMONT INSTRUMENTATION, INC., 75 Mall Dr., Commack, NY 11725, Tel: 516-864-8500, TWX: 510-226-3739; Empl.: 15,000; *Sls. Mgr.:* H. Poschmann

DUMONT OSCILLOSCOPE LABS., 40 Fairfield Pl., W. Caldwell, NJ 07006, Tel: 201-575-8666, Telex: 219236 DOLI-UR; FSC No.: 30669; Empl.: 30; *Sls. Mgr.:* John Carter, Jr.

DUNCAN ELECTRONICS, INC., 2865 Fairview Rd., Costa Mesa, CA 92626, Tel: 714-545-8261, TWX: 910-595-1128; FSC No.: 5905; Empl.: 160; *Sls. Mgr.:* J. Colligan; *Dist. Mgr.:* J. Colligan

DUNEGAN/ENDEVCO, Rancho Viejo Rd., San Juan Capistrano, CA 92675, Tel: 714-831-9131, Telex: 68-3430; Empl.: 80; *Sls. Mgr.:* B. Toffelmier

DUOTONE, 6875 S.W. 81st St., S. Miami, FL 33143, Tel: 305-665-1121; Empl.: 20; *Sls. Mgr.:* S. Nester; *Dist. Mgr.:* S. G. Nester

DUPONT DE NEMOURS, E. I., & CO., 1007 Market St., Wilmington, DE 19898, Tel: 302-773-3218; Empl.: 130,000

DUPREE, INC., 9835 Dupree St., So. El Monte, CA 91733, Tel: 818-442-4700; Empl.: 60; *Sls. Mgr.:* Beverly Bowdry

DURACELL INTL., S. Broadway, Tarrytown, NY 10591, Tel: 914-591-7000, Telex: 131548, TWX: 710-564-0810; Empl.: 4000

DURAKOOL, 1010 N. Main St., Elkhart, IN 46514, Tel: 219-264-1116, Telex: 25-8482; Empl.: 200; *Sls. Mgr.:* Darrell Wilk; *Dist. Mgr.:* F. Aitchison

DURALITH, 525 Orange St., Millville, NJ 08332, Tel: 609-825-6900, TWX: 510-687-7520; Empl.: 370

DURGIN & BROWNE, 80 Allen Rd., So. Burlington, VT 05401, Tel: 802-863-6873; Empl.: 35; *Sls. Mgr.:* Chris Riggs

DY-4 SYSTEMS INC., 888 Lady Ellen Pl., Ottawa, ON K1Z 5M1, Canada, Tel: 613-728-3711, Telex: 053-4969; *Sls. Mgr.:* Terry Black

DYLON DATA CORP., 9561 Ridgehaven Ct., San Diego, CA 92123, Tel: 619-292-5584, TWX: 910-335-1524; Empl.: 20; *Sls. Mgr.:* R. A. Comstock; *Dist. Mgr.:* Steve Komarek

DYMA ENGRG., Box 1535, Los Lunas, NM 87031, Tel: 505-865-6700; Empl.: 14

DYNACIRCUITS INC., 11230 W. Addison, Franklin Park, IL 60131, Tel: 312-451-1700; *Sls. Mgr.:* Fred Stein

DYNAGE, INC., CONTROL PRODS GRP., 135 Prestige Park Circle, E. Hartford, CT 06108, Tel: 203-289-6831, TWX: 710-425-6063; Empl.: 40; *Sls. Mgr.:* Sidney C. Oakleaf

DYNAGE, POWER SUPP. GRP., 135 Prestige Park Circle, E. Hartford, CT 06108, Tel: 203-289-6831, TWX: 710-425-6063; Empl.: 40; *Sls. Mgr.:* Sidney C. Oakleaf

DYNALOY, INC., 7 Great Meadow La., Hanover, NJ 07936, Tel: 201-887-9270, Telex: 642-033; FSC No.: 27908; Empl.: 19

Local Sales Offices & Reps

CA	Westminster, Contronic Devices	714-897-2266
FL	Ft. Lauderdale, Etchomatic	305-563-5060
MA	Manchester, Lee Thomas Assoc.	617-525-3028
MA	Waltham, Etchomatic	617-893-2020
MN	Minneapolis, International Sls.	612-831-8423

DYNAMIC MEASUREMENTS, 8 Lowell Ave., Winchester, MA 01890, Tel: 617-729-7870, TWX: 710-348-6596; Empl.: 61; *Sls. Mgr.:* Bill Schromm

DYNAMICS, Div. of Waugh Controls Corp., 9001 Fullbright Ave., Chatsworth, CA 91311, Tel: 818-998-8281, Telex: 69-6171; Empl.: 100; *Sls. Mgr.:* Jim Moore

DYNAPAR, 1675 Delany Rd., Gurnee, IL 60031, Tel: 312-662-2666, TWX: 910-235-1865; Empl.: 130

DYNAPLEX INC., Interplex, 120-12 28th Ave., Flushing, NY 11354, Tel: 212-961-6750, TWX: 710-582-3048; *Sls. Mgr.:* Lester Zimmerman; *Dist. Mgr.:* Lester Zimmerman

DYNATECH CORP., 1225 E. Wakeham Ave., P.O. Box 1019, Dept. E, Santa Ana, CA 92702, Tel: 714-558-8755, TWX: 910-595-1951; Empl.: 340; *Sls. Mgr.:* Rick Burbank

DYNATEC INTERNATIONAL, 3594 West 1820 South, Salt Lake City, UT 84104, Tel: 801-973-9500, 800-722-7425; *Sls. Mgr.:* Robert Checketts; *Dist. Mgr.:* Robert Checketts

DYNATRONIX, INC., 105 Power St., Amery, WI 54001, Tel: 715-268-8118, 800-826-7172, TWX: 297861 DYTX UR; *Sls. Mgr.:* R. W. Kappler; *Dist. Mgr.:* R. W. Kappler, Natl. Sls. Mgr.

DYNISCO, 10 Oceana Way, Norwood, MA 02062, Tel: 617-769-6600, Telex: 092-4347; Empl.: 108

DYSAN CORP., 5201 Patrick Henry Dr., Santa Clara, CA 95050, Tel: 408-988-3472, Telex: 171551 DYSAN SNTA, TWX: 910-338-2144

DZUS FASTENER, 425 Union Blvd., W. Islip, NY 11795, Tel: 516-669-6000, Telex: 96-1454; FSC No.: 72794; Empl.: 100; *Sls. Mgr.:* George R. Davis

EAGLE ELECTRIC MFG. CO., INC., 45-31 Court Sq., L.I.C., NY 11101, Tel: 212-937-8000, Telex: ITTEAGLE 426774; *Sls. Mgr.:* Joseph Mannarino; *Dist. Mgr.:* John Chambers

EAGLE MAGNETIC COMPANY, INC., 7417 Crawfordsville Rd., P.O. Box 24283, Indianapolis, IN 46224, Tel: 317-297-1030, TWX: 810-341-3386; Empl.: 37; *Sls. Mgr.:* Dane Love .... **2**•1905

EAGLE-PICHER INDS., INC., Elctrns. Div., Box 47, Joplin, MO 64801, Tel: 417-623-8000, TWX: 910-774-4508; Empl.: 700

EAGLE SIGNAL CONTROLS, Mfg. Div. Gulf & Western Inds., Box 16100, Austin, TX 78761, Tel: 512-837-8401; Empl.: 600; *Sls. Mgr.:* Don Benice

Local Sales Offices & Reps

CA	La Fayette	415-283-0380
CA	Studio City	213-572-8000
GA	Atlanta	404-996-4511
IL	Downers Grove	312-969-9000
NJ	Saddle Brook	201-368-2270
TX	Arlington	817-265-7790

EALING OPTICS CO., Ealing Corp., 22 Pleasant St., S. Natick, MA 01760, Tel: 617-655-7000, Telex: 948339; *Sls. Mgr.:* Peter Andreas

E & L INSTRUMENTS, INC., 61 First St., Derby, CT 06418, Tel: 203-735-8774, Telex: 963536; Empl.: 46

EAO SWITCH CORP., 198 Pepe's Farm Rd., P.O. Box 552 MO, Milford, CT 06460, Tel: 203-877-4577, Telex: 96-4347; Empl.: 19; *Sls. Mgr.:* George T. Bracci .... **1B**•1589

Local Sales Offices & Reps

AL	Huntsville, Conley and Assocs.	205-882-0316
AZ	Scottsdale, Luscombe Engrg.	602-949-9333
AR	Little Rock, Beacon Elctrn. Assocs.	501-224-5449
CA	Campbell, Luscombe Engrg.	408-370-2020
CA	Pasadena, Luscombe Engrg.	213-684-2000
CA	San Diego, Luscombe Engrg.	619-295-4300
CO	Denver, Cleveland Entprs. of Colo.	303-751-3252
CT	Farmington, Ray Perron & Co.	203-673-4825
CT	New Milford, Ray Perron and Co.	203-354-2569
FL	Boca Raton, Conley and Assocs.	305-395-6108
FL	Oviedo, Conley and Assocs.	305-365-3283
GA	Atlanta, Conley and Assocs.	404-447-6992
GA	Tampa, Conley and Assocs.	813-885-7658
IL	Arlington Hgts., Brainard-Wilson Mktg.	312-437-2700
IN	Carmel, Brainard-Wilson Mktg.	317-844-2800
KS	Mission, Mertens Co.	918-432-9323
MD	Columbia, Delta 111 Assocs.	301-730-4700
MA	Needham, Ray Perron & Co.	800-225-4280; 617-449-6162
MI	Plymouth, Jay Mktg. Assocs.	313-459-1200
MN	Minneapolis, OEM Elctrical Sls. Co.	612-559-2448
MO	Clayton, Mertens Co.	314-993-6600
NH	Dover, Ray Perron & Co	603-742-2321
NJ	Englewood, Sprung/Nussbaum	201-569-5666
NM	Albuquerque, Cleveland Entprs.	505-265-7893
NY	Rochester, Apex Assocs., Inc.	716-254-6050
NC	Raleigh, Conley and Assocs.	919-876-9862
OH	Mentor, Jay Mktg. Assocs.	216-257-5244
PA	Hatboro, Jacobsen Assoc.	215-674-2937
PA	Pittsburgh, R. W. Kneip	412-823-0169
TN	Johnson City, Beacon Elctrn. Assocs.	615-282-2421
TX	Dallas, Glidden Electro Equip.	214-341-0610
TX	Houston, Glidden Electro Equip.	713-681-1415
UT	Salt Lake City, Cleveland Entprs. of Colo.	801-355-8424
WA	Lynnwood, Blum & Assocs.	206-775-6656
WI	Milwaukee, Badgerep	414-258-6630

Local Distributors

AL	Huntsville, R.M. Alabama	205-852-1550
AZ	Phoenix, Minarik Electric	602-233-3000
AZ	Tempe, Fisher Brownell	602-967-1464
CA	Alhambra, Fisher Brownell	714-739-2201
CA	Burlingame, Electronic Control Devices	415-348-0791
CA	Gardena, California Switch and Signal	213-770-2330
CA	Los Angeles, Minarik Elec. Co.	213-624-3161
CA	San Diego, Minarik Elec. Co.	619-560-8545
CA	San Diego, Fisher Brownell	619-560-6632
CA	Santa Clara, Minarik Elec. Co.	408-727-0575
CA	Santa Clara, Fisher Brownell	408-988-6041
CA	Van Nuys, Patane Avionics	213-988-4455
CO	Denver, CSID	800-525-3532
CT	Hamden, Impact Sls.	203-281-1331
CT	Shelton, Century Elec. Supp.	203-736-2684
FL	Oviedo, Dixie Sales	305-365-5211
GA	Norcross, Wilshire Elctrns.	404-923-5750
IL	Arlington Hgts., Martec Assoc.	312-956-8090
IL	Lombard, R.M. Illinois	312-932-5150
IL	Rosemont, Advent Elctrns.	312-297-6200
IN	Indianapolis, R.M. Indiana	317-247-9701
KY	Louisville, Peerless Elctrns.	502-637-7674
LA	Baton Rouge, Menard Elctrns.	504-355-0323
LA	Jefferson, Gulfside Company	504-733-4481
MA	Canton, Impact Sls. Co.	617-821-1500
MI	Grand Rapids, R.M. Elctrns.	616-531-9300
MI	St. Claire Shores, SPEMCO Switches	313-771-2700
MN	Minneapolis, Electronic Ctr.	612-371-5200
NJ	Cranford, Garden State Elctrns.	201-272-6400
NJ	Roseland, Walker Engrg.	201-226-0855
NY	Buffalo, Summit Distrs.	716-887-2800
NY	New York, Martin Audio/Video	212-541-5900
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Rochester, Modutex Corp.	716-424-1620
NY	Woodside, Switches Unlimited	212-478-5000
NC	Charlotte, Elctrns. Mktg. Corp.	704-394-6195
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Columbus, Electronics Mktg.	614-299-4161
OH	Highland Hgts., Electronic Mktg. Corp.	216-442-3441
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Portland, Minarik Elc. Co.	503-253-3402
PA	Harrisburg, Advacom	717-545-5674
PA	McKean, Advacom	814-476-7774
PA	Norristown, Kimberly-James Co.	215-666-7286
PA	Pittsburgh, Grant Industrial Controls	412-787-9770
TX	Dallas, R.M. Dallas	214-235-3100
TX	Garland, Indl. Equip. Co. of Dallas	214-271-5494
TX	Richardson, Fisher Brownell	214-235-3177
TX	San Antonio, Minarik Elec. Co.	512-822-7097
WA	Bellevue, Integrated Elctrns.	206-455-2727
WI	Milwaukee, Marsh Elctrns.	414-475-6000

E-A-R DIV., Cabot Corp., 7911 Zionsville Rd., Indianapolis, IN 46268, Tel: 317-872-1111, TWX: 810-341-3412; *Sls. Mgr.:* Richard W. Holub .... **2**•1867

EASCO/K-D TOOLS, 3575 Hempland Rd., Lancaster, PA 17604, Tel: 717-665-4557, Telex: 848429; *Sls. Mgr.:* Mark Lax

EASTERN AIR DEVICES MOTOR DIV., 1 Progress Dr., Dover, NH 03820, Tel: 603-742-3330, TWX: 510-297-4454; Empl.: 200; *Sls. Mgr.:* D. Cooper .... **1B**•1141

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
CA	Buena Park, Sales Engrs. Ltd.	213-921-0681

CA	Los Altos, Servo Data	415-964-1325
CO	Boulder, R. G. Entprs.	303-447-9211
FL	Orlando, Perrott Assoc.	305-275-1132
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Chicago, Berndt Assocs.	312-283-0713
IN	Carmel, Berndt Assocs.	317-844-0114
MA	Framingham, Gerald Rosen Co.	617-879-5505
MN	St. Paul, REPCO	612-488-0201
NJ	Ridgefield, Rical Assocs.	201-945-5250
NY	Rochester, Elcom Sls.	716-385-1400
NY	Syracuse, ELCOM Sls.	315-685-8245
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Cleveland, Jim Finnegan & Co.	216-238-5905
PA	Paoli, ETC Sales	215-296-3527
TX	Austin, Mech-Tron Mktg.	512-835-0980
TX	Dallas, MECH-TRON Mktg.	214-343-3786
WA	Seattle, Eltech	206-767-4330
WI	Milwaukee, Berndt Assocs.	414-545-8400

EASTERN DELTA CORP., 29-09 S. Broadway, Fair Lawn, NJ 07410, Tel: 201-797-4200; FSC No.: 18105; Empl.: 35

EASTERN ELECTRONICS MFG. CORP., 180 Roberts St., East Hartford, CT 06108, Tel: 203-528-9821; Empl.: 100; *Sls. Mgr.:* T. P. Dunn

EASTERN MARKING MACHINES, 422 S Franklin St., Hempstead, NY 11550, Tel: 516-483-7070, Telex: 968095; Empl.: 8; *Sls. Mgr.:* P. Coburn; *Dist. Mgr.:* L. Sherman

EASTERN MICROWAVE, 4 Gill St., Woburn, MA 01801, Tel: 617-935-8600; FSC No.: 30616; Empl.: 45; *Sls. Mgr.:* S. C. Lowe

EASTERN SMELTING & REFINING CORP., 37-39 Bubier St., Lynn, MA 01901, Tel: 617-599-9000, Telex: 940108; *Sls. Mgr.:* Donald Decareau

EASY HEAT-WIREKRAFT, 555 North Michigan St., Lakeville, IN 46536, Tel: 219-784-3011, Telex: 233159; *Sls. Mgr.:* Russell W. Riddle

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EATON CORP., Aerospace Controls/Systems Div., 2074 Whitfield Ave., East, Sarasota, FL 33578, Tel: 813-758-7726

EATON CORP., Microwave Components Div., 680 W. Maude Ave., Sunnyvale, CA 94086, Tel: 408-733-3883, TWX: 910-339-9252; FSC No.: 54987; Empl.: 30

Local Sales Offices & Reps

AZ	Tempe, Sierra Technl. Grp.	602-894-2335
CA	Costa Mesa, EBA Microwave	714-857-6079
CA	Sunnyvale, Loeswicks	408-745-6751
FL	Winter Park, Microwave Mktg.	305-678-2141
IA	Cedar Rapids, S & O Sls.	319-393-1845
KS	Merriam, Midwest Tech. Sls.	913-236-8555
ME	Ogunquit, Micronic Assocs.	617-933-2121
MD	Silver Spring, Youth-Nelson Assocs.	301-598-5740
NY	Fayetteville, R. D. Sherman & Co.	315-637-9861
PA	Huntingdon Valley, Rabal Assoc., Inc.	215-947-4825
TX	Dallas, Stevens Sls. Co.	214-350-2476
WA	Seattle, Ecco Mktg.	206-364-0200

EATON CORP., A.I.L. Div., Comac Rd., Deer Park, NY 11729, Tel: 516-595-3094, TWX: 510-227-6073; FSC No.: 00752; Empl.: 2250; *Sls. Mgr.:* H. N. Kreisberg

EATON CORP., Microwave Comps. Div., 783 Palomar Ave., Sunnyvale, CA 94086, Tel: 408-245-6810, TWX: 910-339-9230; Empl.: 120; *Sls. Mgr.:* J. R. Campbell

Local Sales Offices & Reps

AZ	Tempe, Sierra Tech. Grp.	602-894-2335
CA	Sherman Oaks, Midwin & Olifson	213-996-9093
CA	Sunnyvale, Loeswick	408-745-6751
FL	Winter Park, Microwave Mktg.	305-678-2141
KS	Merriam, Midwest Tech. Sls.	913-236-8557
MD	Silver Spring, Youth-Nelson Assocs.	301-598-5740
MA	Needham Heights, O'Sullivan & Murphy	617-449-4141
NY	Fayetteville, R. D. Sherman & Co.	315-637-9861
NY	Melville, Metro Mics	516-271-6677
OH	Dayton, Ashby Assocs.	513-252-5627
PA	Huntingdon Valley, Rabal Assoc.	215-947-4825
TX	Dallas, Stevens Sls. Co.	214-350-2476

EATON CORP., Durant Digital Instrs., 901 S. 12th St., Watertown, WI 53094, Tel: 414-261-4070, TWX: 910-260-3713; Empl.: 400; *Sls. Mgr.:* H. L. Sisson; *Dist. Mgr.:* Dennis G. Walz

EATON CORP., Elctrn. Instrmn. Div., 2070 Fifth Ave., Ronkonkoma, NY 11779, Tel: 516-588-3600, TWX: 510-228-6507; Empl.: 400

EATON CORP., Printer Prods Oper., Techn. Resch. Pk., Riverton, WY 82501, Tel: 307-856-4821, Telex: 910 949 4864; Empl.: 185; *Sls. Mgr.:* Roger Rayburn

EATON CORP., TEST SYS. DIV., Discrete Test, Precision Rd., Danbury, CT 06810, Tel: 203-744-0096, TWX: 710-456-5030; *Sls. Mgr.:* Chuck Winick

EATON CORP., TEST SYS. DIV., Memory Test Sys., 21135 Erwin St., Woodland Hills, CA 91365, Tel: 213-887-5550, Telex: 69-8489; Empl.: 200; *Sls. Mgr.:* Chuck Winick

EATON CORP, Yig-Tek Prods., 785 Palomar Ave., Sunnyvale, CA 94086, Tel: 408-737-7300, TWX: 910-339-9395; Empl.: 100

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Cutler-Hammer Products

EATON CORP./CUTLER-HAMMER PRODS., Aerospace/Commercial Controls Div., 4201 N. 27th St., Milwaukee, WI 53216, Tel: 414-449-7487, Telex: 26-716; FSC No.: 81640; *Sls. Mgr.:* W. L. Reinke; *Dist. Mgr.:* J. R. McDonough .. 1B•1590-1611

Local Sales Offices & Reps

CA	Los Angeles	714-776-1910
CA	San Francisco	415-967-0606
FL	Tampa	813-985-5777
GA	Atlanta	404-939-3023
IL	Chicago	312-530-7980
KS	Kansas City	913-384-0080
MD	Baltimore	301-296-9640
MA	Boston	617-863-5427
MI	Detroit	313-354-7513
MN	Minneapolis	612-831-8668
NY	Melville	516-595-4424
OH	Cleveland	216-835-4554
OH	Dayton	513-294-1877
PA	Philadelphia	215-692-9126
PA	Pittsburgh	412-221-4420
TX	Dallas	214-386-4121
WA	Seattle	206-643-2717
WI	Milwaukee	414-327-7300

Local Distributors

AL	Huntsville, Hamilton-Avnet Elctrns.	800-633-2992
AZ	Phoenix, Dalis Elctrn. Supp.	602-254-8471
AZ	Tempe, Fisher/Brownell	206-967-1464
AZ	Tempe, Hamilton/Avnet	602-894-9600
CA	Campbell, Centrex Elctrns.	408-379-0800
CA	Costa Mesa, Avnet Elctrns.	213-558-2345
CA	Covina, Selecta Switch	213-967-4123
CA	Fountain Valley, Comp. Center	714-979-0433
CA	Glendale, Western Elctrn. Supp.	213-246-4861
CA	Los Angeles, Electric Switch	213-660-1310
CA	Los Angeles, California Switch & Signal	213-770-2330
CA	Los Angeles, Fisher/Brownell	213-289-0255
CA	Los Angeles, Western Electromotive/Shephard	213-820-3777
CA	San Diego, Fisher/Brownell	619-560-8545
CA	San Diego, Hamilton/Avnet	619-571-7500
CA	San Jose, Consolidated Parts	408-263-9521
CA	Santa Ana, Norstan Elctrns. Inc.	714-540-4165
CA	Santa Clara, Western Electromotive	408-727-7411
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CA	Santa Clara, Fisher/Brownell	408-988-6041
CA	Santa Fe Springs, Eurton Elec. Co.	213-946-4477
CA	Sunnyvale, Hamilton-Avnet Elctrns.	408-743-3355
CO	Denver, C.S.I.D. Inc.	303-893-9594
CO	Denver, Con. Parts	303-623-5313
CO	Denver, Newark Elctrns. Corp.	303-757-3351
CO	Englewood, Hamilton/Avnet	303-740-1000
CT	Danbury, Hamilton-Avnet Elctrns.	203-762-0361
CT	New Haven, Hatry Elec.	203-787-5921
CT	Wallingford, Sager Elctrl. Supp. Co.	203-265-4600
CT	West Hartford, Gal Elec. Co.	203-232-9880
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Ft. Lauderdale, Hamilton-Avnet Elctrns.	305-971-2900
FL	Ft. Lauderdale, Peerless	303-973-4141
FL	Miami, Elctrn. Equip.	305-871-3500
FL	Orlando, Hammond	305-849-6060
FL	St. Petersburg, Hamilton-Avnet Elctrns.	813-576-3930
GA	Atlanta, Electro Air Corp.	404-351-3545
GA	Atlanta, Brownell Electro	404-762-5181
GA	Norcross, Hamilton-Avnet Elctrns.	404-447-7500
IL	Addison, LCOMP Chicago	312-628-1400
IL	Chicago, Revere Elec. Supp. Co.	312-738-3636
IL	Chicago, Advent Elctrns.	312-297-6200
IL	Chicago, Steiner	312-685-7000
IL	Chicago, Complete-Reading	312-547-5400
IL	Chicago, Hamilton/Avnet	312-678-6310
IL	Chicago, Ohm	312-359-5500
IL	Chicago, Newark	312-638-4411
IN	Ft. Wayne, Graham Elctrn. Supp.	219-423-3422
IN	Indianapolis, Graham Elctrn. Supp.	317-634-8202
IA	Davenport, Crescent Elec. Supp. Co.	319-323-1811
IA	West Des Moines, Ramco Co.	515-225-6933
KS	Kansas City, Hamilton/Avnet	913-888-8900
KS	Wichita, LCOMP	316-265-8501
KS	Wichita, Airtechnics	316-267-2849
KY	Louisville, Peerless Elctrn. Equip.	502-637-7674
LA	Lafayette, Ralph's of Lafayette	318-233-0105
LA	New Orleans, Long Elctrl. Supp. Co.	504-524-8383
MD	Beltsville, Treeko Sls.	301-792-0112
MD	Gaithersburg, Pioneer-Wash	301-948-0710
MD	Kensington, Marine Air	301-949-9560
MA	Boston, Hamilton-Avnet Elctrns.	617-273-7500
MA	Boston, Controller Svc.	617-269-1300
MA	Boston, Sager	617-749-6700
MA	Canton, Impact Sls. Co.	617-821-1500
MA	Norwood, Gerber Elctrns.	617-769-6000
MA	Waltham, Sterling Elctrns.	617-894-6200
MI	Detroit, Hamilton-Avnet Elctrns.	313-522-4700
MI	Detroit, R S Elctrns.	313-525-1155
MI	Detroit, Don Blackburn & Co.	313-261-9100
MI	Detroit, Spemco Switches	313-771-2700
MI	Grand Rapids, S-F Elctrns. Supp.	616-459-0216
MN	Minneapolis, H. A. Holden	612-333-5353
MN	Minneapolis, Hamilton/Avnet	612-932-0600
MN	Minneapolis, Boustead	612-544-9131
MN	Minneapolis, Newark	612-331-6350
MN	St. Paul, Ragon Elctrns.	612-642-2852
MS	Jackson, Ellington Elctrn. Supp.	601-355-0561
MO	Kansas City, LCOMP	816-221-2400
MO	St. Louis, Hamilton-Avnet Elctrns.	314-340-1200
MO	St. Louis, LCOMP	314-291-6200
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Hackensack, Nassor Elctrl. Supp. Co.	201-641-3737
NJ	Jersey City, Cuny & Guerber	201-653-0222
NJ	Manasquan, Kulka Smith	201-223-9400
NJ	Paterson, Hamilton-Avnet Elctrns.	201-575-3390
NM	Albuquerque, Walker Elctrns. Supp. Co.	505-247-2288

NM	Albuquerque, Hamilton/Avnet	505-765-1500
NY	Bohemia, Key Comps.	516-567-7500
NY	Buffalo, Summit	716-884-3450
NY	Hauppauge, Hamilton-Avnet Elctrns.	516-231-9800
NY	Hempstead, Elctrn. Equip.	516-538-5510
NY	Lynnbrook, Peerless	516-593-2121
NY	New York, Brownell Electro	212-924-6000
NY	Rochester, Modutex	716-647-9700
NY	Rochester, Hamilton-Avnet Elctrns.	716-475-9130
NY	Rochester, Simcona	716-328-3230
NY	Syracuse, Hamilton-Avnet Elctrns.	206-437-2641
NY	Woodside, Switches Unltd.	212-478-5000
NC	Charlotte, Brownell Electro	704-597-1270
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Hamilton/Avnet	919-829-8030
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cincinnati, Schuster	513-489-1400
OH	Cleveland, Pioneer-Cleveland	216-587-3600
OH	Cleveland, Hamilton-Avnet Elctrns.	216-831-3500
OH	Cleveland, Complete-Reading	216-267-1000
OH	Cleveland, Roland	216-351-2050
OH	Dayton, Pioneer Standard Elctrns.	513-236-9900
OH	Dayton, Stotts-Friedman Co.	513-298-5555
OH	Dayton, Related Comps.	513-253-6116
OH	Dayton, Hamilton/Avnet	513-433-0610
OH	Warren, REM Elctrns. Supp. Co.	216-373-1300
OK	Oklahoma City, Electro Entprs.	405-427-6591
OK	Oklahoma City, John H. Cole Co.	405-235-1761
OK	Tulsa, Radio Inc.	918-587-9123
OR	Beaverton, Almac/Stroum	503-641-9070
PA	Altoona, Allegheny Elctrns.	814-946-0871
PA	Braddock, M. Leff Radio Parts Co.	412-351-5000
PA	Erie, Erie Indl.	814-455-8051
PA	Harrisburg, Dauphin Elec.	717-232-4201
PA	McKean, Advacom	814-476-7774
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Philadelphia, Peak	215-293-9000
PA	Pittsburgh, Cam/R.P.C.	412-782-3770
PA	Reading, Barbey	215-376-7451
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Chattanooga, Techni-Tronics	615-875-5449
TN	Memphis, Brownell Electro	901-795-8487
TN	Nashville, Electra Distrbg. Co.	615-329-3971
TX	Addison, Computer Comps. Corp.	214-239-0271
TX	Austin, Southwest Elctrns.	512-837-8971
TX	Austin, Hamilton-Avnet Elctrns.	512-837-8911
TX	Dallas, Fisher/Brownell	214-235-3177
TX	Dallas, Associated Aircraft	214-331-4381
TX	Dallas, Southwest Elctrns.	713-234-3050
TX	Dallas, Complete-Reading	214-827-8891
TX	El Paso, Ideal Indl. Elctrns. Sys.	915-779-6647
TX	Ft. Worth, Swieco	817-429-1107
TX	Ft. Worth, Allied	817-336-5401
TX	Houston, Southwest	713-491-4900
TX	Houston, Hamilton/Avnet	713-780-1771
TX	Irving, Hamilton-Avnet Elctrns.	214-659-4100
UT	Salt Lake City, Stuart	801-466-8605
UT	Salt Lake City, Hamilton/Avnet	801-972-2800
VA	Charlottesville, Virginia Radio Supp.	804-296-4184
VA	Richmond, Sterling Elctrns.	804-266-2190
WA	Seattle, Hamilton-Avnet Elctrns.	206-453-5844
WA	Seattle, Almac Elctrns. Corp.	206-643-9992
WI	Milwaukee, Elctrn. Expeditors	414-228-8100
WI	Milwaukee, Standard Elec.	414-272-8100

EBERHARD MFG. CO., DIV., Eastern Co., 21944 Drake Rd., Strongsville, OH 44136, Tel: 216-238-9720, Telex: 98-5301; FSC No.: 19220; *Sls. Mgr.:* Edward Hongosh

EBM INDS., INC., 525 New Britain Ave., Unionville, CT 06085, Tel: 203-674-1515, TWX: 710-423-8723; FSC No.: 62292; *Sls. Mgr.:* Edward A. Cyr ....2•1255, 1806, 1807

Local Sales Offices & Reps

AL	Huntsville, Raycom	205-859-2017
AZ	Tempe, Argus Sls.	602-968-7791
CA	Los Angeles, Wiley Co.	213-666-1611
CA	San Diego, Wiley Co.	619-571-2881
CA	Santa Clara, Ross Mktg. Assocs.	408-988-8111
CO	Littleton, Simpson Assocs.	303-794-8381
CT	Cheshire, Selmark Assocs.	203-573-9088
FL	Orlando, Trimark Assocs.	305-859-5504
GA	Fayetteville, Raycom	404-461-4026
IL	Elk Grove, Carlson Elctrn. Sls.	312-956-8240
IN	Indianapolis, J & W Sales	317-842-3740
IA	Cedar Rapids, Carlson Elctrn. Sls.	319-377-6341
KS	Overland Park, Web Elctrns.	913-381-2225
MD	Millersville, Tri-Mark	301-987-9103
MA	Millis, Selmark Assocs.	617-376-2914
MI	Detroit, Burcaw Co.	313-533-7700
MN	St. Paul, Arkco Sls.	612-777-7454
MO	Florissant, Web Elctrns.	314-921-5720
NH	Hopkinton, Selmark Assocs.	603-746-3299
NJ	Marlton, b.g.r. Assocs.	609-983-1020
NJ	Oakland, Robert Horne Assocs.	201-337-5200
NY	Buffalo, Rudell-Merrifield Assocs.	716-634-4300
NC	Raleigh, Raycom	919-847-8276
OH	Chesterland, Depco	216-729-3588
OK	Tulsa, Bonser-Philhower Sls.	918-496-3236
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Harrison City, Rudell-Merrifield Assocs.	412-327-0858
TX	Austin, Bonser-Philhower Sls.	512-346-9186
TX	Dallas, Bonser-Philhower Sls.	214-234-8438
TX	Houston, Bonser-Philhower Sls.	713-531-4144
UT	Midvale, Simpson Assocs.	801-566-3691
WA	Seattle, Earl & Brown Co.	206-284-1121
WI	Milwaukee, Carlson Elctrn. Sls. Co.	414-476-2790

Local Distributors

AZ	Tempe, GRQ Ltd.	602-968-5932
CA	Fullerton, Pyramid/Fullerton	714-773-0781
CA	Fullerton, Young Sls. Co.	714-871-5355
CA	Hollywood, Yale Elctrns.	213-465-3186
CA	San Diego, Deco Elctrns.	619-693-1595
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Englewood, Indl. Elctrns.	303-694-9444
CT	Danbury, Pilgrim Elctrns.	203-792-7274
CT	Hamden, Impact Sls. Co.	203-281-1331
FL	Melbourne, Frankland	305-259-7988
GA	Fayetteville, Frankland	404-461-4026
IL	Rosemont, Advent Elctrns.	312-297-6200
IN	Indianapolis, Advent Elctrns.	317-872-4910
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
MD	Baltimore, Resco/Baltimore	301-823-0070
MD	Beltsville, Resco/D.C.	301-937-9100
MA	Canton, Impact Sls. Co.	617-821-1500
MA	Middleboro, Glynn Elctrns.	617-947-4262
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Grand Rapids, S.F. Elctrns.	616-459-0216
MN	Minneapolis, Bergquist	612-835-2322
NJ	Berlin, General Comps.	609-768-6767
NJ	Oakland, Gordon/Horne	201-337-5200
NY	Rochester, Simcona	716-328-3230
NY	Suffern, Nobel Elctrns.	914-357-4500
OH	Akron, Akron Elctrns.	216-762-8818
OH	Dayton, Related Comps.	513-253-6116
PA	Norristown, Century Elctrn. Comp. Co.	215-631-5400
TN	Chattanooga, Techni-Tronics	615-875-5449
TX	Addison, ACT Corp.	214-980-1888
UT	North Salt Lake, Integrated Elctrns.	801-298-1868
WA	Bellevue, Integrated Elctrns./Jaco	206-455-2727
WI	Mequon, Taylor Elec. Co.	414-241-4321

EBY CO., 2751 Southampton Rd., Philadelphia, PA 19154, Tel: 215-969-4200, TWX: 710-670-0452; FSC No.: 72825; Empl.: 150; *Sls. Mgr.:* C. R. Dedera ....2•1256, 1257

Local Sales Offices & Reps

AL	Huntsville, Hollingsworth & Still	800-241-5712
AZ	Tempe, Gassner & Clark	602-968-9037
CA	Anaheim, Galaxie Sls. Intl.	714-752-1580
CA	Los Altos, J. W. Wilhoit Co.	415-961-3660
CO	Boulder, R. F. Mayo Assocs.	303-499-2155
GA	Norcross, Hollingsworth & Still	404-447-1700
IL	Chicago, Rendell Sls. Co.	312-528-9025
IN	Ft. Wayne, Given Corp.	219-432-5585
IA	Cedar Rapids, Gassner & Clark	319-393-5763
MD	Glen Burnie, Macrotech Assocs.	301-437-5588
MA	Newton Upper Falls, Anchor Engrg.	617-964-6205
MI	Brighton, Electronic Sources, Inc.	313-227-3598
MN	Edina, Grayden & Flemmer	612-941-1120
MO	Ellisville, Larco Sls., Inc.	314-394-7141
NY	Fairport, Bastian Sls. Agency, Inc.	716-223-0237
NY	Melville, Comtronic Assoc.	516-249-0505
NY	Syracuse, Bastian Sls. Agency, Inc.	325-437-1482
NC	Kernersville, Hollingsworth & Still	800-241-5712
OH	Dayton, J. N. Bailey & Assoc.	513-226-0512
OR	Beaverton, Caruso & Northcutt, Inc.	503-646-4973
PA	Philadelphia, Omni Sls.	215-233-4600
SC	Columbia, Hollingsworth & Still	800-241-5712
TX	Austin, Stevens Sls. Co.	512-250-5104
TX	Dallas, Stevens Sls. Co.	214-350-2476
VA	Gladys, Ralley Entprs., Inc.	804-283-5656
WA	Bellevue, Caruso & Northcutt, Inc.	206-454-9699

Local Distributors

AL	Birmingham, American Elec. Supp. Co.	205-254-3280
AL	Huntsville, Contact Elctrns.	205-881-9321
AL	Mobile, Electronic Supp. Co.	205-478-0455
AZ	Phoenix, Lion Elctrn. Distrs.	602-869-9611
AZ	Tucson, Kachina Elec. Dist. Inc.	602-792-2223
CA	Canoga Park, Afcom	213-703-6161
CA	City of Industry, Ital Elctrn. Sls.	213-968-8515
CA	Irvine, AMC Milliken	714-549-9811
CA	San Carlos, Logan Elctrns.	415-594-0700
CA	San Jose, Afcom	408-263-0660
CA	Santa Ana, Amcotec Elec. Comp. Sales	714-957-3003
DE	Wilmington, A.M. Elctrns.	302-654-9233
FL	Casselberry, Afcom	305-831-6630
FL	W. Palm Beach, Nurmi Elctrn. Supp.	305-686-8553
GA	Atlanta, Specialty Dist. Co. Inc.	404-873-2521
GA	Atlanta, ACK Radio Supp.	404-351-6340
IL	Elk Grove, Afcom	312-228-0760
KY	Bowling Green, Randolph, Hale & Meredith	502-781-1460
KY	Hopkinsville, Randolph & Hale	502-885-5357
KY	Louisville, P.I. Burkes Co.	502-589-3960
MD	Columbia, Aztech Elctrns. Inc.	301-995-1760
MA	Woburn, Afcom	617-935-3200
MI	Grand Rapids, S-F Elctrn. Supp. Co.	616-459-0216
NJ	Clifton, Afcom	201-365-2700
NY	Albany, E.E. Taylor	518-438-7811
NY	Buffalo, Summit Elctrns.	716-887-2833
NY	Jamaica, Eby Sls. Co. of NY	212-291-3232
NY	Long Island City, Hardware Specialty Co.	212-361-9393
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Rome, Rome Elctrns.	315-337-5400
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Dayton, Televox, Inc.	513-294-4499
PA	Philadelphia, Spectrum Elctrns. Inc.	215-748-3010
PA	York, Electronic Comps. for Ind.	717-843-8971
SC	Columbia, Dixie Elec.	803-779-5332
TN	Chattanooga, Indl. Elec. Dist. Inc.	615-698-3413
TN	Clarksville, Randolph, Hale & Matthews	615-647-2325
TN	Cookville, Randolph & Parks	615-526-6184
TN	Memphis, Bluff City Distrs.	901-345-9500
TN	Nashville, Randolph & Rice	615-255-5602
TN	Tullahoma, Randolph, Rice & Williams	615-455-4531
TX	Dallas, Afcom	214-238-7845
TX	El Paso, Midland Specialty Co.	915-533-9555
VA	Roanoke, Peoples Elctrn. Supp.	703-342-8933

ECD CORP., 196 Broadway, Cambridge, MA 02139, Tel: 617-661-4400, TWX: 710-320-6965; Empl.: 40

ECI COMPANY, Box 1565, Terra Haute, IN 47808, Tel: 812-232-4442; Empl.: 3

ECO INSTRS. DIV., Sea Data Corp., 1 Bridge St., Newton, MA 02158, Tel: 617-964-8360, Telex: 951107; Empl.: 40; *Sls. Mgr.:* Jill Shipman

Local Sales Offices & Reps

CA	Burlingame, BHL Assocs.	415-342-7850
CA	Yorba Linda, Western Analytical Prods.	714-558-7300
CO	Littleton, Hiltech	303-741-2536
GA	Lilburn/Atlanta, Spectrum Sci.	404-921-5235
HI	Honolulu, Aloha Assocs.	808-941-1574
IL	Des Plaines, Byron Ellis Assocs.	312-298-7626
MD	Gaithersburg, Renwar Tech.	301-949-9808
MI	W. Bloomfield, Scientific, Pittsburgh	313-851-2390
MS	Vicksburg, Sea Data Corp.	601-634-1110
NM	Albuquerque, Hiltech	505-268-1733
NY	Westbury, Kramer Assocs.	516-334-7181
OH	Cincinnati, Scientific, Pittsburgh	513-825-6994
PA	Paoli, Engleman Engrg.	215-644-8181
PA	Pittsburgh, Scientific, Pittsburgh	412-921-7700
TX	Houston, Sales Tech. Assocs.	713-723-3228
WA	Kirkland, Pelco Sci.	206-823-2290

ECONOMY FUSE, Reliance Electric, 2070 Maple St., Des Plaines, IL 60016, Tel: 312-299-2211, Telex: 726-453; FSC No.: 72076; Empl.: 200

Refer to Federal Pacific Electric Co. for sales office information.

Ectron CORPORATION®

ECTRON CORP., 8159 Engineer Rd., San Diego, CA 92111, Tel: 619-278-0600, TWX: 910-335-1259; FSC No.: 24856; Empl.: 50; *Sls. Mgr.:* W. W. Hanford ....3•1007

Local Sales Offices & Reps

AL	Huntsville, Saber Assocs.	800-327-0853
AZ	Phoenix, Aztec Entprs.	602-944-9185

CA	Costa Mesa, FLW Inc.	714-751-7512
CA	Hayward, FLW Inc.	415-487-2222
CA	San Diego, FLW Inc.	619-277-0993
CA	Van Nuys, FLW Inc.	818-989-5238
CO	Littleton, Aztec Entprs.	303-795-0250
FL	Melbourne, Saber Assocs.	305-724-0920
GA	Griffin, Saber Assoc. Inc.	800-327-0853
IL	Elmhurst, Sector Engrg. Sls.	312-530-7850
IN	Indianapolis, Sector Engrg. Sls.	317-842-1120
KS	Overland Park, Ramsey Assocs.	913-649-6996
LA	Baton Rouge, Sesco	504-928-4951
MD	Rockville, Elctrn. Mktg. Assoc.	301-744-7700
MA	Needham, Addelco Corp.	617-444-4754
MI	Royal Oak, Satullo	313-549-3910
MN	Bloomington, Sector Eng. Sls. Inc.	612-888-6920
MO	Maryland Hgts., Ramsey Assocs.	314-878-5042
NM	Albuquerque, Aztec Entprs.	505-262-1688
NY	East Syracuse, Ossmann Instrs.	315-437-7052
NY	Plainview, Eastern-Metro Assoc.	516-931-1414
NY	Rochester, Ossmann Instrs.	716-442-6990
NY	Saratoga Springs, Ossmann Instrs.	518-377-8604
NC	Clayton, Saber Assocs.	800-327-0853
OH	Cleveland, Instrmn. Sys.	216-845-8800
OH	Dayton, Instrmn. Sys.	513-294-2838
OK	Tulsa, Sesco	918-622-3868
PA	Pittsburgh, Instrmn. Sys.	412-243-1111
PA	Plymouth Meeting, Elctrn. Mktg. Assoc.	215-828-7400
SC	Columbia, Saber Assoc. Inc.	800-327-0853
TX	Houston, Sesco	713-999-3510
TX	Richardson, Sesco	214-231-9364
UT	Ogden, Aztec Entprs.	801-621-1655
VA	Chesapeake, Elctrn. Mktg. Assoc.	804-482-3318
WA	Seattle, Datacom Assoc. Inc.	206-285-2525
WI	Milwaukee, Sector Eng. Sls. Inc.	414-352-8280

EDAC INC., 20 Railside Rd., Toronto, ON M3A 1A4, Canada, Tel: 416-445-2292, TWX: 610-492-1398; FSC No.: 31781; Empl.: 120; *Sls. Mgr.:* Alan Little; *Dist. Mgr.:* Alan Little .... 2•1258-1263

Local Sales Offices & Reps

AL	Huntsville, Elctrn. Mktg. Assocs.	205-837-7363
AZ	Tempe, Cleveland Entprs. of Ariz.	602-802-1127
AR	Dallas, Allied Comps.	214-238-0408
CA	Los Angeles, Universal Comps. Co.	213-641-4255
CA	Santa Clara, Engrg. Assocs. Corp.	408-988-5001
CO	Aurora, Sage Sls.	303-750-3501
CT	Bloomfield, S.I.R. Assocs.	203-243-9343
FL	Altamonte Springs, Semtronic Assocs.	305-831-8233
FL	Clearwater, Semtronic Assocs.	813-461-4675
FL	Ft. Lauderdale, Semtronic Assocs.	305-731-2484
GA	Atlanta, Elctrn. Mktg. Assocs.	404-448-1215
HI	Honolulu, Aloha Assocs.	
ID	Portland, Earl & Brown Co.	503-245-2283
IL	Elk Grove Village, Control Sls.	312-595-2110
IA	West Des Moines, Nevco	515-225-9866
KS	North Kansas City, Nevco	816-421-1751
ME	Bedford, S.I.R. Assocs.	617-275-5550
MD	Woodbine, Naudain Assocs. Southern	301-442-2270
MA	Bedford, S.I.R. Assocs.	617-275-5550
MI	Birmingham, Favco	313-644-0173
MN	Spring Lake Park, Holmgren Assocs.	612-786-7641
MO	North Kansas City, Nevco	816-421-1751
MO	St. Louis, Nevco	314-843-7406
NV	Santa Clara, Engrg. Assocs. Corp.	408-988-5001
NM	Albuquerque, Cleveland Entprs.	505-265-7893
NY	Manhasset, Win-Cor Elctrn. Sls. Corp.	516-627-9474
NC	Raleigh, Elctrn. Mktg. Assocs.	919-847-8800
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Parkland, Rayco Sls.	215-757-1899
SC	Greenville, Elctrn. Mktg. Assocs.	803-233-4637
TX	Dallas, Allied Comps.	214-238-0408
TX	Houston, Allied Comps.	713-988-1600
TX	Hurst, Allied Comps.	817-589-0456
TX	Round Rock, Allied Comps.	512-244-1166
UT	Salt Lake City, Sage Sls.	801-467-5451
WA	Seattle, Earl & Brown Co.	206-284-1121
WI	Thiensville, Control Sls.	414-242-4580
PR	Puerto Rico, Distributronics	809-843-3321

Local Distributors

AL	Huntsville, Pioneer Elctrns.	205-837-9300
AZ	Phoenix, Heilind Elctrns.	602-243-7171
AZ	Phoenix, Second Source	602-861-1141
AZ	Tempe, Fisher-Brownell	602-967-1464
CA	Alhambra, Fisher-Brownell	213-289-0255
CA	Cerritos, El-Com	213-404-2961
CA	Sacramento, Dunlap Elctrns.	916-444-8070
CA	San Diego, Fisher-Brownell	619-560-8545
CA	San Diego, El-Com	619-578-0900
CA	Santa Clara, Fisher-Brownell	408-988-6041
CA	Santa Clara, El-Com	408-496-0880
CA	Sunnyvale, Time Elctrns.	408-734-9888
CO	Arvada, Denver Wintronics	303-431-7161
CO	Denver, Integrated Elctrns.	303-292-6121
CT	Bethel, Heilind Elctrns.	203-797-8600
CT	Hamden, Connector Co.	203-288-0044
CT	Wallingford, Midan Elctrns.	203-265-2077
FL	Altamonte Springs, Pioneer Orlando	305-834-9090
FL	Ft. Lauderdale, Pioneer	305-771-7520
GA	Atlanta, Prehler	404-447-5540
IL	Addison, Lectro Comps.	312-543-1680
IL	Chicago, Prehler	312-384-6100
IL	Northbrook, Classic Comps. Supp.	312-272-9650
MD	Beltsville, Treeko Sls.	301-937-8260
MD	Gaithersburg, Pioneer Elctrns.	301-921-0660
MD	Savage, Pyttronic Inds.	301-792-0780
MA	Burlington, Heilind Elctrns.	617-272-5610
MA	Waltham, Sterling Elctrns.	617-894-6200
MI	Farmington Hills, Prehler Elctrns.	313-473-7200
MI	Roseville, Madison Elctrns.	313-778-7640
MN	Edina, Inds. Comps.	612-831-2666
MO	Kansas City, L Comp	816-221-2400
MO	Maryland Heights, L Comp	314-291-6200
MO	St. Louis, Time Elctrns./Mid-west	314-391-6444
NH	Hudson, Heilind Elctrns.	603-883-9536
NJ	Dover, Electrospec	201-361-6300
NJ	Old Bridge, BTC Elctrn. Comps.	201-536-8000
NJ	Pennsauken, Resco Elctrns.	609-662-4000
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NY	Mount Vernon, Q.A.R. Inds. Elctrn. Sls.	914-699-2224
NY	New York, Peerless Radio Corp.	516-593-2121
NC	Charlotte, Pioneer/Carolina Elctrns.	704-527-8188
OH	Cincinnati, Schuster Elec. Co.	513-984-1600
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Twinsburg, Schuster Elec. Co.	216-425-8134
OR	Beaverton, Almac Elctrns. Corp.	503-641-9070
OR	Salem, Zepher Elctrn. Sls.	503-399-8503
PA	Allentown, P. A. Peters	215-434-5237
PA	Harrisburg, Cumberland Elctrns.	717-232-5999
PA	Harrisburg, Pyttronic Inds.	717-236-8001
PA	Horsham, Pioneer Elctrns.	215-674-4000
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Willow Grove, Resco Elctrns.	215-659-4440
TX	Austin, Southwest Elctrns.	512-837-8971
TX	Dallas, Heilind Elctrns.	214-351-2050
TX	El Paso, International Elctrns.	915-598-3406
TX	Houston, Sterling Elctrns.	713-627-9800
TX	Houston, Elctrn. Packaging Comps.	713-447-5800
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Richardson, Fisher-Brownell	214-235-3177
TX	Stafford, Southwest Elctrns.	713-491-4900
UT	Salt Lake City, Diplomat Elctrns.	801-486-7227
UT	Salt Lake City, Standard Supp. Co.	801-486-3371
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Bellevue, Almac Elctrns. Corp.	206-643-9992
WA	Seattle, Zepher Elctrn. Sls.	206-241-1980
WI	New Berlin, R. M. Wisconsin	414-784-4420
WI	New Berlin, Classic Comps. Supp.	414-786-5300

EDL INC., 385 Oser Ave., Hauppauge, NY 11787, Tel: 516-435-2808, 800-DIAL EDL, 800 342-5335; Empl.: 50; *Sls. Mgr.:* Don Polsky

EDMAC CORP., 7500 Main St., P.O. Box 750, Fishers, NY 14453-0750, Tel: 716-924-4000, TWX: 510-254-2896; Empl.: 170; *Sls. Mgr.:* Shera Banbury

EDO CORP./ELINCO DIV., 272 Main Ave., Norwalk, CT 06851, Tel: 203-847-5861, Telex: 96-5945; FSC No.: 73693; Empl.: 87

Local Sales Offices & Reps

CA	Buena Park, Rock Assocs.	714-521-6980
CA	Campbell, R & D Assocs.	408-866-6358
CO	Denver, High Plains Mktg.	303-751-7150
FL	Sarasota, H.G.L. Assocs.	813-923-2484
MA	Lexington, John E. Boeing Co.	617-862-2500
MO	St. Louis, Schutz Assocs.	314-962-2622
NY	Liverpool, Jones/Sudders	315-598-3838
NC	Charlotte, Robert W. Chapman & Co.	704-525-2421
OH	Chagrin Falls, K. F. Nauerz Co.	216-338-8450
PA	Birchrunville, Jadelectronic Assocs.	215-296-3800
TX	Lewisville, Jim Hughes Co.	214-221-1536
TX	Stafford, Jim Hughes Co.	713-343-0673

EDO WESTERN CORP., EDO Corp., 2645 South 300 W., Salt Lake City, UT 84115, Tel: 801-486-7481/7481/3846, Telex: 388-315; Empl.: 360; *Sls. Mgr.:* Doug Moore

EDWARDS CO., Signaling Prods. Div., P.O. Box 1188, Farmington, CT 06032, Tel: 203-678-0410; *Sls. Mgr.:* Al Canevari; *Dist. Mgr.:* Al Canevari

EECO INCORPORATED, 1601 E. Chestnut Ave., P.O. Box 659, Santa Ana, CA 92702-0659, Tel: 714-835-6000, Telex: 67-8420, TWX: 910-595-1550; Empl.: 625; *Sls. Mgr.:* Frank Bruder; *Dist. Mgr.:* Ken Plount .... 1B•1612-1615

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Thom Luke Sls.	602-941-1901
AR	Fort Smith, Electra Reps.	501-452-4030
CA	Fountain Valley, Bager Elctrns.	714-957-3367
CA	Los Altos, Recht Assocs.	415-964-6321
CA	San Diego, Harvey King Inc.	619-566-5252
CO	Denver, Delltron Co.	303-373-0300
CT	Farmington, Ray Perron & Co.	203-673-4825
CT	New Milford, Ray Perron & Co.	203-354-2569
FL	Pompano Beach, Ema, Inc.	305-943-3732
FL	Winter Park, EMA, Inc.	305-671-6800
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Elk Grove Village, John G. Twist Co.	312-593-0200
IN	Fort Wayne, M/S Sls. & Assoc.	219-484-1904
IA	Cedar Rapids, Palatine Sls.	319-365-8071
KS	Mission, Palatine Sls.	913-831-0555
MD	Rockville, EMA (Elctrn. Mktg. Assts.)	301-881-5300
MA	Needham, Ray Perron & Co.	617-449-6162
MI	Livonia, Lowell Wendt Mktg.	313-464-2722
MN	Bloomington, Elctrn. Sls. Agecy.	612-884-8291
MO	Hazelwood, Palatine Sls.	314-839-0800
NH	Dover, Ray Perron & Co.	603-742-2321
NJ	Englewood, Tecnimat	201-569-4200
NY	Endicott, Tech-Mark, Inc.	607-748-7473
NY	Mendon, Techmark, Inc.	716-624-3840
NY	Utica, Techmark, Inc.	315-733-0575
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Aurora, EMA, Inc.	216-562-6104
OH	Centerville, EMA, Inc. (Engr. Mktg. Assts.)	513-433-2800
OR	Beaverton, Blair Hirsh Co.	503-641-1875
PA	Plymouth Meeting, EMA (Elctrn. Mktg. Assts.)	215-248-5050
TX	Dallas, Electra Reps. Inc.	214-387-3594
TX	Houston, Electra Reps. Inc.	713-530-2208
UT	Salt Lake City, Delltron Co.	801-268-4574
WA	Lynnwood, Blair Hirsh Co.	206-774-8151
WI	Brookfield, John G. Twist Co.	414-782-2670

Local Distributors

AL	Huntsville, Hallmark Elctrn.	205-837-8700
AZ	Tempe, Fisher-Brownell	602-967-1464
AZ	Tempe, Marshall Ind.	602-968-6181
AZ	Tucson, Marshall Inds.	602-790-5687
CA	Alhambra, Fisher Brownell	213-289-0255
CA	Canoga Park, Marshall Ind.	213-999-5001
CA	El Monte, Marshall Ind.	213-442-7204
CA	Irvine, Marshall Ind.	714-556-6400
CA	San Diego, Fisher Brownell	714-560-8545
CA	San Diego, Marshall Ind.	619-578-9600
CA	Santa Clara, Fisher Brownell	408-988-6041
CA	Sunnyvale, Time Electronics	408-734-9888
CA	Sunnyvale, Marshall Ind.	408-732-1100
CO	Denver, Marshall Ind.	303-427-1818
CO	Englewood, Hallmark Electronics	303-694-1662
CT	Wallingford, Sager Electrical Supply Co.	203-265-4600
CT	Wallingford, Marshall Ind.	203-265-3822
FL	Ft. Lauderdale, Hall-Mark	305-971-9280
FL	Orlando, Marshall Ind.	305-841-1878
FL	Orlando, Hall-Mark	305-855-4020
GA	Atlanta, Marshall Inds.	404-923-5750
GA	Norcross, Hallmark Electronics	404-447-8000
IL	Bensenville, Hall-Mark	312-860-3800
IL	Schaumburg, Marshall Ind.	312-490-0155
KS	Lenexa, Hall-Mark	913-888-4747
MD	Baltimore, Hall-Mark	301-796-9300
MD	Gaithersburg, G.S. Marshall	301-840-9450
MA	Burlington, Marshall Ind.	617-272-8200
MA	Hingham, Sager Supply	617-749-6700
MI	Livonia, LWC Distributors	313-464-7700
MN	Bloomington, Hall-Mark Elctrn.	612-854-3223
MN	Plymouth, Marshall Ind.	612-559-2211
MO	Maryland Heights, Hall-Mark Elctrn.	314-291-5350
NJ	Cherry Hill, Hall-Mark Elctrn.	609-424-7300
NJ	Fairfield, Marshall Inds.	201-882-0320
NJ	Mount Laurel, Marshall Inds.	215-627-1920
NM	Albuquerque, Int'l Elctrns.	505-345-8127
NY	Buffalo, Summit Distributors, Inc.	716-887-2800
NY	Endwell, Marshall Ind.	607-754-1570
NY	Hauppauge, Marshall Ind.	516-273-2424
NY	Lynbrook, L.I., Peerless Radio Corp.	516-593-2121
NY	Rochester, Marshall Ind.	716-235-7620
NC	Raleigh, Hall-Mark Elctrn.	919-872-0712
OH	Dayton, Marshall Ind.	513-236-8088
OH	Solon, Hall-Mark Elctrns.	216-473-2907
OH	Westerville, Hallmark Electronics	614-891-4555

OK	Tulsa, Hall-Mark Elctrn.	918-665-3200
OR	Beaverton, Almac/Electronics Corp.	503-641-9070
TX	Austin, Hall-Mark Ind.	512-258-8848
TX	Dallas, Hall-Mark Ind.	214-341-1147
TX	Dallas, Marshall Ind.	214-233-5200
TX	El Paso, Int'l Elctrns.	915-598-3406
TX	Houston, Hall-Mark Ind.	713-781-6100
TX	Houston, Marshall Ind.	713-789-6600
TX	Richardson, Fisher Brownell	214-235-3177
WA	Bellevue, Almac/Stroum	206-643-9992
WA	Bellevue, Marshall Ind.	206-747-9100
WA	Spokane, Almac/Stroum	509-838-5714
WI	Oak Creek, Hall-Mark Ind.	414-761-3000

EEMCO DIV., 4585 Electronics Pl., Los Angeles, CA 90039, Tel: 213-247-7060, TWX: 910-497-2269; FSC No.: 72121; Empl.: 350; *Sls. Mgr.:* D. Haymond; *Dist. Mgr.:* D. Haymond

EEV INC., 7 Westchester Plaza, Elmsford, NY 10523, Tel: 914-592-6050, Telex: 6818096; Empl.: 36; *Sls. Mgr.:* Tom Soldano

EFRATOM, a division of Ball Corp., 18851 Bardeen Ave, Irvine, CA 92715, Tel: 714-752-2891, Telex: 68-5635; Empl.: 105 .... **1A**•1350

Local Sales Offices & Reps

CA	Los Altos, Kolm Mktg. Assoc.	415-948-2635
CA	Los Angeles, Cain Technlg.	213-477-9054
FL	Sarasota, Bass Assocs.	813-922-9538
MA	Natick, Wayland Engrg. Sls.	617-655-6080
NJ	Pennsauken, Sci. Reps.	609-662-5222
NY	Huntington, CDB Entprs.	516-692-5200
TX	Houston, Sci. Devices	713-864-1711
TX	Richardson, Sci. Devices	214-231-8106
VA	Fairfax, Sci. Assoc.	703-385-0600

EG&G, INC., Electro-Optics Div., 35 Congress St., Salem, MA 01970, Tel: 617-745-3200, TWX: 710-347-6741; FSC No.: 25506; Empl.: 500; *Sls. Mgr.:* J. Murachver

EG & G ALMOND INSTRUMENTS, 1330 E. Cypress St., Covina, CA 91724, Tel: 818-967-9521, TWX: 910-584-1320; Empl.: 200; *Sls. Mgr.:* J. D. Cardall .... **3**•1550, 1551

Local Sales Offices & Reps

FL	Orlando, Truex Assocs.	305-859-2160
TX	Garland, Tesco	214-681-1376

EG&G GAMMA SCIENTIFIC, Div. of EG&G Inc., 3777 Ruffin Rd., San Diego, CA 92123, Tel: 619-279-8034, Telex: 697938; *Sls. Mgr.:* George Unangst

EG&G GEOMETRICS, Div. of EG&G Inc., 395 Java Dr., Sunnyvale, CA 94086, Tel: 408-734-4616, Telex: 357435; FSC No.: 34314; *Sls. Mgr.:* Ross Johnson; *Dist. Mgr.:* Fritz Faber

EG&G RETICON, Div. of EG&G, 345 Potrero Ave., Sunnyvale, CA 94086-9930, Tel: 408-738-4266, Telex: 910-339-9343; *Sls. Mgr.:* Alex Findlay

EG&G ROTRON

EG & G ROTRON, Commercial Div., Shokan, NY 12481, Tel: 914-657-6661, TWX: 510-247-9033; *Sls. Mgr.:* Michael Keating; *Dist. Mgr.:* Ralph Stevens .... **2**•1800, 1808-1813

Local Sales Offices & Reps

AL	Huntsville, Over & Over	205-837-7105
CA	Anaheim, Westrep	213-404-3881
CA	Chatsworth, Rotron Sls.	213-709-2133
CA	San Diego, Hadden Assoc.	619-565-9444
CA	Santa Clara, Westrep	408-988-8833
CO	Littleton, Lange Sls.	303-795-3600
FL	Apopka, G. Bohman	305-886-1882
HI	Honolulu, R. Clark	808-531-5897
IL	Elk Grove Village, EG&G Rotron	312-364-7050
IL	Rolling Meadows, Sumer	312-991-8500
IA	Cedar Rapids, S & O Sls.	319-393-1845
KS	Raytown, CenTech	816-358-8100
MD	Columbia, L. D. Lowery	215-356-5300
MA	Lexington, Circuit Sls.	617-861-0567
MI	Farmington, W. R. Hummon & Assoc.	313-474-0661
MN	Mendota Heights, G-11 Sales	612-454-3086
MO	Earth City, CenTech	314-291-4230
MO	Raytown, CenTech	816-358-8100
NJ	Springfield, F. Sylvester	201-376-3324
NY	Woodstock, Rotron (Commercial Div.)	914-679-2401
NC	Charlotte, Over & Over	704-527-3070
OH	Cincinnati, F. J. Campisano	513-574-7111
OH	Cleveland, Comp., Inc.	216-243-9200
OK	Oklahoma City, Ammon & Rizos	405-942-2552
PA	Columbia, L. D. Lowery	215-356-5300
TX	Dallas, Ammon & Rizos	214-233-5591
TX	Houston, Ammon & Rizos	713-781-6240
UT	Salt Lake City, Lange Sls.	801-487-0843
WA	Lynnwood, Blum & Assocs.	206-775-6656
EXP	NY, Great Neck, A. Auriema	516-487-0700

Local Distributors

AL	Huntsville, Hall-Mark Elctrns.	205-837-8700
AZ	Phoenix, Cetec Elctrns.	602-272-7951
AZ	Phoenix, R. V. Weatherford	602-272-7144
CA	Anaheim, R. V. Weatherford	714-547-0891
CA	El Segundo, Hall Mark Elctrns.	213-643-9101
CA	Glendale, R. V. Weatherford	213-849-3451
CA	Pomona, R. V. Weatherford	714-623-1261
CA	San Diego, Cetec Elctrns.	714-278-5020
CA	San Diego, R. V. Weatherford	714-695-1700
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	Southgate, Cetec Elctrns.	213-773-6521
CA	Sunnyvale, R. V. Weatherford	408-738-8694
CA	Tustin, Hall Mark Elctrns.	714-669-0681
CO	Denver, Arrow Elctrns.	303-758-2100
CO	Denver, R. V. Weatherford	303-428-6900
CT	Norwalk, Pioneer	203-853-1515
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Ft. Lauderdale, Hall-Mark Elctrns.	305-971-9280
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Orlando, Hall-Mark Elctrns.	305-855-4020
FL	Palm Bay, Arrow Elctrns.	305-725-1480
GA	Norcross, Arrow Elctrns.	404-449-8252
GA	Norcross, Hall-Mark Elctrns.	404-447-8000
IL	Bensenville, Hall-Mark Elctrns.	312-860-3800
IL	Palatine, OHM Elctrns.	312-359-5500
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IN	Indianapolis, Pioneer/Indiana	317-849-7300
KS	Lenexa, Hall-Mark Elctrns.	913-888-4747
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Columbia, Hall-Mark Elctrns.	301-988-9800
MD	Gaithersburg, Pioneer/Washington	301-921-0660
MA	Lexington, Pioneer	617-861-9200
MA	Woburn, Hall Mark Elctrns.	617-935-9777
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Livonia, Pioneer/Michigan	313-525-1800
MI	Livonia, RS Elctrns.	313-525-1155
MN	Bloomington, Hall-Mark Elctrns.	612-854-3223
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minneapolis, I.C.I.	612-831-2666
MO	Maryland Hts., Hall-Mark Elctrns.	314-291-5350
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Marlton, Arrow Elctrns.	609-596-8000
NJ	Pennsauken, Resco Elctrns.	609-662-4000
NJ	Pinebrook, Pioneer	201-227-1267
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Buffalo, Summit Elctrns.	716-884-3450
NY	Fairport, Pioneer	716-381-7070
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Rochester, Arrow Elctrns.	716-275-0300
NY	Ronkonkoma, Hall Mark Elctrns.	516-737-0600
NY	Vestal, Pioneer	607-748-8211
NY	Woodbury, Pioneer	516-921-8700
NC	Raleigh, Hall-Mark Elctrns.	919-872-0712
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Solon, Arrow Elctrns.	216-248-3990
OK	Tulsa, Hall-Mark Elctrns.	918-665-3200
PA	Marlton, Arrow Elctrns.	609-596-8000
PA	Pennsauken, Resco Elctrns.	609-662-4000
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Dallas, Hall-Mark Elctrns.	214-343-5000
TX	Houston, Pioneer/Houston	713-988-5555
TX	Houston, Hall-Mark Elctrns.	713-781-6100
WA	Bellevue, Almac Elctrns.	206-643-9992
WA	Bellevue, Arrow Elctrns.	206-643-4800
WA	Seattle, R. V. Weatherford	206-575-1340
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Oak Creek, Hall-Mark Elctrns.	414-761-3000
WI	Oak Creek, Arrow Elctrns.	414-764-6600

EG & G ROTRON, Custom Div., Hasbrouck La., Woodstock, NY 12498, Tel: 914-679-5201, TWX: 510-247-9033; FSC No.: 82877; *Sls. Mgr.:* Mike Lyon; *Dist. Mgr.:* Andy Kozak .... **2**•1814, 1815

Local Sales Offices & Reps

AL	Huntsville, Over & Over, Inc.	205-837-7105
AZ	Tucson, Morrow & Assocs.	602-296-4719
CA	Garden Grove, Custom Div. Dist. Sls. Off.	714-898-5649
CA	San Diego, Hadden Assocs.	619-565-9444
CO	Littleton, Lange Sls., Inc.	303-795-3600
DE	Ft. Lauderdale, G. F. Bohman & Assocs.	305-979-0008
FL	Apopka, G. F. Bohman & Assocs.	305-886-1882
FL	St. Petersburg, G. F. Bohman & Assocs.	813-522-6120
GA	Norcross, Over & Over, Inc.	404-449-6205
HI	Honolulu, Roger Clark Co.	808-531-5897
IL	Rolling Meadows, Sumer, Inc.	312-991-8500
IN	Ft. Wayne, Frank J. Campisano Co.	219-747-2633
IN	Indianapolis, Frank J. Campisano Co.	317-253-7651
IA	Cedar Rapids, S & O Sales Co.	319-393-1845
MD	Towson, Custom Div. Dist. Sls. Off.	301-377-5195
MA	Lexington, Circuit Sls. Co.	617-861-0567
MI	Farmington Hills, W. R. Hummon & Assocs., Inc.	313-474-0661
MN	Mendota Heights, G-II Sales, Inc.	612-454-3086
MO	Bridgeton, Centech, Inc.	314-291-4230
MO	Raytown, Centech, Inc.	816-358-8100
NJ	Neshanic Stat, Dustom Div. Dist. Sls. Off.	201-369-5354
NY	Corona, Dustom Div. Dist. Sls. Off.	212-271-5287
NC	Charlotte, Over & Over, Inc.	704-527-3070
NC	Raleigh, Over & Over, Inc.	919-872-2262
OH	Cincinnati, Frank J. Campisano Co.	513-574-7111
OH	Cleveland, Components, Inc.	216-243-9200
OH	Cleveland, Frank J. Campisano Co.	216-749-5550
OH	Columbus, Frank J. Campisano Co.	614-876-5405
OK	Oklahoma City, Ammon & Rizos Co.	405-942-2552
PA	Coraopolis, Frank J. Campisano Co.	412-264-5151
PA	Pittsburgh, Comps., Inc.	412-824-1600
TX	Austin, Ammon & Rizos Co.	512-454-5131
TX	Dallas, Ammon & Rizos Co.	214-233-5591
TX	Houston, Ammon & Rizos Co.	713-781-6240
UT	Salt Lake City, Lange Sls., Inc.	801-487-0843
WA	Lynnwood, Blum & Assocs.	206-775-6656
WI	Brookfield, Sumer, Inc.	414-784-6641

EG & G TORQUE SYSTEMS, 36 Arlington St., Watertown, MA 02172, Tel: 617-924-6000, Telex: 95-1736; Empl.: 200; *Sls. Mgr.:* W. F. O'Leary; *Dist. Mgr.:* H. D. Waddell

EG & G VACTEC, 10900 Page Blvd., St. Louis, MO 63132, Tel: 314-423-4900, TWX: 910-764-0811; Empl.: 250; *Sls. Mgr.:* D. Hartley; *Dist. Mgr.:* D. Hartley .... **1B**•1253

EG&G WAKEFIELD ENGRG., 60 Audubon Rd., Wakefield, MA 01880, Tel: 617-245-5900, TWX: 710-348-6713; Empl.: 240; *Sls. Mgr.:* Ray A. Radford; *Dist. Mgr.:* Carl Swanson

Local Sales Offices & Reps

AL	Huntsville, Over & Over, Inc.	205-882-9182
AZ	Tempe, Piper Sls. Co.	602-949-0048
CA	Anaheim, West Rep	213-404-3881
CA	Los Altos, Recht Assocs.	415-964-6321
CA	San Diego, Mesa Elctrns.	714-278-8021
CO	Longmont, Piper Sls. Co.	303-443-5337
CT	Stamford, Circuit Sls.	203-322-0240
FL	Orlando, Over & Over Inc.	305-857-4057
GA	Norcross, Over & Over, Inc.	404-449-6205
IL	Rolling Meadows, Sumer, Inc.	312-991-8500
IA	Cedar Rapids, S & O Sls. Co.	319-393-1845
MD	Columbia, Bresson Assocs.	215-664-6460
MA	Lexington, Circuit Sls.	617-861-0567
MI	Livonia, Luebbe Sls.	313-477-3130
MN	Mendota Heights, G-II Sls.	612-454-3086
MO	Raytown, Cen Tech, Inc.	816-358-8100
NY	Commack, ERA, Inc.	516-543-0510
NY	E. Rochester, Tri Tech Elctrns.	716-385-6500
NY	Fayetteville, Tri Tech Elctrns.	315-446-2881
NC	Charlotte, Over & Over, Inc.	704-527-3070
OH	Cincinnati, Luebbe Sls. Co.	513-891-5770
OH	Cleveland, Luebbe Sls. Co.	215-333-0426
OK	Oklahoma City, Ammon & Rizos Co.	405-942-2552
OR	Portland, SDR^2 Prods. & Sls.	503-641-7377
PA	Narbeth, Bresson Assocs.	215-664-6460
TN	Johnson City, Over & Over, Inc.	615-477-7700
TX	Houston, Ammon & Rizos Co.	713-781-6240
TX	Richardson, Ammon & Rizos Co.	214-644-5591
UT	Salt Lake City, Piper Sls. Co.	801-268-8707
VA	Lynchburg, Bresson, Assocs.	215-664-6460
WA	Bellevue, SDR^2 Prods. & Sls.	206-624-2621
WI	Brookfield, Sumer, Inc.	414-784-6641

E-H ELECTRONICS, Sub. E-H Intl., Inc., 7303 Edgewater Dr., Oakland, CA 94621, Tel: 415-638-5656, TWX: 910-366-7258; FSC No.: 13488; Empl.: 99; *Sls. Mgr.:* Nicholai T. Zavadsky

EHRHORN TECHNOLOGICAL OPERS., INC., P.O. Box 888, Canon City, CO 81212, Tel: 303-275-1613; *Sls. Mgr.:* Ray Heaton

EIGEN VIDEO, P.O. Box 848, Nevada City, CA 95959, Tel: 916-272-3461, Telex: 298788 EIG UR; FSC No.: 59535; Empl.: 50

EIKONIX CORP., 23 Crosby Dr., Bedford, MA 01730, Tel: 617-275-5070

Local Sales Offices & Reps

CA	Sunnyvale, Hap Baldwin	408-737-9172
FL	Singer Island, Robert Hanright	305-845-7252
NJ	Trenton, Lester Stine	609-883-4860
NY	Brooklyn, John Milby	212-284-8588
PA	Morristown, George Striker	215-539-5411
TX	Richardson, George Tallman	214-680-2728

EIP MICROWAVE INC., 2731 North First St., San Jose, CA 95134, Tel: 408-946-5700, TWX: 910-338-0155; FSC No.: 34257; Empl.: 250; *Sls. Mgr.:* Robert Loft, West Reg. Mgr.;Bill Dentinger, East Reg. Mgr.

EITEL MFG., 2835 Laguna Canyon Rd., Laguna Beach, CA 92652, Tel: 714-494-2012; Empl.: 6; *Sls. Mgr.:* H. Mengel

ELANTEC, INC., 1996 Tarob Ct., Milpitas, CA 95035, Tel: 408-945-1323, TWX: 910-997-0649; *Sls. Mgr.:* Jerry Zis .... **1A**•1653

Local Sales Offices & Reps

AZ	Scottsdale, Tusar	602-998-3688
CA	Los Altos, Elrepco, Inc.	415-962-0660
CA	Woodland Hills, Interstate Mktg.	213-883-7606
CO	Englewood, Thorson Rocky Mountain	303-779-0666
CT	Wallingford, Com-Sale	203-269-7964
IL	Arlington Heights, Micro Sales, Inc.	312-956-1000
IN	Fort Wayne, Giesting & Assoc.	219-486-1912
IN	Indianapolis, Giesting & Assoc.	317-271-5183
IA	Hiawatha, Gassner & Clark	319-393-5763
MD	Baltimore, Stemler Assocs.	301-944-8262
MA	Needham, Com-Sale	617-444-8071
MI	Coloma, Giesting & Assocs.	616-468-4200
MI	Novi, Giesting & Assocs.	313-348-3811
MN	Bloomington, High Tech Sls.	612-888-8088
MO	Grandview, R. R. Burton & Assoc.	816-763-5385
MO	Maryland Heights, R. R. Burton & Assoc.	314-434-1678
NH	Exeter, Com-Sale	603-772-3300
NJ	Cherry Hill, Stemler Assocs.	609-966-4070
NJ	Parsippany, HLM Assocs.	201-263-1535
NM	Albuquerque, Tusar	505-293-1399
NY	Northport, HLM Assocs.	516-757-1606
OH	Cincinnati, Giesting & Assocs.	513-521-8800
OH	Dayton, Giesting & Assocs.	513-293-4044
OH	Mentor, Giesting & Assocs.	216-942-3407
OR	Oloha, Micro Sales, Inc.	503-642-1818
PA	Bensalem, Stemler Assocs.	215-638-4850
PA	Pittsburgh, Giesting & Assocs.	412-963-0727
TX	Austin, Sundance Sls.	512-250-0320
TX	Houston, Sundance Sls.	713-772-4988
TX	Plano, Sundance Sls.	214-867-0592
UT	West Valley City, Thorson Rocky Mountain	801-973-7969
WA	Bellevue, Micro Sales, Inc.	206-451-0568
WI	Brookfield, Micro Sales, Inc.	414-782-1171

ELCO CORP., Electronic Connector Div., Huntingdon Ind'l. Park, Huntingdon, PA 16652, Tel: 814-643-0700, TWX: 510-691-3117; Empl.: 500; *Sls. Mgr.:* J. J. Smith; *Dist. Mgr.:* John J. Galiney, Jr.

ELCO CORP., Interconnect Systems Div., 2250 Park Pl., El Segundo, CA 90245, Tel: 213-675-3311; *Sls. Mgr.:* T. Tuttle

ELCOM INDUSTRIES, INC., 10268 Bach Blvd., St. Louis, MO 63132, Tel: 314-429-3100

Local Sales Offices & Reps

CA	Anaheim, Magna-Code, Inc.	714-821-7500
MA	Newton Highlands, Butler Assocs., Inc.	617-965-1080

ELCOM SYSTEMS, INC., 4032 Clint Moore Rd., Boca Raton, FL 33431, Tel: 305-994-1774; FSC No.: 32424; Empl.: 5; *Sls. Mgr.:* D. Pollachek

ELDEC CORP., Monitor & Control Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036, Tel: 206-743-1313, Telex: 32-8959, TWX: 910-449-2855

ELDEC CORP., Power Conversion Div., 16700 13th Ave. W., P.O. Box 100, Lynnwood, WA 98036, Tel: 206-743-1313, Telex: 32-8959, TWX: 910-449-2855

ELDEC CORP., Sensing Systems Div., 18009 Hwy. 99, P.O. Box 5110, Lynnwood, WA 98036, Tel: 206-771-7350, Telex: 32-8959, TWX: 910-449-0873

ELDORADO INSTRS., 7303 Edgewater Dr., Oakland, CA 94621, Tel: 415-638-5656, TWX: 910-366-7258; FSC No.: 54495; *Sls. Mgr.:* Paul Magnusson

ELDRE COMPS., 1500 Jefferson Rd., Rochester, NY 14623, Tel: 716-244-2570, TWX: 510-253-4347; FSC No.: 19648; Empl.: 220; *Sls. Mgr.:* Harvey Erdle

ELECTRAC, INC., 1614 Orangethrope Way, Anaheim, CA 92801, Tel: 714-879-6021, Telex: 692433; FSC No.: 016154; Empl.: 21

ELECTRICAL INDS., 691 Central Ave., Murray Hill, NJ 07974, Tel: 201-464-3200, TWX: 701-984-7979; FSC No.: 20093; *Sls. Mgr.:* D.V. Wilson

ELECTRICAL INSTR. SVC., 25 Dock St., Mt. Vernon, NY 10550, Tel: 914-699-9717; FSC No.: 32590; Empl.: 35 .... **3**•1296-1298

Local Sales Offices & Reps

AZ	Scottsdale, Williams Assocs.	602-947-4297
CO	Commerce City, Williams Assocs.	303-289-5647
DC	Washington, Whitcomb Assocs.	202-737-0763
IL	Lincolnwood, Saffro & Assocs.	312-677-9720
KS	Shawnee Mission, Comtel - Midwest	913-722-1030
MD	Baltimore, Whitcomb Assocs.	301-889-1245
MA	Lexington, Zieco	617-861-8300
MI	Southfield, Comtel Instrs. Co.	313-358-2505
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
MO	St. Louis, Comtel - Midwest	314-991-5363
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Mount Vernon, Elctrl. Instr. Svc.	914-699-9717
OH	Cleveland, Comtel Instrs. Co.	216-442-8080
OH	Dayton, Comtel Instrs. Co.	513-298-7573
OH	Hilliard, Comtel Instrs. Co.	614-876-8305
OK	Tulsa, Data Mktg. Assocs.	918-496-1457
PA	Pittsburgh, Comtel Instrs. Co.	412-922-5720
TX	Austin, Data Mktg. Assocs.	512-451-5174
TX	Dallas, Data Mktg. Assocs.	214-661-0300
TX	Houston, Data Mktg. Assocs.	713-780-2511
TX	San Antonio, Data Mktg. Assocs.	512-342-3031
UT	Salt Lake City, Williams-Assocs.	801-532-7701
WI	Lake Mills, Saffro & Assocs.	414-648-2605

ELECTRICAL PLASTICS CORP., 500 Long Branch Ave., Long Branch, NJ 07740, Tel: 201-870-9500; Empl.: 50

ELECTRICAL STANDARDS DIV., E.S.R.S., Inc., 7337 Greenbush, N. Hollywood, CA 91605, Tel: 818-765-4224; Empl.: 6

ELECTRIC DEVICE, PO Box 337, Canfield, OH 44406, Tel: 216-533-3060

ELECTRIC FIELD MEASUREMENTS, Box 326, W. Stockbridge, MA 01266, Tel: 413-637-1929; Empl.: 3; *Sls. Mgr.:* L. Hegl

Distributor

ELECTRIC SWITCHES, INC., 2478 Fletcher Dr., Los Angeles, CA 90039, Tel: 213-660-1310, TWX: 910-321-2971; Empl.: 42; *Sls. Mgr.:* Louis Lim ....**1B**•1616, 1617; **pgs. 605, 616, 630, 634, 638, 652, 658, 667, 679, 681, 683, 703, 716, 717, 727, 734, 741, 756, 773, 778**

ELECTRIC TACHOMETER, 68th & Upland Sts., Philadelphia, PA 19142, Tel: 215-SA6-7723, Telex: 83-1475; FSC No.: 20049; Empl.: 50; *Sls. Mgr.:* F. M. Porter

ELECTROCHEM INDS., Wilson Greatbatch Ltd., 10000 Wehrle, Clarence, NY 14031, Tel: 716-759-6901, Telex: 91-386; FSC No.: 6U589; *Sls. Mgr.:* R. Carey; *Dist. Mgr.:* L. Hanitz, M. Brookman

ELECTROCOM INDS., 1105 N. Ironwood Dr., S. Bend, IN 46615, Tel: 219-232-2743; FSC No.: 27114; *Sls. Mgr.:* B. Jaffe

ELECTRO-CRAFT CORPORATION

ELECTRO-CRAFT, 1600 2nd St. So., Hopkins, MN 55343, Tel: 612-931-2700, TWX: 910-576-3132; Empl.: 500; *Sls. Mgr.:* Don Larson ...... **1B**•1143-1145

Local Sales Offices & Reps

CA	Long Beach, Matzinger-Keegan	213-434-5794
CA	Westlake Village, Electro-Craft	213-889-3631
CO	Boulder, Electro-Craft	303-447-2754
FL	Altamonte Springs, WMM Assocs.	305-831-4530
FL	Clearwater, WMM Assocs.	813-442-3913
FL	Ft. Lauderdale, WMM Assocs.	305-772-9850
GA	Atlanta, Electro-Craft	404-452-7253
IL	Chicago, Electro-Craft Corp.	312-298-0687
IN	Indianapolis, Electro-Craft	317-872-0013
MA	Salem, Electro-Craft	603-893-5552
MN	Minneapolis, Electro-Craft	612-931-2700
NJ	Cherry Hill, Electro-Craft	609-662-0555
NJ	Monmouth Junction, Electro-Craft	201-329-6233
NY	Rochester, Ross Equip.	716-271-5660
OH	Cleveland, Electro-Craft	216-526-3995
TX	Dallas, Electro-Craft	214-980-1948
WA	Bellevue, Sweo Engrg.	206-451-0558

Local Distributors

CA	San Jose, Republic Supp.	408-279-2202
CA	San Leandro, Republic Supply, Power Transmission Div.	415-357-2211
IN	Indianapolis, B&B Motor & Control	317-248-0396
MA	Medford, Empire Electrical Co.	617-395-5000
NY	New York, B & B Motor & Control	212-966-5777
NY	Rochester, B&B Motor & Control	716-473-6640
Can	Ottawa, Ont., Electrodesign Ltd.	613-745-0541
Can	Toronto, Ont., Electrodesign Ltd.	416-787-0991
Can	LaSalle, Electrodesign Ltd.	514-636-4838
Intl.	England, Cricklewood, London, Unimatic Engineers Ltd.,	01-455-0012
Intl.	Finland, Helsinki, Stig Wahlstrom OY	90-5577 x51
Intl.	France, E.R.N.	956.00.11
Intl.	Holland, Rotterdam, Van Gelder Compagnie B.V.	010-156622
Intl.	India, Hyderabad, Kashinath & Co.	36942
Intl.	Israel, Yizreel, Elex Control Sys.	065-94036
Intl.	Italy, Milano, Pamoco S.r.l.	02-800982-804615
Intl.	Japan, Tokyo 104, Midoriya Electric Co.	03-561-8851
Intl.	Spain, Barcelona, Robbins & Myers Espana S.A.	34-38934200
Intl.	Sweden, Johanneshov, L. Ostergren El.	08-815013
Intl.	W. Germany, Darmstadt, Eduard Bautz G.m.b.H.	06151/82973

ELECTROCUBE, 1710 So. Del Mar Ave., San Gabriel, CA 91776, Tel: 818-573-3300, TWX: 910-589-1609; FSC No.: 14752; Empl.: 175; *Sls. Mgr.:* E. F. Bryant; *Dist. Mgr.:* E. F. Bryant

Local Distributors

CA	Chatsworth, Mil-Comm Distrs.	213-998-3111
CA	San Diego, Mock III Sls.	619-560-0515
CA	Sunnyvale, Acacia Sls.	408-745-7200
CO	Lakewood, Acacia Sls.	303-232-2882
IL	Elk Grove Village, Nu-Way Elctrns.	312-437-7120
OH	Englewood, Argent Inds.	513-836-8633
OH	Solon, Repco, Inc.	216-248-8900
PA	Pittsburgh, CAM/RPC Elctrns.	412-782-3770
TX	Houston, Altair Co.	713-462-3029
TX	Richardson, Altair Co.	214-231-5166

ELECTRO DESIGN SYS., 100 W. 35th St., Ste. S, National City, CA 92050, Tel: 619-420-2351, Telex: 182827; Empl.: 35

ELECTRODYNAMICS

ELECTRODYNAMICS, INC., A Talley Inds. Co., 1200 Hicks Rd., Rolling Meadows, IL 60008, Tel: 312-259-0740, Telex: 28-1070; FSC No.: 10236; Empl.: 250; *Sls. Mgr.:* Frank Rafferty .... **3**•1129

Local Sales Offices & Reps

CA	Alhambra, M. W. Riedel & Co.	213-283-7694
CA	Hayward, Avionics Liaison	415-783-1131

CO	Denver, West, Inc.	303-692-0131
FL	Clearwater, Delmac Sls.	813-447-5192
FL	Orlando, Delmac Sls.	305-898-4688
FL	Tamarac, Delmac Sls.	305-726-1330
IA	Cedar Rapids, J.R. Sales Engrg.	319-393-2232
MD	Severna, Delmarva Engrg. Assocs., Ltd.	301-647-8007
MA	Winchester, FJS Assocs.	617-729-3135
MN	New Brighton, TWC Sls.	612-636-1770
MO	Maryland Hgts., Midwest Meridian Corp.	314-878-4441
NY	Binghamton, Noeth Honsinger Assocs.	607-724-4865
NY	Pittsford, Noeth Honsinger Assocs.	716-586-9002
OR	Portland, Caruso & Northcutt	503-646-4973
PA	King of Prussia, Rivco January Inc.	215-265-5211
TX	Hurst, Midwest Meridian	817-654-2132
UT	Salt Lake City, Meridian West	801-968-4177
WA	Bothwell, Caruso & Northcutt	206-454-9699

ELECTRO-DYNAMICS DEV. CO., 475 Mt. Hood Dr. S.W., Issaquah, WA 98027, Tel: 206-392-2493; *Sls. Mgr.:* W. A. Pommer

ELECTROFILM, 27727 Avenue Scott, Valencia, CA 91355, Tel: 805-257-2240, Telex: 65-1438; FSC No.: 85932; Empl.: 250; *Sls. Mgr.:* George Hulett

ELECTRO-FILMS, INC., 111 Gilbane St., Warwick Central Indl. Pk., Warwick, RI 02886, Tel: 401-738-9150, TWX: 710-382-0405; Empl.: 72; *Sls. Mgr.:* Frank Urrico .... **1A**•1870, 1871

Local Sales Offices & Reps

AL	Huntsville, BCI, Inc.	205-539-4411
CA	Santa Ana, Weatherman Assocs.	714-544-1304
CA	Sunnyvale, NES Assocs.	408-738-3259
FL	W. Melbourne, Great Southern Rep. Co.	305-724-4510
GA	Doraville, BCI, Inc.	404-455-0405
IL	Hinsdale, Willtech Corp.	312-655-4850
IN	Indianapolis, CC Electronics	317-255-1508
MA	Allston, Vector Sls.	617-787-2790
MI	Livonia, Electro Sls. Assocs.	313-474-7320
MN	Minneapolis, Comprehensive Tech. Sls.	612-888-7011
NM	Albuquerque, Grady Moore Assocs.	505-262-1416
NY	Kew Gardens, Robert Smith Assocs.	212-780-0097
NY	New York, Robert Smith Assocs.	212-541-4885
NY	Plainview, Robert Smith Assocs.	516-681-3155
NY	Syracuse, Labtronics	315-455-7314
NC	Charlotte, BCI, Inc.	704-567-0473
NC	Raleigh, BCI, Inc.	919-781-9426
OH	Cleveland, Electro Sls. Assocs.	216-261-5440
OH	Dayton, Electro Sls. Assocs.	513-426-5551
PA	Allison Park, Electro Sls. Assocs.	412-487-3801
PA	Oreland, EFW Tech. Sls.	215-887-5300
TX	Austin, J. Clay Co.	512-346-7340
TX	Dallas, J. Clay Co.	214-350-1281
TX	Houston, Elctrn. Mktg. Assocs.	713-498-8120
WA	Seattle, MARS	206-747-3292
EXP	MA, Plainville, Teknis, Inc.	617-695-3591

ELECTRO IMPULSE, Box 870, Red Bank, NJ 07701-0870, Tel: 201-741-0404, TWX: 710-722-5717; FSC No.: 91161; Empl.: 99; *Sls. Mgr.:* Mark Rubin .... **2**•1817; **3**•1220

Local Sales Offices & Reps

CA	Los Angeles, RDH Assocs.	213-396-4100
MA	Reading, Geder Assocs.	617-944-3105
NY	Greenvale, B. D. Aaron & Co.	516-621-0630
TX	Richardson, Spectra Sls. Corp.	214-234-3600
EXP	NJ, Oradell, Sylvan Ginsbury Ltd.	201-261-3200

Local Distributors

CA	Los Angeles, RDH Assocs.	213-396-4100
MA	Reading, Geder Assocs.	617-944-3105
NJ	Oradell, Sylvan Ginsbury	201-261-3200
NY	Greenvale, Bertram D. Aaron & Co.	516-621-0630
TX	Richardson, Spectra Sls.	214-234-3600

ELECTRO INDUSTRIES, Div. E.I. Elctrns. Inc., 316 Westbury Ave., Carle Place, NY 11514, Tel: 516-334-0870; Empl.: 20; *Sls. Mgr.:* S. Kagan .... **3**•1328, 1329

For further information call toll free: 800-645-6342

ELECTRO KINETICS CO., Sub. HTL Inds., Inc., 402 E. Gutierrez St., Santa Barbara, CA 93102, Tel: 805-963-2055, TWX: 910-334-1177; FSC No.: 02101; Empl.: 260; *Sls. Mgr.:* N.G. Otis

ELECTROL

ELEC-TROL, INC., 26477 N. Golden Valley Rd., Saugus, CA 91350, Tel: 805-252-8330, Telex: 18-1151; FSC No.: 15636; Empl.: 650; *Sls. Mgr.:* Frank Cooper; *Dist. Mgr.:* Barbara J. Owens .... **1B**•1352-1362

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrn. Assocs.	205-881-5031
AZ	Scottsdale, TC Electronics	602-944-5153
AR	Little Rock, Beacon Elctrn. Assocs.	501-224-5449
CA	Garden Grove, Elsco	714-891-4621
CA	San Jose, Jeff Mallman	408-972-9072
CO	Denver, Elcom	303-337-2300
FL	Clearwater, Beacon Elctrn. Assocs.	813-796-2378
FL	Ft. Lauderdale, Beacon Elctrn. Assocs.	305-491-1054
FL	Maitland, Beacon Elctrn. Assocs.	305-647-3498
FL	Melbourne, Beacon Elctrn. Assocs.	305-724-8010
GA	Atlanta, Beacon Elctrn. Assocs.	404-256-9640
IL	Des Plaines, Lincoln, Hodges & Assocs.	312-297-3810
IN	Granger, Gregory Sls.	219-272-9626
MA	Framingham, Stone Comps.	617-875-3266
MN	Minneapolis, Westlund & Assoc.	612-866-5002
NY	Clark Mills, KLM-Garner Co.	315-853-6126
NY	Mt. Vernon, Sonkin Assocs.	914-668-9809
NY	North Syracuse, KLM-Garner Co.	315-458-6214
NY	Pittsford, KLM-Garner Co.	716-381-8350
NC	Greensboro, Beacon Elctrn. Assocs.	919-275-9997
OH	Columbus, Mulligan & Assoc.	614-457-2242
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Birchrunville, Jadelectronics	215-296-3800
TN	Johnson City, Beacon Elctrn. Assocs.	615-282-2421
TX	Houston, Aid Elctrns.	713-955-6204
TX	Irving, Aid Elctrns.	214-259-4761
UT	Salt Lake City, Elcom	801-532-7940
WA	Seattle, Earl & Brown Co.	206-284-1121
WI	Waukesha, Lincoln, Hodges & Assocs.	414-542-3087

Local Distributors

AL	Huntsville, Component Distrs.	205-883-7501
AZ	Tempe, Acacia Sls.	602-894-2874
CA	Anaheim, Arrow Elctrns.	714-774-5290
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Irvine, Acacia Sls.	714-549-0954
CA	San Carlos, Control Design	415-592-4806
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	San Diego, Acacia Sls.	619-565-4365
CA	Santa Clara, Patane/Selectronics	408-496-6151
CA	Santa Monica, Master Distrs.	213-452-1229
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Sunnyvale, Acacia Sls.	408-745-7200
CA	Van Nuys, Patane Avionics	213-988-4455
CO	Denver, Arrow Elctrns.	303-758-2100
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Clearwater, Diplomat Elctrns.	813-443-4514
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Ft. Lauderdale, Component Distrs.	305-971-4950
FL	Palm Bay, Arrow Elctrns.	305-725-1480
IL	Bensenville, Diplomat Elctrns.	312-595-1000
IL	Itasca, Voyager Elctrns.	312-773-4900
IN	Indianapolis, Arrow Elctrns.	317-243-9353
MA	Framingham, Jaks Elctrns.	617-875-3266
MA	Holliston, Diplomat Elctrns.	617-429-4121
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Fridley, Voyager Elctrns.	612-571-7766
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	East Brunswick, Brothers Elctrns.	201-238-2200
NJ	Fairlawn, Relay Specialties	201-797-3313
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NJ	Saddle Brook, Arrow Elctrns.	201-797-5800
NY	Farmingdale, Arrow Elctrns.	516-293-6363
NY	Farmingdale, Arrow Elctrns.	516-694-6800
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Mount Vernon, Kin-Tronics	914-668-9885
NY	Rochester, Arrow Elctrns.	716-275-0300
NY	Rochester, Simcona Elctrns. Corp.	716-328-3230
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Winston Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Solon, Repco	216-248-8900
OR	Beaverton, Acacia Sls.	503-646-3377
OR	Portland, Radar Elec. Co.	503-232-3404
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Philadelphia, Shap Elctrns.	215-969-3300
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Houston, Solid State Elctrns. Co. of Tex.	713-772-8510
TX	Irving, Solid State Elctrns. Co. of Tex.	214-438-5700
TX	Stafford, Arrow Elctrns.	713-491-4100
UT	Salt Lake City, Diplomat Elctrns.	801-486-4134
WA	Bellevue, Arrow Elctrns.	206-643-4800
WA	Seattle, Radar Elec. Co.	206-282-2511
WI	Oak Creek, Arrow Elctrns.	414-764-6600

ELECTROL CO., 321 Dewey St., P.O. Box 29, York, PA 17405, Tel: 717-848-1722; Empl.: 38; *Sls. Mgr.:* Debra Dudley; *Dist. Mgr.:* Debra Dudley

ELECTROMAGNETIC INDUSTRIES, INC., Box 6440, Clearwater, FL 33518, Tel: 813-447-2511

ELECTRO-MAGNETIC PROCESSES, INC., 9616 Owensmouth Ave., Chatsworth, CA 91311, Tel: 818-882-6333, Telex: 499 2240 EMP UI; FSC No.: 51290; Empl.: 35; *Sls. Mgr.:* Arthur Sullivan

ELECTRO MATERIALS CORP. AMER., See EMCA, Sub. Rohm & Haas Advanced Matls. Co.

ELECTROMATIC COMPS. LTD., 1531 Burgundy Pkwy., Streamwood, IL 60103, Tel: 312-837-4600, TWX: 910-222-3452; FSC No.: 75203; Empl.: 280; *Sls. Mgr.:* Robert Martin

ELECTROMECH, INC., 528 Elm Street, Kearney, NJ 07032, Tel: 201-997-0950; Empl.: 40; *Sls. Mgr.:* Solomon Ezraseneh

ELECTRO MECHANICAL DESIGN SERVICES, INC., 16698 Oakmont Ave., Gaithersburg, MD 20877, Tel: 301-840-5710; *Sls. Mgr.:* Patrick E. Roney .... **3**•1221

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Local Sales Offices & Reps

CA	Arcadia, Van Gott & Assoc.	818-445-9729
CA	Redwood City, Hickey Indl. Sls.	415-368-3849
CA	San Diego, Van Gott & Assocs.	619-286-3633
CO	Lakewood, Cristee-Meade Co.	303-232-0287
FL	Ft. Meyers, Rainbow Sls., Inc.	813-332-2210
IL	Addison, Engrd. Sls. Co.	312-832-8425
MD	Baltimore, R. P. Luce	301-752-8200
MN	St. Paul, Vikeland Sls., Inc.	612-645-4647
NJ	Piscataway, R. P. Luce	201-752-8750
NY	Buffalo, Good Comps.	716-634-4400
NY	New Hyde Park, R. P. Luce	516-437-4550
NC	Raleigh, G. P. O'Malley & Assoc., Ltd.	919-848-9865
OH	Dayton, Harvey Teplitz	513-898-4330
PA	Philadelphia, R. P. Luce & Co.	215-233-0999
TX	Dallas, Marcom	214-351-4532
WA	Vancouver, Ray Over Sls.	206-695-6179

ELECTRO-MECH COMPS., 1826 N. Floradale Ave., So. El Monte, CA 91733, Tel: 818-442-7180; FSC No.: 07150; Empl.: 75; *Sls. Mgr.:* Walter H. Trumbull; *Dist. Mgr.:* Margaret W. Ambrose ....**1B**•1618, 1619

Local Sales Offices & Reps

CA	Los Angeles, Universal Comps. Co.	213-641-4255
CA	San Diego, Qualtronics	619-560-8955
CA	Santa Clara, Engrg. Assocs.	408-988-5001
CO	Englewood, Franklin Sls.	303-789-2526
CT	Milford, Todino Engrg.	203-874-6643
FL	Orlando, Publicover	305-898-9361
ID	Boise, Doran Sls. Assocs.	208-343-9969
IL	Chicago, Indl. Rep.	312-647-7755
IN	Fort Wayne, Scott Elctrns.	219-484-7865
IN	Indianapolis, Scott Elctrns.	317-897-9976
MA	Needham Hgts., Todino Engrg.	617-444-7925
MI	Southfield, Component Assocs.	313-557-3232
MN	Bloomington, D. A. Case Associates	612-888-8666
NJ	Medford, Comp. Consits.	609-654-5300
NY	Mamaroneck, Bassin Tech.	914-698-9332
NY	Vestal, SHR	717-967-2607
OH	Cincinnati, Scott Elctrns.	513-791-2513
OH	Cleveland, Scott Elctrns.	216-473-5050
OH	Dayton, Scott Elctrns.	513-294-0539
OH	Reynoldsburg, Scott Elctrns.	614-863-1281
OR	Forest Grove, Doran Sls.	503-357-3333
PA	Pittsburgh, Scott Elctrns.	412-963-6116
TX	Richardson, McCoy Assocs.	214-238-1017
WA	Redmond, Doran Sls.	206-885-1885
WI	Milwaukee, Indl. Rep.	414-259-0965

Local Distributors

AZ	Phoenix, Parts Elctrn.	602-258-6476
CA	Los Angeles, Master Distrs.	213-452-1229
CA	Los Angeles, Elec. Distr.	213-660-1310
CA	Pomona, Western Intl.	714-629-3315
CA	Tustin, Western Stitches & Controls	714-731-4333
FL	Ft. Lauderdale, Powell Elctrns.	305-972-4300
FL	Pompano Beach, Components South	305-971-0350
NY	Buffalo, Genesee Radio & Parts	716-873-9661
NY	Mamaroneck, Logi Comp Elctrns.	914-698-9332
Intl	England, Kensington, London, G.E. Elctrns.	01-727 0711/3
Intl	Israel, Holon, M.S.R. Engrg. & Dev.	847686
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ELECTRO NATL., Matthews Ave., Canton, MS 39046, Tel: 601-859-5511, TWX: 810-990-0938; FSC No.: M-54208; Empl.: 40

ELECTRON, INC., P.O. Box 28640, San Diego, CA 92128, Tel: 216-681-4700, Telex: 98-0240; Empl.: 85

ELECTRONIC ARRAYS, 550 E. Middlefield Rd., Mtn. View, CA 94043, Tel: 415-964-4321, TWX: 910-379-6985; Empl.: 450; *Sls. Mgr.:* Ed Neubauer

ELECTRONIC COIL CORP., 347 New Britain Ave., Plainville, CT 06062, Tel: 203-747-1213; Empl.: 85

ELECTRONIC COMPONENTS GROUPE, 26 N. 5th St., Minneapolis, MN 55403, Tel: 612-375-0011, TWX: 910-576-1725; *Sls. Mgr.:* Herman Sinn; *Dist. Mgr.:* Bill Magnuson ....**1B**•1621

Local Sales Offices & Reps

AZ	Phoenix, Eltron	602-266-2164
CA	Brea, Masco	714-529-0867
CA	Cupertino, F & F Assoc.	408-446-2349
CA	Los Angeles, Masco	213-295-7781
CO	Aurora, Mountain View Mktg.	303-699-1665
FL	Ft. Lauderdale, Beacon Elec.	305-491-1054
IL	Downers Grove, Richmar Elec.	312-968-0118
IN	Indianapolis, Insul-Reps	317-842-5203
MA	Newton Upper Falls, A & M Elect.	617-444-8170
MI	Brighton, A. P. Assoc.	313-229-6550
MN	Minneapolis, Comps. Representative Groupe	612-894-8055
MO	Kansas City, Delltron Co.	816-436-6445
MO	St. Louis, Delltron Co. Inc.	314-869-4779
NY	Great Neck, MOS	516-487-3966
OH	Dublin, AP Assoc.	614-766-1855
OH	Fairview Park, A. P. Assoc.	216-356-2424
OK	Tulsa, Southern States Mktg.	918-665-8338
OR	Aloha, Electronic Comp. Sls.	503-245-2342
PA	Ambler, Dalbrook Corp.	215-441-8380
TX	Austin, Southern States Mktg.	512-473-2741
TX	Houston, Southern States Mktg.	713-558-4900
TX	Richardson, Southern States Mktg.	214-238-7500
UT	Salt Lake City, Mountain View Mktg.	801-264-8488
VA	Falls Church, Beacon Elec.	703-534-7200
WA	Mercer Island, Electronic Comp. Sls.	206-232-9301
WI	Milwaukee, Richmar Elec.	312-968-0118

Local Distributors

CA	Hollywood, Yale Radio	213-465-3186
CA	Manhattan Beach, Prime Electro	213-379-3642
CA	Riverside, Electronic Supp.	714-683-7300
CA	San Carlos, Logan Elect.	415-594-0700
FL	Ft. Laud., KSM Elect.	305-971-5900
IL	Chicago, UPCO Dist.	312-631-1122
MD	Beltsville, PSI	301-937-4960
MD	Columbia, D. K. Electronics	301-995-1950
MN	Mpls., Glenmark, Inc.	612-941-4825
WA	Seattle, Radar Elect.	509-747-3053

ELECTRONIC CONCEPTS, INC., Box 627 E, Eatontown, NJ 07724, Tel: 201-542-7880, Telex: 7107226661; Empl.: 215; *Sls. Mgr.:* Philip N. Lepore ....**1A**•1065-1068

Local Sales Offices & Reps

CA	Colton, Elctrn. Concepts, Inc.	714-824-2525
CA	La Mirada, Select Elctrns.	714-739-8891
CA	Los Gatos, Elctrn. Concepts, Inc.	408-395-4224
CO	Aurora, Sage Sls.	303-750-3501
IL	Wheaton, Elctrn. Concepts, Inc.	312-668-8747
MA	Methuen, Elctrn. Concepts, Inc.	617-689-8318
MN	Minneapolis, Components Grp.	612-374-1250
NJ	Englewood Cliffs, Ed Glass Assocs.	201-592-0200, 212-586-8440
OR	Portland, Components West	503-643-5588
OR	St. Louis, Harris-Hanson Co.	816-763-6200
TX	Austin, Milred Assocs., Inc.	512-258-2828
TX	Houston, Milred Assocs., Inc.	713-937-0127
TX	Richardson, Milred Assocs., Inc.	214-644-6731
VT	Salt Lake City, Sage Sls.	801-467-5451
WA	Seattle, Components West	206-885-5880

Local Distributors

IL	Chicago, Nep Elctrns.	312-625-8400
NJ	Teterboro, Elcon Sls.	201-288-8170
TX	Dallas, R. V. Weatherford	214-931-7333
TX	Houston, R. V. Weatherford	713-688-7406
WI	New Berlin, Nep Elctrns.	414-785-9100

ELECTRONIC CONTROLS, INC., 561 Tamarack Ave., Brea, CA 92621, Tel: 714-990-0850; Empl.: 9

ELECTRONIC CONTROLS DESIGN, 13626 S. Freeman Rd., Mulino, OR 97042, Tel: 503-829-9108, Telex: 70-3874 ECDINC; *Sls. Mgr.:* Rex Breunsbach

ELECTRONIC CONVENTIONS, INC., P.O. Box 92275, Worldway Postal Ctr., Los Angeles, CA 90009, Tel: 213-772-2965; *Sls. Mgr.:* William C. Weber, Gen. Mgr.

ELECTRONIC DEV. CORP., 11 Hamlin St., Boston, MA 02127-4198, Tel: 617-268-9696, Telex: 951596 (ELECDEVCO BSN); FSC No.: 12619; *Sls. Mgr.:* Robert B. Ross ....**3**•1223-1225

Local Sales Offices & Reps

AL	Huntsville, MOCO	205-881-5968
AZ	Phoenix, R. A. Mayes Co.	602-279-5243
CA	Costa Mesa, Feeger, Lucas, Wolf	714-751-7512
CA	Hayward, Feeger, Lucas, Wolf	415-487-2222
CA	San Diego, Feeger, Lucas, Wolf	619-277-0993
CA	Van Nuys, Feeger, Lucas, Wolf	213-989-5237
CO	Englewood, R. A. Mayes Co.	303-761-9447
FL	Winter Haven, Lee Assocs.	813-294-5815
IL	Hoffman Estates, Carvel Engrg.	312-885-8800
IN	Carmel, Berndt Assocs.	317-844-0114
KS	Overland Park, Ramsey Assts.	913-649-6996
MD	Bethesda, Powell-Pendergraph	301-656-4535
MA	Hudson, Datarep	617-481-0333
MI	Hazel Park, Tiby Co.	313-547-3550
MN	Edina, Carvel Engrg. & Sls.	612-835-7929
MO	St. Louis, Ramsey Assocs.	314-878-5042
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	E. Syracuse, Ossmann Instrs.	315-437-7052
NY	Rochester, Ossmann Instrs.	716-442-6990
NY	Saratoga Springs, Ossmann Instrs.	518-377-8604
NY	White Plains, Cane Techn. Sls.	914-694-9240
NC	Raleigh, Lee Assocs.	919-848-8818
OH	Cleveland, Tiby Co.	216-371-5335
OH	Dayton, Tiby Co.	513-277-3822
OR	Portland, Topp Engrg. Sls.	503-244-7265
PA	Willow Grove, Powell-Pendergraph	215-657-0330
TX	Dallas, Tech Rep Mktg.	214-241-2434
TX	El Paso, R. A. Mayes Co:	Enterprise 750
TX	Kemah, Hi Tech Systems	713-783-3856
UT	West Jordan, R. A. Mayes Co.	801-292-6781
VT	Burlington, Data Reps.	802-864-0933
VA	Richmond, Powell-Pendergraph	804-270-1400
WA	Bellevue, Topp Engrg. Sls.	206-747-5400
WI	New Berlin, Carvel Engrg.	414-784-7007

ELECTRONIC DEVELOPMENT LABS., See EDL Inc.

ELCTRN. DEVICES, 21 Gray Oaks Ave., Yonkers, NY 10710, Tel: 914-965-4400, TWX: 710-560-0021; Empl.: 200; *Sls. Mgr.:* Dennis Dean; *Dist. Mgr.:* Dennis Dean

ELECTRONIC ENCLOSURES, Div. Wyle Labs, 225 South Aviation Blvd., El Segundo, CA 90245, Tel: 213-643-8181, TWX: 910-348-6699; FSC No.: 09097; Empl.: 400; *Sls. Mgr.:* Richard W. Bow

ELECTRONIC ENGRG. CO. OF CAL., See EECO

ELECTRONIC HARDWARE, 320 Broad Hollow Rd., Farmingdale, NY 11735, Tel: 516-752-1950; Empl.: 100

EI&S

ELECTRONIC INSTR. & SPECIALTY CORP., 42 Pleasant St., Stoneham, MA 02180, Tel: 617-438-5300, Telex: 948-025; FSC No.: 14908; Empl.: 180 .... **1B**•1364, 1365

Local Sales Offices & Reps

AL	Huntsville, REMCO (Raken Engr. of Mktg. Corp.)	205-533-3763
AL	Huntsville, JWL Assocs.	205-881-0413
AZ	Phoenix, Anderson Co.	602-266-2070
CA	Escondido, Cirolia Elctrn. Sls. Inc.	619-489-2452
CA	Granada Hills, C & W Comps.	213-368-4032
CA	San Diego, Cirolia Elctrn. Sls.	619-743-3015
CA	San Jose, G. R. McKnight Co.	408-942-0880
CO	Golden, J. F. Hurlbut Co.	303-279-7796
FL	Lighthouse Point, Jack Krutek & Assocs.	305-941-6544
GA	Atlanta, REMCO (Raker Engr. of Mktg. Corp.)	404-447-6937
IL	Arlington Hgts., Brainard-Wilson Mktg.	312-437-2700
IN	Carmel, Brainard-Wilson Mktg.	317-844-2800
MD	Woodbine, Naudain Assocs.-Southern	301-442-2270
MA	Stoneham, E I & S	617-438-5300
MI	Oak Park, A. Blumenberg Assocs., Inc.	313-968-3230
MN	Minneapolis, Peterson Sls. & Assocs.	612-944-0030
NJ	Perth Amboy, Astrorep	201-826-8050/51
NY	Babylon, Astrorep	516-422-2500
NY	Fairport, NET Sales	716-467-4538
NC	Charlotte, JWL Assocs.	704-523-3001
OH	Rocky River, Norm Case Assocs.	216-333-0400
OR	Portland, SPS Elctrns.	503-297-6919
PA	King of Prussia, R J I, Inc.	215-265-5211
PA	Norristown, Rivco-January Inc.	215-631-1414
TX	Dallas, P. J. Scanlon Co. Inc.	214-231-4661
UT	Salt Lake City, J. F. Hurlbut Co.	801-973-4443
WA	Redmond, SPS Elctrns.	206-323-4140
WA	Seattle, SPS Elctrns.	206-323-4140
WI	Waukesha, Brainard-Wilson Mktg.	414-547-2285

Local Distributors

CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Santa Clara, Cypress Elctrns.	408-727-7080
CA	Torrance, Cypress Elctrns.	215-530-1900
CT	New Haven, The Greene-Shaw Co.	203-397-0710
MD	Columbia, DK Elctrns.	301-995-1950
MA	Billerica, A. W. Mayer Co.	617-229-2255
MA	Newton, The Greene-Shaw Co.	617-969-8900
MN	Minneapolis, The Joel Co.	612-545-5669
NJ	Fairlawn, Relay Specialties	201-797-3313
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Troy, Trojan Elctrn. Supp. Co.	518-274-4481
OK	Tulsa, Radio, Inc.	918-587-9123
TX	Houston, Gaumer Co.	713-460-5200

ELCTRN. INSTR. & SPEC. CORP., MC DIV., See Millen Comps.

ELECTRONIC KITS INTL., INC., 791 Redrock Rd., St. George, UT 84770, Tel: 801-628-3627; *Sls. Mgr.:* Gary Gibson; *Dist. Mgr.:* Charles Meinkey

ELECTRONIC MEASUREMENTS, 405 Essex Rd., Neptune, NJ 07753, Tel: 201-922-9300, Telex: 132-424; Empl.: 250; *Sls. Mgr.:* C. Roney ... **3**•1552, 1553

Local Sales Offices & Reps

AL	Huntsville, Sci. Devices	205-536-1969
AZ	Phoenix, Sci. Devices	602-957-0401
CA	Los Alamitos, Sci. Devices	213-598-7678
CA	San Diego, Sci. Devices	619-279-6642
CA	San Jose, Sci. Devices	408-554-0455
CO	Boulder, Sci. Devices	303-449-9466
FL	Orlando, Sci. Devices	305-841-8180
GA	Marietta, Sci. Devices	404-427-8660
IL	Chicago, Comtel	312-539-4838
IN	Indianapolis, Comtel	317-253-1681
IA	Cedar Rapids, Comtel	319-377-9434
KS	Mission, Palatine Engrg. & Sls.	913-831-0555
MD	Pikesville, Imagitron Sls. Co.	301-521-2020
MA	Winchester, FJS Assoc.	617-729-3135
MI	Southfield, Comtel	313-358-2510
MN	Wayzata, Comtel	612-476-1551
MO	Hazelwood, Palatine Engrg. & Sls.	314-839-0800
NJ	Englewood Cliffs, Scientific Dvcs.	201-871-3916
NM	Albuquerque, Sci. Devices	505-883-3668
NY	East Syracuse, Ossmann Insts.	315-437-7052
NY	Englewood Cliffs N.J., Scientific Dvcs.	201-871-3916
NC	Winston-Salem, Sci. Devices	919-765-5776
OH	Dayton, WKM Assoc.	513-434-7500
PA	Pittsburgh, WKM Assoc.	412-892-2953
TX	Austin, Alphatech	512-458-9179
WA	Bellevue, Al Smith Co.	206-746-6770
WA	Vancouver, Al Smith Co.	206-892-9912
WI	New Berlin, Comtel	414-544-6042

ELCTRN. MOLDING CORP., 96 Mill St., Woonsocket, RI 02895, Tel: 401-769-3800, TWX: 710-387-1350; FSC No.: 17117; Empl.: 300; *Sls. Mgr.:* Murry Roth; *Dist. Mgr.:* Robert Dactrechy ...... **2**•1268-1270, 1872, 1880-1886

Local Sales Offices & Reps

AL	Huntsville, Cartwright & Bean of GA	205-830-1540
AZ	Phoenix, Mercury Engrg. Sales	602-244-0123
CA	Cupertino, Thresum Assocs.	408-996-9889
CA	Mountain View, West Mark Assocs.	415-969-1700
CA	Pasadena, Luscombe Engrg.	213-684-2000
CA	San Diego, Luscombe Engrg.	619-295-4300
CO	Lakewood, Christee-Meade Co.	303-232-0287
CO	Wheat Ridge, Cristee-Meade Co.	303-232-0287
FL	Ft. Lauderdale, Cartwright & Bean of FL	305-735-4900
FL	Orlando, Cartwright & Bean of FL	305-422-4531
GA	Atlanta, Cartwright & Bean of GA	404-233-2939
IL	Lisle, W.G. Controls	312-963-5954
IL	Oak Brook, Winner Co.	312-655-3545
IN	Ft. Wayne, Denton Mktg.	219-627-5525
KS	De Soto, Midtec Assocs.	913-441-6565
KS	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
LA	Kenner, Cartwright & Bean of TN	504-466-0020
MD	Glen Burnie, Macrotech Assocs.	301-437-5588
MD	Pasadena, Macrotech Assocs.	301-437-5588
MI	Bloomfield Hills, Enco Marketing, Inc.	313-642-0203
MI	Farmington, Amtech	313-474-8300
MN	Hopkins, Kits Co.	612-933-1888
MS	Jackson, Cartwright & Bean of TN	601-981-1170
MO	Florissant, Midtec Assocs.	314-837-5200
MO	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NJ	Haddonfield, Mills-Brown Assocs.	609-429-1005
NJ	Wayne, G.T. Assocs.	201-694-6040
NY	Binghamton, Empire Tech. Assoc.	607-772-0651
NC	Charlotte, Cartwright & Bean of GA	704-377-5673
NC	Greensboro, Blair Engrg.	919-292-8200
NC	Raleigh, Cartwright & Bean of GA	919-781-6560
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-725-4477
OK	Tulsa, Blair Engrg.	918-747-3100
OR	Portland, Jas. J. Backer Co.	503-297-8744
OR	Salem, Jas. J. Backer Co.	503-362-0717
PA	Hickory, J.C. Hofstetter Co.	412-356-2305
PA	Pittsburgh, J. C. Hofstetter Co.	412-327-1410
TN	Knoxville, Cartwright & Bean of TN	615-693-7450
TN	Memphis, Cartwright & Bean of TN	901-276-4442
TX	Austin, Blair Engrg.	512-458-3107
TX	Dallas, Blair Engrg.	214-241-5655
TX	Houston, Blair Engrg.	713-776-0011
WA	Seattle, Jas. J. Backer Co.	206-285-1300

Local Distributors

AZ	Phoenix, Kachina Elctrn.	602-269-6201
AZ	Phoenix, Heilind Elctrns.	602-243-7171
CA	Inglewood, Force Elctrn.	213-776-1324
CA	San Jose, Force Elctrn.	408-943-1324
CO	Denver, C.S.I.D.	303-292-9594
CO	Wheat Ridge, ACT	303-422-9229
CT	Bethel, Heilind Elctrns.	203-797-8600
FL	Ft. Lauderdale, Peerless Radio Corp.	305-973-4141
FL	Largo, Graham Elctrn.	813-541-4434
FL	Orlando, Aztech Elctrn.	305-291-1681
FL	Palm Bay, Action Elctrns.	305-725-4920
IL	Elk Grove Village, Nu Way Elctrns.	312-437-7120
IN	Ft. Wayne, Graham Electrn.	219-423-3422
IN	Indianapolis, Graham Electrn.	317-634-8202
IN	Lafayette, Graham Electrn.	317-423-5564
IA	Cedar Rapids, Bergquist	
MD	Columbia, Aztech Elctrn.	301-995-1760
MA	Burlington, Heilind Elctrn.	617-272-5610
MI	Grand Rapids, Calder Elctrn.	616-949-2900
MN	Minneapolis, Bergquist	612-835-2322
MN	Minneapolis, Bergquist Co.	612-835-2322
NH	Hudson, Heilind Elctrn.	603-883-9536
NJ	Pennsauken, Resco Elctrn.	609-662-4000
NM	Albuquerque, Intl. Elctrn.	505-345-8127
NY	Bohemia, Car-Lac Elctrn.	516-567-4200
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Millbrook, Villarreal Elctrn.	914-677-3447
NY	Rochester, Masline Elctrn.	716-546-5373
NY	Suffern, Nobel Elctrn.	914-357-4500
OH	Cincinnati, Graham Elctrn.	513-772-1661
OH	Cincinnati, Schuster Elctrn.	513-489-1400
OH	Columbus, Graham Elctrn.	614-895-1590
OH	Twinsburg, Schuster Elctrn.	216-425-8134
OK	Tulsa, Altair Co.	918-252-5781
TN	Nashville, Graham Elctrn.	615-242-2682
TX	Austin, Altair Co.	512-837-4970
TX	Dallas, Heilind Elctrn.	214-351-2050
TX	Houston, Heilind Elctrn.	713-988-2711
TX	Houston, Altair Co.	713-462-3029
TX	Houston, Lenert Co.	713-225-1465
TX	Richardson, Altair Co.	214-231-5166

ENI The advanced design line of power amplifiers

ELECTRONIC NAVIGATION INDS., 3000 Winton Rd. S., Rochester, NY 14623, Tel: 716-473-6900, Telex: 97-8283; FSC No.: 10226; Empl.: 200; *Sls. Mgr.:* L. A. Benedict .... **3**•1008, 1009

Local Sales Offices & Reps

AL	Huntsville, Brown Instrs.	205-883-8660
AZ	Phoenix, Sci. Devices West	602-957-0401
CA	Los Angeles, McDougall/McLaughlin Co.	213-477-8556
CA	Menlo Park, Kipp Assocs.	415-854-2855
CO	Boulder, Sci. Devices West	303-449-9466
FL	Ft. Lauderdale, Brown Instrs.	305-776-4800
FL	Melbourne, Brown Instrs.	305-723-0766
FL	Orlando, Brown Instrs.	305-425-5505
GA	Atlanta, Brown Instrs.	404-455-1035
IL	Elmhurst, Sector	312-530-7850
IN	Indianapolis, Sector	317-842-1120
KS	Overland Park, Ramsey Assocs.	913-649-6996
LA	Mandeville, Brown Instrs.	504-626-9701
MD	Silver Spring, Gawler Knoop Co.	301-589-4406
MI	Madison Heights, WKM Assocs.	313-588-2300
MN	Bloomington, Sector	612-888-6920
MO	Maryland Hgts., Ramsey Assocs.	314-878-5042
NH	Nashua, JPR Elctrn. Sls.	603-889-8285
NM	Albuquerque, Sci. Devices West	505-293-3494
NY	Great Neck, RTI, Inc.	516-829-3770
NC	Durham, Brown Instrs.	919-683-1580
OH	Dayton, WKM Assocs.	513-434-7500
OH	Independence, WKM Assocs.	216-524-5930
OR	Portland, Sci. Devices Northwest	503-292-6934
PA	Mechanicsville, John Bell Assoc.	215-794-7075
PA	Pittsburgh, WKM Assocs.	412-892-2953
SC	Columbia, Brown Instrs.	803-798-8070
TX	Houston, Sci. Devices-Texas	713-864-1711
TX	Richardson, Sci. Devices-Texas	214-231-8106
TX	San Antonio, Sci. Devices-Texas	512-736-3164
WA	Bellevue, Sci. Devices Northwest	206-454-0900
WI	Milwaukee, Sector	414-352-8280

epc CORPORATION

ELCTRN. PRECISION COMPS., 11 W. Sandford Blvd., Mt. Vernon, NY 10550, Tel: 914-664-2333; FSC No.: 75898; Empl.: 8 .... **1A**•1593, 1869; **3**•1226, 1227

Local Sales Offices & Reps

CA	Granada Hills, W.H. Industries Inc.	213-363-3910
CO	Denver, Midwest Meridian Corp.	303-341-7550

IL	Elk Grove Village, Midwest Meridian Corp.	312-640-9540
IA	Cedar Rapids, Midwest Meridian Corp.	319-365-6561
MA	Andover, William Crawford Assocs.	617-470-2122
MN	Prior Lake, Midwest Meridian Corp.	612-447-8222
MO	Marylan Heights, Midwest Meridian Corp.	314-878-4441
OH	Fairborn, Midwest Meridian Corp.	513-879-7100
TX	Fort Worth, Midwest Meridian Corp.	817-654-2132
WA	Kirkland, W.H. Industries	206-827-1024

ELECTRONIC PRODS. CORP., Interstate Indl. Plaza, R. D. #5, York, PA 17402, Tel: 717-767-6517; Empl.: 16; *Sls. Mgr.:* M. E. Lehman; *Dist. Mgr.:* M. E. Lehman

Local Sales Offices & Reps

IL	Downers Grove, T. E. Moore Co.	312-969-7792
MD	Greenbelt, Potomac Triad Corp.	301-441-2275
NY	Pittsford, Mill Valley	716-248-2653
PA	York, Tillotson & Tillotson	717-767-6517

ELECTRONIC RELAYS, 30 Plaza Dr., Westmont, IL 60559, Tel: 312-789-8166, TWX: 910-991-3903; FSC No.: 53087; Empl.: 29; *Sls. Mgr.:* Barbara Breibach; *Dist. Mgr.:* Barbara Breibach

ELECTRONIC RESEARCH CO., 7618 Wedd St., Overland Park, KS 66204, Tel: 913-631-6700, TWX: 910-749-6477; FSC No.: 13571; Empl.: 60; *Sls. Mgr.:* Charles Ditzler .... **1A**•1351

Local Sales Offices & Reps

Frequency Product

NJ	Riverdale, Comp-Tech Sls.	201-935-5454
NJ	Union, Comp-Tech Sls.	201-687-2484
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628

ELECTRONIC SOLUTIONS, 9255 Chesapeake Drive, San Diego, CA 92123, Tel: 619-292-0242, TWX: 910-335-1169; Empl.: 50; *Sls. Mgr.:* Charles H. Henry .... **3**•1106-1109

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Tempe, Mar Tech	602-968-4944
CA	Anaheim, Qualtech South	714-639-9820
CA	Brentwood, Qualtech South	415-634-9060
CA	Los Angeles, Qualtech South	213-765-1419
CA	San Diego, Mesa Engrg.	619-278-8021
CA	Sunnyvale, Qualtech	408-732-4800
CO	Littleton, Radco	303-794-4279
CT	Canton, Bell Controls	203-693-8926
FL	Melbourne, Southeastern First Rep	305-259-6373
GA	Atlanta, Remco	404-447-6937
IL	Chicago, Marcon	312-675-6450
IA	Des Moines, The Beams Co.	515-255-1148
KS	Shawnee Mission, The Beams Co.	913-631-0300
MD	Rockville, Spectro	301-279-2010
MA	Nashua, Bell Controls	603-882-6984
MI	Livonia, Lowell Wendt	313-464-2722
MN	Minneapolis, Micro Resources	612-830-1454
MO	St. Louis, The Beams Co.	314-434-8448
NH	Nashua, Bell Controls	603-882-6984
NJ	Springfield, Gebhardt Mktg.	201-376-4415
NM	Albuquerque, Mar Tech	505-821-2775
NY	New Hartford, PDQ	315-768-8167
NC	Raleigh, Remco	919-847-5079
OH	Cleveland, Geotronix	216-526-2535
OH	Trotwood, Geotronix	513-854-5939
OR	Portland, NW Mkt	503-297-2581
PA	Jenkintown, Monument Tech. Assocs.	215-884-3737
TX	Austin, Acudatix	512-346-4033
TX	Dallas, Acudata	214-424-3567
TX	Houston, Acudata	713-580-2451
WA	Bellevue, NW Mkt	206-455-5846
WI	Waukesha, Computer & System Sales	414-544-1141

Local Distributors

CT	Danbury, Pilgrim Elctrns.	203-792-7274

ELECTRONIC SPACE SYS. CORP., Old Powder Mill Rd., Concord, MA 01742, Tel: 617-369-7200, Telex: 923480 ESSCO WCRD; FSC No.: 15175; Empl.: 82; *Sls. Mgr.:* Susan M. Cuevas

ELECTRONIC SPECIALISTS, 171 South Main St., Natick, MA 01760, Tel: 617-655-1532, 800-225-4876, Telex: 955-329 ATTN: ESP; Empl.: [illegible]5; *Sls. Mgr.:* David Monahan

ELECTRONIC SPECIALTY DIV., ElecSpec Corp., 18900 N.E. Sandy Blvd., Portland, OR 97230, Tel: 503-665-0121, Telex: 360-453, TWX: 910-469-8782; FSC No.: 98927; Empl.: 250; *Sls. Mgr.:* R. Lisdero .... **1B**•1348-1350

Local Sales Offices & Reps

CA	Costa Mesa, Gabriel & Assoc.	714-957-1981
FL	Ft. Meyers, Rainbow Sls.	813-939-9150
FL	Melbourne, Rainbow Sls.	305-727-3305
KS	Wichita, Baka Corp.	316-262-0179
MI	Brighton, A.P. Assoc.	313-229-6550
NY	Glen Head, Livera-Polk Assoc.	516-759-9300
TX	Dallas, Blackburn Assoc.	214-692-8885

ELECTRONICS STAMPING CORP., Sub. of Buckbee-Mears Co., 19920 S. Alameda St., Rancho Dominguez, CA 90220, Tel: 213-639-2120, Telex: 678401; FSC No.: 57297; Empl.: 70; *Sls. Mgr.:* Robert J. Ferm

ELECTRONIC SYS. & PROGRAMMING, See Augat/ES•P, Inc.

ELECTRONIC TRANSFORMER CORP., P.O. Box 188, Totowa, NJ 07511, Tel: 201-942-2222; FSC No.: 72149; Empl.: 130; *Sls. Mgr.:* Dan Rovine

ELECTRONIC TRANSISTORS, 112-15 Northern Blvd., Flushing, NY 11368, Tel: 212-651-7200, Telex: 96-0173; FSC No.: 12045; Empl.: 45; *Sls. Mgr.:* Mike Byrnes; *Dist. Mgr.:* Mike Byrnes

ELECTRONIC TREND PRODS., 10080 N. Wolfe Rd., Ste. 372, Cupertino, CA 95014, Tel: 408-996-7401, Telex: 345516; Empl.: 3; *Dist. Mgr.:* Gene Selven

ELECTRONIC WATTMETER CO., 2275 Sixth St., Sarasota, FL 33577, Tel: 813-953-5355; Empl.: 6

ELECTRONIZED CHEMICALS CO., Div. of High Voltage Engrg., 23 Industrial Way, Wilmington, MA 01887, Tel: 617-657-8030, Telex: 68-17284

ELECTRON-MACHINE CORP., Box M, Umatilla, FL 32784, Tel: 904-669-3101, Telex: 56-4300; Empl.: 55; *Sls. Mgr.:* S. K. Kemp V.P. Mktg

ELECTRON PRODUCTS, 2084 Central Ave., Duarte, CA 91010, Tel: 818-359-8281; FSC No.: 99515; *Sls. Mgr.:* Ann Meunier; *Dist. Mgr.:* Ann Meunier

ELECTRO-NUMERICS, 1811 Reynolds, Irvine, CA 92714, Tel: 714-549-8821, Telex: 68-5612; FSC No.: 51666; Empl.: 24

Local Sales Offices & Reps

AZ	Phoenix, Shefler-Kahn Co.	602-257-9015
AR	El Dorado, Kemp Engrg.	501-862-5869
CA	Fremont, William Parks Assocs.	415-490-2011
CA	Santa Ana, Brooks-Moore & Assocs.	714-544-8900
CO	Boulder, Herb Bass Assocs.	303-530-7509
FL	Melbourne, Beacon Elctrn. Assocs.	305-724-8010
GA	Atlanta, Beacon Elctrn. Assocs.	404-256-9640
IL	La Grange, PVA Co.	312-579-9300
LA	Lafayette, Kemp Engrg.	318-269-9452
MD	Randallstown, Beacon North	703-591-1300
MA	West Newbury, Di-Ana Sales	617-363-5420
MI	Royal Oak, Satullo Co.	313-549-3910
MN	Hopkins, Kits Co.	612-933-1888
MO	Bridgeton, Electro-Mechanical Assoc.	314-291-8661
NM	Albuquerque, Shefler-Kahn Co.	505-296-0749
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NC	Raleigh, Beacon Electrn. Assocs.	919-787-0330
OH	Aurora, EMA, Inc.	216-562-6104
OH	Centerville, EMA, Inc.	513-433-2800
OK	Tulsa, Kemp Engrg.	918-663-4501
TX	Addison, Kemp Engrg.	214-931-7100
TX	Houston, Kemp Engrg.	713-466-1465
VA	Fairfax, Beacon North	703-591-1300
WA	Redmond, Westenn Sales	206-885-2054
WI	Glendale, Stapleman Corp.	414-352-5777

ELECTRO-OPTICAL INDS., Box 3770, Santa Barbara, CA 93105, Tel: 805-964-6701, Telex: 65-8427; Empl.: 100

ELECTRO-PACIFIC, 5782 Thornwood Dr., Goleta, CA 93017, Tel: 805-964-0751; FSC No.: 29853; Empl.: 60; *Sls. Mgr.:* Kay Mahone

Local Sales Offices & Reps

CA	Del Mar, Electro-Pacific Inc.	619-481-5201

ELECTRO PHYSICS, 1910 West Birchwood Ave., Chicago, IL 60626, Tel: 312-274-9669; Empl.: 6; *Sls. Mgr.:* Abe Siegelman

ELECTROPHYSICS CORP., 48 Spruce St., Nutley, NJ 07110, Tel: 201-667-2262, Telex: 642277

ELECTRO-PREP, 30 Cayuga Ave., E. Falmouth, MA 02536, Tel: 617-477-1791; *Sls. Mgr.:* J. Anderson

ELECTRO-RACK PRODUCTS CO., 1742 S. Clementine St., Anaheim, CA 92802, Tel: 714-776-5420; FSC No.: 26073; Empl.: 25; *Sls. Mgr.:* Allen Benson

ELECTRO-RENT CORP., 4131 Van Owen Place, Burbank, CA 91505, Tel: 213-843-3131, TWX: 910-498-2238; Empl.: 100; *Sls. Mgr.:* R. Tarullo

ELECTRO SCIENTIFIC INDS., 13900 N.W. Science Pk. Dr., Portland, OR 97229, Tel: 503-641-4141, Telex: 15-1246; FSC No.: 11837; Empl.: 750; *Sls. Mgr.:* Dick Donaca;Don Hofmann

ELECTRO SPACE FABRICATORS, 300 W. High St., P.O. BOX 67, Topton, PA 19562-0067, Tel: 215-682-7181; Empl.: 205; *Sls. Mgr.:* T. Roth .... **2**•1028, 1029

Local Sales Offices & Reps

AL	Huntsville, Mackan, Smith & Assocs.	205-539-8000
CA	Irvine, Vale Assocs.	714-551-4004, 4821
CA	San Jose, Silicon Valley Sls.	408-286-7510
CT	Bridgeport, Betronic Assocs.	203-374-6404
FL	Lighthouse Point, Jack Krutek & Assocs.	305-941-6544
FL	Madeira Beach, MacKay, Smith & Assocs.	813-393-7144
FL	Orlando, MacKay, Smith & Assocs.	305-277-1513
GA	Norcross, MacKay, Smith & Assocs.	404-449-7444
IL	Northbrook, Raines & Assocs.	312-498-0890
MD	Pikesville, Imagitron Sls. Co.	800-638-3592
MD	Pikesville, Imagitron Sls.	301-521-2020
MA	Waltham, Betronic Assocs.	617-894-8400
MN	Minneapolis, Electro-Tech Assocs.	612-927-5878
NJ	Boonton, Winter Assocs.	201-334-3434
NY	Binghamton, Miles & Burke Assoc.	607-723-8397
NY	Kirkwood, Miles M. Burke & Assocs.	315-822-5916
NY	Morrisville, Promark-Electrns.	315-662-3310
NC	Charlotte, MacKay, Smith & Assocs.	704-372-1188
OH	Galion, James R. Bright	419-468-3787
OK	Tulsa, Advance Techn. Sls.	918-664-0482
PA	Doylestown, Monteiro Assocs.	215-345-5855
PA	McKean, ECCO	814-476-1376
TN	Chattanooga, MacKay, Smith & Assocs.	615-899-6951
TX	Austin, Advance Techn. Sls.	512-459-1351
TX	Dallas, Advance Techn. Sls.	214-340-1300
TX	Houston, Advance Techn. Sls.	713-440-3888
WA	Auburn, Elctrn. Sls. Northwest	206-839-5808
WA	Maple Valley, Electrn. Sls. Northwest	206-432-1002

ELECTROSPACE SYS., INC., Box 1359, Richardson, TX 75080, Tel: 214-783-2004, TWX: 910-867-4768; FSC No.: 33875; Empl.: 902

ELECTRO STANDARDS LAB., INC., P.O. Box 9144, Providence, RI 02940, Tel: 401-943-1164, Telex: 697-2057 ESLAB; Empl.: 20; *Sls. Mgr.:* R. B. Sepe; *Dist. Mgr.:* R. B. Sepe

ELECTROSTATIC CONSLTG. ASSOCS., 556 Lowell Rd., Groton, MA 01450, Tel: 617-448-5485; Empl.: 5; *Sls. Mgr.:* Paul Malinaric

ELECTROSTATICS, 7718 Clairemont Mesa Blvd., San Diego, CA 92111, Tel: 619-279-1414; FSC No.: 34538; Empl.: 17

ELECTRO STYLUS, 31 Cheyenne Blvd., Colorado Springs, CO 80906, Tel: 303-633-5969; Empl.: 10; *Sls. Mgr.:* L. F. Murray; *Dist. Mgr.:* M. L. Murray

ELECTRO SWITCH, King Ave., Weymouth, MA 02188, Tel: 617-335-5200, TWX: 710-388-0377; FSC No.: 82121; Empl.: 260; *Sls. Mgr.:* H. F. Peters .... **1B**•1010, 1622, 1623

Local Sales Offices & Reps

AZ	Phoenix, Howe & Howe Sls.	602-264-7971
CA	Los Angeles, Wiley	213-666-1611

CA	Moraga, W. Nott & Co.	415-376-1922
CA	San Diego, Wiley Co.	619-571-2881
CO	Boulder, Comp. Prods. Sls.	303-530-2800
FL	Winter Park, Floritronics	305-886-4818
GA	Atlanta, Holman-Lobsinger	404-256-9120
IL	Elk Grove Village, Electro Switch	312-593-2225
IA	Bettendorf, H.J. Weisler & Assoc.	319-344-0566
MD	Woodbine, Naudain Assocs.	301-442-2270
MI	Ferndale, Hilltronics	313-398-5556
MN	St. Paul, Kencotronics	612-645-7717
MO	Ellisville, H.J. Weisler & Assoc.	314-394-4543
MO	No. Kansas City, H.J. Weisler & Assocs.	816-421-1679
NJ	Fairfield, Electro Switch	201-227-6559
NJ	Marlton, Naudain Assocs.	609-983-5300
NY	Rochester, Sweetco Assoc.	716-225-2383
NY	Utica, Sweetco Assoc.	315-797-6721
NC	Winston-Salem, L.G. White Southern	919-725-3612
OH	Columbus, Rockford Controls	614-868-5577
OH	Dayton, Rockford Controls	513-898-5452
OH	Euclid, Rockford Controls	216-731-5250
PA	Pittsburgh, R. F. Clark	412-242-9500
SC	Greenville, L.G. White Southern	803-271-0630
TX	Bellaire, Brice Co.	713-666-1788
TX	Dallas, Brice Co.	214-233-9808
UT	Salt Lake City, Comp. Prods. Sls.	801-262-0000
VA	Richmond, L.G. White Southern	804-740-7093
WA	Seattle, C.B. Parsons & Co.	206-762-7373
WI	Wauwatosa, Larsen Assoc.	414-258-0529

Local Distributors

CA	Los Angeles, Electric Switches	213-660-1310
CA	Moraga, Willard Nott & Co.	415-376-1922
FL	Ft. Lauderdale, Peerless Radio Corp. of Florida	305-973-4141
GA	Atlanta, Georgia Control Ctr.	404-876-8833
IL	Bridgeview, Midco Comp. Sls.	312-599-7777
MD	Baltimore, Automation Indl. Control	301-747-0044
MD	Kensington, Marine Air Supply	301-949-9560
MA	Sharon, Adcour	617-784-8123
MI	Grand Rapids, S-F Electronic Supply	616-459-0216
MN	St. Paul, K. D. I.	612-645-7717
NE	Omaha, West Dodge Elec. Supp.	800-228-2314
NY	Hempstead, Electronic Equip. Co.	516-538-5510
NC	Winston-Salem, General Prods. Co.	919-725-7342
OH	Euclid, Rockford Controls Ohio	216-731-5250
PA	Conshohocken, I/O Elec. Supp. Corp.	215-825-4610
PA	Pittsburgh, Clayton Engrg. Co.	412-288-0643
TX	Bellaire, Barclay Wholesale	713-666-1788
WA	Seattle, C.B. Parsons Co.	206-762-7373
WI	Milwaukee, I/O Elec. Supp. Corp.	414-963-9050

ELECTRO-TECH SYS., INC., 35 E. Glenside Ave., Glenside, PA 19038, Tel: 215-887-2196; *Sls. Mgr.:* Sharon Sandy; *Dist. Mgr.:* Stanley Weitz

ELECTRO VECTOR, INC., 6555 Covey Rd., Forestville, CA 95436, Tel: 707-887-2292, TWX: 510-746-6024; *Sls. Mgr.:* Wayne Brigden

ELECTROVERT INC., 399 Executive Blvd., Elmsford, NY 10523, Tel: 914-592-7322, Telex: 646186; *Sls. Mgr.:* Steve Vineis .... 2•1266, 1267

Local Sales Offices & Reps

CA	Santa Ana	714-835-2033
GA	Norcross	404-441-3644
IL	Rosemont	312-678-5557
TX	Dallas	214-353-9950

ELECTROVERT USA CORP., 10969 Shady Trail, #101, Dallas, TX 75220, Tel: 214-353-9950, Telex: 4630186; Empl.: 150; *Sls. Mgr.:* Tom Gill

Local Sales Offices & Reps

CA	Santa Ana	714-835-2033
CA	Santa Clara	408-739-6015
CO	Denver	303-423-5598
GA	Norcross	404-441-3644
IL	Rosemont	312-678-5557
NH	Manchester	603-625-5877
NY	Elmsford	914-592-7322
TX	Dallas	214-353-9950

ELECTRO WEAVE, 38 Harlow St., Worcester, MA 01605, Tel: 617-752-8932, TWX: 710-340-0635; FSC No.: 54207; Empl.: 18; *Sls. Mgr.:* C. J. Nowasacki

ELFAB CORP., P.O. Box 810555, Dallas, TX 75381-0555, Tel: 214-233-3033, 800-527-0753, TWX: 910-860-5460; Empl.: 299; *Sls. Mgr.:* Kermit Dye .... 2•1271-1274

Local Sales Offices & Reps

AL	Huntsville, Raycom	205-859-2017
AZ	Tempe, Delta Elect.	602-966-9903
CA	Escondido, Cirolia Elctrn. Sls.	619-743-3015
CA	Santa Clara, Elfab Corp.	408-988-1716
CA	Tustin, Elfab Corp.	714-731-2515
CO	Littleton, Lange Sls., Inc.	303-795-3600
FL	Orlando, Tri Mark Assocs.	305-859-5504
GA	Fayettsville, Raycom, Inc.	404-461-4026
IL	Crystal Lake, E. S. Healy & Assocs.	815-459-4386
MD	Pikesville, Imagitron Sls.	301-521-2020
MA	Hopkinton, Marathon Sls., Ltd.	617-435-6984
MI	Grand Rapids, R. P. Urban Assoc.	616-245-0511
MN	Stillwater, Tech Mktg.	612-330-3699
MO	St. Charles, C.F. Elctrns.	314-946-8500
NJ	Cherry Hill, Elfab Corp.	609-795-6262
NJ	Springfield, F. F. Sylvester Assoc.	201-376-3324
NY	N. Syracuse, Advanced Comps.	315-699-2671
NC	Raleigh, Rick Burns Assoc., Inc.	919-876-2224
OH	Beachwood, Duane Thompson & Assoc.	216-831-6277
OH	Dayton, Duane Thompson & Assocs.	513-237-9422
OK	Oklahoma City, Ammon & Rizos Co.	405-942-2552
TX	Austin, Ammon & Rizos Co.	512-454-5131
TX	Dallas, Ammon & Rizos Co.	214-233-5591
TX	Houston, Ammon & Rizos Co.	713-781-6240
UT	Salt Lake City, Lange Sls., Inc.	910-925-4006
WA	Seattle, Blum & Assocs.	206-285-2590

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ELGAR CORP., 8225 Mercury Ct., San Diego, CA 92111, Tel: 619-565-1155, TWX: 910-335-1246; FSC No.: 25965; Empl.: 375 .... 3•1854-1859

Local Sales Offices & Reps

AL	Huntsville, Pen-Tech Assocs.	205-881-9298
AZ	Tempe, Trembly Assoc.	602-967-2058
CA	Redondo Beach, Ward/Davis Assocs.	213-973-7772
CA	San Diego, Ward/Davis Assocs.	619-292-1000
CA	San Jose, D.P. Assocs.	408-296-1492
CO	Lakewood, Trembly Assocs.	303-233-9544
CT	North Haven, P. Jenks Assocs.	203-239-6201
FL	Casselberry, Pen-Tech Assocs.	305-645-3444
FL	Deerfield Beach, Pen-Tech Assocs.	305-421-4989
GA	Marietta, Pen-Tech Assocs.	404-424-1931
HI	Honolulu, Elctrn. Sls. Procurement	808-847-4300
IL	Arlington Heights, Dytec/Central	312-394-3380
IN	Indianapolis, Dytec/Central	317-247-1316
KS	Lenexa, Dytec/South	913-888-0215
MD	Rockville, Elctrn. Mktg. Assocs.	301-881-5300
MA	Woburn, P. Jenks Assocs.	617-938-0488
MI	Madison Heights, WKM Assocs.	313-588-2300
MN	Minneapolis, Berndt Assocs.	612-546-2021
MO	Maryland Hgts., Dytec/South	314-569-2990
NV	Las Vegas, Trembly Assocs.	702-739-9770
NJ	Hackensack, TMA	201-646-9222
NM	Albuquerque, Trembly Assoc.	505-266-8616
NY	Fairport, NACO Elctrns. Corp.	716-223-4490
NY	Great Neck, RTI	516-829-3770
NY	North Syracuse, NACO Elctrns. Corp.	315-699-2651
NY	Utica, NACO Elctrns. Corp.	315-732-1801
NC	High Point, Pen-Tech Assocs.	919-883-9125
OH	Cleveland, WKM Assocs.	216-267-0445
OH	Dayton, WKM Assocs.	513-434-7500
OR	Beaverton, Northwest Test & Meas.	503-646-9966
OR	Portland, Topp Engrg.	503-244-7265
PA	Pittsburgh, WKM Assocs.	412-892-2953
PA	Plymouth Meeting, Elctrn. Mktg. Assocs.	215-828-7400
TX	Austin, Data Aids Assocs.	512-327-8600
TX	Dallas, Data Aids Assocs.	214-620-1551
TX	Spring, Data Aids Assocs.	713-353-7728
UT	Salt Lake City, Trembly Assocs.	801-486-5292
WA	Bellevue, Topp Engrg.	206-747-5400
WA	Redmond, Northwest Test & Meas.	206-881-8857
WI	Elm Grove, Dytec Central Inc.	414-784-9686
EXP	CA, San Diego, Elgar Intl. Corp.	619-565-1155

Local Distributors

CA	Berkeley, Northern Lights	415-540-6162
CA	Inglewood, Cal. Micro	213-671-6075
IL	Arlington Heights, Peak Distrs., Inc.	312-394-3380
MN	St. Paul, Dytec North, Inc.	612-645-5816
MO	Maryland Heights, Dytec Distrs.	314-569-2990
NJ	Hackensack, Logon, Inc.	201-646-9222
NY	North Syracuse, Naco Elctrns. Corp.	315-699-2651
NC	Greensboro, Pen-Tech Sls.	919-852-6000
OH	Centerville, National Instrs. Distrs., Inc.	513-434-7500
PA	Penllyn, Promark Distrs., Inc.	215-643-3400
TX	Springs, Data Aids Assocs.	713-353-7728
WA	Bellevue, Topp Engrg. Sls. Corp.	206-747-5400

ELGENCO, INC., Box 460, Hurricane, UT 84737, Tel: 801-635-4954; FSC No.: 15455; *Sls. Mgr.:* Duane Beecher .... 3•1228-1233

Local Sales Offices & Reps

CA	Sherman Oaks, Windsor Dynamics	213-990-4173
CA	Woodside, N-S Assocs.	415-854-4870
CT	Hamden, Polytek Assoc.	203-288-5246
MA	Waban, Polytek Assoc.	617-881-4741
NJ	Marmore, Holdsworth & Co.	609-398-4340
NM	Albuquerque, Technology Mktg. Assoc.	505-345-8921
PA	Newtown Square, Holdsworth & Co.	215-356-8550

ELIN DIV., California Instrs. Co., Div. of Norlin Ind., 5150 Convoy St., San Diego, CA 92111, Tel: 619-279-8620, Telex: 695-047; FSC No.: 16067; Empl.: 90; *Sls. Mgr.:* W.W. Hanford

ELMA ENGRG., 1066 E. Meadow Circle, Palo Alto, CA 94303, Tel: 415-494-7303, Telex: 345-560; Empl.: 50; *Sls. Mgr.:* Karl W. Widl

ELMAG, 54 Clark St., Newark, NJ 07104, Tel: 201-481-1600; FSC No.: 23160; Empl.: 25

Local Sales Offices & Reps

OH	Dayton, Irving Atkind Assoc.	513-278-4160

ELM SYSTEMS, 1101 Brown St., Wauconda, IL 60084, Tel: 312-526-5003; *Sls. Mgr.:* T. A. McCollum

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Local Sales Offices & Reps

AL	Decatur, Tenn. Tech. Sls.	205-350-0630
AZ	Phoenix, O'Donnell SW	602-944-9542

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GA	Atlanta, Tenn. Tech. Sls.	404-622-5784
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IN	Fort Wayne, O. Bromberg	219-456-6010
KY	Louisville, O. Bromberg	502-245-8916
MA	Danvers, C. H. Burnham Assoc.	617-774-0111
MI	Brooklyn, Engineered Comps.	517-592-3236
MN	Minneapolis, C. Listug Sls.	612-537-6740
MO	Creve Coeur, Hill & Co.	314-432-1136
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NY	Fairport, Bastian Sls.	716-223-0237
NY	Larchmont, G. M. Moch Co.	914-834-3530
NY	Latham, L-Tron Corp.	518-785-5032
NY	Syracuse, Canavan-Scanlon	315-437-1271
NC	Charlotte, Tenn-Tech Sls.	704-525-6295
OH	Cincinnati, O. Bromberg	513-771-9333
OH	Cleveland, Allied Entprs.	216-779-0080
OK	Tulsa, Ion Assoc.	918-664-0186
PA	Murrysville, Allied Entprs.	412-325-3200
RI	Johnston, C. H. Burnham Assoc.	401-231-7475
TX	Austin, Ion Assocs.	512-346-7160
TX	Grand Prairie, Ion Assocs.	214-647-8225
TX	Houston, Ion Assocs.	713-977-4354
UT	Salt Lake City, Front Range Mktg.	801-364-6481
VA	Midlothian, Daniel E. Boehling Assocs.	804-794-5879
WA	Bellevue, Lehr Assoc.	206-453-9993
WA	Bothell, Temco Northwest	206-488-1254
WI	Milwaukee, R. Zingler	414-351-5005

ELNA AMERICA, INC., 153 E. Savarona Way, Carson, CA 90746, Tel: 213-327-6090, Telex: 68-6427, TWX: 910-346-6730; *Sls. Mgr.:* Don L. Bilsing; *Dist. Mgr.:* Isao Kikuchi

ELNETIC ELCTRNS., 1730 21st St., Santa Monica, CA 90404, Tel: 213-828-9541; FSC No.: 98460; Empl.: 25; *Sls. Mgr.:* Ernest H. Carlson, Jr.

ELNIK INSTRS., 410 Garibaldi Ave., Lodi, NJ 07644, Tel: 201-779-7388, Telex: 133429; Empl.: 8; *Sls. Mgr.:* Claus J. Joens

ELPAC COMPS., 3131 S. Standard Ave., Santa Ana, CA 92705, Tel: 714-979-4440, TWX: 910-595-1513; Empl.: 130; *Sls. Mgr.:* Rod Bolton ......**1A**•1070, 1071

Local Sales Offices & Reps

AZ	Tempe, Sunwest Mktg. Assocs.	602-838-7586
CA	Loomis, Sacremento Office	916-652-9702
CA	San Diego, Wes-K Assocs.	619-578-2040
CA	Santa Clara, I Squared.	408-988-3400
CA	Van Nuys, Wes-K Assocs.	213-989-3070
CO	Arvada, Wescom Mktg.	303-422-7619
CT	Milford, Todino Engr. Sls.	203-874-6643
FL	Orlando, OEM Mktg. Corp.	305-299-1000
IL	Highland Park, Bransky Sls.	312-433-2375
IA	Cedar Rapids, Palatine Engr. & Sls.	319-365-8071
KS	Mission, Palatine Engr. & Sls.	913-831-0555
KS	Rose Hill, Palatine Engr. & Sls.	316-776-0065
MD	Timonium, Wakefield Grp.	301-561-3221
MA	Needham Heights, Todino Engr. Sls.	617-444-7925
MI	Farmington Hills, W. R. Hummon & Assocs.	313-474-0661
MN	Bloomington, Smiley-Scott Assocs.	612-888-5551
MO	Hazelwood, Palatine Engr. & Sls.	314-839-0800
NJ	Englewood, Harold Gray Assocs.	201-894-0894
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OR	Beaverton, Caruso & Northcutt.	503-646-4973
PA	Hickord, J. C. Hofstetter Co.	412-356-2305
TX	Dallas, Reese & Assocs.	214-638-6575
UT	Salt Lake City, Wescom Mktg.	801-466-9594
WA	Bellevue, Caruso & Northcutt.	206-454-9699
WI	Cedarburg, Bransky Sls.	414-377-6837

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Phoenix, T.T.I.	602-861-0222
AZ	Tempe, Powell Elctrns.	602-438-1505
CA	Chatsworth, Mil-Comm	213-998-3111
CA	Costa Mesa, Powell Elctrns.	714-754-1717
CA	Garden Grove, Megacap	714-891-5176
CA	Irvine, Kelex	714-863-1230
CA	San Jose, T.T.I.	408-943-9155
CA	San Jose, Powell Elctrns.	408-943-9020
CA	San Jose, Capacitors Unltd.	408-946-7676
FL	Ft. Lauderdale, Powell Elctrns.	305-979-5000
FL	Orlando, T.T.I. Florida	305-979-5000
IL	Northbrook, Classic Components	312-272-9650
IL	Skokie, Kellner Elctrns.	312-677-1120
MD	Columbia, Powell Elctrns.	301-995-0410
MA	Westborough, Powell Elctrns.	617-366-6100
MA	Wilmington, Aved Elctrns.	617-657-8311
MA	Woburn, T.T.I., Inc. NE	617-938-8800
MN	Minneapolis, C. Tennant & Sons	612-475-7300
MO	Maryland Heights, Ensco Distribg., Inc.	314-423-3935
NJ	Englewood, Powell Elctrns.	201-894-0800
NY	Bohemia, T.T.I.	516-567-1500
NC	Cary, Powell Elctrns.	919-467-1212
OK	Tulsa, Altair Co.	918-252-5781
PA	Philadelphia, Powell Elctrns.	215-365-1900
TX	Austin, Captronics	512-459-4328
TX	Dallas, Captronics	214-340-3592
TX	Ft. Worth, T.T.I.	817-429-1440
TX	Houston, Altair Co.	713-462-3029
TX	Irving, Powell Elctrns.	214-258-6841
WA	Bellevue, Powell Elctrns.	206-641-4446
WI	Mequon, Taylor Elec. Dists.	800-558-8921
WI	New Berlin, Classic Comps.	414-786-5300
WI	Racine, Badger Elctrns.	414-637-1256; 414-933-6685

ELPAC POWER SYS., 3131 S. Standard Ave., Santa Ana, CA 92705, Tel: 714-979-4440, TWX: 910-595-1513; Empl.: 270; *Sls. Mgr.:* Patrick D'Acre; *Dist. Mgr.:* Randy Bilsley .... **3**•1554-1559

Local Sales Offices & Reps

AL	Huntsville, K&E Assoc.	205-883-9720
AZ	Phoenix, Westrep	602-997-8899
CA	Anaheim, Westrep	714-527-2822
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, Westrep	408-988-8833
CO	Parker, A-5 Co.	303-841-3651
CT	Yalesville, The Newscott Co.	203-269-2654
FL	Clearwater, Gallagher & Assoc.	813-726-3187
FL	Plantation, Gallagher & Assoc.	305-473-2101
GA	Doraville, K&E Assoc.	404-448-7025
IL	Highland Park, Bransky Sls.	312-433-2375
IN	Ft. Wayne, F. J. Campisano	219-747-2633
IN	Indianapolis, F. J. Campisano	317-253-7651
IA	Cedar Rapids, Electromec	319-362-6413
MD	Pikesville, Imagitron Sls.	301-521-2020
MA	Needham Hgts., Newscott Co.	617-444-1923
MN	Burnsville, Electromec Sls.	612-894-8200
NJ	Fairfield, TAM	201-575-4390
NY	S. Hauppauge, TAM	516-348-0800
OH	Cincinnati, F. J. Campisano	513-574-7111
OH	Cleveland, F. J. Campisano	216-749-5550
OK	Tulsa, ION Assoc	918-664-0186
OR	Beaverton, Caruso & Northcutt	503-646-4973
PA	Coraopolis, F. J. Campisano	412-264-5151
TX	Austin, Ion Assoc.	512-346-7160
TX	Grand Prairie, ION Assoc	214-647-8225
TX	Houston, Ion Assoc.	713-977-4354
WA	Bellevue, Caruso & Northcutt	206-454-9699
WI	Cedarburg, Bransky Sls.	414-377-6837

Local Distributors

BS	Huntsville, Marshall Industries	205-881-9235
AL	Birmingham, ACK Radio Supp.	205-322-0588
AL	Huntsville, RM Elctrns.	205-852-1550
AZ	Tempe, Marshall Inds.	602-968-6181
CA	Canoga Park, Marshall Inds.	213-999-5001
CA	El Monte, Marshall Industries	213-442-7204
CA	Inglewood, Newark Elctrns.	213-678-0441
CA	Irvine, Marshall Inds.	714-556-6400
CA	San Diego, Marshall Inds.	619-578-9600
CA	Sunnyvale, Marshall Inds.	408-732-1100
CO	Denver, Marshall Inds.	303-427-1818
CT	Wallingford, Sager Elctrns.	203-265-4600
CT	Wallingford, Marshall Inds.	203-265-3822
FL	Orlando, Marshall Inds.	305-841-1878
GA	Atlanta, ACK Radio Supply	404-351-6340
GA	Norcross, Marshall Inds.	404-923-5750
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Northbrook, Classic Components	312-272-9650
IL	Schaumburg, Marshall Inds.	312-490-0155
IN	Indianapolis, RM Elctrns.	317-247-9701
MD	Gaithersburg, Marshall Inds.	301-840-9450
MA	Burlington, Marshall Inds.	617-272-8200
MA	Burlington, QPL Elctrns.	617-229-2424
MA	Hingham, Sager Elctrns.	617-749-6700
MI	Grand Rapids, RM Elect.	616-531-9300
MI	Livonia, Marshall Industries	313-525-5850
MN	Plymouth, Marshall Inds.	612-559-2211
MO	St. Charles, Finnigan Elect.	314-946-6201
NJ	Cranford, Garden State Indl.	201-272-6400
NJ	Fairfield, Marshall Industries	201-882-0320
NJ	Mt. Laurel, Marshall Inds.	215-627-1920
NJ	Nutley, Vantage Comps.	201-667-1840
NY	Commack, Vantage Comps.	516-543-2000
NY	Endwell, Marshall industries	607-754-1570
NY	Hauppauge, Marshall Inds.	516-273-2424
NY	Hauppauge, Broadline Elctrns.	212-895-6232
NY	Melville, Diplomat	516-454-6400
NY	Rochester, Marshall Inds.	716-235-7620
NC	Greensboro, Hammond	919-275-6391
OH	Dayton, Marshall Industries	513-236-8088
PA	Philadelphia, Shap Elctrns.	215-969-3300
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Austin, Marshall Industries	512-458-5654
TX	Dallas, RM Elctrns.	214-235-3100
TX	Dallas, Marshall Inds.	214-233-5200
TX	Houston, Marshall Inds.	713-789-6600
TX	Houston, Newark Elctrns.	713-782-4800
WA	Bellevue, Marshall Inds.	206-747-9100
WI	New Berlin, RM Elctrns.	414-784-4420
WI	New Berlin, Classic Comps.	414-786-5300

ELPA MARKETING IND., Thorens & Atlantic Ave., Garden City Park, NY 11040, Tel: 516-746-3002

ELPOWER, 2117 S. Anne St., Santa Ana, CA 92704, Tel: 714-540-6155, Telex: 678354 ELPOWER SNA; Empl.: 200; *Sls. Mgr.:* D. Keil; *Dist. Mgr.:* Ronnie LeFevre .... **3**•1408-1410

Local Sales Offices & Reps

AZ	Phoenix, Shefter-Kahn	602-257-9015
CA	Mountain View, Gene C. Woempner Co.	715-964-5454
CO	Denver, Moss Mktg.	303-455-7205
CT	Milford, Todino Engrg. Sls. Co.	203-874-6643
GA	Norcross, Hollingsworth & Still	404-447-1700
IL	Chicago, G. Mcl. Cole Co.	312-774-3535
IN	Indianapolis, Elctrn. Mktg. Conslts.	317-253-1668
KS	Overland Park, Thomas L. Dowell & Assoc.	913-648-7373
MD	Baltimore, Component Sales	301-484-3647
MA	Needham Heights, Todino Engrg.	617-444-7925
MI	Coopersville, Electronic Salesmasters	800-321-1848
MN	Edina, Restronics	612-941-9135
MO	St. Louis, Thomas L. Dowell & Assoc.	314-849-4234
NJ	Englewood Cliffs, Masin Esco	201-569-8868
NJ	Marlton, Twin Sales	609-966-4070
NY	Chappaqua, Masin Esco	914-238-8337
NY	Syosset, Masin Esco	516-364-0310
OH	Beachwood, Electronic Salesmasters	216-831-9555
PA	Bensalem, Twin Sales	215-638-4850
TX	Dallas, R. E. Nesbitt Co.	214-357-4601
WA	Seattle, Northmar	206-524-5170

Local Distributors

AL	Huntsville, Components Distrs.	205-883-7501
CA	Cerritos, El Com	213-404-2961
CA	Fremont, Terminal Sls.	415-656-7722
CA	Gardena, Culver Elctrn. Sls.	213-538-2811
CA	Mountain View, Energy Sales	415-969-0800
CO	Denver, Hensley Battery	303-455-3643
FL	Del Rey Beach, Chapman Security Sys.	305-737-6776
GA	Atlanta, Custom Alarm Prods.	404-458-0990
IL	Downers Grove, Telecommunication Dvcs.	312-971-3460
IL	Palatine, Ohm Elctrns.	312-359-5500
IN	Indianapolis, Graham Elctrns.	317-634-8202
LA	Shreveport, Industrial Elctrn. Supp.	318-222-9459
MD	Savage, Pyttronic	301-792-0780
MA	Newtonville, Security Supp. Svc.	617-965-3400
MI	Livonia, Alarm Supp. Co.	313-591-9100
MN	Burnsville, Power Trust Grp.	612-890-1360
MO	St. Louis, Van Sickle Radio	314-621-5000
NE	Lincoln, Scott Elctrns.	402-466-8221
NY	Centereach, Air Ways Distrs.	516-698-7447
NY	Jackson Hgts., A-1 Alarmatic	212-639-8300
OR	Portland, Radar Elec.	503-232-3404
PA	Allentown, A. A. Peters	215-434-5237

UT	Salt Lake City, Standard Supply	801-486-3371
VA	Richmond, AVCC Elctrns.	804-359-6071
WA	Seattle, Radar Elec.	206-282-2511

EL-RAD MFG., 4300 N. California, Chicago, IL 60618, Tel: 312-478-7300, TWX: 910-221-0104; FSC No.: 11253; Empl.: 225; *Sls. Mgr.:* Marvin S. Christ

Local Sales Offices & Reps

AZ	Scottsdale, Memco Sales	602-241-2254
AR	Little Rock, Jard Electro Sales	214-231-6654
CA	Huntington Beach, J. J. Riley Assoc.	714-841-1411
CA	Mountain View, Westech Sls.	415-961-1422
FL	Pompano Beach, Cole-Tek	305-781-8110
IL	Elk Grove Village, I R O Co.	312-593-0644
MD	Glen Burnie, Faion Lott & Co.	301-744-4611
MD	St. Louis, Abrams & Assoc.	314-569-0447
MI	Benton Harbor, Mc Nabb & Assocs.	616-925-2166
NJ	Baltimore, Faion Lott & Co.	301-744-4611
NM	Phoenix, Memco Sls.	602-952-2254
TX	Richardson, Jaro Electro Sls.	214-231-6654

ELTEC INSTRS., P.O. Box 9610, Daytona Bch., FL 32020, Tel: 904-252-0411, TWX: 810-832-6294; Empl.: 120; *Sls. Mgr.:* Douglas S. Armstrong

EMCA, Sub. Rohm and Haas Advanced Matls. Co., 605 Center Ave., Mamaroneck, NY 10543, Tel: 914-698-8434, TWX: 710-566-1128; Empl.: 70; *Sls. Mgr.:* Dennis Hanley

Local Sales Offices & Reps

CA	Pleasant Hill, EMCA	408-998-1540
CA	Santa Clara, Mead Assocs.	408-748-1991
CA	Tustin, EMCA	714-731-4373
FL	Largo, Michael Nadreau	813-581-9113
NY	Chappaqua, Micrel Assocs.	914-238-4961
TX	Dallas, EMCA	214-321-5498

EMCO HIGH VOLTAGE CO., 556 Weddell Dr., Sunnyvale, CA 94089, Tel: 408-734-9123; Empl.: 38 .... **3**•1560

EMCON INC., Sub. of Kyocera Intl., 11620 Sorrento Valley Rd., San Diego, CA 92138, Tel: 619-459-4355, TWX: 910-322-1130; Empl.: 500; *Sls. Mgr.:* Bob Goodman; *Dist. Mgr.:* George Maines

Emcor Products

EMCOR PRODUCTS, Crenlo, Inc., 1600 Fourth Ave. NW, Rochester, MN 55901, Tel: 507-289-3371, TWX: 910-565-2374; *Sls. Mgr.:* John Horton .... **2**•1030

Local Sales Offices & Reps

AL	Huntsville, W. A. Brown Instrs.	205-883-8660
AZ	Phoenix, Aztec Enterprises	602-944-9185
CA	Cupertino, T. Louis Snitzer Co.	408-257-8333
CA	Del Mar, T. Louis Snitzer Co.	714-226-0305
CA	Los Angeles, T. Louis Snitzer Co.	213-836-6170
CO	Denver, Delltron Co.	303-373-0300
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Ft. Lauderdale, W. A. Brown Instrs.	305-776-4800
FL	Melbourne, W. A. Brown Instrs.	305-723-0766
FL	Orlando, W. A. Brown Instrs.	305-425-5505
GA	Norcross, W. A. Brown Instrs.	404-441-2980
ID	Boise, N. R. Schultz Co.	208-377-8686
IL	Des Plaines, Marsland Assocs.	312-694-2262
IN	Indianapolis, Marsland Assocs.	317-293-5437
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
LA	Mandeville, W. A. Brown Instrs.	504-626-9701
MA	Burlington, Kitchen & Kutchin	617-229-2660
MI	Southfield, Comtel Instrs.	313-358-2505
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	Grandview, Harris-Hanson Co.	816-763-6200
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Cedar Grove, KLS Associates	201-785-4450
NM	Albuquerque, Aztec Entps.	505-262-1688
NY	Albany, Reagan/Compar Albany	518-489-4777
NY	Endwell, Reagan/Compar Albany	607-723-8743
NY	Fairport, Reagan/Compar Albany	716-271-2230
NY	New Hartford, Reagan/Compar Albany	315-732-3775
NY	New York, KLS Assocs.	201-785-4450
NC	Durham, W. A. Brown Instrs.	919-683-1580
OH	Cleveland, Comtel Instrs.	216-442-8080
OH	Dayton, Comtel Instrs.	513-298-7573
OH	Hilliard (Columbus), Comtel Instrs.	614-876-8305
OR	Beaverton, N. R. Schultz Co.	503-643-1644
PA	Hatboro, Jacobsen Assocs.	215-674-2937
PA	Huntingdon Valley, Jacobsen Assocs.	215-674-2937
PA	Pittsburgh, Comtel Instrs.	412-922-5720
SC	Columbia, W. A. Brown Instrs.	803-798-8070
TN	Oak Ridge, W. A. Brown Instrs.	615-482-5761
TX	Dallas, J. A. Green Co.	214-631-7450
TX	Houston, J. A. Green Co.	713-526-2959
UT	Salt Lake City, Delltron Co.	800-692-2069
VA	Alexandria, Dyna Rep Co.	703-354-1222
WA	Bellevue, N. R. Schultz Co.	206-454-0300

EMC TECHNOLOGY INC, 1971 Old Cuthbert Rd., Cherry Hill, NJ 08034, Tel: 609-429-7800, Telex: 710 896 0193; FSC No.: 24602; Empl.: 75; *Sls. Mgr.:* Peter Semitschew

EMERGENCY BEACON CORP., 15 River St., New Rochelle, NY 10801, Tel: 914-235-9400; Empl.: 25; *Sls. Mgr.:* T. E. Ziegler

EMERSON, INDL. CONTROLS DIV., 3300 Standard St., Santa Ana, CA 92702, Tel: 714-545-5581, Telex: 67-8460; Empl.: 800; *Sls. Mgr.:* R. L. Calvin

EMERSON & CUMING, W. R. Grace & Co., 59 Walpole St., Canton, MA 02021, Tel: 617-828-3300, TWX: 710-348-1324; Empl.: 500

Local Distributors

CA	Culver City, E. V. Roberts & Assoc.	213-870-9561
FL	Stuart, Southeast Resin	305-286-8955
IL	Chicago, Prehler, Inc.	312-384-6100
MD	Baltimore, Sosco Corp.	301-574-7555
MA	Burlington, Schaal Associates, Inc.	617-272-7940
MA	Peabody, Adhesive Packaging Specialists	617-531-3300
MN	Bloomington, T.C. Services, Inc.	612-881-4536
MO	Maryland Heights, Thomas B. Moore, Inc.	314-434-6844
NJ	Plainfield, Pro-Pac	201-755-4940
NY	Ronkonkoma, Plastic Products & Tooling	516-467-0960
NC	Greensboro, Whitaker Metals, Inc.	919-294-3825
OH	Westerville, John W. Blair Co.	614-882-6431
TN	Memphis, Accrabond, Inc.	601-895-4480
TX	Dallas, Roy E. Davis & Co.	214-688-0652
TX	Garland, Ipscot, Inc.	214-272-5952

EMICO INC., Box 368, Dublin, PA 18917, Tel: 215-249-9330, TWX: 510-665-9583; FSC No.: 85925; Empl.: 170; *Sls. Mgr.:* R. Jones .... **3**•1330, 1331

Local Sales Offices & Reps

AZ	Scottsdale, Luscombe	602-949-9333
CA	Campbell, Luscombe Engrg.	408-370-2020
CA	Pasadena, Luscombe	213-684-2000
CO	Arvada, Arrowhead Sls. Co.	303-423-5556
FL	Pinellas Park, Chaco Sls.	813-546-6658
IL	Chicago, Ropek & Cahill	312-631-0070
IN	Carmel, S T B & Assocs.	317-844-9227
KS	Shawnee Mission, Robinson & Assocs.	913-262-1374
MD	Silver Spring, H.R. Sieber Co.	301-589-9110
MA	Braintree, Anderson Sls. Co.	617-848-9194
MN	Minneapolis, H.M.R., Inc.	612-831-7400
NJ	Marlton, B.G.R. Assocs.	609-428-2440
NY	Mt. Vernon, Sonkin Assoc.	914-MO8-9809
NY	Syracuse, Nycom, Inc.	315-437-8343
NC	Charlotte, Electro-Rep. Assocs.	704-527-2530
OH	Rocky River, Loesch Assocs.	216-333-0077
TX	Richardson, Campion Sls.	214-238-8145
WA	Redmond, Barrett-Squibb	206-885-6991
WI	Colgate, Rep I and Assocs.	414-628-4016

EMI GENCOM INC., See THORN EMI Gencom Inc.

EMI TECHNOLOGY INC., See THORN EMI Technology Inc.

E/M LUBRICANTS, INC., Div. of Great Lakes Chemical Corp., Highway 52 NW, W. Lafayette, IN 47906, Tel: 317-463-2511, Telex: 27-9428; FSC No.: 11770

Local Sales Offices & Reps

CA	Mountain View	415-961-5865
CA	North Hollywood	213-875-0101
CO	Denver	303-371-6771
CT	New Britain	203-224-9148
GA	Atlanta	404-361-2550
IL	Lombard	312-620-6808
MA	Auburn	617-792-6919
MI	Roseville	313-779-6460
MN	New Brighton	612-780-3202
OH	Dayton	513-254-8481
PA	Sharon Hill	215-461-1015
TX	Ft. Worth	817-834-8817

EMM SEMI, SUB OF EM & M, See GTE Microcircuits

EMM/SESCO, 20630 Plummer St., Chatsworth, CA 91311, Tel: 213-998-9090, Telex: 691404, TWX: 910-494-4990; *Sls. Mgr.:* Russ Summers

Empro
SHUNTS ®

EMPRO MFG. CO., INC., P.O. Box 26060, Indianapolis, IN 46226, Tel: 317-823-4478; Empl.: 25 .... **3**•1234

Local Sales Offices & Reps

CA	La Canada, Lew Brooks Co.	213-790-8358
CA	Santa Ana, Lew Brooks Co.	714-544-8900
GA	Atlanta, Brownell Electro Inc.	404-762-5181
MA	Burlington, E.I.L. Instr.-Mancib Div.	617-272-9450
NJ	Belleville, D. F. Tobias & Co.	201-751-8680
OH	Cleveland, Weschler Elec. Corp.	216-238-2550
PA	Philadelphia, Sunshine Sci. Instr. Inc.	215-673-5600
TX	Houston, Ev Smith Sls.	713-649-5756

EMR DATA SYSTEMS, DIV. SANGAMO-WESTON, Box 3041, Sarasota, FL 33578, Tel: 813-371-0811, Telex: 052-890, TWX: 810-864-0406; Empl.: 1100; *Sls. Mgr.:* F. V. Hinkel

E M S DEVELOPMENT CORP., 200 Allen Blvd., Farmingdale, NY 11735, Tel: 516-694-2886, TWX: 510-224-6480; FSC No.: 51435; Empl.: 95; *Sls. Mgr.:* Ed Simkovich

EMULOGIC, 3 Technology Way, Norwood, MA 02062, Tel: 617-329-1031; *Sls. Mgr.:* Robert Smith

ENCLOSURE CORP., 4529 Adams Circle, Cornwells Hts., PA 19020, Tel: 215-638-9550; FSC No.: 32360; *Sls. Mgr.:* Gene Goldner

ENCODER DIV., LITTON SYSTEMS, INC., See Litton Encoder Div.

ENCODER PRODS., 1601B Dover Rd., Sandpoint, ID 83864, Tel: 208-263-8541, TWX: 510-776-1595; Empl.: 70; *Sls. Mgr.:* Vance Conner

ENDEVCO, 30700 Rancho Viejo Rd., San Juan Capistrano, CA 92675, Tel: 714-493-8181, Telex: 68-5608, TWX: 910-596-1415; FSC No.: 95411; Empl.: 400; *Sls. Mgr.:* B. Toffelmier

Local Sales Offices & Reps

AL	Huntsville	205-536-4454
CA	Anaheim	714-831-9200
CA	Mountain View	415-969-3212
CA	San Francisco	415-552-1763
CT	West Mystic	203-572-0571
DC	Washington	391-261-1760
FL	Orlando	305-855-4535
IL	Chicago	312-754-3888
MD	Annapolis	301-269-8800
MA	Boston	617-969-8063
MI	Charlotte	313-471-0685
NJ	Lambertville	609-397-0883
OH	Cleveland	216-659-3138
OH	Dayton	513-253-6175
TX	Houston	713-462-1971

ENDICOTT COIL, 22 E. Charlotte St., Binghamton, NY 13905, Tel: 607-797-1263, Telex: 932411; Empl.: 180; *Sls. Mgr.:* Raymond Taylor .... **1A**•1244, 2152

ERC™
Endicott Research Group.Inc.

ENDICOTT RESCH. GRP., INC., 2601 Wayne St., P.O. Box 269, Endicott, NY 13760, Tel: 607-754-9187, TWX: 510-252-0155; FSC No.: 63312; Empl.: 100; *Sls. Mgr.:* Robert S. Rakowski .... **1B**•1049-1051; **3**•1561

Local Sales Offices & Reps

CA	Lomita, Component Mktg. Assoc.	213-326-1460
CA	Saratoga, Testco	408-253-1900

CO	Denver, West Incorporated	303-692-0131
CT	Bloomfield, SIR Assocs.	203-243-9343
FL	Pompano Beach, Cole-Tek Assocs.	305-781-8110
GA	Atlanta, Wallace Electronics	404-752-6611
IL	Elk Grove Village, Carlson Elctrn. Sls.	312-956-8240
IN	Indianapolis, Carlson Elctrn. Sls.	317-842-3740
IA	Cedar Rapids, Carlson Elctrn. Sls.	319-377-6341
KS	Wichita, PMR, Inc.	316-684-4141
MA	Bedford, SIR Assocs.	617-275-5550
MN	Minneapolis, Jos-Col Melius	612-861-3343
MO	Maryland Hts., PMR, Inc.	314-569-1220
NE	Overland Park, PMR, Inc.	913-381-0004
NJ	Livingston, Eagle Sls. Co.	201-992-2030
NY	Albany, H. C. Johnson Agencies	518-459-1239
NY	Buffalo, H. C. Johnson Agencies	716-632-7880
NY	Rochester, H. C. Johnson Agencies	716-482-3000
NY	Wadin & River, Rywel Sales Inc.	516-929-4884
NC	Kernersville, Wallace Electronics	919-996-2742
OH	Dayton, Dynel Co.	513-434-6467
PA	Glenshaw, H. C. Johnson Agencies	412-961-0414
PA	King of Prussia, Freedman-Malta Assocs.	215-279-5767
TX	Austin, Mil-Rep Associates	512-258-2828
TX	Houston, Mil-Rep Associates	713-937-0127
TX	Richardson, Mil-Rep Associates	214-644-6731
UT	Salt Lake City, West Inc.	801-466-5739
WA	Bellevue, Testco	206-454-7422
WI	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

ENERCO, INC., 9615 W. Marginal Way S., Seattle, WA 98108, Tel: 206-762-1422; Empl.: 5; *Sls. Mgr.:* Lee Rabie

ENERGY CONCEPTS, PO Box 128, Carlsbad, CA 92008, Tel: 619-942-3144; FSC No.: 01830; Empl.: 6; *Sls. Mgr.:* Marilyn Decarlo

Local Sales Offices & Reps

CA	Mill Valley, Roy Colen Sls.	415-383-8700
CA	Sante Fe Springs, Wallace & Wallace	213-945-2908
CO	Denver, KC Marketers	303-733-5561
GA	Atlanta, Harvey Minsk and Assoc.	404-934-3272
IL	Schaumburg, Resha/Assoc.	312-397-9010
KS	Wichita, Maury Bettis Co.	316-265-8250
MA	N. Scituate, Montague & Murray	617-545-5505
OH	Aurora, GTEC	216-562-9872
TX	Dallas, The Assoc.	214-241-7190
WA	Everett, Fordco	206-258-1515

ENGELHARD CORP., 70 Wood Ave. S., Iselin, NJ 08830, Tel: 201-321-5900, Telex: 83-3147; Empl.: 8500

ENGELMANN MICROWAVE CO., KDI Pyrofilm, 60 S. Jefferson Rd., Whippany, NJ 07981, Tel: 201-887-5700, TWX: 710-986-8220; *Sls. Mgr.:* Carl Schraufnagl

EC2 engineered components company

ENGINEERED COMPS. CO., P.O. Box Y, San Luis Obispo, CA 93406, Tel: 805-544-3800; FSC No.: 32440; Empl.:160 .... **1A**•1444,1484-1508; **2**•1870,1887

ENGD. PROD., Div. of Acme Elec. Corp., 40 Water St., Cuba, NY 14727, Tel: 716-968-2400, Telex: 91-6451, TWX: 510-245-2700; Empl.: 850; *Sls. Mgr.:* Dick Milne

ENGINEERING & ELCTRN. DEVICES, 1024 N. McCadden Pl., Los Angeles, CA 90038, Tel: 213-463-4175; Empl.: 4; *Sls. Mgr.:* John H. Aulbach, Jr.; *Dist. Mgr.:* Henry C. Lerner

ENGINEERING DESIGN & SLS., Rt. 2, Box 305, Danville, VA 24540, Tel: 804-685-7073; Empl.: 50; *Sls. Mgr.:* Mark Gignac

ENGLER INSTRS., Sangamo Weston, Inc., 250 Culver Ave., Jersey City, NJ 07305, Tel: 201-332-5353, TWX: 710-730-5236; FSC No.: 07446; *Sls. Mgr.:* Vic Stuart; *Dist. Mgr.:* Al Brunelli

ENI, INC., See Electronic Navigation Inds., Inc.

ENI POWER SYS., 3000 Winton Rd. S., Rochester, NY 14623, Tel: 716-473-7330, Telex: 97-8283; FSC No.: 10226; Empl.: 200; *Sls. Mgr.:* L. A. Benedict

Local Sales Offices & Reps

CA	Santa Ana, Micro-Tec West	714-547-5941
MA	Needham, NGS Associates	617-449-6777

ENTECH SYSTEMS, INC., 15 Herman Dr., Simsbury, CT 06070, Tel: 203-651-9557; *Sls. Mgr.:* A. D. Jorczak

ENTERPRISE SYS. CORP., P.O. Box 698, Dover, NH 03820, Tel: 603-742-7363; Empl.: 20; *Sls. Mgr.:* G. E. Perrine

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Local Sales Offices & Reps

AZ	Phoenix, J. Smith & Assocs.	602-267-0981
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CA	San Diego, Saber Entprs.	619-271-1523
CA	Walnut Creek, Secco	415-937-1094
CO	Colorado Springs, J. Smith & Assoc.	303-597-5343
GA	Atlanta, Quantum Meas.	404-351-3531
IL	Lombard, The G.B. Hall Co.	312-858-1700
IN	Plainfield, Stress Analysis Svcs.	317-839-8235
MI	Brighton, Stress Analysis Svcs.	313-632-6110
NJ	Hopatcong, Measurements, Inc.	201-770-1281
NM	Albuquerque, J. Smith & Assocs.	505-265-3406
NC	Chapel Hill, Quantum Meas.	919-933-7408
OH	Dayton, Stress Analysis Svcs.	513-263-8036
OH	Medina, Stress Analysis Svc.	216-725-7733
OR	Portland, Topp Engrg. Sls.	503-244-7265
PA	Frazer, Measurements, Inc.	215-644-7142
TX	Dallas, Technical Prods.	214-357-9603
TX	Houston, Technical Prods.	713-493-6520
VA	Fredericksburg, Measurements, Inc.	703-373-5520

ENTRELEC DIV., See Cogenel, Inc./Entrelec Div.

ENVIRONMENTAL COMM., 3150 Pullman St., Costa Mesa, CA 92627, Tel: 714-557-7800, TWX: 910-595-1781; FSC No.: 16450; Empl.: 65; *Sls. Mgr.:* Glen Underwood

ENVIRONMENTAL CONTAINER SYS., INC., 3560 Rogue River Hwy., Box 188, Grants Pass, OR 97526, Tel: 503-476-8871, TWX: 510-755-0777; FSC No.: 24995; Empl.: 135

EOTEC CORP., 200 Frontage Rd., W. Haven, CT 06516, Tel: 203-934-7961; Empl.: 24; *Sls. Mgr.:* James W. Campbell

E.P.E. CORP., P.O. Box 5238, Manchester, NH 03108, Tel: 603-669-9181, Telex: 943536; Empl.: 65; *Sls. Mgr.:* James D. Bell; *Dist. Mgr.:* Thomas S. Bell

EPIC, INC., 150 Nassau St., New York, NY 10038, Tel: 212-349-2470, Telex: 12-6531; Empl.: 8; *Sls. Mgr.:* Peter Letica

ERIE TECHNOLOGICAL PRODUCTS, 645 West 11th St., Erie, PA 16512, Tel: 814-453-5611

EPOCH ENTPR., 3541 N. Olive Rd., Tucson, AZ 85719, Tel: 602-887-1970

EPOXYLITE CORP., 1265 N. Kraemer Blvd., Anaheim, CA 92806, Tel: 714-630-7910; Empl.: 60

EPOXY TECHNOLOGY, INC., 14 Fortune Dr., P.O. Box 567, Billerica, MA 01821, Tel: 617-667-3805, Telex: 94-7140; FSC No.: 33246

Local Sales Offices & Reps

AZ	Phoenix, Wadsworth/Bryant	602-275-7366
CA	Atherton, Wadsworth/Bryant	415-321-3619
CA	Hacienda Heights, Wadsworth/Bryant	213-330-5592
CO	Boulder, Specialty Sales Co.	303-444-0954
CT	Colchester, Normell Assoc.	203-537-5555
FL	Fort Pierce, Hyber-Sem	305-464-0461
IL	Chicago, E. Przechera Sls. Co.	312-725-1933
MA	Newton, Normell Assoc.	617-969-5478
MI	Royal Oak, Murray A. Perciuau Co.	313-548-1971
NJ	Clinton, Price-Tech Inc.	201-735-9797
NY	Fair Haven, Feikert Assoc.	315-652-5577
OH	Dayton, Berberich Assoc.	513-433-0342
OR	Beaverton, Demarest Assoc.	503-643-0141
UT	West Jordan, Specialty Sales Co.	801-561-0222
WA	Seattle, Demarest Assoc.	206-523-3210

EPSCO, 920 Westwood Ave., Addison, IL 60101, Tel: 312-543-0410; FSC No.: 53003; Empl.: 8 .... **3**•1563

Local Distributors

AR	Little Rock, Carlton-Bates Co.	501-562-9100
CA	Garden Grove, Allied Elctrns.	714-554-0731
CA	San Francisco, VWR Scientific Inc.	415-469-0100
CO	Denver, Newark Elctrns.	303-757-3351
FL	Marathon, Marathon Wholesale Electric Supply	305-743-2262
GA	Atlanta, Spec. Distr. Co.	404-873-2521
HI	Honolulu, Honolulu Elctrn.	808-949-5564
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IN	Indianapolis, Graham Elctrns.	317-634-8202
LA	New Orleans, Radio Parts	504-581-5959
MA	Lynn, Land Elctrns.	617-592-2220
MI	Flint, Shand Elctrns.	313-743-8940
MI	Lansing, Fulton Radio	517-394-5020
MO	Kansas City, Walters Radio Supp.	816-531-7015
MO	St. Louis, Olive Elctrn.	314-426-4500
NJ	Bridgeport, VWR Scientific Corp.	609-467-2600
NM	Albuquerque, Walker Radio	505-247-2288
NY	Buffalo, Summit Distr.	716-884-3450
OH	Dayton, Stotts-Friedman	513-298-5555
OK	Oklahoma City, Trice Whlsr.	405-524-4411
PA	Pittsburgh, Fischer Scientific Co.	412-562-8300
SC	Columbia, Dixie Radio Supp.	803-253-5333
TN	Nashville, Electra Distr. Co.	615-329-3971
TX	Dallas, Wholesale Elctrns.	214-824-3001
TX	Ft. Worth, Allied Elctrns.	817-336-5401
UT	Salt Lake City, Newark Elctrns.	801-486-1048
VA	Norfolk, Avec Elctrns.	804-627-3502
WI	Milwaukee, Industrial Elctrns. Supp.	414-276-1212

EPSCO MICROWAVE, 411 Providence Hwy., Westwood, MA 02090, Tel: 617-329-1500, TWX: 710-348-0484; FSC No.: 15894; Empl.: 185; *Sls. Mgr.:* John M. Shalhoub

EPSILON-LAMBDA ELCTRNS. CORP., 427 Stevens St., Geneva, IL 60134, Tel: 312-232-9611, TWX: 910-237-1684; Empl.: 30; *Sls. Mgr.:* Robert Knox

EQUIPTO, 225 S. Highland Ave., Aurora, IL 60507, Tel: 312-859-1000; Empl.: 300; *Sls. Mgr.:* Ralph Zettinger

EQUIPTO ELCTRNS. CORP., 351 Woodlawn Ave., Aurora, IL 60507, Tel: 312-897-4691; FSC No.: 14002; *Sls. Mgr.:* Larry Suggett .... **2**•1031

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AZ	Tempe, Burland Assoc.	602-894-5564
CA	Anaheim, Spectrum Assocs.	714-630-6977
CA	Sunnyvale, Ward Elctrn. Packaging Sls.	408-730-4494
CO	Littleton, Grifco	303-795-1989
CT	Stratford, Technical Instrs.	203-368-4582
FL	Orlando, Hollingsworth & Still	800-241-5712
GA	Norcross, Hollingsworth & Still	404-447-1700
IL	Palatine, Joseph Clark Co.	312-358-5095
IN	Ft. Wayne, Scott Elctrns.	219-484-7865
MD	Silver Spring, Sel-Tronics	301-589-3391
MA	Wilmington, Technical Instrs.	617-944-3930
MI	Troy, Scott Elctrns.	313-585-7690
MO	Blue Springs, Cairns & Hayes Elctrn. Sls.	816-229-1404
MO	St. Charles, Cairns & Hayes Elctrn. Sls.	314-946-6677
NJ	Englewood, Tecnimat	201-569-4200
NM	Albuquerque, R.L.S. Instr.	505-265-4187
NY	Syracuse, Labtronics	315-455-7314
OH	Cincinnati, Scott Elctrns.	513-791-2513
OH	Cleveland, Scott Elctrns.	216-473-5050
OH	Dayton, Scott Elctrns.	513-294-0539
PA	Valley Forge, J. E. Cuesta & Co.	215-265-5800

SC	Columbia, Hollingsworth & Still	800-241-5712
TX	Dallas, Kruvand Assocs.	214-691-4592
TX	Houston, Kruvand Assocs.	713-780-9710
WA	Seattle, S.J.I. Corp.	206-763-8981

ERA POLY-PLANAR DIV., 311 E. Park St., Moonachie, NJ 07074, Tel: 201-641-3650, TWX: 710-990-5064; Empl.: 100; *Sls. Mgr.:* John Apelian

ERA TRANSPAC DIV., Sub. Elctrn. Research Assocs., 311 B East Park St., Dept. 1202, Moonachie, NJ 07074, Tel: 201-641-3650, TWX: 710-990-5064; FSC No.: 96762; Empl.: 100; *Sls. Mgr.:* John Apelian

ERC, See Electronic Research Co.

ERICSON MFG. CO., 4215 Hamann Pkwy., Willoughby, OH 44094, Tel: 216-951-8000, Telex: 98-5390; *Sls. Mgr.:* J. E. (Jay) Ericson, Jr.

ERIE TECHN. PRODS., See Murata Erie No. Amer., Inc.

ERM, 27 Water St., Wakefield, MA 01880, Tel: 617-246-3550

ERNI COMPS. CORP., Erni Elektroapparate GMBH, 1235 E. Davis St., Arlington Heights, IL 60005, Tel: 312-577-8620, TWX: 910-687-0260; *Sls. Mgr.:* J. Garratt; *Dist. Mgr.:* G. F. Zib

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CA	Burbank, Mod-Co.	213-848-2215
CO	Littleton, Protronics Group	303-973-3096
FL	Melbourne Beach, Jack McGirr Assoc.	305-723-6678
GA	Jonesboro, Wallace Elctrn. Sls.	404-471-6297
IL	Mt. Prospect, Dombrow Co.	312-253-3326
IN	Indianapolis, Sukup & Cox	317-253-5501
MA	Dover, George Urban Assoc.	617-329-4068
MN	Bloomington, D. A. Case Assoc.	612-888-8666
MO	Lees Summit, MYA Midwest	816-865-3370
NC	Kernersville, Wallace Elctrn. Sls.	800-672-4290
PA	Southampton, Campbell Assoc.	215-322-6630
TN	Hixson, Wallace Elctrn. Sls.	615-870-2080
TX	Dallas, D & K Sales	214-247-0138
WA	Auburn, Elctrn. Sls. Northwest	206-432-1002

Local Distributors

CA	Inglewood, Force Elctrns.	213-776-1324
CA	Santa Clara, Force Elctrns.	408-739-1324
CT	Hamden, Impact Sls.	203-281-1331
GA	Atlanta, Prehler, Inc.	404-447-5540
IL	Chicago, Prehler, Inc.	312-384-6100
MA	Canton, Impact Sls.	617-821-1500
MN	Bloomington, Prehler, Inc.	612-854-6670
MN	St. Paul, Northern Automatic Assembly	612-481-0022
NH	Salem, Astrum Elctrns.	603-329-5656
NJ	Englewood Cliffs, M.G. Assoc., Co.	201-567-4900
NY	Port Washington, Connector Concepts Corp.	513-883-3800
OH	Middleburgh Heights, Prehler, Inc.	216-826-0110

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AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Mesa, Sedco Sales	602-835-6281
CA	Culver City, Westaironics	213-641-4122
CA	Santa Clara, Rodgers Assoc.	408-984-8110
CO	Westminster, D/Z Assocs.	303-429-9369
CT	Bridgeport, Betronic Assocs.	203-374-6404
FL	St. Petersburg, QXI, Inc.	813-821-2281
FL	Tamarac, QXI, Inc.	305-485-6030
IL	Elk Grove, Carlson Elctrn. Sls. Co.	312-956-8240
IN	Indianapolis, J & W Sales	317-842-3740
IA	Cedar Rapids, Carlson Elctrn. Sls. Co.	319-377-6341
KS	Merriam, Midwest Tech. Sls.	913-236-8555
MA	Waltham, Betronic Assocs.	617-894-8400
MN	Minneapolis, R-J, Inc.	612-866-3661
NY	New York City, Robert Smith Assocs.	212-541-4885
NY	Plainview, Robert Smith Assocs.	516-681-3155
NC	Raleigh, Interep Assoc.	919-872-1401
NC	Raleigh, Interep Assocs.	919-872-1401
OH	Cincinnati, Makin Assocs.	513-871-2424
OR	Beaverton, Ravencraft	503-646-9261
PA	Marlton, BGR Assocs.	609-983-1020
TX	Plano, Zeus Engrg.	214-423-2027
UT	Salt Lake City, D/Z Assocs.	801-268-2876
VA	Reston, Tytronics Tech. Sls.	703-471-0440
WI	Milwaukee, Carlson Elctrn. Sls. Co.	414-476-2790
EXP	NJ, Palisades Pk., ESC Elctrns. Corp.	201-947-0400

ESE, 142 Sierra St., El Segundo, CA 90245, Tel: 213-322-2136; FSC No.: 58525; Empl.: 25; *Sls. Mgr.:* R. Mayers; *Dist. Mgr.:* R. Mayers

ESNA DIV., 2330 Vauxhall Rd., Union, NJ 07083, Tel: 201-686-6000, Telex: 1-38243, TWX: 710-985-4677; Empl.: 700

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ESPEY MFG. & ELECTRONICS CORP., 223-239 Ballston Ave., Saratoga Springs, NY 12866, Tel: 518-584-4100

E² TECHNOLOGY CORP., 1545 Morse Ave., Ventura, CA 93003, Tel: 805-644-9544, Telex: 658-480

ESSCO INDS., P.O. Box 515, Sierra Madre, CA 91024-0515, Tel: 818-355-8315; Empl.: 33

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ESSEX GROUP, 9933 13th St., Ft. Wayne, IN. 46809, Tel: 219-478-1521; Empl.: 300-500; *Sls. Mgr.:* J. Scott

ESSEX GRP., ESSEX TERMINALS/TERMINALS/CONNECTORS, See United Technologies, Comps. Div. Terminals

ESSEX GRP., Power Conductor Div., 2601 S. Adams, Marion, IN 46953, Tel: 317-664-6211, TWX: 317-667-6972; Empl.: 700; *Sls. Mgr.:* J. Burdick

ESTES ENGRG. CO., 930 Marine Dr., Port Angeles, WA 98362, Tel: 206-457-0904; FSC No.: 22590; Empl.: 28

E-SYSTEMS, Garland Div., Box 226118, Dallas, TX 75266, Tel: 214-272-0515, TWX: 910-860-5187; Empl.: 1927

E-SYSTEMS, Greenville Div., P.O. Box 1056, Greenville, TX 75401, Tel: 214-457-4694, Telex: 73-2392; *Sls. Mgr.:* C. L. Byrom

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E-SYSTEMS, Memcor Div., 1320 Flaxmill Rd., Huntington, IN 46750, Tel: 219-356-4300, TWX: 810-333-1530; Empl.: 1100; *Sls. Mgr.:* Ray Vanderspool .... **1A**•1872, 2037

Local Sales Offices & Reps

AL	Huntsville, Murcota	205-539-8476
CA	Santa Ana, Cal-Tronic Sls.	714-979-4863
CA	Santa Clara, D.H. Ross	408-988-8111
CO	Denver, West, Inc.	303-692-0131
FL	Indialantic, Raycom	305-727-8860
GA	Atlanta, Murcota	404-875-2525
IL	Chicago, D. Dolin Sls.	312-286-6200
IN	Ft. Wayne, Menze Sls.	219-747-5616
MI	St. Clair Shores, J.M. Thorpe	313-779-6363
MN	Eden Praise, Bohlig & Associates	612-698-6921
MO	Blue Springs, Chesco	816-229-1404
MO	St. Charles, Chesco	314-946-6677
NH	Atkinson, Mark Rep Assoc.	603-362-4526
NJ	Englewood Cliffs, Masin Esco	201-569-8868
NY	Hauppauge, Masin Esco	516-273-3500
NY	Pittsford, Noeth-Honsinger	315-586-9002
NC	Burlington, Murcota	919-585-1577
NC	Winston-Salem, Murcota	919-723-1001
OH	Cleveland, Glover Sls.	216-842-4520
PA	Newtown Square, G.M. Conneen	215-353-2241
TX	Dallas, SW Elctrn. Ind.	214-233-9816
TX	Houston, SW Elctrn. Ind.	713-729-1670
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CA	Tustin, Sierra-Pacific Eng.	714-731-3411
CO	Denver, Challenge Sls.	303-450-2402
CT	East Haven, Eagle Assocs.	203-467-6542
FL	Orlando, EAB Inc.	305-898-7444
IL	Arlington Heights, Thermek	312-577-6900
IN	Ft. Wayne, Needler Sls. Co.	219-447-2123
IN	Indianapolis, Needler Sls. Co.	317-255-8056
KY	Louisville, Needler Sls. Co.	502-241-4046
MA	Boston, Eagle Assocs.	617-444-3446
MI	Detroit, Hilltronics	313-398-5556
MN	Minneapolis, Chris & Assocs.	612-432-1823
MO	Kansas City, Delltron Co.	816-436-6445
MO	St. Louis, Delltron Co.	314-869-4779
NY	New York, Schmitt Indl. Mktg. Corp.	516-486-3510
NY	Rochester, Robert F. Lamb Co.	716-323-1250
NY	Syracuse, Robert F. Lamb Co.	315-455-2469
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OH	Cleveland, J. O. Olsen Co.	216-662-3454
OR	Portland, Temco Northwest	503-648-8171
PA	Philadelphia, Techparts	215-628-3200
PA	Pittsburgh, J. O. Olsen Co.	412-279-2550
TN	Hendersonville, Stark & Assoc.	615-822-1667
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TX	Dallas, Delta Comps.	214-287-6333
UT	Salt Lake City, Frank Merchant	801-277-3775
WA	Seattle, Temco Northwest	206-488-1254
WI	Milwaukee, Star Engineering	414-645-3680

ETI ELECTRONICS, 5751 Miami Lakes Dr., Miami Lakes, FL 33014, Tel: 305-556-4000, Telex: 80-3347; *Sls. Mgr.:* R. Grossman; *Dist. Mgr.:* S. Zucker

ETI SYSTEMS

ETI SYSTEMS, Polaris Indl. Entprs., 215 Via Del Norte, Oceanside, CA 92054, Tel: 619-757-7770, TWX: 910-322-1396; FSC No.: 952 762672; *Sls. Mgr.:* Bill Tice; *Dist. Mgr.:* Bill Tice .... **1A**•2038; **1B**•1146-1149

ETM ELECTROMATIC, 470 San Antonio Ave., Palo Alto, CA 94306, Tel: 415-494-1505; *Sls. Mgr.:* Kenneth F. Lillis

ETRI

ETRI, 608 Broome St., P.O. Box 568, Monroe, NC 28110, Tel: 704-289-5423, TWX: 810-649-1352; *Sls. Mgr.:* G. Wolf .... **2**•1818-1820

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Luscombe Engrg.	602-949-9333
CA	Los Gatos, Nor-West	408-395-1190
CA	Pasadena, Luscombe Engrg.	213-684-2000
CA	San Diego, Bestronics	619-452-5500
CO	Boulder, Comp. Prods. Sls.	303-530-2800
CT	N. Haven, John E. Boeing Co.	203-239-5369; 800-343-4331
FL	Altamonte Springs, Semtronics Assoc.	305-831-8233
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Des Plaines, Lincoln, Hodges & Assocs.	312-297-3810
IN	Ft. Wayne, Advanced Comp. Sls.	219-484-0722
IN	Indianapolis, Advanced Comp. Sls.	317-545-6441
IA	Cedar Rapids, PMR, Inc.	319-362-9177
KS	Overland Park, PMR, Inc.	913-381-0004
KS	Wichita, PMR, Inc.	316-684-4141
MA	Lexington, J. E. Boeing	617-862-2500
MI	Birmingham, Favco Techn. Reps.	313-644-0173
MN	Minneapolis, Milt Westlund	612-866-5002
MO	Maryland Heights, PMR, Inc.	314-569-1220
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NY	Manhasset, Win-Cor Elctrns.	516-627-9474
NY	Syracuse, C. W. Floring Assocs.	315-478-2149
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Akron, Imtech, Inc.	216-666-1185
OH	Dayton, Imtech, Inc.	513-278-6507
OK	OK, Tulsa, Nova Mktg.	918-743-6202
OR	Wilsonville, RTS, Inc.	503-638-5670
TX	Dallas, Nova Mktg.	214-750-6082
TX	Houston, Nova Mktg.	713-988-6082
UT	Salt Lake City, Comp. Prods. Sls.	801-262-0000
WA	Vancouver, RTS, Inc.	206-892-0141
WA	Vashon, RTS, Inc.	206-285-1363
WI	Waukesha, Lincoln, Hodges & Assocs.	414-542-3087

Local Distributors

AZ	Tempe, Fisher-Brownell	602-967-1464
AZ	Tempe, Acacia Sls.	602-894-2874
CA	Alhambra, Fisher-Brownell	213-289-0255
CA	Fountain Valley, Comps. Ctr.	714-979-0433
CA	Irvine, Acacia Sls.	714-549-0954
CA	San Diego, Fisher-Brownell	619-560-8545
CA	San Diego, Acacia Sls.	619-565-4365
CA	Santa Clara, Fisher-Brownell	408-988-6041
CA	Sunnyvale, Acacia Sls.	408-745-7200
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Orange, Milgray Elctrns.	203-795-0711
FL	Altamonte Springs, Pioneer	305-834-9090
FL	Ft. Lauderdale, Pioneer	305-771-7520

Intelligent Display Modules

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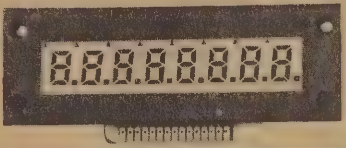

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CA	San Diego, Cummings & Assoc.	714-297-6035
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NM	Albuquerque, RLS Instrs.	505-293-7931
OH	Hudson, Technical Sales	216-656-3978
OR	Beaverton, Northwest Test & Meas.	503-646-9966
TX	Dallas, Elctrn. Production Spec.	214-985-1932
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IL	Chicago, ESCO Assocs.	312-763-0800
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NJ	E. Brunswick, Kong Sys.	201-828-8514
NC	Charlotte, Mackay, Smith and Assoc.	704-372-1188
OR	Portland, Frank Jackson, Assoc.	503-292-2638
TX	Dallas, Southwest Elctrn. Inds.	214-690-9881

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CA	Tustin, Morgan Johnson	714-832-7282
CO	Englewood, Techna-Quip	303-779-5399
CT	Hamden, Aid Engrg. Sls.	203-434-1673
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FL	Ft. Lauderdale, Reynolds & Assocs.	305-581-6611
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MO	St. Louis, Terry & Hodges	314-965-0746
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TX	Woodlands, MJM Intl. Sls.	713-273-3126
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WI	Wauwatosa, Gille Engrg. Sls.	414-258-4100

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FAIRCHILD MICROPROCESSOR DIV., Fairchild Camera & Instr. Corp., 450 National Ave., Mountain View, CA 94042, Tel: 415-962-3838, TWX: 910-379-5091

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FAIRCHILD WESTON, DATA RECORDERS, P.O. Box 3041, Sarasota, FL 33578, Tel: 813-371-0811, Telex: 4991610, TWX: 810-864-0406; FSC No.: GS-00K-8301-S0078; Empl.: 750; *Sls. Mgr.:* Steve Hoff .... **3**•1235

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CA	Laguna Hills, Elotek Sys.	714-830-4856
CA	Westlake, Fairchild Weston	213-889-1057
CO	Fort Collins, Vic Myers Assocs.	303-223-8907
CT	Higganum, Intersell	203-528-5357
FL	Fort Walton Beach, RAM-Z Assocs.	904-862-2700
FL	Maitland, Wade H. Boggs	305-647-2226
ID	Rathdrum, Hood Engrg. Sls., Inc.	208-772-7235
IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-293-5437
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
MD	Silver Spring, Sel-Tronics	301-589-3391
MA	Burlington, Intersell	617-273-3844
MI	Madison Heights, WKM Assocs.	313-588-2300
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	St. Lovis, Marsland Assocs.	314-991-1399
NJ	Cedar Grove, KLS Assocs.	201-785-4450
NM	Albuquerque, Vic Myers Assocs.	505-884-6878
NY	Rochester, Scientific Dvcs. NY	716-334-2445
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PA	Devon, Fairchild Weston	215-687-3220
TX	Conroe, Fairchild Weston	713-539-1315
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WI	New Berlin, Marsland Assocs.	414-786-6611

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AL	Huntsville, Macro-Mktg. Assocs.	205-883-9630
CA	Anaheim, Micrometals	714-630-7420
CA	Sunnyvale, Schwerin & Merrill Assocs.	408-735-7900
CO	Englewood, A-G Elctrns.	303-850-0657
CT	W. Hartford, R. S. Pettigrew & Assoc.	203-233-8533
FL	New Smyrna Beach, J. Wetzel	904-423-5707
IL	Marshall, Fair-Rite Prod.	618-584-2944
IN	Indianapolis, Frank J. Campisano Co.	317-253-7651
MI	Southfield, J. L. Montgomery Assoc.	313-358-2616
MN	Bloomington, Holmes & Ladky Assocs. of Minn.	612-884-2125
NY	Hempstead, Kahgan Sales	516-538-2300
OH	Cincinnati, F. J. Campisano & Assoc.	513-574-7111
OR	Portland, Freed Assocs.	503-289-5320
PA	Easton, Kendon Co.	215-253-3100
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FARINON DIV., Harris Corp., 1691 Bayport, San Carlos, CA 94070, Tel: 415-594-3000, Telex: 34-8491; *Sls. Mgr.:* John Stockford

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FCM PLASTICS, Plastics Technologies Inc., 2555 Oak Industrial Dr. NE, Grand Rapids, MI 49505, Tel: 616-451-4502, TWX: 810-273-6038; *Sls. Mgr.:* Patrick K. Parsons

FEMA ELCTRNS. CORP., 12-6 Edgeboro Rd., E. ✓ Brunswick, NJ 08816, Tel: 201-238-1223, Telex: 299425 FEMA UR; Empl.: 10 to 20; *Sls. Mgr.:* Bob Cheng

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AL	Huntsville, Conley & Assocs.	205-882-0316
AZ	Phoenix, Dorton Entprs.	602-944-2957
CA	Cupertino, Codella Mktg. Grp.	408-257-2561
CA	Los Angeles, Landa/Minyard, Inc.	213-879-0770
CO	Denver, Elcom	303-337-2300
CT	Southington, Andrews Airtronics	203-621-6158
FL	Boca Raton, Conley & Assocs.	305-395-6108
FL	Oviedo, Conley & Assocs.	305-365-3283
FL	Tampa, Conley & Assocs.	813-885-7658
GA	Doraville, Conley & Assocs.	404-447-6992
IL	Chicago, Century Elctrns. Corp.	312-777-9700
IN	Noblesville, Century Elctrns. Corp.	317-849-2026
IA	Cedar Rapids, Palatine Engrg. & Sls.	319-365-8071
KS	Mission, Palatine Engrg. & Sls.	913-831-0555
MD	Woodbine, Naudain Assoc. So.	301-442-2270
MA	Danvers, Andrews Airtronics	617-246-2450
MI	Ferndale, Hilltronics	313-398-5556
MN	Bloomington, Northport Engrg.	612-854-5556
MO	Hazelwood, Palatine Engrg. & Sls.	314-839-0800
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NY	Rochester, R. P. Kennedy Co.	716-271-6326
NY	Rochester, R. P. Kennedy Co.	716-271-6322
NC	Raleigh, Conley & Assocs.	919-876-9862
OH	Cleveland, Arthur H. Baier Co.	216-461-6161
OH	Dayton, Arthur H. Baier Co.	513-276-4128
OR	Portland, Jas. J. Backer Co.	503-297-8744
OR	Salem, Jas. J. Backer Co.	503-362-0717
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
PA	Wynnewood, Metz-Benham Assoc.	215-896-7300
TX	Arlington, W. Pat Fralia Co.	817-640-9101
TX	Austin, W. Pat Fralia Co.	512-835-7911
TX	Houston, W. Pat Fralia Co.	713-772-1572
UT	Salt Lake City, Elcom	801-532-7940
WA	Seattle, Jas. J. Backer Co.	206-285-1300
WI	Milwaukee, Century Elctrns. Corp.	414-645-3680
EXP	MA, Framingham, Fenwal Elctrns.	617-872-8841

Local Distributors

CA	Burlingame, Rose Elctrn. Distr.	415-348-2740
CA	Chatsworth, Mil-Comm Distr.	213-998-3111
CO	Denver, Newark-Denver Elctrn. Supp.	303-757-3351
CO	Englewood, Indl. Elctrns. Corp.	303-694-9444
FL	Ft. Lauderdale, Newark Elctrns.	305-587-2372
GA	Norcross, Newark Elctrns.	404-321-0413
IL	Chicago, Newark Elctrns. Corp.	312-638-4411
IL	Elgin, Allied Elctrns.	312-697-8200
IN	Indianapolis, Graham Elctrns. Supp.	317-634-8202
MD	Beltsville, Newark Elctrns.	301-937-5085
MA	Woburn, Newark Elctrns.	617-935-8350
MI	Grand Rapids, Newark Elctrns.	616-241-6681
MI	Oak Park, Newark Elctrns.	313-967-0600
MN	Minneapolis, Stark Elec.	612-332-1325
MO	St. Louis, Olive Indl. Elec.	314-426-4500
NJ	Springfield, Newark Elctrns.	201-376-9500
NY	Buffalo, Summit Dists.	716-887-2800
NY	Huntington, CDB Dev.	516-692-5200
NY	Rochester, Summit Elctrns.	716-334-8110
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Warrensville Heights, Newark Elctrns.	216-587-1700
OK	Tulsa, Radio, Inc.	918-587-9123
PA	Wynnewood, Metz-Benham Assoc.	215-896-7300
TX	Fort Worth, Allied Elec.	817-336-5401
TX	Fort Worth, Patco Supply	817-429-8596
UT	Salt Lake City, Standard Supp.	801-486-3371

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Local Sales Offices & Reps

CA	Los Altos, Jay Stone & Assocs.	415-948-4563
CA	Torrance, DeTomasi & Grupp Inc.	213-327-1775
FL	Mebourne Beach, Millett Assocs.	305-725-5055
IL	Wauconda, Cudahy Sls. Co.	312-526-2484
MD	Severna Park, Delmarva Engrg. Assocs.	301-647-8007
MA	Chelmsford, BBC	617-452-7211
MO	Leasburg, EIR Co.	314-245-6860
NY	Great Neck, Phase Four Inc.	516-482-1790
NY	Utica, B. D. Hummel Co.	315-736-7821
PA	Elkins Park, Snow Assocs.	215-379-4700
TX	Dallas, Tritex Technical Sls., Inc.	214-247-3041

FERRO CORP., Composites Div., 34 Smith St., Norwalk, CT 06852, Tel: 203-853-2123

FERRO CORP., Ottawa Chem. Div., 700 N. Wheeling St., Toledo, OH 43605, Tel: 419-691-3507

FERRO, Thick Film Sys. Div., 25 Castilian Dr., Santa Barbara, CA 93117, Tel: 805-968-5000, Telex: 98-0165; Empl.: 26; *Sls. Mgr.:* William Falx, Jr.

FERRO CERAMIC GRINDING, INC., 247 Water St., Wakefield, MA 01880, Tel: 617-245-1833; Empl.: 14; *Sls. Mgr.:* Philip Strasnick

FERRONICS, 66 N. Main St., Fairport, NY 14450, Tel: 716-223-1010, TWX: 510-254-2893; Empl.: 90; *Sls. Mgr.:* M. Northrup

Local Sales Offices & Reps

AL	Huntsville, L & D	205-837-1469
AZ	Tempe, Gassner & Clark	602-968-9037
CA	Seal Beach, Texel	213-596-9411
FL	Ft. Lauderdale, Electrocomp	305-491-4141
GA	Atlanta, L & D	404-455-3473
IL	Rolling Meadows, Sumer, Inc.	312-991-8500
IN	Columbus, Chambers Mktg.	812-362-0272
MD	Baltimore, Bernard White	301-484-5400
MA	Canton, New England Elctrn. Sls.	617-828-4835
MI	Birmingham, Forand Sls.	313-644-0087
MN	St. Paul, Countryman Assoc.	612-645-9151
MO	Blue Springs, Cairns & Hayes Co.	816-229-1404
NJ	Upper Saddle River, B. Cameron	201-825-1304
NY	Syracuse, J Rudy Co.	315-487-6951
NC	Raleigh, L & D	919-876-5301
PA	Hatboro, Joe Oberlies Co.	215-675-4226
TX	El Paso, Alexander Entprs.	915-591-3142
TX	Richardson, Jaro Elec. Sls.	214-231-6654
WA	Seattle, General Elctrns.	206-575-4030

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FIBERGUIDE INDUSTRIES INC., 33 Poplar Dr., Stirling, NJ 07980, Tel: 201-647-6601

FIBEROPTIC FABRICATIONS, INC., 70 Pullman St., Worcester, MA 01606, Tel: 617-853-6449, Telex: 951838; *Sls. Mgr.:* A. John Cunningham

FIBEROPTICS TECHNLG., INC., Quassett Rd., Pomfret, CT 06258, Tel: 203-928-0443; *Sls. Mgr.:* J. H. Castonguay

FIBRONICS INTL. INC., 325 Stevens St., Hyannis, MA 02601, Tel: 617-778-0700, Telex: 951297; *Sls. Mgr.:* Kenneth Bowes

FIC CORP., 12216 Parklawn Dr., Rockville, MD 20852, Tel: 301-881-8124, 800-638-6594, TWX: 710-828-9809; FSC No.: 3613; Empl.: 46; *Sls. Mgr.:* Robert E. Frye; *Dist. Mgr.:* Robert E. Frye .... **1B•**1265

FIDELITY CHEM. PRODS. CORP., 472 Frelinqhuysen Ave., Newark, NJ 07114, Tel: 201-242-4110; Empl.: 35

FIELD ELECTRONICS, 1416 Commerce St., Chatham, NJ 07928, Tel: 201-635-6566

FIELD-FAB, 43 School St., N. Springfield, VT 05150, Tel: 802-886-8278; *Sls. Mgr.:* Harold Lombard

FIFTH DIMENSION, INC., 801 New York Ave., Trenton, NJ 08638, Tel: 609-393-8350, TWX: 510-681-8412; Empl.: 50; *Sls. Mgr.:* William D. Kinney .... **1B•**1366, 1624

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NJ	West Long Branch, Eastern Elctrn. Sls. Co.	201-544-0600

FIL-COIL CO., INC., 800 Axinn Ave., Garden City, NY 11530, Tel: 516-294-5445, Telex: 965-957; FSC No.: 56528; Empl.: 70; *Sls. Mgr.:* William Goldman

FIL-COIL ECONOMY INTL., INC., 800 Axinn Ave., Garden City, NY 11530, Tel: 516-294-5445, Telex: 965-957; FSC No.: 56528; Empl.: 85; *Sls. Mgr.:* William Goldman .... **1A•**1595

Local Sales Offices & Reps

AZ	Phoenix, Thor Engrg.	602-867-1843
CA	Goleta, Thorson Co.	805-964-8751
CA	Los Angeles, High Voltage Sales	213-881-9194
CA	Walnut Creek, W. A. Borden Co.	415-937-5196
FL	Clearwater, Brennan Assoc.	813-446-5006
GA	Atlanta, Remco	404-447-6937
IL	Skokie, Esco Assocs.	312-674-2376
MD	Beltsville, Applied Engrg.	301-953-2808
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MN	Chanhassen, Barnes Sls. Assoc.	612-474-2907
NJ	Fairfield, Addem Sls. Co.	201-882-0993
NM	Albuquerque, IMEC	505-883-9010
OH	Avon, J. D. Babb Assoc.	216-934-6113
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PA	Southampton, Campbell Assocs.	215-322-6630
PA	Thomasville, Lou Weaver	717-792-1305
TX	Richardson, Eagle Mktg.	214-238-5383

FILM CAPACITORS, 100 8th St., Passaic, NJ 07055, Tel: 201-779-2240; Empl.: 55

FILM MICROELECTRONICS, 17 A St., Burlington, MA 01803, Tel: 617-272-5650, TWX: 710-332-1124; Empl.: 130; *Sls. Mgr.:* Denise Laplante

FILTER CONCEPTS INC., 2624 S. Rousselle, Santa Ana, CA 92707, Tel: 714-545-7003; *Sls. Mgr.:* Stan Jones .... **1A•**1596, 1597

FILTRON CO., INC., Div. of Aeroflex Labs., Inc., 148 Sweet Hollow Rd., Old Bethpage, NY 11804, Tel: 516-752-1144; *Sls. Mgr.:* Harold Samkoff

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AZ	Tucson, WJM Sls.	602-887-4847
CA	Granada Hills, C & W Comp. Sls.	213-368-4032
CA	Sunnyvale, Esco Assoc.	408-745-1410
CO	Boulder, A. Bissell Co.	303-444-1173
FL	New Port Richey, Lobo Mktg. Assoc.	813-848-8578
MD	Baltimore, Bernard White & Co.	301-484-5400
MA	Westwood, O. E. M. New England	617-769-4976
MN	Bloomington, Merrill Franklin Co.	612-854-9446
NY	Melville, Carnes Assoc.	516-694-1600
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AL	Pinson, JM Simpson & Assocs.	205-854-2546
CA	Los Angeles, Dyna Sls.	213-268-1175
FL	Altamonte Springs, WMM Assocs.	305-831-4530
FL	Clearwater, WMM Assocs.	813-442-3913
FL	Ft. Lauderdale, WMM Assocs.	305-772-9850
MI	Centerline, Dietrich & Assoc.	313-754-6450
MN	Minneapolis, Scott Elctrn. Sls.	612-929-2985
NJ	Cinnaminson, Scott Sls. Co.	609-829-2991
NY	Huntington, C. R. Mayer Co.	516-WA 1-7876
OH	Cleveland, Dietrich & Assoc.	216-781-1855
OH	Dayton, Dietrich & Assoc.	513-223-6042
PA	Pittsburgh, Dietrich & Assoc.	412-892-2992
TX	Garland, Tesco	214-681-1376
WA	Seattle, Eicher-Richards Co.	206-LA 3-7888

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FITCHBURG COATED PRODS., P.O. Box 1106, Scranton, PA 18501, Tel: 717-347-2035; Empl.: 300

FKC ENGINEERING CO., 161 Rand Street, Central Falls, RI 02863, Tel: 401-724-1760

FLEXCO MICROWAVE, INC., P.O. Box 174, Karrville Rd., Port Murray, NJ 07865, Tel: 201-689-3020, Telex: 467439; FSC No.: 52214; *Sls. Mgr.:* Robert C. Tappen; *Dist. Mgr.:* Robert C. Tappen

FLEX-CORE DIV., Morlan & Assocs., Inc., 6625 McVey Blvd., Worthington, OH 43085, Tel: 614-889-6152; *Sls. Mgr.:* D. Morlan .... **1A**•2165

FLEX-KEY CORP., 18 Sargent St., Gloucester, MA 01930, Tel: 617-281-2040, Telex: 94-0333; FSC No.: 51163; Empl.: 50; *Sls. Mgr.:* Philip P. Bodoni .... **1B**•1770, 1771

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FLIGHT CONNECTOR CORP., Dubilier America, 233 E. Manville St., Rancho Dominguez, CA 90220, Tel: 213-631-1133, Telex: 664734; FSC No.: 28680; *Sls. Mgr.:* Ken Tillery; *Dist. Mgr.:* Ken Tillery

FLIGHT SYSTEMS, INC., Tracor, Inc., 1091 Dove St., Newport Beach, CA 92660, Tel: 714-833-9661, Telex: 183542 FSI NPBH; *Sls. Mgr.:* William J. Weiss

FLITE-TRONICS COMPANY, INC., See Marathon Flite-Tronics Company

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FLORIDA DATA, 600D John Rodes Blvd., Melbourne, FL 32935, Tel: 305-259-4700, Telex: 56-210 FDC MELB; Empl.: 200; *Sls. Mgr.:* B. Winkelspecht

FLOW TECHN., Box 21346, Phoenix, AZ 85036, Tel: 602-437-1315, Telex: 668-344; Empl.: 85; *Sls. Mgr.:* Art Marshall

FLUKE, JOHN, MFG. CO., Box C9090, MS 250C, Everett, WA 98206, Tel: 206-356-5400, Telex: 152662, TWX: 910-445-2943; Empl.: 2645; *Sls. Mgr.:* W. Hoffman; *Dist. Mgr.:* T. Rockney

FMC CORP., Ind'l. Chemical Grp., 2000 Market St., Philadelphia, PA 19103, Tel: 215-299-6000; Empl.: 800

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CA	City of Industry	213-330-0680
CA	San Jose	408-289-3853
IL	Downers Grove	312-971-8600
NC	Charlotte	704-554-1551
OH	Cincinnati	513-563-2100
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AZ	Glendale, Adtek	602-931-9289
CA	Aqoura, Cal Rep	213-991-1940
CA	Mountain View, Brooks Tech. Grp.	415-960-3880
CA	Riverside, Cal Rep Branch	714-682-6762
CA	San Diego, DePierre & Assocs.	619-578-2555
CA	Tarzana, Cal Rep Branch	213-996-6745
CO	Parker, Technology Mktg. Assoc. of CO	303-841-3435
CT	Waterbury, HLM CT	203-753-9894
FL	Clearwater, Beacon	813-796-2378
FL	Ft. Lauderdale, Beacon	305-491-1054
FL	Maitland, Beacon	305-647-3498
FL	Melbourne, Beacon	305-724-8010
GA	Atlanta, Beacon	404-256-9640
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WA	Seattle, Earl & Brown	206-284-1121
WI	Brookfield, Sumer	414-784-6641

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NY	Pittsford, Noeth-Honsinger Assoc.	716-586-9002
NY	White Plains, QED Elctrns.	914-946-3424
OH	Cleveland, Scott Elctrns.	216-291-2600
OH	Trotwood, I. Atkind & Assoc.	513-837-4750
PA	King of Prussia, Freedman-Malta Assoc.	215-279-5767
EXP	NY, Plainview, Morhan Exp.	516-293-5582

FREQUENCY AND TIME SYSTEMS, INC., 34 Tozer Rd., Beverly, MA 01915, Tel: 617-927-8220, Telex: 94-0518 FTS BVLY; FSC No.: 56219; Empl.: 126 ....3•1154

Local Sales Offices & Reps

CA	Anaheim, Datum Timing	714-533-6333
CA	Santa Clara, Ward-Davis Assocs.	408-245-3700
FL	Sarasota, Ram-Z Assocs.	813-921-5561
MD	Ashton, Blackwood Assocs., Inc.	301-924-2858
NJ	Haddonfield, G. L. Williams Assocs.	609-428-6060
TX	Richardson, Lear Assocs., Inc.	910-867-4718

FREQUENCY CONTROL PRODS., INC., American Time Prods. Div., 61-20 Woodside Ave., Woodside, NY 11377, Tel: 212-458-5811, TWX: 710-582-2637; FSC No.: 59559; *Sls. Mgr.:* Sanford Cohen - Crystals, Ed Cohen - Oscillators Servo, John Murray - Electro Optic ....1A•1356, 1357; 3•1010

Local Sales Offices & Reps

AL	Huntsville, Murcota Corp.	205-539-8476
AZ	Tempe, Foley, Tallent & Lee	602-894-2345
CA	Auburn, Straube Assocs.	916-885-0632
CA	Mountain View, Straube Assocs.	415-969-6060
CA	Palo Alto, Alfred Barauck	415-327-7711
CA	San Luis Obispo, Johnson Assocs.	805-544-7770
CO	Westminster, Straube Assocs.	303-426-0890
FL	Melbourne, Raycom	305-259-7988
IL	Chicago, Probe Elctrns.	312-698-2044
IN	Ft. Wayne, J & B Sls. Co.	219-483-2813
IN	Ossian, Science Sls.	219-622-7383
IA	Cedar Rapids, J.R. Sls. Engrg.	319-393-2232
MA	Lowell, Underwood Sls. Corp.	617-256-8191
MI	Grand Rapids, A. Blumenberg	616-456-7320
MI	Oak Park, A. Blumenberg	313-968-3230
MN	Minneapolis, Bohlig & Assocs.	612-922-7011
NJ	Carlstadt, Com-Tech Sls.	201-935-5454
NM	Albuquerque, Straube Assocs.	505-292-0428
NY	Albany, H. C. Johnson Agencies	518-459-1239
NY	Buffalo, H. C. Johnson Agencies	716-632-7880
NY	Centerport, Carnes Diamond Assoc.	516-261-8100
NY	Rochester, H. C. Johnson Agencies	716-586-0777
NY	White Plains, Cane Technical Sls.	914-694-9240
NC	Winston-Salem, Murcota Corp.	919-722-9445
PA	Broomall, Sapinosa Assoc.	215-353-7267
PA	Glenshaw, H. C. Johnson Agencies	412-961-0414
TX	Richardson, Carl Tinch Sls.	214-231-1322
UT	Salt Lake City, Straube Assocs.	801-263-2640

FREQUENCY DEVICES, INC., 25 Locust St., Haverhill, MA 01830, Tel: 617-374-0761, TWX: 710-347-0314; Empl.: 60 ....1A•1624; 3•1237

FREQUENCY ELCTRNS., 55 Charles Lindbergh Blvd., Mitchel Field, NY 11553, Tel: 516-794-4500, TWX: 510-223-0418; Empl.: 350; *Sls. Mgr.:* A. Lazar ....1A•1358, 1359

Local Sales Offices & Reps

CA	Mountainview, Pacific Techn. Mktg.	415-969-3010
FL	Orlando, Truex Assoc.	305-859-2160
MD	Silver Spring, Marktron	301-460-6100
MD	Timonium, Marktron	301-252-7111
MA	Wayland, High-Tech Sls.	617-653-3838
NJ	East Windsor, Micro Lambda	609-443-3113
NJ	W. Orange, E-F Techn. Sls.	201-731-7203
NY	Huntington Sta., E-F Techn. Sls.	516-549-1818
OH	Cleveland, Tiby Co.	216-371-5335
TX	Houston, Spectra Sls. Corp.	713-783-8333
TX	Richardson, Spectra Sls. Corp.	214-234-3600
VA	Charlottesville, Marktron	804-973-5874
EXP	NY, New York, Henley Elctrns.	212-986-5544

FSN

FREQUENCY SELECTIVE NETWORKS, INC., 69-20 Garfield Ave., Woodside, NY 11377, Tel: 212-424-7500; FSC No.: 56662; Empl.: 30; *Sls. Mgr.:* Michael L. Izzolo ....1A•1361

Local Sales Offices & Reps

AZ	Scottsdale, Thorson Desert States	602-998-2444
CA	Santa Clara, F.M. Assocs.	408-733-9143
FL	Ft. Lauderdale, Donato Assoc.	305-733-3450
KS	Shawnee Mission, Elctrn. Comp. Sls.	913-764-2611
MA	Andover, B. E. E. Assocs	617-475-2124
MN	Bloomington, 2M Sls.	612-888-7414
NJ	Paramus, Carnes Diamond Assocs	201-967-1309
NY	Centerport, Carnes Diamond Assocs	516-261-8100
NY	Rochester, H.C. Johnson Agencies	716-482-3000
NC	Winston-Salem, Murcoto	919-722-9445
OH	Akron, Augnat Assocs	216-725-6087
PA	Glenshaw, H. C. Johnson Assocs	412-961-0444
PA	Glenside, Koebert Assoc.	215-887-2310

FREQUENCY SOURCES, KSW Semiconductor Div., 16 Maple Rd., Chelmsford, MA 01824, Tel: 617-256-8101, TWX: 710-343-0404; FSC No.: 50101; Empl.: 80

FREQUENCY WEST, INC., 3140 Alfred St., Santa Clara, CA 95050, Tel: 408-727-8500, TWX: 910-338-0163; FSC No.: 8F150; Empl.: 158; *Sls. Mgr.:* James K. McGuinness

FRESNEL OPTICS, Div. of Alliance Tool Corp., 1300 Mt. Read Blvd., Rochester, NY 14606, Tel: 716-647-1140, Telex: 97-8322; *Sls. Mgr.:* Helmut Walter;Adolph Gulde

FRONT PANEL DEVICES, INC., 530 Burnside Ave., Inwood, NY 11696, Tel: 212-471-9800, Telex: 645-580; Empl.: 20; *Sls. Mgr.:* Michael Geller

FSI/FORK STANDARDS INC., 666 Western Ave., Lombard, IL 60148, Tel: 312-231-3511, 312-932-9380; FSC No.: 14986; Empl.: 20; *Sls. Mgr.:* A. E. Toht; *Dist. Mgr.:* A. E. Toht

FTS SYS., POB 158, Stone Ridge, NY 12484, Tel: 914-687-7664, TWX: 510-247-0547; Empl.: 45; *Sls. Mgr.:* T. N. Thompson, Jr.

FUJI-SVEA, P. O. Box 3375, Torrance, CA 90510, Tel: 213-533-1221, Telex: 182-392; *Sls. Mgr.:* Chris Moore

FUJITSU

FUJITSU AMERICA, INC., 918 Sherwood Dr., Lake Bluff, IL 60044, Tel: 312-295-2610, Telex: 206196, TWX: 910-651-2259; Empl.: 30 ....1B•1367-1385; 2•1276-1292

Local Sales Offices & Reps

AL	Huntsville, Dixie Tech. Mktg.	205-536-5938
AZ	Phoenix, Sanford Sls.	602-957-3570
CA	San Diego, Earle Assocs., Inc.	619-278-5441
CA	San Jose, Applied Elctrn. Mktg.	408-225-6144
CA	Thousand Oaks, SC Cubed	805-496-7307
CA	Tustin, SC Cubed	714-731-9206
CO	Denver, Donohue Sls.	303-455-1719
FL	Altamonte Springs, 'C' Assocs.	305-831-1717
FL	Pompano Beach, 'C' Assocs.	305-972-9200
GA	Lawrenceville, Tek-Rep Mktg.	404-963-1600
GA	Stone Mtn., Dixie Tech. Mktg.	404-962-2530
IL	Elk Grove Vl., John G. Twist	312-593-0200
IL	Highland Park, Bransky Sls.	312-433-2375
IN	Noblesville, McFadden Sls.	317-877-5070
KS	Prairie Village, R. W. Kunz & Assocs., Inc.	913-648-3535
ME	E. Sabago, Electrical Comps. Inc.	207-787-3145
MD	Baltimore, Component Sls.	301-484-3647
MA	Fall River, Elec. Comps.	617-674-0064
MA	Longmeadow, Elec. Comps.	413-567-0153
MA	Natick, Elec. Comps.	617-655-2225
MI	Brighton, A. P. Assocs.	313-229-6550
MI	Warren, DEM Elctrn. Sls.	313-575-9444
MN	Bloomington, John G. Twist	612-835-2120
MN	Minneapolis, Milt Westlund & Assoc.	612-866-5002
MO	St. Louis, R. W. Kunz & Assocs., Inc.	314-966-4977
NJ	Bellmawr, TAI Corp.	609-933-2600
NJ	Parlin, JMR Sls.	201-727-5335
NY	E. Setauket, JMR Sls.	516-689-8871
NY	Rochester, Lake Bluff Sls. Div., Elec. Comps.	716-385-9303
NC	Charlotte, Robert W. Chapman Co.	704-525-2421
NC	Greensboro, Robert W. Chapman	919-282-0740
NC	Raleigh, Robert W. Chapman	919-782-2624
OH	Columbus, McFadden Sls.	614-459-1280
PA	Greensburg, Pro-Mark	412-832-3800
TX	Dallas, United Comps.	214-475-0051
UT	Bountiful, Anderson Assocs.	801-292-8991
VA	Charlottesville, Component Sls., Inc.	804-979-1681
WA	Bellevue, Whisler Sls. Co.	206-643-1463
WI	Brookfield, John G. Twist	414-782-2670
WI	Cedarburg, Bransky Sls.	414-377-6837

Local Distributors

CA	Brisbane, Automated Process Controls	415-467-6162
CA	Buena Park, Control Design Supp.	213-802-2429
CA	San Carlos, Control Design Supp.	415-592-4808
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Santa Ana, Pacesetter Elctrns.	714-557-7131; 213-233-5800
CA	Santa Monica, Distr. Specialists	213-393-9666
CA	Torrance, Cypress Elctrns.	213-533-6005; 714-761-3366
CO	Denver, CSID	303-292-9594
CT	Orange, Milgray Elctrns.	203-795-0711
FL	Altamonte Springs, Control Design Supp.	305-788-3220
FL	Lakeland, A-A Elec.	813-665-6941
FL	Winter Park, Milgray Elctrns.	305-647-5747
GA	Atlanta, Prehler Elctrns., Inc.	404-447-5540
GA	Atlanta, Milgray Elctrns.	404-393-9666
GA	Atlanta, Electrical Control Prods.	404-455-1216
GA	Norcross, A-A Elec.	404-449-8670
GA	Stone Mountain, Control Design Supp.	404-979-3500
IL	Addison, Lectro Comps.	312-543-1680
IL	Chicago, Prehler Elctrns., Inc.	312-384-6100
IL	Chicago, NEP Elctrns.	312-625-8400
IL	Genoa, Control Design Supp.	815-784-6519
IL	Joliet, Mainline Supp. Co.	815-436-3900
IL	Northbrook, Classic Comp. Supp.	312-272-9650
IL	Wheeling, Hawk Elctrns.	312-459-4030
IN	Indianapolis, Control Design Supp.	317-788-0551
IA	Marian, Control Design Supply, Inc.	319-373-2923
KS	Overland Park, Milgray Elctrns.	913-236-8800
ME	Portland, Rockingham Elec. Supp.	207-772-4614
MD	Rockville, Milgray Elctrns.	301-468-6400
MA	Burlington, Milgray Elctrns.	617-272-6800
MA	Middleboro, Glynn Electronics	617-947-4262
MA	Natick, Tec-Con Elctrns.	617-655-9333
MA	Somerville, Electro Sls.	617-666-0500
MI	Farmington Hills, Prehler Elctrns., Inc.	313-473-7200
MN	Burnsville, Custom Connections	612-894-4090
MN	Minneapolis, Control Design Supp.	612-721-1628
MN	Minneapolis, Bergquist	612-835-2322
MO	St. Louis, Control Design Supp.	314-426-3160
MO	St. Louis, Interstate Industrial Elctrns.	314-423-4322
NE	Omaha, Radio Equip.	402-341-7700
NJ	Berlin, General Comps. Inc.	609-768-6767
NJ	Fairlawn, Relay Specialties	201-797-3313
NJ	Marlton, Milgray Elctrns.	609-983-5010
NJ	Nutley, Vantage Comps.	201-667-1840
NJ	Whippany, Tonar Inds.	201-884-1400
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Farmingdale, Milgray Elctrns.	516-420-9800
NY	N. Babylon, E.I.M. Intl. Mktg.	516-643-5700
NY	Pittsford, Milgray Elctrns.	716-385-9330
NC	Charlotte, Control Design Supp.	704-588-4410
OH	Cleveland, Milgray Elctrns.	216-447-1520
OH	Middleburg Heights, Prehler Elctrns., Inc.	216-243-5510
OH	Solon, Repco	216-248-8900
OK	Tulsa, Altair Co.	918-252-5781
PA	Harrisburg, Cumberland Elctrns.	717-232-5999
PA	Malvern, Control Design Supp.	215-296-0150
PA	McKean, Advacom, Inc.	814-476-7774
TX	Austin, Altair Co.	512-837-4490
TX	Dallas, Control Design Supp.	214-358-1441
TX	Houston, Altair Co.	713-462-3029
TX	Richardson, Altair Co.	214-231-5166
UT	Salt Lake City, Active Comp Technlg.	801-487-8131
WA	Bellevue, Integrated Elctrns./Jaco	206-455-2727
WI	Cedarburg, A-A Elec.	414-377-7500
WI	Mequon, Taylor Elec.	414-241-4321
WI	Milwaukee, Indl. Elctrns.	414-276-1212
WI	New Berlin, Control Design Supp.	414-784-1016
WI	New Berlin, NEP Elctrns.	414-785-9100
WI	New Berlin, Classic Comp. Supp.	414-786-5300
WI	Racine, Badger Elctrn. Parts Co.	414-637-1256

FURMAN SOUND, INC., 30 Rich St., Greenbrae, CA 94904, Tel: 415-927-1225, Telex: 172029 SPXSRFL; *Sls. Mgr.:* Diane Poole; *Dist. Mgr.:* Diane Poole

FURNAS ELEC., 1197 McKee St., Batavia, IL 60510, Tel: 312-879-6000, Telex: 72-0458; Empl.: 1360; *Sls. Mgr.:* T. W. Thornton; *Dist. Mgr.:* R. Lanser

FUSECOM, 14864 NE 95th St., Redmond, WA 98052, Tel: 206-881-2442; *Sls. Mgr.:* Bruce Barndt

GABRIEL ELCTRNS., Box 70, Scarborough Indl. Pk., Scarborough, ME 04074, Tel: 207-883-5161, Telex: 95-0113; Empl.: 135; *Sls. Mgr.:* D. B. Crisman

Local Sales Offices & Reps

MO	St. Louis, Gabriel Elctrns.	314-878-2982

GALITE, 2 Tower Dr., Wallingford, CT 06492, Tel: 203-265-7126, TWX: 710-476-0764; FSC No.: 56447; *Sls. Mgr.:* James W. Campbell, Jr.

GAMBLE, CHARLES T., INDS., 605 Perkins La., Delanco, NJ 08075, Tel: 609-461-1900; Empl.: 150; *Sls. Mgr.:* W. Snyder

GAMMA HIGH VOLTAGE RESCH. INC., 152 S. MacQuesten Pkwy., Mt. Vernon, NY 10550, Tel: 914-667-5050 .... 3•1574, 1575

Local Sales Offices & Reps

IL	Chicago, Ropek, Cahill & Vogt	312-631-0070
NM	Albuquerque, Cleveland Entprs.	505-265-7893

GAMMA SCIENTIFIC INC., 3777 Ruffin Rd., San Diego, CA 92123, Tel: 619-279-8034, Telex: 69-7938; Empl.: 65; *Sls. Mgr.:* G.C. Unangst

GANDALF DATA, INC., 1019 S. Noel Ave., Wheeling, IL 60090, Tel: 312-541-6060, TWX: 910-651-4951; Empl.: 350; *Sls. Mgr.:* Ken Charbauski

Local Sales Offices & Reps

CA	El Monte	213-571-6644
CA	San Francisco	415-363-0848
CO	Denver	303-321-4246
GA	Atlanta	404-451-2293
MD	Silver Spring	301-622-5400
MA	Dedham	617-329-7630
TX	Bellaire	713-665-6546
TX	Richardson	214-669-3643

GAP INSTR., 110 Marcus Blvd., Hauppauge, NY 11787, Tel: 516-273-0909, TWX: 510-227-6237; FSC No.: 00607; Empl.: 50

GARDINER ELCTRNS., 4729 North 7th Ave., Phoenix, AZ 85013, Tel: 602-274-9681

GARDINER SOLDER CO., Div. of Gardiner Metal Co., 4820 S. Campbell Ave., Chicago, IL 60632, Tel: 312-847-0100, TWX: 910-221-2510; Empl.: 100; *Sls. Mgr.:* M. Boyle .... 2•1927

Local Sales Offices & Reps

AZ	Phoenix, Astro Prods.	602-268-2948
CA	La Mirada, Gardiner Solder	714-994-6350
FL	Merritt Island, James A. Kennedy	305-452-9821
GA	Tucker, Elctrl. Concepts, Inc.	404-491-3154
IA	Princeton, Johnson Mfg.	319-289-5123
MA	Woburn, Yankee Tech Sls.	617-935-6278
MO	St. Charles, Phillips & Assocs.	314-441-0148
NJ	Englewood, Wilson Industries	201-871-4658
NJ	Scotch Plains, Gardiner Solder Co.	201-232-1965
NY	Sidney, Wingate & Assocs.	607-563-2113
OH	Cleveland, Jim Finnegan & Co.	216-238-5905
TX	Dallas, The Mello Co.	214-241-9196
TX	Dallas, Elctrn. Production Specialists	214-422-5476
VA	Falls Church, Hyka, Inc.	703-560-6115
WA	Bellevue, Doland	206-454-4952

Local Distributors

AL	Birmingham, E.I.S., Inc.	205-252-9046
AZ	Phoenix, Lion Elctrns. Distrs.	602-869-9611
AZ	Phoenix, Elctrl. Specialty Co.	602-275-5736
CA	Anaheim, Elctrl. Specialty Co.	714-630-7050
CA	Anaheim, Advance Electrical Sls., Inc.	714-870-0300
CA	Belmont, Advance Elctrl. Sls.	415-592-4550
CA	Chino, Tracy Elctrn. Sls.	714-591-4736
CA	Glendale, Mac Donald & Co.	800-423-2453
CA	Los Angeles, Elctrl. Specialty Co.	213-724-9600
CA	Los Angeles, John Cameron Supply Co.	213-870-7403
CA	San Diego, Hi-Tech Metals Co.	619-270-8081
CA	San Diego, Elctrl. Specialty Co.	619-560-1800
CA	San Diego, Casco	619-560-9319
CA	San Francisco, Elctrl. Specialty Co.	415-589-9611
CA	Santa Clara, RGB Electro Ind. Tool	408-980-1300
CA	Simi Valley, Cal-Pacific Suppliers	213-998-4982
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Denver, Elctrl. Specialty Co.	303-321-0226
CT	Wallingford, Tech. Assocs.	203-265-4241
FL	Boca Raton, Kimco	305-994-0590
FL	Clearwater, Your Production Cupboard	813-447-2581
FL	Orlando, E.I.S., Inc.	305-855-7100
FL	Orlando, Mavidon Entprs.	305-298-7324
GA	Atlanta, E.I.S., Inc.	404-355-1651
IL	Addison, International Soldering Supplies	312-628-8083
IL	Hillside, Complete-Reading Electric Co.	312-547-5400
IN	Indianapolis, Complete-Reading Electric Co.	317-872-3710
KY	Louisville, E.I.S., Inc.	502-636-0384
LA	New Orleans, Complete-Reading Elec. Co.	504-944-5561
MD	Baltimore, Complete-Reading Elec. Co.	301-646-1330
MA	Woburn, Pacer Electronics	617-935-8330
MI	Warren, Complete-Reading Elec. Co.	313-755-6020
MN	Eden Prairie, Cassidy Elctrns.	612-944-0100
MN	Edina, Complete-Reading Elec. Co.	612-831-8145
MN	Minneapolis, W. D. Forbes Co., Inc.	612-378-1917
MO	Kansas City, Complete-Reading Elec. Co.	816-471-5966
MO	Maryland Heights, Complete-Reading Elec. Co.	314-569-1611
MO	St. Charles, Finnigan Wire & Cable	314-946-6201
NV	Carson City, Gibson Tool Co.	702-883-3566
NJ	Stirling, Janel	201-647-5600
NY	Fairport, Pacer Elctrns. of NY	716-377-0462
NY	Farmingdale, S.A.I.	516-293-2710
NY	Liverpool, Complete-Reading Elec. Co.	315-457-1350
NY	Sidney, Wingate & Assoc.	607-563-2113
NC	Charlotte, E.I.S., Inc.	704-392-7366
NC	Raleigh, E.I.S., Inc.	919-781-4750
OH	Cincinnati, E.I.S., Inc.	513-771-4073
OH	Cleveland, Complete-Reading Elec. Co.	216-267-1000
OH	Mentor, Kimco	216-255-1992
OK	Tulsa, Complete-Reading Elec. Co.	918-664-4000
OR	Portland, Elctrl. Specialty Co.	503-227-3601
PA	Pittsburgh, Complete-Reading Elec. Co.	412-788-1580
TN	Memphis, E.I.S., Inc.	901-947-4176
TN	Nashville, E.I.S., Inc.	612-883-0862
TX	Beaumont, Complete-Reading Elec. Co.	713-842-2117
TX	Dallas, Complete-Reading Elec. Co.	214-827-8891
TX	El Paso, Elctrl. Specialty Co.	915-594-8251
TX	Houston, Complete-Reading Elec. Co.	713-691-0080
UT	Salt Lake City, Electrical Specialty Co.	801-972-4184
VA	Bluefield, Complete-Reading Elec. Co.	703-322-5424
VA	Richmond, E.I.S., Inc.	804-649-9221
WA	Tukwila, Electrical Specialty Co.	206-241-1010
WI	Mequon, Complete-Reading Elec. Co.	414-241-3880
PR	San Juan, Distributronics, Inc.	809-781-0631

GAR ENTERPRISES, 2029 N. Lincoln Ave., Pasadena, CA 91103, Tel: 818-798-0785; Empl.: 25

GARNER GLASS CO., 177 S. Indian Hill Blvd., Claremont, CA 91711, Tel: 714-624-5071; Empl.: 50; *Sls. Mgr.:* Joseph C. Hyatt

GARRY MFG. CO., DIV. OF BRAND-REX CO., 9 Queen Anne Ct., Laghorne, PA 19047, Tel: 215-949-2300; Empl.: 250; *Sls. Mgr.:* Tom Malek; *Dist. Mgr.:* Bob D'Autrachy

GASKET INTL. INC., 49 Ackerman St., Bloomfield, NJ 07003, Tel: 201-338-6814; Empl.: 5; *Sls. Mgr.:* Russell L. Steinman

GATES, GEO. W., & CO., INC., Hempstead Tpke. & Lucille Ave., Franklin Sq., NY 11010, Tel: 212-347-0787; Empl.: 10; *Sls. Mgr.:* T. E. Schulz, Jr

GATES ENERGY PRODS., 1050 S. Broadway, Denver, CO 80217, Tel: 303-744-4806, Telex: 045-511, TWX: 910-931-2658; Empl.: 500; *Sls. Mgr.:* R. O. Hammel; *Dist. Mgr.:* M. R. Harrison

GAVITT WIRE & CABLE, Brookfield, MA 01506, Tel: 617-867-6476; Empl.: 75

GAYNOR ELEC. CO., 172 E. Aurora St., Waterbury, CT 06720, Tel: 203-755-1175; Empl.: 50; *Sls. Mgr.:* John Swanson; *Dist. Mgr.:* John Swanson

Local Sales Offices & Reps

CA	Chatsworth, Porter Co.	818-700-0808
CT	Madison, United Comps.	203-562-4002
IL	Elk Grove Village, Control Sls.	312-595-2110
MA	Norwood, United Comps.	617-226-0556
MN	St. Louis, Lestronix	612-926-8466
NJ	Mountain Lakes, Browning-Naughton Co., Inc.	201-335-2029
OH	Cleveland, Jubell Assoc.	216-662-2884
OH	Mentor, Appliance Elctrns.	216-257-6019
WI	Thiensville, Control Sls.	414-242-4580

G B INSTRUMENTS INC., 2030 Coolidge St., Hollywood, FL 33020, Tel: 305-920-0225, TWX: 510-954-9813; FSC No.: 31601; Empl.: 30; *Sls. Mgr.:* B. J. Weiss

GC ELCTRNS., 400 S. Wyman St., Rockford, IL 61101, Tel: 815-968-9661, Telex: 237-318, TWX: 257318 GC Elect; Empl.: 360; *Sls. Mgr.:* Owen Jackson

GCI, INC., 14520 Lima Rd., Fort Wayne, IN 46808, Tel: 219-637-5520; Empl.: 108; *Sls. Mgr.:* C. Ward

Local Sales Offices & Reps

CA	Canoga Park, Ward Elctr. Packaging Sls.	213-998-5844
CA	Granada Hills, C&W Component Sls.	213-368-4032
FL	Orlando, B&M Sales	305-855-2455
IL	Chicago, L-Tec, Inc.	312-593-7200
IN	Columbus, J. Weaver Co.	812-372-3625
IA	Cedar Rapids, J. R. Sales Engrg., Inc.	319-393-2232
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GEC TECHNOLOGY CORP., 4430 Forest Lane, Garland, TX 75042, Tel: 214-276-1164

GECO, 145 Penn St., Millheim, PA 16854, Tel: 814-349-5555; Empl.: 11

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TX	Dallas, J. Clay Co.	214-350-1281
UT	Salt Lake City, Medax	801-266-4545
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GEN/COMP INC., 6 Algonquin Rd., Canton, MA 02021, Tel: 617-828-2008; *Sls. Mgr.:* G. Nutter

GENERAL ATRONICS CORP., 1200 E. Mermaid Lane, Philadelphia, PA 19118, Tel: 215-233-4100

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PA	Doylestown, Monteiro Assoc.	215-345-5855
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GENERAL INSTR., Discrete Semiconductor Div., 600 West John St., Hicksville, NY 11802, Tel: 516-733-3333, TWX: 510-221-1865; *Sls. Mgr.:* Tom Hurley; *Dist. Mgr.:* R. Graziano

GENERAL INSTR., Govt. Sys., 600 W. John St., Hicksville, NY 11802, Tel: 516-733-3000, Telex: 510221-1865; Empl.: 500

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AR	Fort Smith, Electra Reps.	501-452-4030
CA	Fremont, General Instr. Lamp Div.	415-796-8210
CA	Los Angeles, Wiley Co.	213-666-1611
CA	San Diego, Wiley Co.	619-571-2881
CA	Santa Clara, Ross Mktg.	408-988-8111
CO	Denver, Moss Mktg.	303-455-7205
CT	Middletown, Gerber Sls.	203-347-3000
FL	Altamonte Springs, "C" Assocs.	305-831-1717
FL	Pompano Beach, "C" Assocs.	305-972-9200
GA	Norcross, Electro-Mech Sls. Engrg. Co.	404-447-6478
IL	Des Plaines, Elctrn. Mktg.	312-298-2330
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MO	Independence, Dy-Tronix	816-373-6600
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NY	Commack, Kaelber & Mack	516-499-2924
NY	Fairport, L. D. Allen	716-377-3530
NY	Syracuse, L. D. Allen	315-437-8387
NC	Raleigh, Electro-Mech	919-851-8165
OH	St. Marys, T. Shelby & Co.	419-394-3377
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TX	Dallas, Electra Reps.	214-387-3594
TX	Houston, Electra Reps.	713-530-2208
UT	Bountiful, Moss Mktg.	801-292-8660
WA	Seattle, J. J. Backer Co.	206-285-1300
EXP	Rio Piedras, Elctrn. Sls. Assocs.	809-769-2911

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CA	Gardena, Bell Ind.	213-515-1800
CA	Mountain View, Abacus Elctrn.	408-961-1500
CA	Sun Valley, Richey Elctrn.	213-875-2862
CA	Sunnyvale, Bell Ind.	408-734-8570
CO	Denver, Electronic Parts	303-744-1992
CT	Middletown, Mid-State	203-347-5638
FL	Orlando, Hammond Elctrn.	305-849-6060
GA	Atlanta, E. Sam Jones	404-351-3250
IL	Chicago, Steiner Elec.	312-685-7000
IL	Chicago, Newark Elect.	312-638-4411
IL	Palatine, Ohm Elctrn.	312-359-5500
IL	Peoria, Klaus Radio	309-691-4840
IN	Indianapolis, Genesis (Radisco)	317-637-5571
IA	Cedar Rapids, Deeco	319-365-7551
KY	Louisville, Peerless Elctrn.	502-636-3336
LA	Lafayette, Ralph's Elctrn.	318-234-4507
MD	Rockville, Capitol Radio	301-881-2270
MA	Hingham, Sager Elec.	617-749-6700
MI	Flint, Michigan Elctrn.	313-232-6550
MN	St. Paul, Gopher Elctrn.	612-483-3322
MO	Kansas City, Walters Radio	816-531-7015
MO	St. Louis, Olive Indl.	314-426-4500
NJ	Camden, General Radio	609-964-8560
NJ	Cranford, Garden State	201-272-6400
NY	Buffalo, Summitt Dist.	716-884-3450
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Rochester, Rochester Radio	716-454-7800
NY	Rochester, Masline Elect.	716-546-5373
NC	Raleigh, Southeastern Elctrn.	919-828-2311
OH	Akron, Akron Elect.	216-762-8818
OH	Cincinnati, Hughes-Peters	513-591-2000
OH	Columbus, Hughes-Peters	614-294-5351
OK	Oklahoma City, Trice Elctrn.	405-524-4411
OK	Tulsa, Oil Capitol Elctrn.	918-622-8520
OR	Portland, United Radio	503-233-5346
SC	Columbia, Dixie Elctrn.	803-779-5332
TN	Memphis, Bluff City	901-345-9500
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Fort Worth, Allied Elctrn.	817-336-5401
TX	Fort Worth, Swieco	817-335-6521
TX	Houston, Harrison Equip.	713-652-4700
UT	Salt Lake City, Standard Supp.	801-486-3371
WA	Seattle, Robert E. Priebe Co.	206-682-8242
WI	Milwaukee, Marsh Elctrn.	414-475-6000

GENERAL INSTRUMENT CORP., Microelectronics Div., 600 W. John St., Hicksville, NY 11802, Tel: 516-733-3107, TWX: 510-221-1866; *Sls. Mgr.:* A. Lindgren; *Dist. Mgr.:* J. Johnson

GENERAL INSTR., Optoelctrns. Div., 3400 Hillview Ave., Palo Alto, CA 94304, Tel: 415-493-0400, Telex: 348430, TWX: 910-373-1767; FSC No.: 58361; Empl.: 500; *Sls. Mgr.:* J. Beach; *Dist. Mgr.:* W. Clark

GENERAL MAGNETICS, 211 Grove St., Bloomfield, NJ 07003, Tel: 201-743-2700; FSC No.: 99165; Empl.: 60

GENERAL MFG., 724 Ruberta Ave., Glendale, CA 91201, Tel: 818-243-2069; FSC No.: 10454

GENERAL MICROWAVE CORP., 155 Marine St., Farmingdale, NY 11735, Tel: 516-694-3600, TWX: 510-224-6406; FSC No.: 11332; Empl.: 185; *Sls. Mgr.:* M. Wind ....1A•1704; 3•1238

Local Sales Offices & Reps

AL	Huntsville, Saber Assocs.	800-327-0853
AZ	Phoenix, Odyssey One	602-246-8846
CA	Los Angeles, RF Assocs.	213-478-1586
CA	Palo Alto, RF Assocs.	415-494-3331
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FL	Apopka, Saber Assocs.	800-432-6288

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FL	Ft. Lauderdale, Saber Assocs.	800-432-6288
FL	Melbourne, Saber Assocs.	305-724-0920
GA	Griffin, Saber Assocs.	800-327-0853
IL	Mt. Prospect, Cain Forlaw	312-253-3578
MA	Burlington, Microwave Mktg. Specialists	617-272-7530
NJ	West Orange, EF Tech. Sls.	201-731-7203
NM	Albuquerque, Odyssey One	505-265-6645
NY	Huntington Sta., EF Tech. Sls.	516-549-1818
NC	Clayton, Saber Assocs.	800-327-0853
OH	Lancaster, Cain Forlaw	614-654-4800
PA	Andalusia, Les Associates	215-245-5250
SC	Columbia, Saber Assocs.	800-327-0853
TX	Dallas, Cain & Co.	214-233-6809
VA	McLean, Creative Mktg. Assoc., Ltd.	703-442-9100

GENERAL OPTRONICS, 3005 Hadley Rd., So. Plainfield, NJ 07080, Tel: 201-549-9000, TWX: 710-997-9556; Empl.: 65; *Sls. Mgr.:* Mas Oishi

GENERAL POWER SYS., 1400 N. Baxter St., Anaheim, CA 92806, Tel: 714-956-9321, Telex: 182283; FSC No.: 04801; Empl.: 340; *Sls. Mgr.:* M. E. Heyman; *Dist. Mgr.:* M. E. Heyman

GENERAL PRODUCTS CORP., 9030 Carroll Way, San Diego, CA 92121, Tel: 619-578-9690

GENERAL RESISTANCE, INC., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, Tel: 203-481-5721, TWX: 710-452-3092; FSC No.: 05591; Empl.: 60; *Sls. Mgr.:* J. L. Jamieson .... **1A**•1873; **3**•1239

Local Sales Offices & Reps

Instruments

AL	Birmingham, SESCO	205-988-8304
AZ	Phoenix, Qualtech	602-967-4655
CA	Long Beach, Saber Entprs.	213-595-5646
CA	Palo Alto, Gado Instr. Sls.	415-961-2222
CA	San Diego, Saber Entrps.	619-271-1523
CO	Littleton, Radco	303-794-4279
CT	Cheshire, MECO, Inc.	203-271-0026
FL	St. Petersburg, SESCO	813-576-6991
GA	Altanta, SESCO	404-458-6423
IL	Des Plaines, Marsland Assocs.	312-694-2262
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
LA	Baton Rouge, SESCO	504-928-4951
MA	Reading, MECO, Inc.	617-944-6660
MI	Mt. Clemens, R. J. O'Hara Assocs.	313-791-7140
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	St. Louis, Marsland Assocs.	314-991-1399
NJ	Hillsdale, CB Associates	201-664-6230
NJ	Pennsauken, Scientific Reps	609-662-5222
NM	Albuquerque, Qualtech	505-243-5605
NY	Binghamton, TAE-REP	607-772-6952
NY	Fishkill, TAE-REP	914-896-6966
NY	Rochester, TAE-REP	716-586-8710
NC	Charlotte, SESCO	704-535-4920
OH	Dayton, RIXAN Assocs.	513-278-4216
OK	Tulsa, SESCO	918-622-3868
TX	Austin, SESCO	512-892-2490
TX	Dallas, SESCO	214-231-9364
TX	El Paso, Waltech Inc.	915-592-2415
TX	Houston, SESCO	713-999-3510
VA	Fairfax, Scientific Assocs.	703-385-0600
WA	Seattle, Datacom Assocs.	206-285-2525

Components

CA	Saratoga, TESTCO	408-253-1900
CO	Golden, J. F. Hurlbut Co.	303-279-7796
MI	Farmington, W. R. Hummon & Assoc.	313-474-0661
OH	Dayton, RIXAN Assocs.	513-278-4216
PA	Havertown, Quarracino	215-449-7500
TX	Dallas, Blackburn Assocs.	214-692-8885
TX	Houston, Blackburn Assocs.	713-463-1354
UT	Salt Lake City, J. F. Hurlbut Co.	801-973-4443
VA	Fairfax, Beacon North Inc.	703-591-1300
VA	Forest, Beacon North Inc.	804-239-8486

Local Distributors

CA	Saratoga, TESTCO	408-253-1900
OH	Dayton, RIXAN Assocs.	513-278-4216

GENERAL ROBOTICS CORP., 57 N. Main St., Hartford, WI 53027, Tel: 414-673-6800, Telex: 269686; *Sls. Mgr.:* Lou Bruner; *Dist. Mgr.:* Lou Bruner

GENERAL SCANNING, 500 Arsenal St., Watertown, MA 02172, Tel: 617-924-1010, Telex: 443-0105; Empl.: 195

GENERAL SEMICONDUCTOR INDS., INC., 2001 W. 10 Pl., Tempe, AZ 85281, Tel: 602-968-3101, TWX: 910-950-1942; FSC No.: 24444; Empl.: 425; *Sls. Mgr.:* Jim Williams; *Dist. Mgr.:* Howard Israel

GENERAL TRANSISTOR CORP., 216 W. Florence Av., Inglewood, CA 90301, Tel: 213-673-8422, Telex: 653474; FSC No.: 1P738; Empl.: 39; *Sls. Mgr.:* Al Barrios

GENICOM CORP., General Electric Dr., Waynesboro, VA 22980, Tel: 703-949-1000; FSC No.: 01526; Empl.: 2300; *Sls. Mgr.:* W. J. Vanco .... **1B**•1386, 1387

Local Sales Offices & Reps

CA	Los Angeles	213-701-0353
CA	San Francisco	408-925-6648
CT	Meriden	203-238-6800
DC	Washington	301-770-4434
GA	Atlanta	404-256-1966
IL	Chicago	312-577-1100
MA	Boston	617-657-4800

Local Distributors

AL	Huntsville, Arrow Elctrns.	205-882-2730
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Newport Beach, Arrow Elctrns.	714 851-8961
CA	San Diego, Arrow Elctrns	619-565-4800
CA	Santa Ana, Norstan	714-540-4165
CA	Sunnyvale, Arrow	408-745-6600
CO	Thornton, Arrow	303 451-5934
CT	Wallingford, Arrow	203-265-7741
FL	Fort Lauderdale, Arrow	305-776-7790
FL	Palm Bay, Arrow	305-725-1480
GA	Norcross, Schweber	404-449-9170
IL	Schaumburg, Arrow	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IA	Cedar Rapids, Arrow Electrns.	319-395-7230
MD	Baltimore, Arrow	301-247-5200
MD	Towson, Electronic Comp. Sls.	301-296-6282
MA	Woburn, Arrow	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Grand Rapids, Arrow Elctrns.	612-830-1800
MN	Edina, Arrow	612-830-1800
MO	St. Louis, Arrow	314-567-6888
NH	Manchester, Arrow	603-668-6968
NJ	Fairfield, Arrow	201-575-5300
NJ	Moorestown, Arrow	609-235-1900
NM	Albuquerque, Arrow	505-243-4566
NY	Hauppauge, Arrow	516-231-1000
NY	Liverpool, Arrow	315-652-1000
NY	Rochester, Arrow	716-275-0300
NC	Charlotte, Electronics Mktg. Corp.	704-394-6195
NC	Raleigh, Arrow Elctrns.	919 876-3132
NC	Winston-Salem, Arrow	919-725-8711
OH	Centerville, Arrow Electrns.	513-435-5563
OH	Cleveland, Electronics Mktg. Corp.	216-442-3441
OH	Columbus, Electronics Mktg. Corp.	614-299-4161
OH	Dayton, Elctrns Mktg. Corp.	513-278-5745
PA	Monroeville, Arrow Elctrns.	412-856-7000
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Dallas, Arrow	214-386-7500
TX	Stafford, Arrow	713-491-4100
UT	Salt Lake City, Arrow Elctrns.	801-539-1135
WA	Bellevue, Arrow Elctrns.	206-643-4800
WI	Madison, Arrow Elctrns.	414-764-6600
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GENISCO MEMORY PRODS. CORP., 10874 Hope St., Cypress, CA 90630, Tel: 213-537-4750, 714-220-0720, TWX: 910-347-6773; FSC No.: 96682; Empl.: 175; *Sls. Mgr.:* Harry Watt

GENISCO TECHNOLOGY CORP., Eldema Div., 18435 Susana Rd., Rancho Dominguez, CA 90221, Tel: 213-537-4750, TWX: 910-346-6773; FSC No.: 03797; Empl.: 450; *Sls. Mgr.:* W. R. Esser

GENISCO TECHNLG. CORP., Filters Div., 18435 Susana Rd., Rancho Dominguez, CA 90221, Tel: 213-537-4750, TWX: 910-346-6773; FSC No.: 07294; Empl.: 450; *Sls. Mgr.:* B. Hanna

GENISCO TECHNLG. CORP., Rotating Test Div., 18435 Susana Rd., Rancho Dominguez, CA 90221, Tel: 213-537-4750, TWX: 910-346-6773; FSC No.: 13946; Empl.: 450; *Sls. Mgr.:* F. Schodlbauer

GENISCO TECHNLG. CORP., Transducers Prods. Div., 650 Easy St., Simi Valley, CA 93065, Tel: 805-581-3985, TWX: 910-346-6773; FSC No.: 13946; Empl.: 450; *Sls. Mgr.:* J. Becker

GENRAD, INC., 300 Baker Ave., Concord, MA 01742, Tel: 617-369-4400

GENSTAR RENTAL ELCTRNS., 2445 Faber Pl., Palo Alto, CA 94303, Tel: 415-856-7600, Telex: 348368

GENTEX, Box 315, Carbondale, PA 18407, Tel: 603-434-0311, Telex: 831-883; FSC No.: 97427; *Sls. Mgr.:* Ture Heline

GENTRON CORP., 6667 N. Sydney Pl., Milwaukee, WI 53209, Tel: 414-351-1660, Telex: 26881; Empl.: 90; *Sls. Mgr.:* Ron Ragland

Local Sales Offices & Reps

CA	Arcadia, Van Gott Assocs.	213-445-9728
CA	Mountain View, Energy Comp.	415-969-0330
FL	Sunrise, Arnold Milrot & Assocs.	305-748-6446
IN	Greenwood, Valentine & Assoc.	317-888-2260
KS	Overland Park, WEB Elctrns.	913-381-2225
MA	Millis, Selmark Assocs.	617-376-2914
MI	Brighton, SAI Mktg. Corp.	313-227-1786
MN	Minneapolis, Furber Sls.	612-881-3620
MO	Florissant, WEB Elctrns.	314-921-5794
NH	Hopkinton, Selmark Assocs.	603-623-5774
NJ	Teaneck, R. T. Reid Assocs.	201-692-0200
NY	Rochester, Ossmann Comp. Sls.	716-424-4460
NY	Syracuse, Ossmann Comp. Sls.	315-455-6611
OR	Portland, SPS Elctrns.	503-285-0214
PA	Philadelphia, Fite Eltech	215-248-3171
TX	Lewisville, Jim Hughes Co.	214-434-2566
TX	Stafford, Jim Hughes Co.	713-343-0673
WA	Seattle, SPS Elctrns.	206-323-4140
WI	Mequon, Stumm Sls.	414-241-8414
WI	Milwaukee, Speaker Electronics	414-878-3727

Local Distributors

CA	Santa Ana, AMCOTEC	714-957-3003
NY	Ronkonkoma, Trace Elctrns.	516-645-6111
NC	Gastonia, JMT Elctrn. Supply Co.	704-867-4401
TX	Fort Worth, Allied Elctrns.	817-336-5401

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GERBER SYS. TECHNLGY., INC., 40 Gerber Rd. E., South Windsor, CT 06074, Tel: 203-644-2581, Telex: 6819200 GSTH UW, TWX: 710-447-5300 GST HFD; *Sls. Mgr.:* A. John Klein

GERMANIUM POWER DEVICES, Box 3065, Shawsheen Village Sta., Andover, MA 01810, Tel: 617-475-5982, Telex: 94-7150; Empl.: 100; *Sls. Mgr.:* R. W. Kassiotis

GEYER SYSTEMS, See GSI Corp.

GFC/HAMMOND ELCTRNS., INC., 1690 Walden Ave., Buffalo, NY 14225, Tel: 716-894-5710, Telex: 91-6452; *Sls. Mgr.:* Ray Shatzel .... **3**•1583

Local Sales Offices & Reps

CA	N. Hollywood, Bert Moore & Assocs.	213-877-5955
CA	Sunnyvale, W. W. Posey Co.	408-746-0771
CT	Guilford, Elctrn. Mktg. Assoc.	203-453-5424
FL	Clearwater, Brennan Assocs.	813-446-5006
GA	Atlanta, Millar Elctrns.	919-787-9564
MA	Marblehead, Elctrn. Mktg. Assoc.	617-536-8206
MI	Southfield, Component Assocs.	313-557-3232
MS	Jackson, Welch & Doby Mktg.	601-932-5534
NH	Salem, Elctrn. Mktg. Assoc.	603-893-5378
NJ	Middlesex, Comtec Cornell Assocs.	201-469-1303
TX	Dallas, S. W. Marketing	214-341-8631
UT	Salt Lake City, Control Agencies	801-328-4305
WA	Seattle, Fleehart & Sullivan	206-522-1533

GGB INDUSTRIES, INC., Picoprobe Division, P.O. Box 125, Gillette, NJ 07933, Tel: 201-464-1749; *Sls. Mgr.:* Greg Boll

GIANNINI PETRO MARINE, 9474 Chesapeake Dr., San Diego, CA 92123, Tel: 619-569-1668, Telex: 181754; FSC No.: 24727; Empl.: 12

GIBSON/EGAN, 2666 East Huntington Dr., Duarte, CA 91010, Tel: 818-358-0191; Empl.: 40

GIC SYSTEMS, 2324 A Ridgepoint Dr., Austin, TX 78754, Tel: 512-926-8840; *Sls. Mgr.:* Ed Barry; *Dist. Mgr.:* Bob Lynch .... **3**•1078-1081

Refer to Gordos Corporation, Bloomfield, New Jersey for Representatives and Authorized Distributor information.

GIC THERMODYNAMICS, 2611 Parmenter, Royal Oak, MI 48073, Tel: 313-280-1648, Telex: 23-5714; Empl.: 7

GIDDINGS & LEWIS ELCTRNS., A Unit of AMCA Intl., 666 S. Military Rd., P.O. Box 1658, Fond du Lac, WI 54935, Tel: 414-921-7100, Telex: 26-2722, TWX: 910-275-1100; Empl.: 200; *Sls. Mgr.:* Tom Bullock

GILTRONIX, 3780 Fabian Way, Palo Alto, CA 94303, Tel: 415-493-1300, Telex: 345542; *Sls. Mgr.:* Eddie Poplawski

GILWAY TECHNICAL LAMP, 165M New Boston St., Woburn, MA 01801, Tel: 617-935-4442, Telex: 949-329; Empl.: 11; *Sls. Mgr.:* Clark Benjamin III; *Dist. Mgr.:* Cathy A. DiCroce .... **1B**•1057

GIMIX, INC., 1337 W. 37th Place, Chicago, IL 60609, Tel: 312-927-5510, TWX: 910-221-4055; Empl.: 14; *Sls. Mgr.:* Richard Don

GLAR-BAN DIV. OF MARK IV INDS., INC., 2937 Alt Blvd., Grand Island, NY 14072, Tel: 716-773-2871, Telex: 91578; Empl.: 85; *Sls. Mgr.:* Scott Simons

GLASGAL COMMUNICATIONS, INC., 207 Washington St., Northvale, NJ 07647, Tel: 201-768-8082, TWX: 710-991-8585; *Sls. Mgr.:* Ralph Glasgal; *Dist. Mgr.:* Al Harnisch

GLASSMAN HIGH VOLTAGE INC.

GLASSMAN HIGH VOLTAGE INC., P.O. Box 551, Salem Indl. Pk., Whitehouse Sta., NJ 08889, Tel: 201-534-9007, TWX: 710-480-2839; Empl.: 45; *Sls. Mgr.:* John R. Belden .... **3**•1578-1581

Local Sales Offices & Reps

AZ	Scottsdale, Power Specialists	602-996-4100
CA	Los Alamitos, Power Specialists	213-594-9418
CA	Los Altos, Jay Stone & Assocs.	415-948-4563
CA	San Diego, Power Specialists	619-560-4061

GLATZER INDUSTRY CORP., 15 River St., New Rochelle, NY 10801, Tel: 914-576-2700; Empl.: 15

GLENAIR, 1211 Air Way, Glendale, CA 91201, Tel: 213-247-6000, Telex: 67-3485, TWX: 910-497-2066; FSC No.: 06324; Empl.: 485; *Sls. Mgr.:* Fred J. Hans

GLENMARC MFG., 330 Melvin Dr., Northbrook, IL 60062, Tel: 312-272-9030, Telex: 28-3499; Empl.: 13; *Sls. Mgr.:* Kevin L. Bagaline, David Greenwood

GLOBAL SPECIALTIES CORP., 70 Fulton Terrace, P.O. Box 1942, New Haven, CT 06509, Tel: 203-624-3103, TWX: 710-465-1227; Empl.: 107

GLOBE BATTERY DIV., See Johnson Controls, Globe Battery Div.

GLOBE PLASTICS, 1342 S. Signal Dr., Pomona, CA 91766, Tel: 714-623-2747; Empl.: 15

GLOBE UNION, See Johnson Controls, Globe Battery Div.

GM NAMEPLATE, INC., 2040 15th Ave. West, Seattle, WA 98119, Tel: 206-284-2200, TWX: 910-444-2053; *Sls. Mgr.:* Ed Westfall

GMR INC., Computer Elctrns., 1048 E. Burgrove St., Carson, CA 90746, Tel: 213-639-4663; *Sls. Mgr.:* Harvey Mushman

GNB BATTERIES INC., Ind'l. Battery Div., 2010 Cabot Blvd. W., Langhorne, PA 19047, Tel: 215-752-0555, TWX: 510-667-2056

GNT AUTOMATIC, 1560 Trapelo Rd., Waltham, MA 02154, Tel: 617-890-3305; Empl.: 14; *Sls. Mgr.:* K. P. Olson

GOLDEN PACIFIC ELCTRNS., INC., 1020 N. Batavia St., Ste. Q, Orange, CA 92667, Tel: 714-538-9752/9753, TWX: 910-593-1620 .... **1B**•1058; **3**•1029, 1582

GOLDWELL COMPS., 1815 W. 205th St. Ste. 201, Torrance, CA 90501, Tel: 213-533-1228, Telex: 182-392; *Sls. Mgr.:* S. Komori

GORDON, CLAUD S., CO., 5710 Kenosha St., Richmond, IL 60071, Tel: 815-678-2211, Telex: 72-2427; Empl.: 260

GORDON, L., PACKAGING, 1050 S. Paca St., Baltimore, MD 21230, Tel: 301-539-6537

GORDON PRODS., 67 Del Mar Dr., Brookfield, CT 06804, Tel: 203-775-4501; Empl.: 20; *Sls. Mgr.:* Leon Najman; *Dist. Mgr.:* Leon Najman

GORDOS CORPORATION

GORDOS CORP., 250 Glenwood Ave., Bloomfield, NJ 07003, Tel: 201-743-6800, TWX: 710-994-4787; Empl.: 800; *Sls. Mgr.:* Bill McDermott; *Dist. Mgr.:* Bob Lynch .... **1B**•1396-1399, 1401-1403, 1625-1627; **2**•1888, 1889

Local Sales Offices & Reps

AZ	Phoenix, Cleveland Entprs.	602-944-4679
CA	Santa Clara, Maxim Elctrn. Sls.	408-727-0694
CO	Wheatridge, Waugaman Assocs.	303-423-1020
CT	Orange, R. F. Duffy Assocs.	203-795-3678
MA	Braintree, R. F. Duffy Assocs.	617-848-3550
NM	Albuquerque, Cleveland Entprs.	505-265-7893
NY	Pittsford, Noeth-Honsinger Assoc.	716-586-9002
OR	Portland, Micro Sls.	503-297-4726
UT	S. Jordan, Waugaman Assocs.	801-254-0570
WA	Bellevue, Micro Sls.	206-451-0568

Local Distributors

AL	Birmingham, Regal Controls	205-991-6340
AL	Huntsville, RM	205-852-1550
AL	Huntsville, Pioneer	205-837-9300
AZ	Phoenix, Newark	602-957-0085
AZ	Phoenix, Arizona Comps.	602-279-9446
AZ	Phoenix, Be Switched	602-275-4805
AZ	Tempe, Bell Inds.	602-966-7800
AZ	Tempe, Time	602-967-2000
AR	Little Rock, Newark	501-225-8130
CA	Buena Park, Control Design	714-521-5040
CA	Chatsworth, IEC	213-998-2200
CA	Foster City, Newark	415-572-8300
CA	Inglewood, Newark	213-671-7066
CA	Los Angeles, Elec. Switches	213-660-1310
CA	Riverside, Elctrn. Supp.	714-683-7300
CA	San Carlos, Control Design	415-592-4808
CA	San Diego, Elctrn. Supp.	619-693-8222
CA	Sunnyvale, Time	408-734-9888
CA	Torrance, Time Elctrns.	213-320-0880
CO	Denver, Integrated Elctrns.	303-534-6121
CO	Denver, Newark	303-757-3351
CO	Wheatridge, Bell Inds.	303-424-1985
CT	Cheshire, Future Elctrns.	203-272-1852
CT	Danbury, Future	203-743-9594
FL	Ft. Lauderdale, Power Comps.	305-565-1614
FL	Ft. Lauderdale, Pioneer	305-771-7520
FL	Ft. Lauderdale, Newark	305-587-2372
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	Orlando, Pioneer	305-834-9090
GA	Atlanta, Control Design	404-979-3500
GA	Norcross, Newark	404-448-1300
GA	Norcross, Pioneer	404-448-1711
GA	Stone Mountain, Control Design	404-979-3500
HI	Pearl City, Newark	808-456-5933
ID	Boise, Newark	208-342-4311
IL	Addison, L Comp	312-628-1400
IL	Chicago, Newark	312-638-4411
IL	Elk Grove Village, Pioneer	312-437-9680
IL	Genoa, Control Design	815-784-6515
IL	Lombard, RM	312-932-5150
IN	Carmel, Altex Elctrns.	317-848-1323
IN	Indianapolis, Control Design	317-788-4559
IN	Indianapolis, RM	317-247-9701
IN	Indianapolis, Pioneer	317-849-7300
IA	West Des Moines, Ramco	515-225-6933
KS	Wichita, L Comp	316-265-8501
LA	New Orleans, Currier P Roser	504-734-1147
MD	Beltsville, Newark	301-937-5085
MD	Columbia, Time	301-964-3090
MD	Gaithersburg, Pioneer	301-921-0600
MA	Westboro, Future Elctrns.	617-366-2400
MA	Woburn, Newark	617-935-8350

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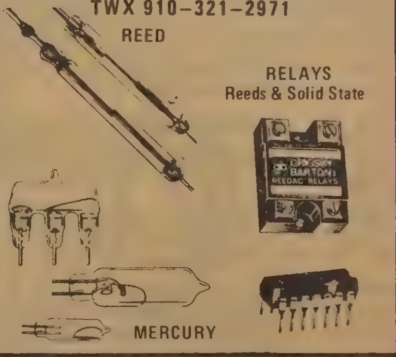

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MA	Woburn, Time	617-935-8080
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MN	Minneapolis, Control Design	612-721-1628
MN	Minnetonka, Pioneer	612-935-5444
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MO	St. Louis, L Comp	314-291-6200
MO	St. Louis, Control Design	314-426-3150
NE	Omaha, L Comp	402-895-5517
NE	Omaha, Newark	402-392-1221
NJ	Fair Lawn, Relay Specialties	201-797-3313
NJ	Pennsauken, Resco	609-662-4000
NJ	Springfield, Newark	201-376-9500; 212-349-7087
NM	Albuquerque, Bell Inds.	505-292-2700
NM	Albuquerque, Elctrn. Dvcs.	505-884-2950
NY	Buffalo, Summit	716-884-3450
NY	Hauppauge, JACO	516-273-5500
NY	New York, Time	516-273-0100
NY	Rochester, Summit	716-334-8110
NY	Rochester, Simcona Elctrns.	716-328-3230
NC	Charlotte, Electronics Mktg. Corp.	704-394-6195
NC	Charlotte, Pioneer/Carolina	704-527-8188
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Pineville, Control Design	704-588-4410
NC	Shelby, Dixie Indl. Supply	704-482-5641
OH	Cleveland, Pioneer	216-587-3600
OH	Columbus, Elctrns. Mktg. Corp.	614-299-4161
OH	Dayton, Pioneer	513-236-9900
OH	Kettering, Elctrns. Mktg. Corp.	513-439-4711
OH	Solon, REH Elctrns.	216-248-1636
OH	Valley View, Newark	216-447-1050
OK	Tulsa, Newark	918-832-7004
OR	Lake Oswego, Bell Inds.	503-241-4115
PA	Broomall, Time Elctrns.	215-359-1200
PA	Horsham, Pioneer	215-674-4000
PA	Malvern, Control Design	215-296-0150
PA	Pittsburgh, Pioneer	412-782-2300
PA	Willow Grove, Resco Elctrns.	215-659-4575
SC	Greenville, Hammond	803-233-4121
TX	Austin, Pioneer	512-835-4000
TX	Dallas, Control Design	214-358-1441
TX	Dallas, Pioneer	214-386-7300
TX	Dallas, RM Elctrns.	214-263-8361
TX	Houston, Newark	713-782-4800
TX	Houston, Pioneer	713-988-5555
TX	Richardson, JACO	214-235-9575
UT	Salt Lake City, Bell Inds.	801-972-6969
UT	Salt Lake City, Ballard Supp. Corp.	801-972-2435
VA	Chester, Virginia Control Equip. Co.	804-796-3001
WA	Bellevue, Newark	206-641-9800
WA	Bellevue, IEC	206-455-2727
WA	Bellevue, Bell Inds.	206-747-1515
WI	Milwaukee, Indl. Elctrns.	414-276-1212
WI	New Berlin, RM Elctrns.	414-784-4420
WI	New Berlin, Control Design	414-784-1015
PR	Carolina, Newark	809-762-4490

GORDOS ARKANSAS, INC., 1000 N. Second St., Rogers, AR 72756, Tel: 501-636-5000, TWX: 910-720-7998; *Sls. Mgr.:* Paul Bachman; *Dist. Mgr.:* Bob Lynch .... **1A**•1654-1657; **1B**•1388-1395, 1400

Local Sales Offices & Reps

AZ	Phoenix, Cleveland Entprs.	602-944-4679
CA	Santa Clara, Maxim Elctrn. Sls.	408-727-0694
CO	Wheatridge, Waugaman Assocs.	303-423-1020
CT	Orange, R. F. Duffy Assocs.	203-795-3678
MA	Braintree, R. F. Duffy Assocs.	617-848-3550
NM	Albuquerque, Cleveland Entprs.	505-256-7893
NY	Pittsford, Noeth-Honsinger Assoc.	716-586-9002
OR	Portland, Micro Sls.	503-297-4726
UT	S. Jordan, Waugaman Assocs.	801-254-0570
WA	Bellevue, Micro Sls.	206-451-0568

Refer to Gordos Corporation, Bloomfield, New Jersey for Authorized Distributor information.

GORE, W. L., & ASSOCS., INC., 1505 N. Fourth St., P.O. Box 1389, Flagstaff, AZ 86002, Tel: 602-526-1290, TWX: 910-972-0969; FSC No.: 60622; *Sls. Mgr.:* Burt Chase (Intl.)

GORE, W. L., & ASSOCS., 555 Paper Mill Rd., Newark, DE 19714, Tel: 302-738-4880, TWX: 510-666-0825; Empl.: 2000; *Sls. Mgr.:* A. B. Chase

GORMAN MACHINE CORP., 7 Burke Dr., Brockton, MA 02401, Tel: 617-588-2900, TWX: 710-345-0679; *Sls. Mgr.:* Kenneth P. Gorman

GORMAN-REDLICH MFG. CO., 6 Curtis St., Athens, OH 45701, Tel: 614-593-3150; Empl.: 4; *Sls. Mgr.:* Jim Gorman

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GOULD INC., Corporate Headquarters, 10 Gould Center, Rolling Meadows, IL 60008; Empl.: 20,650 ....**1B**•1404-1413; **3**•1380, 1384

GOULD-AMI, Sub. Gould Inc., 3800 Homestead Rd., Santa Clara, CA 95051, Tel: 408-554-2150, TWX: 910-338-0018; *Dist. Mgr.:* Judi MacGregor

Local Sales Offices & Reps

CA	Newport Beach, AMI	714-851-5931
CA	Santa Clara, AMI	408-738-4151
FL	Altamonte Springs, AMI	305-830-8889
IL	Elk Grove Village, AMI	312-437-6496
NY	Monsey, AMI	914-352-5333
PA	Ambler, AMI	215-643-0217

GOULD INC., Circuit Protection Div., 374 Merrimac St., Newburyport, MA 01950, Tel: 617-462-6662/3131, Telex: 94-7427, TWX: 710-347-0264; *Sls. Mgr.:* Richard Gray

Local Sales Offices & Reps

AK	Palmer, North Star Agencies	907-745-5436/5446
AZ	Scottsdale, Mahaffey & Assocs.	602-991-9790
CA	Concord, G & R Sales	415-827-1727
CA	Costa Mesa, Dennis Don & Assocs.	213-638-0427
CO	Evergreen, Jim Hammond & Assocs.	303-674-6906
FL	Miami, Glenn Assoc. of Florida	305-592-7335
FL	Orlando, Glenn Assoc. of Florida	305-293-7482
GA	Atlanta, Berry-Elsberry Co.	404-355-9296
HI	Honolulu, Pacific Factors	808-533-7135
ID	Boise, C & J Enterprises	208-375-3116
IL	Addison, McBud, Inc.	312-628-8570
IN	Indianapolis, ESI, Inc.	317-638-4439
IA	Des Moines, Jerry L. Shumway & Assoc.	515-285-0704
KS	Prairie Village, George H. Pearson Co.	913-341-6210
KY	Louisville, Henry Thompson Sls. Co.	502-583-3636
LA	Mandeville, Service Electrical Sls.	504-467-0775
MD	Owings Mills, Specialty Electrical Sls. Co.	301-356-7700, 800-638-6146
MI	Highland, Holley & Upleger	313-887-0064
MN	Minneapolis, LESCO, Inc.	612-542-8242
MS	Brandon, Service Electrical Sls.	601-992-9122
MO	St. Louis, George H. Pearson Co.	314-822-4080
MT	Big Fork, B. L. Peck & Assoc.	406-837-5092
NH	Meredith, Raymon Gerard Assocs.	603-524-6005, 800-343-0574
NJ	Kenilworth, Tri-Tech Assoc.	201-851-0370/0371, 212-567-2610
NY	No. Syracuse, Lachut Electrical Sls,	315-422-2575
NC	Greensboro, Electra-Tek Carolinas	919-272-8254
OH	Cleveland, Electro-Specialities	216-447-3048
OH	Milford, Alexander Equip. Co.	513-248-0901
OK	Oklahoma City, P. & C. Sales Co.	405-745-3431
OR	Portland, Robert A. Amey Co.	503-646-7196
PA	Pittsburgh, Robert W. Colley & Assoc.	412-331-3121
TN	Germantown, Talley & Talley Assocs.	901-755-3130
TX	Houston, Hodges, Kinney & Clark	713-748-8235
TX	Plano, Tubbesing Sls. Corp.	214-985-1079
UT	Salt Lake City, Electrical Systems	801-487-8811
WA	Seattle, Shaffer & Nelson	206-453-5575
WI	Milwaukee, D. S. Berry Co.	414-224-0680
PR	Carolina, Glenn Intl.	809-769-1851

GOULD COMPION, 1101 E. University, Urbana, IL 61081, Tel: 217-384-8500

GOULD INC., Computer Sys. Div., 6901 W. Sunrise Blvd., Ft. Lauderdale, FL 33313, Tel: 305-587-2900, TWX: 510-955-9843; FSC No.: 59-0913135; Empl.: 2376; *Sls. Mgr.:* Howard Kossak; *Dist. Mgr.:* Lionel Agar (Intl.)

GOULD INC., Design & Test Sys. Div., 4600 Old Ironsides Dr., Santa Clara, CA 95050, Tel: 408-988-6800, TWX: 910-338-0509; *Sls. Mgr.:* Dan Cockcroft

GOULD INC., Foil Div., 35129 Curtis Blvd., Eastlake, OH 44094, Tel: 216-953-5000, TWX: 810-427-2506; *Sls. Mgr.:* Tim Quigley

GOULD INC., Imaging & Graphics Div., 1870 Lundy Ave., San Jose, CA 95131, Tel: 408-263-7155, TWX: 910-338-7656; Empl.: 200; *Sls. Mgr.:* Mike Battaglia; *Dist. Mgr.:* Ernie Ohrenstein

GOULD INC., Industrial Controls Div., 901 Baltimore Blvd., Westminster, MD 21157, Tel: 301-876-2214, TWX: 710-862-0846; Empl.: 325; *Sls. Mgr.:* M. Freyermuth ....**1B**•1404-1413

Local Sales Offices & Reps

AZ	Tempe, Delta Elctrn. Sls.	602-966-9903
CA	Cerritos, El-Com	213-404-2961
CA	Fremont, Wm. Parks Assocs.	415-490-2011
CO	Denver, Electronic Sls.	303-771-6300
CT	Cheshire, Selmark Assocs.	203-573-9088
FL	Melbourne, Raycom	305-259-7988
GA	Atlanta, Electro-Rep. Assocs.	404-320-1134
ID	Boise, Huntley Assocs.	208-343-3753
IL	Chicago, Industrial Reps.	312-647-7755
IN	Indianapolis, M & L Elctrn. Sls.	317-359-4742
IA	Marion, Design Solutions	319-377-1129
KS	Wichita, Design Solutions	316-529-0114
MD	Columbia, Delta III Assocs.	301-730-4700
MA	Millis, Selmark Assocs.	617-376-2914
MI	Livonia, Elctrn. Salesmasters	800-321-1848
MN	Minneapolis, Giefer Sls.	612-884-2395
MO	Brentwood, Design Solutions	314-961-7170
NH	Hopkinton, Selmark Assocs.	603-623-5774
NJ	Medford, Component Consits.	609-654-5300
NJ	Oakland, Peter C. Gordon Assoc.	201-337-5200
NY	Endicott, Noeth Honsinger Assoc.	607-724-4865
NY	Pittsford, Noeth Honsinger Assoc.	716-586-9002
NC	Charlotte, Electro-Rep Assocs.	704-527-2530
OH	Beachwood, Elctrns. Salesmasters	216-831-9555
OR	Beaverton, Huntley Assocs.	503-649-5388
PA	Pittsburgh, Process Engrg. Co.	412-561-5050
TX	El Paso, Alexander Entprs.	915-591-3142
TX	Seagoville, Delta Comps.	214-287-6333
WA	Everett, Huntley Assocs.	206-353-1833
WI	Milwaukee, Industrial Reps.	414-259-0965

Local Distributors

CA	Cerritos, El-Com	213-404-2961
CA	Hayward, KEA Distr.	415-887-2900
CA	Los Angeles, Master Distrs.	213-452-1229
CO	Englewood, Elctrn. Sls.	303-771-6300
CT	East Haven, JV Elctrns.	203-469-2321
CT	Stamford, Bond Elctrns.	203-348-2663
FL	Altamonte Springs, Control Design	305-788-3220
FL	Ft. Lauderdale, Peerless Radio	305-973-4141
ID	Spirit Lake, A-I Elctrns.	208-623-3111
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Genoa, Control Design	815-784-6515
IN	Fort Wayne, Graham Elctrns.	219-423-3422
KS	Wichita, R.S.C., Inc.	316-267-5213
MA	Newton, Greene-Shaw	617-969-8900
MN	Minneapolis, Control Design	612-721-1628
NJ	Fair Lawn, Relay Specialties	201-797-3313
NJ	Kenilworth, Federated Purchaser	201-272-0505
NJ	Oakland, Gordon/Horne	201-337-5200
NM	Albuquerque, Intl. Elctrns.	505-262-2011
NY	Amherst, Standard Elctrns.	716-691-3801
NY	Buffalo, Summit Distributing	716-884-3450
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Rome, Rome Elctrns.	315-337-5400
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Akron, Akron Elctrns.	216-762-8818
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Wickliffe, Gateway-Megatech	216-944-8565
OK	Oklahoma City, Electro Entprs.	405-427-6591
PA	Philadelphia, Shap Elctrns.	215-969-3300
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
TN	Nashville, Electra Distrs.	615-329-3971
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Houston, Geophysical Supp.	713-666-4100
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
WA	Seattle, Carlyle Tech. Sls.	206-575-6750

GOULD INC., Meas. Sys. Div., 2230 Statham Blvd., Oxnard, CA 93030, Tel: 805-487-8511, Telex: 65-9223; Empl.: 500

GOULD INC., Medical Prods. Div., 1900 Williams Dr., Oxnard, CA 93030, Tel: 805-983-1300, Telex: 182-204

GOULD INC., Micro Power Prods. Div., 2777 Eagandale Blvd., Eagan, MN 55121, Tel: 612-681-4200, Telex: 297-486; Empl.: 100; *Sls. Mgr.:* H. T. Ross; *Dist. Mgr.:* Mary Weber

GOULD INC., Motion Control Div., 2701 N. Green Bay Rd., Racine, WI 53404, Tel: 414-637-6591, Telex: 201-309

GOULD INC., POWER CONVERSION DIV., See RTE DELTEC CORPORATION

GOULD INC., Programmable Control Div., Box 83, S.V.S., Andover, MA 01810, Tel: 617-475-4700, Telex: 947-402, TWX: 710-347-6610; *Sls. Mgr.:* George Dannecker; *Dist. Mgr.:* Richard Bell

GOULD INC., Recording Systems Div., 3631 Perkins Ave., Cleveland, OH 44114, Tel: 216-361-3315; FSC No.: 96795; Empl.: 550; *Sls. Mgr.:* George Trudeau .... **3**•1380, 1384

Local Sales Offices & Reps

AZ	Mesa, Gould Inc., Recording Sys. Div.	602-833-1602
CA	Cerritos, Gould Inc., Recording Sys. Div.	213-404-1919
CA	Hayward, Gould Inc., Recording Sys. Div.	415-782-0852
CO	Englewood, Gould Inc., Recording Sys. Div.	303-781-4473
FL	Altamonte Springs, Gould Inc., Recording Sys. Div.	305-830-0695
GA	Atlanta, Gould Inc., Recording Sys. Div.	404-441-5556
HI	Honolulu, EMC Corp.	808-836-1138
IL	Elk Grove Village, Gould Inc., Recording Sys. Div.	312-640-4135
IN	Indianapolis, Gould Inc., Recording Sys. Div.	317-842-4484
MD	Greenbelt, Gould Inc., Recording Sys. Div.	301-345-0050
MA	Burlington, Gould Inc., Recording Sys. Div.	617-272-0750
MI	Madison Heights, Gould Inc., Recording Sys. Div.	313-588-4020
MN	Minneapolis, Gould Inc., Recording Sys. Div.	612-544-5253
MO	Florissant, Gould Inc., Recording Sys. Div.	314-921-3444
NJ	Saddle Brook, Gould Inc., Recording Sys. Div.	201-845-0220
NM	Albuquerque, Gould Inc., Recording Sys. Div.	505-292-4063
NY	Albany, Gould Inc., Recording Sys. Div.	518-584-7999
NY	Rochester, Gould Inc., Recording Sys. Div.	716-235-4980
NC	Greensboro, Gould Inc., Recording Sys. Div.	919-275-1978
OH	Centerville, Gould Inc., Recording Sys. Div.	513-433-9586
OH	Cleveland, Gould Inc., Recording Sys. Div.	216-361-3315
PA	Malvern, Gould Inc., Recording Sys. Div.	215-647-2214
PA	Pittsburgh, Gould Inc., Recording Sys. Div.	412-923-2970
TN	Hermitage, Gould Inc., Recording Sys. Div.	615-754-7100
TX	Dallas, Gould Inc., Recording Sys. Div.	214-634-2131
TX	Houston, Gould Inc., Recording Sys. Div.	713-680-1121
VA	Richmond, Gould Inc., Recording Sys. Div.	804-282-5533
WA	Bellevue, Gould Inc., Recording Sys. Div.	206-453-2461

GOULD DATAMETRICS, See Datametrics Inc.

GOWANDA ELCTRNS., 1 Industrial Pl., Gowanda, NY 14070, Tel: 716-532-2234, TWX: 710-529-1211; FSC No.: 24226; Empl.: 200; *Sls. Mgr.:* K. Strohmeyer

GOW-MAC INSTR. CO., P.O. Box 32, Bound Brook, NJ 08805, Tel: 201-560-0600, Telex: 833-174; Empl.: 40; *Sls. Mgr.:* R. J. Mathieu

Local Sales Offices & Reps

CA	Anaheim, Applied Instr. Corp.	714-535-6551
CA	Danville, Western Scientific Assoc.	415-837-4622
MD	Edgewater, Gow-Mac Instr. Co.	301-956-5641
MO	St. Louis, P.J. Cobert Assocs.	314-423-8388
NM	Albuquerque, Hiltech	505-268-1733
NC	Pinehurst, Tri Sci. Co.	919-295-6112
OR	Portland, Extech Ltd.	503-292-9219
TX	Houston, Indl. Sci. Corp.	713-528-1258
UT	Salt Lake City, Instrmn. Sls.	801-277-2044

GRADO LABS., 4614 Seventh Ave., Brooklyn, NY 11220, Tel: 212-435-5340

GRALEX INDS., 155 Marine St., Farmingdale, NY 11735, Tel: 516-694-3600, TWX: 510-224-6406; FSC No.: 11332; Empl.: 25; *Sls. Mgr.:* Moe Wind

GRA-MAR INC., 3165 McCrory Pl., Ste. 265, Orlando, FL 32803, Tel: 305-894-3351, TWX: 810-850-0125; FSC No.: 58-12-31006-40

GRAND TRANSFORMERS, Box 188, Grand Haven, MI 49417, Tel: 616-842-5430; Empl.: 125; *Sls. Mgr.:* G. V. Retzlaff

GRANGER ASSOCS., 3101 Scott Blvd., Santa Clara, CA 95051, Tel: 408-727-3101, Telex: 34-8380; Empl.: 750; *Sls. Mgr.:* Rick Green

GRANITE STATE CIRCUITS, Power Elctrns. Corp., P.O. Box 2208, 96 Milton Rd., Rochester, NH 03867, Tel: 603-332-3334, TWX: 510-297-4462; *Sls. Mgr.:* Robert S. Karstedt

GRANT HARDWARE CO., Div. of Grant Inds. Inc., 7 Hoover Ave, Haverstraw, NY 10927-1092, Tel: 914-EL8-4400, TWX: 914-358-3541; FSC No.: 83508; Empl.: 490; *Sls. Mgr.:* F. Centrillo

Local Sales Offices & Reps

CA	Canoga Park, Catlin Inds.	213-347-0444
CA	City of Industry, Grant Hardware Co.	213-686-2110
CA	Santa Clara, Nova-Tronix	408-243-9530
CO	Arvada, Challege Sls.	303-427-3149
FL	Ft. Lauderdale, Electro-Comp Assocs.	305-491-4141
IL	Des Plaines, Lincoln, Hodges & Assocs.	312-297-3810
KS	Overland Park, J. Singer Indl. Sls. Corp.	913-381-3684
MA	Lexington, E.F. Del Fino Co.	617-938-1217
MI	Farmington Hills, Carter, McCormic & Peirce	313-477-7700
MN	St. Paul, Repco	612-642-2828
NJ	Fort Lee, Necco	201-461-2789
NJ	Ridgefield, M - D Inds.	201-941-3113
NY	Binghamton, Precision Sls.	607-648-3686
NY	Liverpool, Precision Sls.	315-451-3480
NC	Charlotte, J. Corn Assocs.	704-552-0991
OH	Cincinnati, Tri State Mktg.	513-761-7993
OH	Cleveland, Carter McCormic & Peirce	216-779-5100
OH	Englewood, Carter McCormic & Peirce	513-836-0951
TX	Dallas, Blackburn Assocs.	214-692-8885
WA	Seattle, Norwest Co.	206-282-3707
WI	Waukesha, Lincoln, Hodges & Assoc.	414-542-3087

GRANT TECHNOLOGY SYS. CORP., 11 Summer St., Chelmsford, MA 01824, Tel: 617-256-8881; Empl.: 15; *Sls. Mgr.:* V.P.T. McLeod

GRAPHITE METALLIZING CORP., 1036 Nepperhan Ave., P.O. Box 1810, Yonkers, NY 10702, Tel: 914-968-8400, Telex: 13-1571; Empl.: 178; *Sls. Mgr.:* W. W. Walker .... **1B**•1156

GRAPHTEC SERVICES, INC., 1600 N.W. Madrid Way, Boca Raton, FL 33432, Tel: 305-392-3373; Empl.: 12; *Sls. Mgr.:* Ralph D. Pistor

GRASSLIN CONTROLS CORP., Dieter Grasslin Feinwerktechnik, 45 Spear Rd., Ramsey, NJ 07446, Tel: 201-825-9696, Telex: 135038; Empl.: 5

GRAYHILL INC., 569 Hillgrove Ave., La Grange, IL 60525, Tel: 312-354-1040, Telex: 6871375 GHLG UW, TWX: 910-683-1850; FSC No.: 5930; Empl.: 1000; *Sls. Mgr.:* John A. Udisches; *Dist. Mgr.:* Robert J. Ferrel .... **1B**•1414, 1415, 1629-1645, 1772-1779; **2**•1294

Local Sales Offices & Reps

AL	Huntsville, Rep, Inc.	205-881-9270
AZ	Phoenix, Mercury Engrg. Sls.	602-244-0123
CA	Anaheim, Impact Elctrns.	714-533-1351
CA	Los Altos, Nickerson-Gray Assoc.	415-941-5777
CA	San Diego, Earle Assocs.	619-278-5441
CO	Denver, Lindberg Co.	303-758-9033
FL	Ft. Lauderdale, Newell-Hynes	305-761-1113
GA	Tucker, Rep, Inc.	404-938-4358
IL	La Grange, Grayhill Inc.	312-354-1040
IN	Ft. Wayne, Menze Sls.	219-747-5616
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
KS	Overland Park, PMR Inc.	913-381-0004
KS	Wichita, PMR Inc.	316-684-4141
MD	Woodbine, Naudain Assocs. Southern	301-442-2270
MA	Wellesley Hills, Newscott Co.	617-444-1923
MI	Troy, C. B. Jensen & Assoc.	313-643-0506
MN	Bloomington, Northport Engrg.	612-854-5556
MO	Maryland Hgts., PMR Corp.	314-569-1220
NJ	Marlton, Naudain Assoc.	609-983-5300
NM	Albuquerque, Lindberg Co.	505-881-1006
NY	Great Neck, Tylinski Assocs.	516-466-9070
NY	Ithaca, B. Dean Inc.	607-257-1111
NC	Charlotte, R. W. Chapman & Co.	704-525-2421
NC	Greensboro, R. W. Chapman	919-282-0740
NC	Raleigh, R. W. Chapman	919-782-2624
OH	Cleveland, A. H. Baier Co. & Assoc.	216-461-6161
OH	Dayton, A. H. Baier Co. & Assoc.	513-276-4128
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
TN	Jefferson City, Rep, Inc.	615-475-4105
TX	Arlington, W. Pat Fralia Co.	817-640-9101
TX	Austin, W. Pat Fralia Co.	512-835-7911
TX	Houston, W. Pat Fralia Co.	713-772-1572
UT	Salt Lake City, Lindberg Co.	801-467-1794
WA	Bellevue, Eltech, Inc.	206-643-4330
WI	Milwaukee, Badgerep	414-258-6630

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Phoenix, Fisher/Brownell	602-967-1464
AZ	Phoenix, Kachina Elctrns.	602-269-6201
AZ	Tempe, Richey/Western Electrns.	602-894-9251
AR	Little Rock, Carlton-Bates Co.	501-562-9100
CA	Alhambra, Fisher/Brownell	213-289-0255
CA	Anaheim, R. V. Weatherford Co.	714-634-9600
CA	Glendale, R. V. Weatherford Co.	213-849-3451
CA	Los Angeles, Electric Switches	213-660-1310
CA	Riverside, Electronic Supp.	714-683-7300
CA	San Diego, Fisher/Brownell	619-560-8545
CA	San Diego, Richey/Western Electrns.	619-271-4511
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Santa Clara, Fisher/Brownell	408-988-6041
CA	Sun Valley, Richey/Western Electrns.	213-875-2862
CA	Sunnyvale, R. V. Weatherford Co.	408-738-8694
CO	Denver, Ragon Elctrns.	303-777-9430
CO	Denver, Newark Elctrns.	303-757-3351
CO	Denver, CSID Inc.	303-292-9594
CT	Bethel, Heilind Elctrns.	203-797-8600
CT	Wallingford, Midan Elctrns.	203-265-2077
FL	Ft. Lauderdale, Powell Elctrns.	305-972-4300
FL	Ft. Lauderdale, Peerless Radio	305-973-4141
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Norcross, A-A Elec.	404-449-8670
HI	Honolulu, Precision Radio	808-537-5291
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Northbrook, Classic Comp. Supp.	812-272-9650
IL	Palatine, Ohm Elctrn.	312-359-5500
IL	Peoria, Klaus Radio	309-691-4840
IN	Evansville, Hutch & Son	812-425-7201
IN	Fort Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Genesis Elctrns.	317-637-5571
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Cedar Rapids, Deeco Inc.	319-365-7551
KS	Wichita, LComp, Inc.	316-265-5100
MD	Baltimore, Resco	301-823-0070
MD	Columbia, Powell Elctrns.	301-621-4070
MD	Gaithersburg, Pioneer/Wash.	301-921-0660
MD	Kensington, Marine Air Supp.	301-949-9560
MA	Burlington, Heilind Elctrns.	617-272-5610
MA	Hingham, Sager Elctrns.	617-749-6700
MA	North Adams, Elctrn. Supp. Ctr.	413-663-6828
MA	Norwood, Gerber Elctrns.	617-329-2400
MA	Worcester, R M Elctrns.	617-791-7861
MI	Livonia, R.S. Elctrns.	313-525-1155

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MI	Livonia, Pioneer Mich	313-525-1800
MI	Oak Park, Newark Detroit Elctrns.	313-967-0600
MI	St. Clair Shores, Spemco	313-771-2700
MN	Minneapolis, Newark Elec.	612-331-6350
MN	Minneapolis, Stark Elctrns.	612-332-1325
MN	St. Paul, Gopher Elctrns.	612-483-3322
MS	Jackson, Ellington Elctrn. Supp.	601-355-0561
MO	Kansas City, LComp, Inc.	816-221-2400
MO	Maryland Hgts., LComp, Inc.	314-291-6200
MO	St. Louis, Olive Indl. Elctrns.	314-426-4500
NE	Lincoln, Scott Elctrns.	402-466-8221
NH	Hudson, Heilind Elctrns.	603-883-9536
NJ	East Hanover, State Elec.	201-887-2550
NJ	Mt. Laurel, Jerseyswitch, Inc.	609-778-8190
NM	Albuquerque, Walker Elctrn. Supp.	505-247-2288
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NY	Bohemia, Car-Lac Elctrns.	516-567-4200
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Endwell, A.S.I. Elctrns.	607-754-3823
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Rochester, Simcona Elctrns.	716-328-3230
NY	Rome, Rome Elctrns.	315-337-5400
NC	Charlotte, Pioneer/Carolina	704-527-8188
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Cincinnati, URI Elctrns.	513-761-4030
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Dayton, Stotts-Friedman	513-298-5555
OK	Oklahoma City, Electro Entprs.	405-427-6591
OK	Tulsa, Oil Capitol Elctrns.	918-622-8520
OR	Beaverton, Component Resources	503-641-8488
OR	Portland, United Radio	503-233-5346
PA	Erie, REM Elctrns.	814-453-5626
PA	Harrisburg, Cumberland Elctrns.	717-232-5999
PA	Philadelphia, Herbach & Rademan	215-426-1700
PA	Philadelphia, Almo Elctrns.	215-698-4000
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
PA	Pittsburgh, CAM/RPC	412-782-3770
PA	Reading, George D. Barbey Co.	215-376-7451
RI	Pawtucket, Major Edwards Elctrns.	401-781-8000
SC	Columbia, Dixie Elctrns.	803-779-5332
SC	Greenville, Hammond Elctrns.	803-233-4121
TX	Dallas, Harrison Equip. Co.	214-239-2750
TX	Dallas, Norvell Elctrns.	214-233-0020
TX	El Paso, Intl. Elctrns.	915-598-3406
TX	Garland, Newark Elctrns.	214-494-5911
TX	Houston, Kent Elctrns.	713-780-7770
TX	Stafford, Harrison Equip.	713-879-2600
TX	Stafford, Southwest Elctrns.	713-491-4900
UT	Salt Lake City, Standard Supp.	801-486-3371
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Seattle, R. V. Weatherford Co.	206-575-1340
WI	Milwaukee, Marsh Elctrns.	414-475-6000

GREENLEE TOOL CO., 2330 23rd Ave., Rockford, IL 61108, Tel: 815-399-3903

GREENRAY INDS., INC., 840 W. Church Rd., Mechanicsburg, PA 17055, Tel: 717-766-0223, TWX: 510-650-4939; FSC No.: 16681; Empl.: 65; *Sls. Mgr.:* D. R. Widener

Local Sales Offices & Reps

AZ	Scottsdale, Faser Technical Sls.	602-948-4404
CA	Inglewood, L&M Engrg. So.	213-674-6850
CA	Los Altos Hills, HB Mktg.	415-941-4080
FL	Clearwater, Electrocraft Inc.	813-576-5404
IL	Wauconda, Cudahy Sls.	312-526-2484
MD	Wheaton, Brimberg Sls. Inc.	301-946-2670
MA	Reading, Geder Assoc.	617-944-3105
NY	Huntington, Andrews & Andrews, Inc.	516-692-8686
NY	Skaneateles, Robtron Inc.	315-685-5731
NC	Burlington, P. J. Nahser Co. Inc.	919-226-8053
OH	Columbus, Tom Mulligan & Assoc.	614-457-2242
PA	Glenside, Arby Elctrns.	215-887-2317
TX	Richardson, Southwest Microwave Elect.	214-669-1195

GREGG ELEC., 608 W. Emporia, Ontario, CA 91761, Tel: 714-983-1794; FSC No.: 53014; Empl.: 8

GREIBACH INSTRS. DIV., 25 Dock St., Mt. Vernon, NY 10550, Tel: 914-699-9717; FSC No.: 32590; Empl.: 35

G. R. ELECTRONICS, 1640 5th St., Suite 224, Santa Monica, CA 90401, Tel: 213-395-4774, Telex: 65-2337 (BT Smedley SNM); *Sls. Mgr.:* Jillian I. Girard; *Dist. Mgr.:* Christopher E. Thomson

GRIES/DYNACAST, Div. Coats & Clark Inc., 162 Beechwood Ave., New Rochelle, NY 10801, Tel: 914-633-8600, TWX: 914-235-2188; Empl.: 600

GRIM CORPORATION, Box 67, Medford, NJ 08055, Tel: 609-267-7950, TWX: 510-683-9392; FSC No.: 21870; Empl.: 125; *Sls. Mgr.:* T. A. McGarrity .... 3•1064

GRM CORP., See Grim Corp.

GROVER PATENT PRODUCTS, 339 W. Arden Ave., Glendale, CA 91203, Tel: 213-245-4400; Empl.: 4

GRUENBERG OVEN CO., INC., P.O. Box 3246, 2121 Reach Rd., Williamsport, PA 17701, Tel: 717-326-1755; Empl.: 75; *Sls. Mgr.:* James Polk

GSE, 23640 Research Dr., Farmington Hills, MI 48024, Tel: 313-476-7875, Telex: 23-0738; Empl.: 105; *Sls. Mgr.:* Harold G. Munn

GSI

GSI CORP., 1917 Greenspring Dr., Timonium, MD 21093, Tel: 301-252-1768; FSC No.: 60990; Empl.: 28; *Sls. Mgr.:* L. B. Morgan .... 2•2102

Local Sales Offices & Reps

MD	Timonium, Roy N. Cook, Jr. & Assocs.	301-252-1161
NC	Raleigh, Barker Assocs.	919-876-0282

GTE AUTOMATIC ELEC., 400 N. Wolf Rd., Northlake, IL 60164, Tel: 312-681-7071, Telex: 72-8477, TWX: 910-226-1975; Empl.: 8,000; *Sls. Mgr.:* J. E. Murphy

GTE CORP., Sylvania Emissive Prods./Process Heat, Portsmouth Ave., Exeter, NH 03833, Tel: 603-772-4331, TWX: 510-294-4471; Empl.: 200000

GTE METAL LAMINATES, 1704 Barnes St., Reidsville, NC 27320, Tel: 918-342-2381; Empl.: 260; *Sls. Mgr.:* J. W. Leone

GTE MICROCIRCUITS, 2000 West 14th St., Tempe, AZ 85281, Tel: 602-968-4431, TWX: 910-951-1383; FSC No.: 16766; Empl.: 432; *Sls. Mgr.:* David Thompson

GTE PRODUCTS GRP. (SYLVANIA), See Sylvania Miniature Lighting

GTE SWITCHING & TELEPHONE PRODUCTS, 400 N. Wolf Rd., Northlake, IL 60164, Tel: 312-681-7100

GTE SYLVANIA, INC., CHEM. & METAL. DIV., See Sylvania Chemicals/Metals

GTE SYLVANIA LIGHTING PRODS., Sylvania Lighting Ctr., 100 Endicott St., Danvers, MA 01923, Tel: 617-777-1900

GTE SYLVANIA, INC., CIRCUIT MOD. OPER., See Sylvania Electronics

GTE SYLVANIA, INC., CONNECTOR PRODS. OPER., See Sylvania Connector Prods. Oper.

GTE SYLVANIA, INC., DETROIT, MI, See GTE Metal Laminates

GTE SYLVANIA, INC., ELCTRN. SYS. GRP., See Sylvania Elctrn. Sys. Grp.

GTE SYLVANIA, INC., STANDISH, ME, See Sylvania Control Devices

GTE SYLVANIA, INC., TECH PRODS. DIV., See Sylvania Parts

GTE SYS.-SYLVANIA SYS. GRP., Western Div., P.O. Box 7188, Mountain View, CA 94039, Tel: 415-966-2000, Telex: 415-966-3401, TWX: 910-379-6948; Empl.: 2500; *Sls. Mgr.:* Evan S. Baker; *Dist. Mgr.:* Evan S. Baker

GTE WESGO TECHNICAL CERAMICS & METALS, 477 Harbor Blvd., Belmont, CA 94002, Tel: 415-592-9440; Empl.: 500; *Sls. Mgr.:* W. S. Smith

GTI/CIRCUITS DIV., Box 217, Leesburg, IN 46538, Tel: 219-453-3261, Telex: 023-2653; Empl.: 150; *Sls. Mgr.:* Hugh M. Walker

GTI/ELCTRNS. DIV., P.O. Box 96, Hadley, PA 16130, Tel: 412-253-3161, Telex: 914-545; Empl.: 250; *Sls. Mgr.:* Richard C. Kaufman; *Dist. Mgr.:* Richard C. Kaufman

GUARDIAN CALIFORNIA, 16100 S. Figueroa St., Gardena, CA 90240, Tel: 213-532-3092, TWX: 910-344-7381; Empl.: 48; *Sls. Mgr.:* J. Antrim; *Dist. Mgr.:* K. Ross

Local Sales Offices & Reps

AL	Huntsville, Electro-Mech Sls. Engr. Co.	205-883-9624
AZ	Phoenix, O'Donnell Assocs. SO W	602-274-6072
CA	San Jose, O'Donnell Assocs.	408-263-6500
CA	Torrance, O'Donnell Assocs.	213-539-9664
CO	Denver, Comp. Technlgy.	303-758-5750
FL	Coral Springs, CBC Elctrns.	305-755-1111
GA	Atlanta, Electro-Mech Sls. Engr. Co.	404-447-6478
IL	Chicago, Frank Nitti Sls.	312-243-1100
IN	Fort Wayne, Needler Sls.	219-447-2123
MD	Glen Burnie, Faion Lott & Co.	301-744-4611
MI	Farmington, Miltimore Sls.	313-476-2446
MN	St. Paul, Arkco Sls.	612-777-7454
MO	St. Louis, KKB & Co.	314-647-2400
NH	Salem, Sls. Engrg.	603-893-5521
NJ	Manville, DynoRep	201-685-0135
NY	Rochester, Elcom Sales	716-385-1400
OH	Mentor, K-T/Depco	216-729-3588
PA	Doylestown, T.O.E. Sls.	215-348-5333
TX	Dallas, Ion Assocs.	817-640-8282
WA	Bothell, Temco Northwest	206-488-1254

GUARDIAN ELEC. MFG. CO., 1550 W. Carroll Ave., Chicago, IL 60607, Tel: 312-243-1100, TWX: 910-221-5073 .... **1B•1417-1431**

GUILDLINE INSTRS., 2 Westchester Plaza, Elmsford, NY 10523, Tel: 914-592-9101, Telex: 145-487; Empl.: 85; *Sls. Mgr.:* W. Dietz

GULTON INDS., INC., ELCTRN. COMPS. DIV., See Gulton Inds., Inc., Piezo Products Div.

GULTON INDS., INC., Graphic Instruments Div., Gulton Ind'l. Pk., E. Greenwich, RI 02818, Tel: 401-884-6800, TWX: 710-387-1500; Empl.: 400; *Sls. Mgr.:* Dave Snyder; *Dist. Mgr.:* Ed Cunnie

GULTON INDS., INC., Piezo Prods. Div., Box 4300, Fullerton, CA 92634, Tel: 714-871-2150, TWX: 910-592-1247; Empl.: 120; *Sls. Mgr.:* J. Sloane

GULTON INDS., INC., Servonic Div., 1644 Whittier Ave., Costa Mesa, CA 92627, Tel: 714-642-2400, 800-854-4066, Telex: 183-532, TWX: 910-596-1352; FSC No.: 99564; Empl.: 320; *Sls. Mgr.:* Tom Perrin, Jr.

GUNTHER, W., GMBH, Virnsberger Strasse 51, D 8500 Nurnberg 82, West Germany, Tel: 0911/65521, TWX: 622351 Wigu d; Empl.: 260; *Sls. Mgr.:* Albert Gunther; *Dist. Mgr.:* Bob Lynch

Refer to Gordos Corporation, Bloomfield, New Jersey for Representatives and Authorized Distributor information.

HACKER INSTRS., Box 657, Fairfield, NJ 07007, Tel: 201-226-8450, Telex: 642769; Empl.: 12

HADCO PRINTED CIRCUITS, Manchester Rd. Rte. 28, Derry, NH 03038, Tel: 603-432-9541, TWX: 710-366-0788; *Sls. Mgr.:* Ronald Boutin

HADES MFG. CORP., 151-A Verdi St., Farmingdale, NY 11735, Tel: 516-249-4244; FSC No.: 51578; Empl.: 18; *Sls. Mgr.:* K. Norris

HADLEY, ROBERT M. CO., INC., 750 West 51st St., Los Angeles, CA 90037, Tel: 213-234-9091

HALLMARK METALS INC., 610 W. Foothill Blvd., Glendora, CA 91740, Tel: 213-335-1263; Empl.: 20; *Sls. Mgr.:* Robert Schoenick

HALMAR ELECTRONICS, INC., 900 N. Hague Ave., Columbus, OH 43204, Tel: 614-276-0131, TWX: 810-482-1654; Empl.: 80

HALLMARK NAMEPLATE, INC./ELECTROPANEL CO., 1855 New Highway, Farmingdale, NY 11735, Tel: 516-454-0700, Telex: 510-222-0884; *Sls. Mgr.:* Florence Finkle

HAMAMATSU PHOTONICS K.K., 1126 Ichino-Cho, Hamamatsu City, Shizuoka Pref, Japan, Tel: 0534-34-3311, Telex: 4225-185; Empl.: 890; *Sls. Mgr.:* M. Ito

HAMEG, INC., 88-90 Harbor Rd., Port Washington, NY 11050, Tel: 516-883-3837, TWX: 510-223-0889; *Sls. Mgr.:* John F. King

HAMILTON METALCRAFT, 848 N. Fair Oaks Ave., Pasadena, CA 91103, Tel: 818-795-4811; *Sls. Mgr.:* Mel Stahler

HAMILTON STANDARD CONTROLS/STANCOR, See Stancor/Hamilton Standard Controls

HAMILTON STD. CONTROLS, United Technologies, 9100 Airport Dr., P.O. Box 11648, Fort Wayne, IN 46859, Tel: 219-747-6142, TWX: 810-295-0699; Empl.: 3,700; *Sls. Mgr.:* C. Michalski .... 1B•1474

Local Sales Offices & Reps

CA	Santa Fe Springs	213-946-4807
FL	Orlando, A.P. Assocs.	305-298-2816
N	Logansport	219-753-7521
NY	New York, Roburn Agencies	212-989-5939
PA	E. Stroudsburg	717-421-1025

HAMILTON STANDARD DIV., United Technologies Corp., Windsor Locks, CT 06096, Tel: 203-623-1621

HAMLIN, Lake & Grove Sts., Lake Mills, WI 53551, Tel: 414-648-2361, TWX: 910-260-3740; Empl.: 1800; *Sls. Mgr.:* Ken Deans .... 1B•1063, 1433, 1646, 1844

Local Sales Offices & Reps

AZ	Phoenix, Shefler-Kahn Co.	602-257-9015
CA	Anaheim, Westrep	213-404-3881
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, Westrep	408-988-8833
CO	Boulder, R-G Entprs.	303-447-9211
CT	North Haven, Coakley, Boyd & Abbett, Inc.	203-239-6217
FL	Casselberry, Southern Elctrn. Mktg.	305-695-3334
FL	Ft. Lauderdale, Southern Electrn. Mktg.	305-475-3686
GA	Jonesboro, Wallace Elctrn. Sls.	404-471-6297
L	Chicago, Indl. Rep.	312-647-7755
N	Carmel, Rich Elctrn. Mktg.	317-844-8462
N	Fort Wayne, Rich Elctrn. Mktg.	219-432-5553
A	Cedar Rapids, Palatine Sls.	319-365-8017
KS	Mission, Palatine Sls.	913-831-0555
KY	Louisville, Rich Elctrn. Mktg.	502-499-7808
MD	Churchville, Atlantic Technical Sls.	301-879-2236
MA	Needham Heights, Coakley, Boyd & Abbett, Inc.	617-444-5470
MI	Brighton, A.P. Assocs.	313-229-6550
MN	Minneapolis, R-J, Inc.	612-866-3661
MO	Hazelwood, Palatine Sls.	314-839-0800
NH	Plaistow, Coakley, Boyd & Abbett, Inc.	617-444-5470
NJ	Marlton, Naudain Assoc.	609-983-5300
NJ	West Caldwell, Grimm Siegel	201-575-9300
NM	Albuquerque, Shefler-Kahn	505-296-0749
NY	Great Neck, Tylinski Assocs.	516-466-9070
NY	Ithaca, Bob Dean, Inc.	607-257-1111
NY	Wappingers Falls, Bob Dean, Inc.	914-297-6406
NC	Kernersville, Wallace Elctrn. Sls.	919-996-2742
OH	Richfield, Bear Mktg.	216-659-3131
OR	Portland, Syscom	503-644-2505
TX	Dallas, Allied Comps.	214-238-0408
TX	Houston, Allied Comps.	713-988-1600
TX	Hurst, Allied Comps.	817-589-0456
TX	Round Rock, Allied Comps.	512-244-1166
WA	Bellevue, Testco, Inc.	206-454-7422
WI	Milwaukee, Indl. Rep.	414-259-0965

Local Distributors

AL	Huntsville, Mock Elctrns.	205-539-2401
AZ	Tempe, Circuit Specialties	602-966-0764
CA	Fullerton, Pyramid Elctrns.	714-773-0781
CA	San Jose, Cypress Elctrns. Inc.	408-945-8400
CA	Santa Clara, Pyramid Elctrns.	408-727-9018
CA	Torrence, Cypress Elctrns. Inc.	213-533-6005
CA	Van Nuys, Patane Avionics	213-988-4455
CO	Englewood, Ind. Elctrns.	303-694-9444
CT	Bethel, Heilind Elctrns.	203-797-8600
CT	Hartford, Hatry Elctrns.	203-527-1881
CT	New Haven, Hatry Elctrns.	203-787-5921
CT	Stratford, Hatry Elctrns.	203-375-5866
CT	Wallingford, Sager Elect. Supp.	203-265-4600
CT	Waterbury, Hatry Elctrns.	203-755-1181
FL	Lakeland, AA Elec.	813-665-6941
FL	Longwood, Intertec Inc.	305-834-7777
FL	Miami, Elctrn. Equip. Co.	305-871-3500
FL	Orlando, Hammond Elctrn.	305-849-6060
FL	Tampa, Leader Elctrns.	813-870-3315
GA	Norcross, AA Elec.	404-449-8670
L	Chicago, Newark Elctrns.	312-638-4411
L	Lombard, RM Illinois	312-932-5150
IL	Palatine, Ohm Elctrns.	312-359-5500
IN	Carmel, Altex Elctrns.	317-848-1323
IN	Ft. Wayne, Graham Elctrns.	219-424-3422
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Indianapolis, RM Elctrns. Co.	317-247-9701
IA	Cedar Rapids, Iowa Radio Supp. Co.	319-393-4510
MD	Gaithersburg, Pioneer/Wash.	301-921-0660
MA	Burlington, Heilind Elctrns.	617-272-5610
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	Norwood, Gerber Elctrns.	617-769-6000
MI	Wyoming, R-M Elctrn. Co.	616-531-9300
MN	Fridley, Voyager Electronics	612-571-7766
MO	St. Louis, Olive Indl. Elctrns.	314-426-4500
NH	Hudson, Heilind Elctrns.	603-883-9536
NJ	Fairlawn, Relay Spec.	201-797-3313
NJ	Pennsauken, Resco Elctrns.	609-662-4000
NM	Albuquerque, Bell Inds.	505-292-2700
NY	Buffalo, Summit Distr.	716-884-3450
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rome, Rome Elctrns.	315-337-5400
NC	Charlotte, United Elctrn. Supp.	704-372-2650
NC	Gastonia, JMT Elctrns.	704-867-4401
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Greenville, Pair Elctrns.	919-756-2291
NC	Greenville, Hammond Elctrns.	803-232-5357
NC	Shelby, Dixie Indl. Supp.	704-482-5641
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Cincinnati, Graham Elctrns.	513-772-1661
OH	Solon, Repco	216-248-8900
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Portland, Radar Elec.	503-233-3691
PA	McKeesport, Barno Radio	412-751-5966
RI	Providence, Wm. Dandreta & Co.	401-861-2800
SC	Columbia, Dixie Elctrns.	803-779-5332
TN	Gray, Dixie Elctrns.	615-477-3838
TN	Nashville, Eddie Warner Inc.	615-254-1224
TX	Austin, Harrison Equip. Co.	512-458-3555
TX	Dallas, Harrison Equip. Co.	214-239-2750
TX	Fort Worth, Allied Elctrns.	214-265-9341
TX	Houston, Harrison Equip.	713-879-2771
WA	Kent, Interface Elctrns.	206-872-5800
WA	Seattle, Radar Elec. Co.	206-282-2511
WA	Spokane, Radar Elec. Co.	509-747-3053
WI	Cedarburg, AA Elec.	414-377-7500
WI	Mequon, Taylor Elec.	414-241-4321

HAMMOND MFG. CO., 1690 Walden Ave., Buffalo, NY 14225, Tel: 716-894-5710, Telex: 91-6452; Empl.: 850; *Sls. Mgr.:* Ray Shatzel ... 1A•2171; 2•1036, 1037

Local Sales Offices & Reps

AZ	Scottsdale, Mahaffey & Assoc.	602-991-9790
CA	N. Hollywood, Burt Moore & Assocs.	213-877-5955
CA	Redwood City, Hickey Indl. Sls.	415-368-3849
GA	Atlanta, Millar Elctrns.	404-261-6160
IL	Highland Park, Bransky Sls.	312-433-2375
IN	Indianapolis, Wilson Tech. Sls.	317-298-3345
MD	Silver Spring, Mid Atlantic Sls.	301-593-7749
MA	N. Scituate, W. A. Hendrickson Co.	617-545-0652
MI	Hazel Park, Component Assocs.	313-557-3232
MO	St. Louis, Kathrinus, Kelly & Baumhauer (K.K.B.)	314-647-2400
NY	Bellmore, Spector Sls.	516-221-7865
NY	Syracuse, Paston-Hunter Co. Inc.	315-437-2992
NC	Raleigh, Millar Elctrns.	919-787-9564
OH	Dayton, Shamrock Elctrn. Sls.	513-258-1227
OR	Portland, Dussault & Assoc. Inc.	503-641-8780
PA	Springfield, George M. Conneen	215-544-5884
TX	Dallas, J. Y. Schoonmaker Co. Inc.	214-349-1650
WA	Seattle, Dussault & Assoc. Inc.	206-527-5454

Local Distributors

AL	Birmingham, Ack Radio	205-322-0588
AL	Montgomery, Handey's Elec. Ctr.	205-262-4885
AL	Muscle Shoals, Jones Elctrns.	205-383-1241
AZ	Phoenix, Tri Tek	602-995-9352
AZ	Phoenix, Electronic Parts Co.	602-277-7281
AZ	Tempe, Circuit Specialists	602-966-2878
AR	Ft. Smith, Carlton Bates	501-646-8201
AR	Little Rock, Carlton Bates	501-562-9100
CA	Burbank, Electronic City	213-842-5275
CA	Burlingame, Logan Elctrns.	415-697-6481
CA	Canoga Park, Sandy's Elec.	213-346-8353
CA	Chatsworth, Poco Sls.	213-700-8727
CA	Costa Mesa, Marvac Elec.	714-540-3280
CA	El Toro, R-Vac Elec.	714-586-1210
CA	Glendale, Eagle Elctrns.	213-245-2338
CA	Hollywood, Yale Radio Elec.	213-465-3186
CA	Hollywood, Pacific Radio	213-462-1392
CA	Irvine, Graymark Intl.	714-540-5480
CA	Los Angeles, I. T. C.	213-388-0621
CA	Manhattan Beach, Prime Electro	213-379-3642
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Pasadena, Dow Radio	213-681-3416
CA	Redwood City, H.D.B.	415-368-1388
CA	San Diego, Western Radio Elec.	714-239-0361
CA	San Jose, Con. Parts Inc.	408-263-9521
CA	San Jose, Quement Elctrns.	408-998-5900
CA	San Rafael, Elctrns. Plus	415-457-0466
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CA	Santee, Mouser Elec.	619-449-2300
CO	Denver, Fistell Elctrns.	303-629-1312
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Denver, Con. Parts Inc.	303-458-0978
CT	Danbury, Pilgrim Elec.	203-792-7274
CT.	Hartford, Hatry Elec.	203-527-1881
CT	Hartford, Signal Elec. Center	203-233-8551
CT	Middletown, Midstate Elec.	203-347-5638
CT	New London, Aikins Elec. Supp.	203-442-4406
CT	Norwalk, Park Distrbg.	203-853-2011
CT	Norwalk, Cobra	203-853-8228
CT	Stratford, Hatry Elec.	203-375-5866
FL	Dania, Summit Elec.	305-920-6253
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Longwood, Intertec	305-834-7777
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Atlanta, Ack Radio	404-351-6340
GA	Atlanta, Wholesale Dist.	404-447-8431
HI	Honolulu, Elctrn. Equip. Co.	808-533-3884
HI	Honolulu, Honolulu Elec.	808-949-5564
IL	Chicago, Newark Elec.	312-638-4911
IL	Joliet, Mainline Elec.	815-436-3900
IL	Niles, Joseph Elec.	312-459-4030
IL	Northbrook, Classic Comps.	312-272-9650
IL	Wheeling, Hawk Elec.	312-459-4030
IN	Indianapolis, Advent Elec.	317-872-4910
IN	Indianapolis, Mar Elec.	317-875-4510
IN	Lafayette, C.W.Y. Elec.	317-448-1611
KY	Louisville, Peerless Elctrns.	502-637-7677
LA	Harvey, A.F.G. Elec.	504-368-9696
LA	New Orleans, Wm. B. Allen Supp.	504-525-8222
LA	Shreveport, Industrial Elec. Supp.	318-222-9459
MD	Beltsville, Mark Elctrns.	301-595-5040

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Serving Western Region

MD	Bethesda, Empire Elec.	301-656-3300
MD	College Park, Electronics Plus	301-441-9009
MD	Rockville, M. S. Elec.	301-340-6400
MA	Lynn, Land Elec. Supp.	617-592-2220
MA	Needham, Y.D.I. Elec.	617-449-1005
MA	Woburn, Abbott Elec.	617-935-2040
MA	Woburn, Brownell Electro.	617-935-7820
MI	Farmington Hills, Advent Elec.	313-477-1650
MI	Grand Rapids, S. F. Electrns.	616-459-0216
MI	Lansing, Demco	517-321-1700
MN	Edina, Northern Elec.	612-944-1167
MN	Minneapolis, Acme Elec.	612-338-4754
MO	Kansas City, Electronic Supp.	816-931-0250
MT	Billings, Electronic Supp. Co.	406-252-2197
NH	Dover, American Radio Corp.	603-742-6800
NH	Mason, Radio Kit	603-878-1033
NJ	Fairlawn, Relay Specialties	201-797-3313
NY	Albany, E. E. Taylor Co.	518-438-7811
NY	Buffalo, Summit Dist.	716-884-3450
NY	Buffalo, Goldcrest Elec.	716-885-5878
NY	Buffalo, Genesee Radio	716-873-9661
NY	Commack, Spartan Elec.	516-499-9500
NY	Cortland, Central Elec.	607-756-2523
NY	Deer Park, BVG Elec.	516-586-8668
NY	Glenn Falls, Ray Supp.	518-792-5848
NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Johnson City, Goldcrest Elec.	607-797-2389
NY	Johnson City, Unicorn	607-798-0260
NY	Kingston, Greylock Elec.	914-338-5300
NY	Levittown, Edlie Elec.	516-735-3330
NY	Middletown, Greylock Elec.	914-343-7900
NY	N.Y.C., Martin Audio Video	212-541-5900
NY	N.Y.C., Advance Elec.	212-730-7030
NY	Port Washington, Corrector Concepts	516-883-3800
NY	Poughkeepsie, Greylock Elec.	914-452-0550
NY	Rochester, Rochester Radio	716-454-7800
NY	Rochester, Goldcrest Elec.	716-546-8464
NY	Rochester, Masline Elec.	716-546-5373
NY	Rome, Rome Elec.	315-337-5400
NY	Schenectady, Grimmers Elec.	518-374-8480
NY	Schenectady, Goldcrest Elec.	518-377-6424
NY	Syracuse, Goldcrest Elec.	315-471-7115
NY	Syracuse, Saling Elec.	315-422-2336
NY	Troy, Trojan Elec.	518-272-4481
NY	Utica, Central Elec.	315-735-6474
NY	Woodside, Switches Unltd.	212-478-5000
NC	Greensboro, Hammond Elec.	919-275-6391
OH	Cleveland, Roberts Elec.	216-238-1711
OH	Cleveland, Winteradio	216-621-9383
OH	Columbus, Thompson Elec. Supp.	614-228-6191
OH	Dayton, Stott Friedman	513-251-3633
OH	Parma Heights, Phil Reddish Supp.	216-885-1222
OH	Toledo, Warren Radio	419-248-3364
OH	Wintersville, D & R Elec.	614-264-1611
OK	Oklahoma City, Radio Inc.	405-528-2391
OK	Tulsa, Radio Inc.	918-587-9123
OK	Tulsa, Combined Tech.	918-582-8242
OK	Tulsa, Genesis Elec.	918-622-8520
PA	Drexel Hill, Kass Elec.	215-449-2300
PA	Erie, Warren Radio	814-454-5285
PA	Erie, J. V. Duncombe Elec.	814-454-5278
PA	McKean, Advacom	814-476-7774
PA	McKeesport, Barno Radio	412-751-5966
PA	Wayne, Peak Elec.	215-293-9000
RI	Cranston, OEM Supp.	401-781-3904
RI	Newport, J & S Elec. Supp.	401-847-2977
RI	Pawtucket, Major Elec. Supp.	401-725-7400
RI	Providence, Hope Elctrns.	401-521-5600
SC	Greensville, Hammond Elec.	803-242-6880
TN	Memphis, Bluff City Elec.	901-345-9500
TX	Austin, Austin Elec.	512-836-9677
TX	Corpus Christi, Douglas Elec.	512-883-5103
TX	Dallas, Wholesale Elec.	214-824-3001
TX	Dallas, Electrotex	214-234-0433
TX	El Paso, Midland Specialties	915-533-9555
TX	Ft. Worth, Wholesale Elec.	817-336-0461
TX	Ft. Worth, Allied Elec.	817-336-5401
TX	Houston, City Elec. Supp.	713-621-1060
TX	Houston, Ace Elec.	713-688-8114
TX	Houston, Electrotex	713-526-3456
TX	Long View, Vidco	214-757-4911
TX	San Antonio, Electrotex	512-735-9271
TX	San Antonio, Sherman Elec.	512-224-1001
TX	San Antonio, Altex	512-828-0503
UT	Salt Lake City, Standard Elec. Supp.	801-486-3371
UT	Salt Lake City, Western Cont.	801-328-4302
VT	Burlington, Greylock Elec.	802-658-5700
VA	Alexandria, Certified Elec.	703-548-5115
WA	Bellevue, Integrated Elec.	206-455-2727
WA	Bellevue, Nidi Northwest	206-746-7970
WI	Mequon, Lakeview Elec.	414-377-8250
WI	Mequon, Taylor Elec.	414-241-4321
WI	New Berlin, R. M. Wisconsin	414-784-4420

HAMPTON PRODS., 2995 Eastrock Dr., Rockford, IL 61109, Tel: 815-398-2770, TWX: 910-631-3432; *Sls. Mgr.:* Gary Gohlinghorst; *Dist. Mgr.:* Steve Schweitzer

H&T COMPONENTS INC., H&T Components Ltd., 87 Sand Pit Rd., Danbury, CT 06810, Tel: 203-794-1798, Telex: 643011; *Sls. Mgr.:* K. Pulasky; *Dist. Mgr.:* Janet Rapoza .... 2•1318-1328

Local Sales Offices & Reps

AL	Huntsville, D.H.R. Mktg.	205-533-5165
AZ	Phoenix, Adtek Inc.	602-931-9289
CA	Sunnyvale, Schwerin Merrill Inc.	408-735-7900
CO	Littleton, Elctrn. Comp. Sys.	303-797-2772
CT	Milford, Todino Engineering Sales	203-874-6643
FL	Casselberry, Sls. Engrg. Concepts	305-678-1035
GA	Atlanta, D.H.R. Mktg.	404-451-9848
IL	Chicago, Esco Assocs.	312-763-0800
KS	DeSoto, Midtec Assocs.	913-441-6565
MD	Columbia, Delta III Assocs.	301-730-4700
MA	Needham Heights, Todino Engrg. Sls.	617-444-7925
MI	Birmingham, Favco	313-644-0173
MN	Bloomington, D. A. Case Assocs.	612-888-8666
MO	Florissant, Midtec Assocs.	314-837-5200
NJ	Haddonfield, Mills Brown Assocs.	609-429-1005
NY	Endicott, Noeth-Honsinger Assocs.	607-754-3214
NY	Hackensack, Meg Elctrns.	201-489-7700
NY	Pittsford, Noeth-Honsinger Assocs.	716-586-9002
NC	Raleigh, McGee Assocs.	919-781-9579
OH	Akron, Augnat Assocs.	216-273-1211
OR	Portland, Barrett Squibb & Assocs.	503-644-2550
TX	Plano, Richmar Elctrns.	214-867-8224
UT	Salt Lake City, Charles Fields & Assocs.	801-277-4859
VA	Richmond, Delta III Assocs.	804-771-9204
WA	Redmond, Barrett Squibb & Assocs.	206-885-6991

Local Distributors

AZ	Phoenix, Dalis Elctrns.	602-275-2626
AZ	Tucson, Inland Elctrn. Supp.	602-294-2628
CA	Mountain View, Bell Inds.	415-960-1440
CA	S. San Francisco, Peters deLaet	415-873-9595
CA	Santa Ana, C. R. Electronics	714-556-2040
CT	Bridgeport, Accurate Elctrns.	203-366-0214
FL	Ft. Lauderdale, Simcona	305-485-4455
GA	Norcross, Whitehead Elctrns.	404-923-6667
IL	Lisle, Components Inc.	312-852-7707
IL	Rosemont, Advent Elctrns.	312-297-6200
IN	Indianapolis, Advent Elctrns.	317-872-4910
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
LA	Lafayette, Ralphs Indl. Elctrn. Supp.	318-234-4507
MD	Baltimore, Pyttronic Inds.	301-792-0780
MA	Hopkinton, Interface Elctrns.	617-435-6858
MA	Lowell, Colonial Wire & Cable	617-459-6400
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MN	North Chatsworth, Northern Automatic	612-481-0022
NJ	Oakland, Gordon/Horne	201-337-5200
NY	Buffalo, Summit Distrs.	800-462-1880
NY	Hauppauge, Broadline Elctrns.	516-231-4100
OH	Cleveland, Roberts Elctrns.	216-238-1711
OH	Columbus, Whitehead Elctrns.	614-224-1186
OH	Dayton, Televok Inc.	513-294-4499
PA	Montgomeryville, Pyttronic Inds.	215-242-6700
TX	Dallas, Computer Components	214-239-0271
TX	Houston, Ralphs Indl. Elctrn. Supp.	713-748-4902
UT	Salt Lake City, Pen-Tec Entprs.	801-972-4817
WA	Redmond, Murphy Elctrns.	206-881-1234

HANDY & HARMAN, 850 Third Ave., New York, NY 10022, Tel: 212-752-3400; Empl.: 800; *Sls. Mgr.:* C. P. Zitzmann

HANDY & HARMAN ELCTRN. MATLS. CORP., 72 Elm St. N., Atteboro, MA 02760, Tel: 617-695-1401; Empl.: 450

HANKSCRAFT MOTORS, Div. of Gerber Prods. Co., P.O. Box 120, Reedsburg, WI 53959, Tel: 608-524-4341; Empl.: 550

HANSCOM, H. F., CO., INC., 225 Chapman St., Providence, RI 02905, Tel: 401-941-1455, Telex: 952107; Empl.: 50; *Sls. Mgr.:* William E. Taplin

HAPCO, Box 1205, Boulder, CO 80302, Tel: 303-447-0441; Empl.: 10; *Sls. Mgr.:* B. Ewing

HARBISON INDL. PRODS., Sub. of Polymer Corp., 7205 Hibbs La., Levittown, PA 19057, Tel: 215-943-9000, TWX: 510-667-0167; Empl.: 50; *Sls. Mgr.:* R. S. Spangler

HARDIGG INDS., INC., North Main St., South Deerfield, MA 01373, Tel: 413-665-2163, Telex: 955431; FSC No.: 11214; *Dist. Mgr.:* Warren H. Bickford

HARDMAN INC., 600 Cortlandt St., Belleville, NJ 07109, Tel: 201-751-3000, TWX: 710-995-4940; Empl.: 95; *Sls. Mgr.:* Carl T. Sanford

HAROWE SERVO CONTROLS, Westtown Rd. at West Chester Pike, W. Chester, PA 19380, Tel: 215-692-2700, Telex: 83-5486, TWX: 510-663-0335; FSC No.: 06989; Empl.: 450; *Sls. Mgr.:* Dennis B. Daisy

HARREL, INC., 16 Fitch St., E. Norwalk, CT 06855, Tel: 203-866-2573; *Sls. Mgr.:* W. Becker .... 3•1131

Local Sales Offices & Reps

CA	Sherman Oaks, Windsor Dynamics	213-989-3631
CA	Walnut Creek, Viking Instr.	415-933-1221
NY	Cazenovia, P. M. Decew, Inc.	315-065-8602
NC	Charlotte, Beck Sls.	704-366-5366
OH	North Olmstead, Odessa Instr. Co.	216-734-6777
PA	Elkins Park, Edwin F. Gregg	215 CA4-0248
TN	Knoxville, Robert Olsen Co.	615-688-4038

HARRIS CIRCUITS MFG., 2706 Colley Ave., Norfolk, VA. 23517, Tel: 804-467-1116; Empl.: 15

HARRIS CORP., Computer Systems Div., 2101 W. Cypress Creek Rd., Ft. Lauderdale, FL 33309, Tel: 305-974-1700, TWX: 510-956-3096; FSC No.: 29436; Empl.: 1000; *Sls. Mgr.:* Jeff Oromaner

HARRIS CORP., Dracon Div., 809 Calle Plano, Camarillo, CA 93010, Tel: 805-987-9511, Telex: 182327; Empl.: 360; *Sls. Mgr.:* Tom Sadowski; *Dist. Mgr.:* Keith Boutillier

HARRIS CORP., PRD Elctrns. Div., 6801 Jericho Tpke., Syosset, NY 11791, Tel: 516-364-0400, TWX: 510-222-4494; FSC No.: 77327; Empl.: 1,850; *Sls. Mgr.:* R. A. Lebowitz

HARRIS MICROWAVE SEMICONDUCTOR, 1530 McCarthy Blvd., Milpitas, CA 95035, Tel: 408-262-2222, TWX: 910-338-2247

HARRIS SEMICONDUCTOR, Box 883, Melbourne, FL 32901, Tel: 305-724-7400, TWX: 510-959-6259; FSC No.: 34371; Empl.: 2300; *Sls. Mgr.:* Dan McCranie; *Dist. Mgr.:* Charles H. Beaty

HARSHAW FILTROL PARTNERSHIP, 1945 E. 97th St., Cleveland, OH 44106, Tel: 216-721-8300; *Sls. Mgr.:* Robert Anfang

HARTLEY PRODS., 620 Island Rd., Ramsey, NJ 07446, Tel: 201-327-4443; *Sls. Mgr.:* R. Schmetterer

HARTMAN SYSTEMS, Figgie Intl., 360 Wolf Hill Rd., Huntington Sta., NY 11746, Tel: 516-427-7500, TWX: 510-226-6982; FSC No.: 92220; Empl.: 310; *Sls. Mgr.:* Robert Griffith

HARTWELL CORP., 900 S. Richfield Rd., Placentia, CA 92670, Tel: 714-993-4200, Telex: 683-485, TWX: 910-596-1294; FSC No.: 83014; Empl.: 425

HARWIL, 1548 17th St., Santa Monica, CA 90404, Tel: 213-829-2310; Empl.: 7

HASCO COMPS., INC., 214-22 Waters Edge Dr., Bayside, NY 11360, Tel: 212-428-5155, TWX: 710-582-5750; Empl.: 6; *Sls. Mgr.:* Tab Hauser .... 18•1436-1442, 1647

HAYDON SWITCH & INSTR., 1500 Meriden Rd., P.O. Box 3329, Waterbury, CT 06705, Tel: 203-756-7441, Telex: 643852 - HSIINTLWBY; FSC No.: 02005; Empl.: 291; *Sls. Mgr.:* Scott Moulton

HAZELTINE CORP., 500 Commack Rd., Commack NY 11725, Tel: 516-462-5100, Telex: 64-0525, TWX 510-226-0239; Empl.: 2,500

H-A-Z LABORATORIES, Brass Castle Rd., P.O. Box 67-M, Washington, NJ 07882, Tel: 201-689-0110 *Sls. Mgr.:* Henry Zajac

HBS EQUIPMENT DIV., 3000 Supply Ave., Los Angeles, CA 90040, Tel: 213-726-3033, TWX: 910-580-3179; Empl.: 40; *Sls. Mgr.:* K. Lowery

HDR POWER SYS., INC., 600 Oakland Park Ave. Columbus, OH 43214, Tel: 614-262-6832, Telex 246524; Empl.: 41; *Sls. Mgr.:* Harlan W. Bates

HDS INC., 12310 Pinecrest Rd., Reston, VA 22091, Tel: 703-620-6200, Telex: 64585; Empl.: 54

HEADWAY RESCH., INC., 3713 Forest La., Garland, TX 75042, Tel: 214-272-5431, Telex: 73-0257; Empl.: 50; *Sls. Mgr.:* Mina Kelly

Local Sales Offices & Reps

CA	Santa Clara, California Tech. Svcs.	408-496-1156/57
CA	Tarzana, California Tech. Svcs.	213-343-3131
NY	New Rochelle, East Coast Sls. Co.	914-636-4325

HEATH CO., Benton Harbor, MI 49022, Tel: 616-982-3886, Telex: 72-9421

HEAT SYSTEMS-ULTRASONICS, INC., 1938 New Highway, Farmingdale, NY 11735, Tel: 516-694-9555, Telex: 14-3101; *Sls. Mgr.:* Lyle E. Cady

HECON CORP., 31 Park Rd., Tinton Falls, NJ 07724, Tel: 201-542-9200, Telex: 13-2457; Empl.: 200; *Sls. Mgr.:* P. Shine; *Dist. Mgr.:* R. Drum

HEI, INC., 1495 Steiger Lake La., Victoria, MN 55386, Tel: 612-443-2500, TWX: 910-578-3961; Empl.: 175; *Sls. Mgr.:* R. D. Young .... **1B**•1219

Local Sales Offices & Reps

AL	Huntsville, REP, Inc.	205-881-9270
AZ	Phoneix, Toward Engrg.	602-955-3193
AR	Little Rock, Quad State	501-680-9588
CA	Los Angeles, MASCO	714-525-0866
CA	Mountain View, Leddy Assocs.	415-969-6313
CO	Aurora, Ausco Sls.	303-750-3846
FL	Coral Springs, CBC Elctrns.	305-755-1111
FL	Longwood, CBC Elctrns.	305-831-5380
GA	Tucker, REP, Inc.	404-938-4358
IL	Schaumburg, Micro-Tex	312-885-1131
KS	De Soto, Midtec Assocs.	913-441-6565
MI	Novi, Miltimore Sls.	313-349-0260
NH	Salem, Sls. Engrg.	603-893-5521
NJ	Pitman, Colrud Corp.	609-589-5866
NY	Massapequa, Coughlin Assoc.	516-799-7743
NY	Rochester, D. L. Eiss Assocs.	716-328-3000
NC	Raleigh, REP, Inc.	919-851-3007
OH	Rocky River, Norm Case Assocs.	216-333-0400
TN	Jefferson City, REP, Inc.	615-475-9012
TX	Dallas, Quad State Mktg.	214-680-9588
WA	Bellevue, Comtec	206-453-1188

HEINEMANN ELEC. CO., Brunswick Pike, Alt. Rte. 1, P.O. Box 6800, Lawrenceville, NJ 08648-0800, Tel: 609-882-4800, Telex: 843431; FSC No.: 74193; Empl.: 625; *Sls. Mgr.:* R. E. Delaney .... **1B**•1266, 1267

Local Sales Offices & Reps

AL	Birmingham, Austin Brown Assocs. Inc.	205-822-6198
AZ	Phoenix, O'Donnell Assocs. SW	602-944-9542
CA	Chatsworth, Porter Co.	818-700-0808
CA	San Diego, Porter Co.	619-275-0641
CA	San Jose, O'Donnell Assocs. No.	408-263-6500
CO	Englewood, Computech Mktg.	303-773-3981
FL	Boca Raton, Conley & Assoc.	305-395-6108
FL	Oviedo, Conley & Assocs.	305-365-3283
FL	Tampa, Conley & Assocs.	813-885-7658
GA	Atlanta, Austin Brown Assocs. Inc.	404-457-6381
IL	Chicago, D. Dolin Sls.	312-286-6200
IN	Ft. Wayne, O.H. Bromberg & Assocs.	219-456-6010
KY	Louisville, O.H. Bromberg & Assocs.	502-245-8916
MD	Pikesville, Imagitron Sls. Co.	301-521-2020
MA	Framingham, Sullivan Tech. Sls.	617-620-0195
MI	Southfield, L. H. Dickelman Co.	313-353-8210
MN	Minneapolis, Furber/Smith Assoc.	612-881-3620
MO	Creve Coeur, Hill & Co.	314-432-1136
NJ	Ridgewood, Ballou, Inc.	201-444-6990
NY	Rochester, Canavan-Scanlon	716-424-1830
NY	Syracuse, Canavan-Scanlon	315-437-1271
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
OH	Cincinnati, O.H. Bromberg & Assocs.	513-771-9333
OH	Cleveland, Brown Elect. Prod.	216-331-2072
OH	Dayton, KW Elctrn. Sls.	513-890-2150
PA	Allison Park, KW Electrn. Sls.	412-487-4300
PA	Washington Crossing, DVS Co.	215-493-4642
TN	Brentwood, Austin Brown Assocs. Inc.	615-373-2068
TX	Dallas, Glidden Electro Equip.	214-341-0610
TX	Houston, Glidden Electro Equip.	713-681-1415
WA	Mercer Island, Andersen Assocs.	206-232-0484
WI	Elm Grove, Key Entpr.	414-784-3390

Local Distributors

AL	Montgomery, Southern Controls	205-277-5030
CA	Burlingame, Campbell & George	415-697-2965
CA	Chatsworth, POCO Sls.	818-700-8727
CA	San Jose, Cazco Sls.	408-263-6503
CO	Denver, CSID Inc.	303-292-9594
CT	Hartford, L. E. Whelan Co.	203-246-5694
CT	New Haven, Green Shaw Co.	203-397-0710
FL	Oviedo, Dixie Sls.	305-365-5211
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Nedco Elctrns.	312-286-5565
IL	Northbrook, Classic Comps. Supp.	312-272-9650
IN	Indianapolis, Graham Elctrns.	317-634-8202
KS	Edwardville, C. Tennant & Sons	913-441-1801
MD	Baltimore, Automation Indl. Control	301-747-0044
MA	Boston, Apparatus Svc.	617-787-1300
MA	Framingham, Cavalier Comps.	617-875-2000
MA	Newton, Green Shaw Co.	617-969-8900
MI	Southfield, Michigan Lectrols Corp.	313-353-1350
MN	Minneapolis, Northland Elec. Supp.	612-341-6100
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Trenton, Automation Controls & Equip.	609-882-6330
NJ	West Caldwell, L. E. Whelan Co.	201-575-5880
NY	Binghamton, Pioneer/Harvey Elctrns.	607-748-8211
NY	Syracuse, Baldwin Hall	315-463-9251
NY	Whitestone, Power Electro Supp. Co.	212-767-1447
NC	Charlotte, Joyce Sls. Co.	704-377-1555
OH	Cincinnati, Cartessa Corp.	513-385-7700
OH	Dayton, Duellman Elec.	513-461-5010
OH	Solon, REPCO Elctrns.	216-248-8900
OH	Valley View, Newark Elctrns.	216-447-8860
OR	Portland, Platt Elec. Supp.	503-228-6121
OR	Tualatin, North Coast Elec. Co.	503-684-2570
PA	Washington Crossing, Riverside Comps.	215-493-4642
PA	West Chester, West Chester Elec. & Electrn.	215-696-7500
TN	Chattanooga, Techni-Tronics	615-875-5449
TX	Dallas, Geeco Sls. Co.	214-341-2626
VA	Charlottesville, Va. Radio Supp. Co. Inc.	804-296-4184
WI	Milwaukee, Hunt Co.	414-383-1781

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HEITZ, KARL, INC., P.O. Box 427, Woodside, NY 11377, Tel: 212-565-0004; Empl.: 15

HELICAL PRODS. CO., INC., Box 1069, Santa Maria, CA 93456, Tel: 805-928-3851, TWX: 910-351-5856; FSC No.: 13201; Empl.: 41

HELIONETICS, INC., DECC Div., 17312 Eastman St., Irvine, CA 92714, Tel: 714-546-4731, 800-421-7915, TWX: 910-595-2829; *Sls. Mgr.:* R. S. Tullock

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HERBERT PRODS. INC., 180 Linden Ave., Westbury, NY 11590-0384, Tel: 516-334-6500, TWX: 510-222-5963; Empl.: 98; *Sls. Mgr.:* L. C. Peshkin

HERMETIC SEAL, 4232 Temple City Blvd., Rosemead, CA 91770, Tel: 818-283-0411, TWX: 910-587-3352; FSC No.: 04820; Empl.: 220

HERMETIC SWITCH, Box 1325, Hwy. 92, Chickasha, OK 73018, Tel: 405-224-4046, Telex: 796125 Hermetic CKSA; Empl.: 150; *Sls. Mgr.:* E. R. Andrus .... **1B**•1648

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NY	Oceanside, Current Inds.	516-678-3895
OR	Beaverton, LD Elctrns.	503-649-8556
PA	Furlong, Avenir	215-348-8290
TX	Austin, R. F. Kimball Co.	800-442-4506
TX	Houston, R. F. Kimball Co.	713-840-0590
TX	Richardson, R. F. Kimball Co.	214-231-3447
WA	Snohomish, LD Elctrns.	206-568-0511
WA	Spokane, LD Elctrns. (Boise, ID #)	208-343-2741

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HERTZ FILTER, 3 Aerial Way, Syosset, NY 11791, Tel: 516-822-4770; Empl.: 22 .... **1A**•1598

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CA	N. Hollywood, Qualtech	213-765-1419
CA	Orange, Qualtech	714-639-9820
CA	Palo Alto, Qualtech	415-494-9060
CA	San Diego, Mesa Engrg.	619-278-8021
CO	Denver, PAR Assocs.	303-371-4140
GA	Atlanta, Magaro & Assocs.	404-451-8862
KS	Prairie Village, Panatek	913-362-3349
MD	Rockville, Spectro Assocs.	301-279-2010
MA	Waltham, Daner-Hayes	617-894-7290
MN	Minneapolis, Micro Resources	612-830-1454
NY	Brewster, Daner-Hayes	800-225-8760
OH	Cincinnati, Applied Data Management	513-579-8108
TX	Houston, Acudata	713-488-8195
TX	Plano, Acudata	214-424-3567
UT	Centerville, PAR Assocs.	801-292-8145

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AZ	Phoenix	602-273-8000
AZ	Tucson	602-889-4631
CA	Fresno	209-221-6821
CA	Fullerton	714-870-1000
CA	Lawndale	213-970-7500
CA	North Hollywood	213-877-1282
CA	Palo Alto	415-857-8000
CA	Sacramento	916-929-7222
CA	San Diego	714-279-3200
CA	Santa Ana	714-641-0977
CA	Santa Clara	408-988-7000
CO	Englewood	303-771-3455
CT	Wallingford	203-265-7801
FL	Ft. Lauderdale	305-973-2600
FL	Orlando	305-859-2900
GA	Atlanta	404-955-1500
HI	Honolulu	808-526-1555
IL	Bloomington	309-663-0383
IL	Downers Grove	312-960-5760
IL	Rolling Meadows	312-255-9800
IN	Indianapolis	317-842-1000
IA	Iowa City	319-351-1020
LA	Kenner	504-463-6201
MD	Hanover	301-796-7700
MD	Rockville	301-948-6370
MA	Lexington	617-861-8960
MI	Farmington Hills	313-476-6400
MN	St. Paul	612-644-1100
MO	Kansas City	816-763-8000
MO	St. Louis	314-878-0200
NV	Las Vegas	702-736-6610
NJ	Eatontown	201-542-1384
NJ	Paramus	201-265-5000
NJ	Piscataway	201-981-1199
NM	Albuquerque	505-292-1330
NM	Las Cruces	505-526-2484
NY	Albany	518-458-1550
NY	Clarence	716-759-8621
NY	Fairport	716-223-9950
NY	Poughkeepsie	914-462-7683
NY	Syracuse	315-455-2486
NY	Woodbury	516-921-0300
NC	Greensboro	919-852-1800
OH	Cleveland	216-243-7300
OH	Columbus	614-436-1041
OH	Dayton	513-859-8202
OK	Oklahoma City	405-721-0200
OR	Wilsonville	503-682-8000
PA	King of Prussia	215-265-7000
PA	Pittsburgh	412-782-0400
TX	El Paso	915-533-3555
TX	Houston	713-776-6400
TX	Richardson	214-231-6101
TX	San Antonio	512-434-8241
UT	Salt Lake City	801-974-1700
VA	Richmond	804-285-3431
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CA	Newport Beach, Ross IV Asso.	714-650-5542
CA	Sunnyvale, J. F. Peil Co.	408-730-5869
CO	Littleton, Production Equip. Sls.	303-795-5022
CT	E. Woodstock, H & M Assocs.	203-928-9442
FL	Merritt Island, J. A. Kennedy Co.	305-452-9821
IL	Elk Grove Village, Bradley Reps.	312-228-8450
IN	Indianapolis, Harvey Guenther	317-251-8143
KS	Kansas City, L. E. Bruns	913-287-5242
MD	Phoenix, B&W Mktg.	301-592-8907
MN	Fridley, Teskey & Assocs.	612-571-0876
NJ	Jersey City, Dunn & Bryan	201-963-4478
NY	New Hartford, V. Clair	315-735-8122
OH	Solon, KDF Co.	216-248-8010
OR	Gladstone, Northcoast Mfrs. Agency II	503-657-9427
PA	West Chester, B&W Mktg.	215-692-7155
TX	Dallas, P. J. Scanlon	214-231-4661
WA	Seattle, Northcoast Mfrs. Agency	206-284-5024
EXP	NY, New York, W. D. Blood & Co.	212-344-0210

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Intl	Austria, Braunau/Inn, Albert Berner	07722-2211
Intl	Belgium, Bruxelles, N.V. Beluma S.A.	02-427-42-15
Intl	Denmark, Herlev, Harttung Fasteners A/S	02-84-11-00
Intl	England, Wimborne, Heyco Mfg.	0202-87-14-11
Intl	Finland, Tampere, United Shoe Mach.	28-180
Intl	France, Paris, M.F.O.M.	205-67-39
Intl	Germany, Giessen, Heyman Mfg.	0641-76250
Intl	Hong Kong, North Point, S & T Entprs.	5-784-0921
Intl	Israel, Tel Aviv, Helet Trading Ltd.	216-157
Intl	Italy, Milan, Elektrozubehor	02-74-90-541
Intl	Japan, Tokyo, Hakuto Co. Ltd.	03-341-2611
Intl	Mexico, Mexico City, Retenes y Refacciones Ind.	5-754-0503
Intl	Netherlands, Diemen, Onkenhout & Onkenhout B.V.	020-90-40-40
Intl	Norway, Oslo, United Shoe Mach.	02-21-86-50
Intl	Singapore, 0923, S & T Entprs.	747-9235
Intl	South Africa, Durban, Three-D Agencies	39-23-51
Intl	South Africa, Johannesburg, Three-D Agencies	825-5065
Intl	South America - Colombia - Cordoba, Ira Export	40-4648
Intl	Sweden, Orebro, United Shoe Mach.	019-12-42-30
Intl	Switzerland, Hunzenschwil, Agro AG	064-472-61
Intl	Taiwan, Taipei, Shigma Inc.	771-3403
Can	Toronto, Cords Canada	416-787-1114

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AL	Huntsville, L & D Inc.	205-837-1469
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CA	Anaheim, Westrep	213-404-3881
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, Westrep	408-988-8833
CO	Littleton, Omega	303-798-7040
FL	Clearwater, Hallmark Elctrns.	305-530-4543
FL	Melbourne, Beacon	305-724-8010
IL	Highland Park, Bransky Sls.	312-433-2375
IN	Fort Wayne, Given Corp.	219-432-5585
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
KS	Overland Park, Advanced Tech. Sls.	913-642-6675
MD	Pikesville, Imagitron Sls. Co.	301-521-2020
MA	Bloomfield, Astrorep New England	203-967-4848
MI	Ann Arbor, Elliott Sls. Co.	313-662-4087
MN	St. Paul, Repco	612-642-2828
MO	St. Louis, Advanced Tech. Sls.	314-227-4448
NE	Lincoln, Lorenz Sls.	402-475-4660
NJ	Perth Amboy, Astrorep	201-826-8050
NY	Babylon, Astrorep	516-422-2500
NY	Fayetteville, Tri-Tech Elctrns.	315-446-2881
NY	Ronkonkoma, Hallmark Elctrns.	516-737-0600
NC	Greensboro, L & D Inc.	919-292-3201
OH	Cleveland, Comps.	216-243-9200
OH	Miamisburg, Comps.	513-866-0661
OK	Tulsa, Bonser-Philhower Sls.	918-496-3236
OR	Wilsonville, RTS	503-638-5670
PA	Pittsburgh, Comps.	412-824-1600
TX	Richardson, Bonser - Philhower Sls.	214-234-8438
WA	Vashon, RTS	206-285-1363
WI	Cedarburg, Bransky Sls.	414-377-6837

Local Distributors

AL	Huntsville, Hallmark Elctrns.	205-837-8700
AZ	Phoenix, Hallmark Elctrns.	602-243-6601
AR	Little Rock, Electro Entprs.	501-664-9207
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Chatsworth, IEC/Jaco	213-998-2200
CA	Newport Beach, Arrow Elctrns.	714-851-8961
CA	San Diego, Hallmark Elctrns.	714-268-1201
CA	San Diego, Arrow Elctrns.	714-565-4800
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Santa Ana, Norstan Elctrns.	714-540-4165
CA	Sunnyvale, Hallmark Elctrns.	408-773-9990
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Torrance, Cypress Elctrns.	213-533-6005
CO	Denver, Arrow Elctrns.	303-758-2100
CO	Englewood, Hallmark Elctrns.	303-790-1662
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Clearwater, Hallmark Elctrns.	305-530-4543
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
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FL	Palm Bay, Arrow Elctrns.	305-725-1480

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IL	Bensenville, Hallmark Elctrns.	312-860-3800
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IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
KS	Lenexa, Hallmark Elctrns.	913-888-4747
KS	Wichita, Lee Prods.	316-264-2172
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Columbia, Hallmark Elctrns.	301-988-9800
MA	Waltham, QPL Elctrn. Distrs.	617-229-2424
MA	Woburn, Arrow Elctrns.	617-933-8130
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NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Solon, Arrow Elctrns.	216-248-3990
OH	Solon, Hallmark Elctrns.	216-349-4632
OH	Wosterville, Hallmark Elctrns.	614-891-4555
OK	Oklahoma City, Electro Entprs.	405-478-1752
OK	Tulsa, Hallmark Elctrns.	918-835-8458
PA	Monroeville, Arrow Elctrns.	412-856-7000
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Austin, Hallmark Elctrns.	512-837-2814
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Dallas, Hallmark Elctrns.	214-341-1147
TX	Houston, Hallmark Elctrns.	713-781-6100
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HILEVEL TECH., INC., 18902 Bardeen Way, Irvine, CA 92715, Tel: 714-752-5215, Telex: 655316; *Sls. Mgr.:* Norbert Laengrich

HILTON INDUSTRIES, INC., Div. of Core Industries, 1177 Cattlemen Road, Sarasota, FL 33582, Tel: 813-371-2600, TWX: 810-864-4363; *Sls. Mgr.:* F. Moloney

Local Sales Offices & Reps

CA	Los Altos, Landia Sls. Grp.	415-490-5651
CA	Los Angeles, Corcoran Assocs.	213-823-2425
CO	Parker, Parker-Webster	303-841-4888
FL	Orlando, EAB, Inc.	305-898-7444
IL	Steamwood, Al Holte & Assocs.	312-837-4066
KS	Shawnee Mission, Florence & Meyer, Inc.	913-722-5210
MA	Topsfield, RFC Assocs.	617-887-8545
MN	Minneapolis, Wendell E. Lee & Assocs.	612-831-5056
NY	Great Neck, Cooper & Simon & Co., Inc.	516-487-1142
NY	Rochester, BKT Assocs., Inc.	716-586-5814
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
PA	W. Conshohocken, Eastern Comps. Sls. Corp.	215-825-8610
TX	Plano, B & R Elctrn Sls. Corp.	214-985-0028

Local Distributors

CA	Santa Ana, Projections Unltd.	714-641-4172
FL	Longwood, Intertec Comps., Inc.	305-834-7777
IL	Des Plaines, Edmar Elctrn. Co.	312-298-8580
IL	Elmhurst, Schuten Elctrns.	312-941-9033
IL	Melrose Park, Belford Elctrns.	312-965-2400
NJ	Clifton, J-Mar Elctrns.	201-772-6400
NY	Plainview, A.C.I. Elctrns.	516-293-6630
PA	McKean, ADVACOM	814-476-7774
PA	York, E.C.I., Inc.	717-843-8971
WA	Kent, Shannon Ltd.	206-763-0545

HILTRONICS CORP., 111 S. Liberty Dr., Stony Pt., NY 10980, Tel: 914-942-1222

HIPOTRONICS, P.O. Drawer A, Brewster, NY 10509, Tel: 914-279-8091, Telex: 425476 (Ams. Back:Hipo UI), TWX: 710-574-2420 (Ams. Back:Hipo Brws NY); Empl.: 200; *Sls. Mgr.:* Steve Peschel .... 1A•2172-2174; 3•1240-1242, 1590, 1591, 1882, 1883

Local Sales Offices & Reps

AL	Birmingham, E. J. Ruth Assocs.	205-979-0880
CA	Pasadena, RDX Corp.	213-681-3451
CA	San Diego, RDX Corp.	619-278-6863
CA	Sunnyvale, RDX Corp.	408-734-4500
CO	Denver, E. C. Rudy Co.	303-433-1066
CT	Meriden, Abbott Allison Co.	203-481-0405
FL	Ft. Lauderdale, Powercom Engrg. Corp.	305-463-6059
HI	Honolulu, Aloha Assocs.	808-879-5296
IL	Hawthorne Woods, Ryan & Assocs.	312-438-2905
IN	Ossian, Science Sales	219-622-7383
KS	St. Louis, Fitzgerald Sales Co.	314-862-1660
MN	Edina, Ainslie Co.	612-920-2996
NJ	East Orange, Friedman Assocs.	201-694-6200
NM	Albuquerque, Hewitt & Assocs.	505-229-7746
NY	Cazenovia, Peter De Cew Agency	315-655-8602
PA	Downingtown, Kenn Ebert-Hipotronics	215-269-5898
TX	Richardson, Hipotronics-Dusty Arnold	214-644-7607
WA	Bellevue, Topp Engrg. Sls. Corp.	206-747-5400

HIRAM JONES ELCTRNS., 11607 Vanowen St., No. Hollywood, CA 91605, Tel: 818-875-0213; FSC No.: 04867; Empl.: 8 .... 2•1314-1317

Local Sales Offices & Reps

TX	Paris, Packard Assocs.	214-785-4544
EXP	MN, Minneapolis, C. Tennant, Sons & Co. of New York	612-475-7321

Local Distributors

TX	Houston, Lenert Co.	713-225-1465
TX	Paris, Electro Hardware Co.	214-785-4544

HISONIC, INC., 249 N. Troost, P.O. Box 1130, Olathe, KS 66061-1130, Tel: 913-782-0012, Telex: 4-2562; FSC No.: 11402; Empl.: 98; *Sls. Mgr.:* W. S. Bonebright .... 1A•1599, 2175

Local Sales Offices & Reps

AL	Huntsville, MacKay, Smith & Assocs.	205-539-8000
FL	Ft. Lauderdale, MacKay, Smith & Assocs.	305-467-3888
FL	Madeira Beach, MacKay, Smith & Assocs.	813-393-7144
FL	Orlando, MacKay, Smith & Assocs.	305-277-1513
FL	St. Petersburg, MacKay, Smith & Assocs.	813-393-7144
GA	Atlanta, MacKay, Smith & Assocs.	404-449-7444
KS	Shawnee Mission, Florence & Meyer	913-722-5210
MO	St. Louis, Florence & Meyer	314-965-5117
NC	Cary, MacKay, Smith & Assocs.	919-467-5400
NC	Charlotte, MacKay, Smith & Assocs.	704-372-1188
NC	Raleigh, MacKay, Smith & Assocs.	919-851-5000
TX	Houston, AID Elctrns.	713-777-3882
TX	Irving, AID Elctrns.	214-259-4761

HITACHI AMERICA, 1800 Bering Dr., San Jose, CA 95112, Tel: 408-292-6404, Telex: 17-1581, TWX: 910-338-2103; *Sls. Mgr.:* Jack Ordway; *Dist. Mgr.:* Michael Barthman

HITACHI AMERICA, LTD., 59 Route 17 South, Allendale, NJ 07401, Tel: 201-825-8000, Telex: (WU) 642734; *Sls. Mgr.:* William J. Pearson

HITACHI DENSHI AMERICA LTD., Test & Meas. Div., 175 Crossways Pkwy. W., Woodbury, NY 11797, Tel: 516-921-7200, TWX: 510-221-1899; Empl.: 110

Local Sales Offices & Reps

CA	Carson, Hitachi Denshi Amer. Ltd.	213-538-4880
CO	Broomfield, Connors Inc.	303-466-9628
GA	Doraville, Hitachi Denshi Amer. Ltd.	404-451-9453
GA	Smyrna, BC Elctrns.	404-436-5169
IL	Itasca, L-Tec	312-775-2900
IL	Melrose Park, Hitachi Denshi Amer. Ltd.	312-344-4020
IN	Indianapolis, Loren Green Assocs.	317-293-9827
MA	Burton, Forrester	617-848-7234
MI	Lathrup Village, R. C. Nordstrom & Co.	313-559-7373
MN	Eden Prairie, Electronics Instr. Conslts.	612-937-9701
NY	Auburn, ADN Enterprises	315-255-2701
OH	Westlake, KRW Sls.	216-871-7521
TX	Dallas, Hitachi Denshi Amer. Ltd.	214-233-7623
TX	Dallas, SW Mktg. Assocs.	214-341-8631
WA	Tumwater, Weeks & Assocs.	206-943-1079

Local Distributors

CA	Canoga Park, RAG Entprs.	213-998-6500
CA	Chatsworth, Priority I Elctrns.	213-709-5464
CA	Palo Alto, Metermaster	415-968-0313
CA	Sacramento, Zackit Corp.	916-446-3131
CA	San Diego, Instrument Engrs.	619-278-8037
CA	Van Nuys, Testek Corp.	213-786-6890
CO	Boulder, Instr. Repair Labs	303-449-2721
CO	Denver, CW Elctrns. Sls.	303-832-1111
CT	Norwalk, Park Distrs.	203-853-2011
CT	West Hartford, Signal Elctrn. Center	203-233-8551
FL	Ft. Lauderdale, Southeastern	305-563-4131
FL	Miami, Walder Elctrns.	305-379-4794
FL	Tampa, Hammond Elctrns.	813-253-0104
GA	Decatur, EME II	404-325-0165
HI	Honolulu, R. W. Tully Co.	808-836-0838
IL	Niles, Joseph Elctrns.	313-297-4200
IL	S. Holland, Union Elctrns.	312-333-4100
IA	Davenport, Waren Radio Co.	319-322-5301
KS	Wichita, Radio Supp.	316-267-5213
LA	Metairie, Pelican Elctrn. Supp.	504-888-4720
LA	Shreveport, Whls. Elctrn. Supp.	318-222-2063
MD	Savage, Pyttronic Inds.	301-792-0780
MA	N. Billerica, AST/Servo System	617-667-8541
MA	N. Wilbraham, Industrial Comps.	413-596-3854
MA	Waltham, Calibron Instrs.	617-894-6440
MI	Clawson, Radio Supp. & Engrg.	313-435-5660

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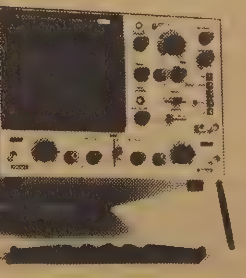

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West (Outside CA) 1-800-732-3457

East (Outside NJ) 1-800-922-0945

MN	Minneapolis, Stark Elctrn.	612-333-3361
MO	St. Louis, Olive Elctrns.	314-426-4500
NJ	N. Caldwell, Hosica Labs.	201-256-7724
NJ	Ocean, RAG Entprs.	201-544-0666
NJ	Pinebrook, Parts Masters Inc.	201-227-7797
NM	Santa Fe, A-1 Comms. Supp.	505-982-4488
NY	Great Neck, Instr. Mart	516-487-7430
NY	New York, Advance Elctrns.	212-730-7030
NY	Rochester, R. Baker Elctrns.	716-586-9164
NY	Rochester, Goldcrest Elctrns.	716-546-8464
NY	Rockville Center, Midway Indl. Elctrns.	516-764-2400
NY	Schenectady, Adirondack Elctrns.	518-346-4717
NC	Greenville, Pair Elctrns.	919-756-2291
OK	Oklahoma City, Whls. Elctrns. Supp.	405-528-2391
OK	Tulsa, Whls. Elctrn. Supp.	918-587-5516
PA	Allentown, A. A. Peters	215-434-5237
PA	Melrose Park, Robert Meyers Assoc.	215-224-1663
PA	Philadelphia, Sunshine Sci. Inst.	215-673-5600
RI	Providence, Hope Elctrns. Supp.	401-521-5600
TN	Nashville, Eddie Warners	615-254-1224
TX	Austin, Whls. Elctrn. Supp.	512-478-9568
TX	Austin, Electrotex	512-476-7644
TX	Beaumont, Electrotex	713-838-6421
TX	Corpus Christi, Electrotex	512-854-5306
TX	Dallas, Electrotex	214-234-0433
TX	Dallas, SJB Distrs.	214-343-1328
TX	Dallas, Whls. Elctrn. Supp.	214-824-3001
TX	Dallas, M. Hutton & Co.	214-661-9800
TX	Ft. Worth, Whls. Elctrns. Supp.	718-429-3956
TX	Houston, Electrotex	713-941-7016
TX	Houston, Electrotex	713-526-3456
TX	Houston, Electrotex	713-695-6851
TX	Longview, Whls. Elctrn. Supp.	214-757-3961
TX	Lufkin, Electrotex	713-632-4409
TX	Phoenix, Meter Master	602-243-4111
TX	Phoenix, Dalis Elctrn. Supp.	602-258-8151
TX	San Antonio, Electrotex	512-735-9271
TX	Waco, Whls. Elctrns. Supp.	817-752-9252
TX	Wichita Falls, Whls. Elctrn. Supp.	817-723-8106
UT	Provo, Central Utah Elctrns.	801-373-7522
VA	Richmond, I.T.R.	804-275-1431
VA	Vienna, Elctrn. Equip. Bank	703-938-3350
WA	Seattle, Radar Elec. Co.	206-282-2511
WA	Tumwater, JW Elctrns.	206-943-1079
WI	Madison, Schrenk Sls.	608-255-7400
WI	Mequon, Taylor Elec.	414-241-4321
WY	Casper, Hathaway Elctrns.	307-234-1821

HI-TECH, INC., 3600 16th St., Zion, IL 60099, Tel: 312-746-2447; Empl.: 35 ....**2**•1822

Local Sales Offices & Reps

AR	Fort Smith, Electro-Related Prods.	501-452-4030
CA	Woodland Hills, Glenn M. Stevenson Co.	213-348-5506
CT	South Windsor, Maher Assocs.	203-644-2481
FL	Orlando, Alcott Prods. Co.	305-295-5457
IL	Wood Dale, Power Prods.	312-595-1142
MA	Lynn, Maher Assocs.	617-581-3244
MI	Sheridan, MacDougall and Assocs.	517-291-3334
MN	Minneapolis, Elec. Comp. Sls.	612-933-2594
NJ	River Edge, Maher Assocs.	201-261-2225
OH	Seven Hills, Nenaoal Entprs.	216-524-4293
OR	Lake Oswego, Baxter Air Engrg.	503-635-3915
TN	Chattanooga, Wade Prods. Co.	615-266-2262
TX	Fort Worth, Terrell J. Small Co.	817-332-6352
WA	Bellevue, Baxter Air Engrg.	206-641-6118

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Local Sales Offices & Reps

AL	Huntsville, MacKay, Smith & Assoc.	205-539-8000
CA	Los Angeles, RF Assocs.	213-478-1586
CA	Palo Alto, RF Assocs.	415-494-3331
CT	Ridgefield, Manning & Assoc. Inc.	203-438-5027
CT	West Haven, Northeast Power Sys.	203-933-8222
FL	Ft. Lauderdale, MacKay, Smith & Assocs.	305-467-3888
FL	Orlando, MacKay, Smith & Assocs.	305-277-1513
FL	St. Petersburg, MacKay, Smith & Assocs.	813-393-7144
GA	Atlanta, MacKay, Smith & Assocs.	404-449-7444
HI	Honolulu, Aloha Assocs.	808-941-1574
ID	Boise, Calvert Controls	208-343-3964
MD	Elkton, Electro-Mek Sls.	301-398-8148
MT	Billings, Calvert Controls	406-252-0064
NJ	Wayne, G & A Sales	201-256-8500
NJ	Woodbury, Electro-Mek Sls.	609-423-5611
NY	Manlius, Electrotech Sys.	315-682-5346
NY	Moravia, Electrotech Sys.	315-497-1598
NY	Roslyn Hgts., G & A Sales	516-621-3223
NC	Charlotte, MacKay, Smith & Assocs.	704-372-1188
NC	Raleigh, MacKay, Smith & Assocs.	919-851-5000
OH	Dayton, Mohawk Intronics	513-434-8873
OR	Eugene, Calvert Controls	503-683-2018
OR	Portland, Calvert Controls	503-222-6473
PA	Harrisburg, Electro-Mek Sls.	717-589-7222
PA	Pittsburgh, Greye Glass Assocs.	412-366-6664
UT	Salt Lake City, Calvert Controls	801-531-8129
VA	Charlottesville, Marktron	804-973-5874
WA	Seattle, Calvert Controls	206-447-9375
WA	Spokane, Calvert Controls	509-244-3601
WA	Tri-Cities, Calvert Controls	509-545-4506

Local Distributors

FL	Winter Park, Elctrn. Technlg.	305-678-5876

HM ELCTRNS., 6151 Fairmount Ave., San Diego, CA 92120, Tel: 619-280-6050, Telex: 697-122; Empl.: 55; *Sls. Mgr.:* John Kenyon

HMW ENTERPRISES INC., 604 Salem Road, Etters, PA 17319, Tel: 717-938-4691, TWX: 510-650-3536; FSC No.: 06A150; Empl.: 40; *Sls. Mgr.:* Gerhard Schmutz

HOBART ENGRG., 4143 Cheshire Dr., Cypress, CA 90630, Tel: 714-827-2135; *Sls. Mgr.:* D. C. Hobart

HOBBS, Div. of Steward Warner, Ash at Yale Blvd., Springfield, IL 62705, Tel: 217-753-7600

HOBSON BROS., 4940 W. Lawrence Ave., Chicago, IL 60630-3884, Tel: 312-283-3600; Empl.: 75; *Sls. Mgr.:* H. L. Behm

Local Sales Offices & Reps

CA	Fremont, Spence Assocs.	415-656-9506
CA	Los Angeles, Corcoran Assocs.	213-823-4589
IN	Indianapolis, Specialty Mfrs.	317-635-2723
NY	Buffalo, R. W. Mitscher Co.	716-633-7970
NC	Raleigh, R. W. Mitscher Co.	919-848-0941
WA	Bothell, Temco Northwest	206-488-1254

HOFFMAN, P.R., CO., DIV. AIKEN INDS., See Hoffman, P.R., Co.

HOFFMAN, P. R., CO., MATERIALS PROCESSING DIV., Amstar Tech. Prods. Co., Inc., 321 Cherry St., Carlisle, PA 17013, Tel: 717-243-2011, TWX: 510-650-2285; Empl.: 150

HOFFMAN ENGRG., Federal Cartridge, 9th & Tyler Sts., Anoka, MN 55303, Tel: 612-421-2240, Telex: 29-0499, TWX: 910-578-2211; *Sls. Mgr.:* Larry Muehlbauer

HOFFMAN ENGRG. CORP., 183 Sound Beach Ave., Old Greenwich, CT 06870, Tel: 203-637-1719; FSC No.: 06097; *Sls. Mgr.:* Richard H. Hulit

HOFFMAN INDUSTRIAL PRODS., 170 Allen Blvd., Farmingdale, NY 11735, Tel: 516-293-5244, Telex: 14-4578; Empl.: 30; *Sls. Mgr.:* Sy Friedman; *Dist. Mgr.:* J. Dunnells

HOKE, 1 Tenakill Pk., Cresskill, NJ 07626, Tel: 201-568-9100, Telex: 135428; *Sls. Mgr.:* David Grim; *Dist. Mgr.:* Len Bruscia

HOLADAY INDUSTRIES, INC., 14825 Martin Drive, Eden Prairie, MN 55344, Tel: 612-934-4920, Telex: 290922; *Sls. Mgr.:* Burton Gran

HOLLEX, INC., 81 W. Wyoming Ave., Melrose, MA 02176, Tel: 617-665-2413; Empl.: 28; *Sls. Mgr.:* H. E. Holley; *Dist. Mgr.:* H. E. Holley

HOLLINGSWORTH SOLDERLESS TERMINAL CO., 700 N.W. 57th Pl., Ft. Lauderdale, FL 33309, Tel: 305-772-7660, Telex: 846143; Empl.: 750; *Sls. Mgr.:* Terry Rodenhaver

HOLLIS ENGRG., INC., Charron Ave., Box 1189, Nashua, NH 03061, Tel: 603-889-1121, TWX: 710-228-1881; Empl.: 121; *Sls. Mgr.:* R. Abercrombie

HOLLIS ENGRG./WIRE-WRAP, 15 Charron Ave., Nashua, NH 03061, Tel: 603-889-1121, Telex: 710-2281881; Empl.: 250; *Sls. Mgr.:* Gary Barrett

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Local Sales Offices & Reps

AZ	Phoenix, M. R. Engrg.	602-956-4670
AZ	Scottsdale, Fred Board & Assoc.	602-994-9388
CA	San Diego, Hadden Assoc., Inc.	619-565-9444
CO	Aurora, Electrodyne	303-695-8903
FL	Boca Raton, Lawrence Assoc.	305-368-7373
FL	Clearwater, Lawrence Assoc.	813-443-2698
GA	Lawrenceville, B.T.F. Inc.	404-963-9495
IL	Downers Grove, Momak Sls.	312-963-6400
IN	Indianapolis, Elctrn. Mktg. Consul. (EMCI)	317-253-1668
MA	Lexington, Circuit Sls.	617-861-0567
MN	Edina, Monroe Hanna	612-925-5700
NJ	Livingston, Varrellman-Gorman Co.	201-992-2505
NM	Alburquerque, Fred Board & Assoc.	505-293-1399
NY	Binghamton, Empire Technical Assoc.	607-772-0651
NC	Henderson, B.T.F., Inc.	919-438-7570
NC	Raleigh, B.T.F. Inc.	919-782-3493
OH	Dayton, Del Steffen & Assoc.	513-293-3145
OR	Portland, Barrett-Squibb	503-644-2550
TX	Dallas, Erickson Sls.	214-739-5833
UT	Salt Lake City, Electrodyne	801-486-3801
WA	Redmond, Barrett- Squibb	206-885-6991
WI	Milwaukee, Momak Sls.	414-962-9576
EXP	SC, Inman, Holmberg Elctrns.	803-472-2821
PR	Hato Rey, Karden Corp.	809-765-7355

Local Distributors

AZ	Mesa, Bergquist Co.	602-986-4271
AZ	Phoenix, Arizona Comps.	602-279-9446
AZ	Tempe, Bell Inds., Elctrn.	602-966-7800
CA	Belmont, Lodan, Inc.	415-592-4600
CA	Cerritos, El-Com Sls.	714-739-5656
CA	Fountain Valley, Component Center	714-979-0433
CA	Irvine, Product Supply	714-641-8736
CA	Riverside, Electronic Supply	714-683-7300
CA	Sacramento, Integrated Elctrns.	916-424-5297
CA	San Diego, El-Com Sls.	619-578-0900
CA	San Francisco, Peters-De Laet	415-873-9595
CA	San Jose, Cypress Elctrns.	408-945-8400
CO	Denver, CSID Elctrns.	303-893-9594
CT	Yalesville, Schaal Assoc.	203-269-3779
FL	Ft. Lauderdale, KSM Elctrns.	305-971-5900
FL	Longwood, Intertec Comps.	305-834-7777
FL	Orlando, Deanco	305-671-5100
GA	Atlanta, K.S.M.	404-458-2013
GA	Cumming, Pan American	800-554-9796
GA	Marietta, Deanco	404-429-0126
IL	Addison, K.S.M.	312-953-9473
IL	Arlington Hgts., Lodan Elctrns.	312-398-5311
IL	Lisle, Comps., Inc.	312-852-7707
IN	Indianapolis, RM Indiana	800-792-3445
IA	Cedar Rapids, Bergquist Co.	319-366-8733
MD	Baltimore, Whitney Distr.	301-944-8080
MD	Baltimore, Resco-Baltimore	301-823-0070
MD	Beltsville, Resco/Washington	301-937-9100
MD	Gaithersburg, Deanco	301-948-5444
MA	Burlington, Deanco	617-272-1506
MA	Burlington, Schaal Assocs.	617-272-7940
MA	Natick, Tec-Con	617-655-9333
MI	Grand Rapids, S&F Elec.	616-459-0216
MN	Minneapolis, Cassidy Elctrns.	612-835-7746
MN	Minneapolis, Bergquist Co.	612-835-2322
MO	Kansas City, Finnigan Elctrns.	816-421-4277
NJ	Fairfield, Deanco	201-575-7960
NJ	Whippany, Tonar Inds.	201-884-1400
NY	Hauppauge, Schaal Assocs.	516-234-4600
NY	Ithaca, Deanco	607-257-4444
NY	Lynbrook, Peerless Radio Corp.	516-593-212
NY	Rome, Rome Elctrns.	315-476-2033
NC	Raleigh, Century	919-872-2203
NC	Raleigh, Deanco	919-851-2065
OH	Dayton, Televox, Inc.	513-294-4499
OR	Lake Oswego, Bell Inds.	503-241-4115
OR	Lake Oswego, Rose Elctrn. Distr. Co.	503-635-8823
PA	Montgomeryville, Pytronic Ind., Inc.	215-643-2850
PA	Norristown, Century Elctrn. Comps.	215-631-5400
TN	Memphis, Nealco Dist.	901-353-124
TX	Corpus Christi, Douglas Elctrns.	512-883-510
TX	Ft. Worth, Texas Connector	817-246-010
UT	Salt Lake City, Diplomat	800-453-550
VA	Virginia Beach, Deanco	804-460-355
WA	Bellevue, Bell Inds.	206-747-151
WA	Redmond, Murphy Elctrns.	206-881-123

HOLT INC., 8 Chrysler Ave., Irvine, CA 92714, Tel: 714-859-8800, Telex: 753307; Empl.: 102; *Sls. Mgr.:* Mark Ellsberry

HOLT LLOYD CORP., LPS Chem. Prods., 4647 Hugh Howell Rd., Tucker, GA 30084, Tel: 404-934-7800, TWX: 810-766-4920; *Sls. Mgr.:* Les Gable

HOLUB INDUSTRIES, 1701 W. Bethany Rd., Sycamore, IL 60178, Tel: 815-895-6501, Telex: 25-7359; Empl.: 90; *Sls. Mgr.:* R. J. Morrison

HONEYWELL INC., Aerospace & Defense Grp., Honeywell Plaza, Minneapolis, MN 55408, Tel: 612-870-5186, TWX: 910-576-2692; Empl.: 15,000

HONEYWELL INC., Commercial Div., MN 27-7246, Honeywell Plaza, Minneapolis, MN 55408, Tel: 612-870-5346

HONEYWELL INFO. SYS., 200 Smith St., MS 440, Waltham, MA 02154, Tel: 617-895-6000

HONEYWELL MICRO SWITCH DIV., See Micro Switch, a Honeywell Division

Honeywell

HONEYWELL OPTOELECTRONICS, 830 E. Arapaho Dr., Richardson, TX 75080, Tel: 214-234-4271, Telex: 73-0890; Empl.: 300; *Sls. Mgr.:* Joe Tucker; *Dist. Mgr.:* Joe Tucker ....**1B**•1112, 1113, 1220-1230

Local Sales Offices & Reps

AL	Huntsville, RM Alabama	205-852-1550
AZ	Phoenix, Cetec Elctrns.	602-272-7951
CA	Anaheim, Honeywell Optoelectronics	714-956-4410
CA	Cupertino, Western Micro	408-725-1660
CA	Glendale, Orion Sales, Inc.	213-240-3151
CA	Inglewood, Force Elctrns.	213-776-1324
CA	Irving, Cetec Elctrns.	714-250-4141
CA	San Diego, Force Elctrns.	619-569-9661
CA	San Diego, Cetec Elctrns.	619-278-5020
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	Santa Clara, Force Elctrns.	408-739-1324
CA	Santa Clara, I⅜¢2 Inc.	408-988-3400
CA	South Gate, Cetec Elctrns.	213-773-6521
CO	Denver, Integrated Elctrns.	303-534-6121
CO	Englewood, Delta Sls. Assocs.	303-741-0646
CO	Englewood, Honeywell Optoelctrns.	303-779-6541
CT	Glastonbury, Honeywell Optoelctrns.	203-659-4011
CT	Stanford, Bond	203-348-2663
DE	Huntington Valey, Knowles Assocs.	215-947-5641
FL	Coral Springs, E.P.M.	305-752-0054
FL	Ft. Lauderdale, Hammond	305-973-7103
FL	Orlando, Hammond	305-849-6060
GA	Atlanta, E.M.A. Inc.	404-448-1215
L	Bensenville, Honeywell Optoelctrns.	312-860-3984
L	Chicago, NEP Elctrns.	312-625-8400
L	Elk Grove Village, Oasis Sales	312-640-1850
L	Lombard, RM Illinois	312-932-5150
L	Rosemont, Advent	312-297-6200
N	Indianapolis, Advent	317-872-4910
N	Indianapolis, Elctrn. Sls. and Engrg.	317-849-4260
N	Indianapolis, Advent	317-247-9701
A	Cedar Rapids, Dy-Tronix, Inc.	319-377-8275
A	Cedar Rapids, Advent	319-363-0221
KS	Wichita, LCOMP, Inc.	316-265-8501
KS	Wichita, LComp	316-265-8501
MD	Baltimore, Whitney	301-944-8080
MD	Baltimore, Whitney	301-944-8080
MD	Glen Burnie, Stinson Assocs.	301-760-8878
MA	Burlington, Lionex	617-272-9400
MA	Newton, Gerber Sls.	617-969-2620
MA	Newton Lower Falls, Honeywell Optoelctrns.	617-923-7675
MA	W. Newton, A. W. Mayer	617-965-1111
MI	Grand Rapids, RM Michigan	616-531-9300
MI	Novi, Action Comps.	313-349-3940
MN	Bloomington, Com-Tek Sls.	612-888-7011
MN	Minneapolis, Industrial Comp.	612-831-2666
MO	Bridgeton, Dy-Tronix, Inc.	314-731-5799
MO	Independence, Dy-Tronix, Inc.	816-373-6600
MO	Kansas City, LComp	816-221-2400
MO	Maryland Heights, LComp	314-291-6200
NH	Hudson, C&H Elctrns.	603-882-1133
NJ	Bellmawr, Mid Atlantic	609-931-5303
NJ	Fairfield, Lionex Corp.	201-227-7960
NJ	Fairfield, Lionex	201-227-7960
NM	Albuquerque, B.F.A. Corp.	505-292-1212
NM	Albuquerque, Elctrn. Devices	505-884-2950
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Endwell, Noeth Honsinger Assocs.	607-754-3214
NY	Hauppauge, Lionex	516-273-1660
NY	Ilion, Noeth Honsinger Assocs.	315-894-9943
NY	Pittsford, Noeth Honsinger Assocs.	716-586-9002
NY	Port Chester, Zeus Comps.	914-937-7400
NY	Rochester, Honeywell Optoelctrns.	716-424-2700
NC	Greensboro, Hammond	919-275-6391
NC	Raleigh, E.M.A. Inc.	919-847-8800
OH	Akron, B.J. David Corp.	216-645-0517
OH	Cincinnati, Schuster Elec.	513-489-1400
OH	Columbus, Hughes-Peters	614-294-5351
OH	Twinsburg, Schuster Elec.	216-425-8134
OR	Portland, Jas. J. Backer Co.	503-297-8744
PA	Feasterville, Knowles Assocs.	215-322-7100
PA	Horsham, Lionex	215-443-5150
SC	Greenville, E.M.A. Inc.	803-233-4637
SC	Greenville, Hammond	803-233-4121
TX	Austin, Harrison Equip. Co. Inc.	512-458-3555
TX	Dallas, Harrison Equip. Co. Inc.	214-239-2750
TX	Houston, Harrison Equip. Co. Inc.	713-879-2727
TX	Houston, Force Elctrns.	713-772-8483
TX	Irving, Force Elctrns.	214-438-5700
TX	Richardson, Honeywell Optoelctrns.	214-234-4271
UT	Salt Lake City, Integrated Elctrns.	801-298-1869
VA	Charlottesville, Stinson Assocs.	804-973-2678
VA	Cloverdale, Stinson Assocs.	703-992-5459
VA	Rustin, Stinson Assocs.	703-471-0723
WA	Kent, Shannon Ltd.	206-763-0540
WA	Seattle, Jas. J. Backer Co.	206-285-1300
WI	Brookfield, Oasis Sales	414-782-6660
WI	Mequon, Taylor Elec. Co.	414-241-4321

HONEYWELL, Process Control Div., 1100 Virginia Dr., Ft. Washington, PA 19034, Tel: 800-321-5111, Ext. 596, TWX: 510-661-0328; Empl.: 2500

Local Sales Offices & Reps

AL	Birmingham	205-945-3500
AZ	Phoenix	602-861-4402
AR	Little Rock	501-664-0070
CA	Los Angeles	213-726-6000
CA	San Francisco	415-957-2500
CO	Englewood	303-779-6200
CT	Hartford	203-549-3800
FL	Orlando	305-894-3131
GA	Atlanta	404-982-2000
IL	Lansing	312-474-9300
IL	Park Ridge	312-296-0710
IN	Indianapolis	317-243-0831
IA	Davenport	319-359-3441
KS	Wichita	316-522-3431
KY	Louisville	502-459-5970
LA	Baton Rouge	504-924-8601
ME	Portland	207-775-3501
MD	Baltimore	301-667-4020
MA	Newton	617-969-0250
MI	Farmington Hills	313-478-1600
MI	Grand Rapids	616-247-4811
MN	Minneapolis	612-830-3500
MS	Jackson	601-957-1025
MO	St. Louis	314-576-2500
NE	Omaha	402-331-3200
NJ	Westfield	201-233-9200
NM	Albuquerque	505-884-1070
NY	Albany	518-456-7000
NY	Syracuse	315-451-4000
NC	Charlotte	704-364-4770
OH	Cleveland	216-459-6000
OK	Oklahoma City	405-848-2811
OR	Portland	503-245-0721
PA	Philadelphia	215-666-8200
SC	Columbia	803-779-3280
TN	Memphis	901-345-6222
TX	Houston	713-780-6500
UT	Salt Lake City	801-487-0681
VA	Richmond	804-285-8211
WA	Seattle	206-233-2000
WV	Charleston	304-766-8000
WI	Milwaukee	414-784-6260

HONEYWELL, Test Instrs. Div., P.O. Box 5227, Denver, CO 80217, Tel: 303-773-4700, Telex: 45793 DVR; Empl.: 850; *Sls. Mgr.:* Frank Doherty

HOPKINS ENGRG., 12900 Foothill Blvd., San Fernando, CA 91342, Tel: 213-361-8691, TWX: 910-496-1531; FSC No.: 02777; Empl.: 100; *Sls. Mgr.:* Gary M. Smith; *Dist. Mgr.:* Clyde M. Salisbury

HOPT, KARL, CO., 118 First Ave., Atlantic Highlands, NJ 07716, Tel: 201-291-0633, Telex: 132496; Empl.: 400; *Sls. Mgr.:* G.C. Ellis

HOTPACK CORP., Heinicke Instrs., 10940 Dutton Rd., Philadelphia, PA 19154, Tel: 215-824-1700, 800-523-3608, TWX: 710-670-1694; FSC No.: 66; Empl.: 100; *Sls. Mgr.:* Ed Hammer

Hotpack is a manufacturer and is sold direct. To contact the salesman in your area call 800-523-3608 or 215-824-1700.

HOTTINGER BALDWIN MEASUREMENTS, 139 Newberry St., Framingham, MA 01701, Tel: 617-875-8282, Telex: 94-8499; Empl.: 179; *Sls. Mgr.:* Robert Haggerson

HOUSE OF METAL ENCLOSURES, Box 225, Hermann, MO 65041, Tel: 314-486-3111; Empl.: 55; *Sls. Mgr.:* Richard L. Kastel

HOUSTON INSTRUMENT, Div. Bausch & Lomb, P.O. Box 15720, Austin, TX 78761, Tel: 512-835-0900, TWX: 910-874-2022; Empl.: 450; *Dist. Mgr.:* Rod Schaffner

HOWARD INDS., Box 287, Milford, IL 60953, Tel: 815-889-4105, TWX: 910-642-2950; FSC No.: 815-889-4105; Empl.: 500; *Sls. Mgr.:* Ralph Young; *Dist. Mgr.:* Al Mancuso

HOWELL INSTRS., 3479 W. Vickery Blvd., Ft. Worth, TX 76107, Tel: 817-336-7411, Telex: 75-8233; FSC No.: 98869; Empl.: 180; *Sls. Mgr.:* Bruce Pike

HTL ELECTRO KINETICS, 402 E. Gutierrez St., Santa Barbara, CA 93101, Tel: 805-963-2055, TWX: 910-334-1177; Empl.: 180; *Sls. Mgr.:* Robert E. Lynch

HUDSON TOOL & DIE CO., INC., 18 Malvern St., Newark, NJ 07105, Tel: 201-589-1800, TWX: 710-995-4445; FSC No.: 02875; Empl.: 300; *Sls. Mgr.:* William Miller

HUGHES AIRCRAFT CO., 6155 El Camino Real, Carlsbad, CA 92008, Tel: 619-438-9191, TWX: 910-322-1393; Empl.: 1000

HUGHES AIRCRAFT CO, Aerospace Grps./Support Sys., P.O. Box 90515, Los Angeles, CA 90009, Tel: 213-670-1515, Telex: 67222, TWX: 213-871-5210; *Sls. Mgr.:* W. L. Pemberton

HUGHES AIRCRAFT CO., Connecting Devices Div., 17150 Von Karman Ave., Irvine, CA 92714, Tel: 714-660-5701, TWX: 910-595-2523; FSC No.: 53669; Empl.: 700; *Sls. Mgr.:* Phil Larson

HUGHES AIRCRAFT CO., Electron Dynamics Div., 3100 W. Lomita Blvd., P.O. Box 2999, Torrance, CA 90509, Tel: 213-517-6000, Telex: 67-7064, TWX: 910-347-7321; Empl.: 2,748; *Sls. Mgr.:* Robert L. Woods

Local Sales Offices & Reps

AZ	Phoenix, Odyssey 1	602-246-8846
CA	Anaheim, Blair Assocs.	714-635-1350
CA	San Jose, MCH Assocs.	408-246-7330
CO	Littleton, FG Mktg.	303-795-9176
FL	Orlando, E. G. Holmes & Assocs.	305-894-8901
GA	Chamblee, E. G. Holmes & Assocs.	404-451-6161
IL	Mt. Prospect, Cain-Forlaw Co.	312-253-3578
MD	Columbia, M. Lader Co.	202-296-2497
MO	Kansas City, EIR Co.	816-452-7030
MO	Leasburg, EIR Co.	314-895-4100
NH	Nashua, JPR Electronic Sls.	603-889-8285
NM	Albuquerque, Odyssey 1	505-265-6645
NY	Fayetteville, R.D. Sherman	315-637-9861
NY	New Rochelle, Ascor Elctrns.	914-235-8838
OH	Lancaster, Cain-Forlaw	614-654-4800
PA	Lafayette Hill, M. Lader Co.	215-825-3177
WA	Bellevue, Arva-Hudson, Inc.	206-455-0773

HUGHES AIRCRAFT CO., Indl. Prods. Div. FACT Sys., 6155 El Camino Real, Carlsbad, CA 92008, Tel: 619-438-9191, Telex: 672222, TWX: 910-322-1393; *Sls. Mgr.:* R. L. Giusti

HUGHES AIRCRAFT CO., Microelctrn. Sys. Div., 2601 Campus Dr., Irvine, CA 92715, Tel: 714-752-3800, TWX: 910-595-2435; *Sls. Mgr.:* J. L. Waters

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HUGHES SOLID STATE PRODUCTS, 500 Superior Ave., Dept. E8, Newport Bch., CA 92663, Tel: 714-759-2411, TWX: 910-596-1374 ....**1A**•1362-1365

Local Sales Offices & Reps

AL	Huntsville, L & D Inc.	205-837-1469
AZ	Phoenix, Toward Engrg. Assocs.	602-955-3193

CA	Mountain View, Weseloh/Swanson	415-961-0565
CA	San Diego, Wes-K Assocs.	619-295-3501
CA	Van Nuys, Wes-K Assocs.	213-989-3070
CT	Ansonia, R. H. Sturdy Co.	203-734-2186
CT	Rocky Hill, R. H. Sturdy Co.	203-563-8455
FL	Clearwater, Delmac Sls.	813-447-5192
FL	Orlando, Delmac Sls.	305-898-4688
FL	Tamarac, Delmac Sls.	305-726-1330
GA	Atlanta, L & D Inc.	404-455-3483
IL	Elk Grove Village, Carlson Elctrn. Sls.	312-956-8240
IN	Indianapolis, J & W Sales	317-842-3740
IA	Cedar Rapids, Carlson Elctrn. Sls.	319-377-6341
KS	Shawnee Mission, Technical Sls. Assocs.	913-888-3330
MD	Glen Burnie, Faion Lott & Co.	301-744-4611
MA	Salisbury, R. H. Sturdy Co.	617-465-1505
MA	Wellesley Hills, R. H. Sturdy Co.	617-235-2330
MI	Livonia, Luebbe Sls.	313-477-3131
MN	Minneapolis, Deming (Bill) & Assocs.	612-888-5000
MO	Ferguson, Technical Sls. Assocs.	314-725-5361
NY	Endwell, Tri-Tech Elctrns.	607-754-1094
NY	Fairport, Tri-Tech Elctrns.	716-223-5720
NY	Fayetteville, Tri-Tech Elctrns.	315-446-2881
NY	Great Neck, Cooper-Simon & Co.	516-487-1142
NY	Poughkeepsie, Tri-Tech Elctrns.	914-473-3880
NC	Greensboro, L & D Inc.	919-292-3201
NC	Raleigh, L & D Inc.	919-876-5301
OH	Cincinnati, Luebbe Sls.	513-891-5770
OH	Cleveland, Luebbe Sls.	216-333-0425
OH	Columbus, Luebbe Sls.	614-431-0474
OH	Dayton, Luebbe Sls.	513-294-0426
PA	Bala Cynwyd, Electro-Comp Sls.	215-667-9360
PA	Pittsburgh, Luebbe Sls.	412-931-0414
TX	Dallas, Southern States Mktg.	214-248-8600
TX	Houston, Southern States Mktg.	713-988-0991
WI	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

HUGHEY & PHILLIPS, INC., 3050 N. California St., Burbank, CA 91504, Tel: 818-849-1104, TWX: 910-498-2252; FSC No.: 94295; Empl.: 38; *Sls. Mgr.:* C.L. Phillis; *Dist. Mgr.:* C.L. Phillis

HUGIN INDS. INC., 745 Distel Dr., Los Altos, CA 94022, Tel: 415-961-2950, Telex: 348 399; Empl.: 4; *Sls. Mgr.:* Peter Hugin

Local Sales Offices & Reps

IL	Chicago, Patton Sls.	312-325-2170
NJ	Tenafly, D&D Engrg.	201-568-5032
NY	Rochester, Irondequoit Inds.	716-544-6257
NC	Fayetteville, Zim-Tek	919-485-2222
OH	Dover, AJ Assocs.	216-343-2224

HULL CORP., Davisville Rd., Hatboro, PA 19040, Tel: 215-672-7800, TWX: 510-665-6822; Empl.: 200; *Sls. Mgr.:* Ken Haywood

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HUMISEAL DIV., 26-60 Bklyn. - Queens Expwy., Woodside, NY 11377, Tel: 212-932-0800, TWX: 710-582-2141; FSC No.: 99109; Empl.: 150 .... **2**•1083

Local Sales Offices & Reps

AL	Huntsville, BJR Mfg. Reps.	205-881-3569
AZ	Phoenix, Coker & Assocs.	602-277-7148
CA	Alhambra, M. W. Riedel & Co.	213-283-7694
CA	Mountain View, Target Elctrns.	415-961-1170
CO	Arvada, Arrowhead Sls.	303-423-5556
CT	Bridgeport, Betronic Assocs.	203-374-6404
FL	Casselberry, Barrett Assocs.	305-699-0311
IL	Hillside, Miltex Sales Corp.	312-449-0420
KS	Kansas City, L. E. Bruns Co.	913-287-5242
MD	Baltimore, Advanced Tech. Sls.	301-583-8252
MA	Waltham, Betronic Assocs.	617-894-8400
MI	Birmingham, W. R. Cline	313-642-2526
MN	Bloomington, Smiley-Scott Assoc.	612-888-5551
NJ	Florham Park, H. Thaw Sls.	201-992-2711
NY	Rochester, Gislason Sls.	716-454-4741
NC	Charlotte, Reynolds Cowardin Assocs.	704-596-6898
OH	Cleveland, Marlow Assocs.	216-991-6500
PA	Pittsburgh, Marlow Assocs.	412-367-8886
TX	Dallas, R. D. Spooner Co.	214-357-6636
VA	Richmond, Reynolds Cowardin Assocs.	804-266-3457
WA	Kirkland, R. R. Chase & Assocs.	206-823-6500

Local Distributors

CA	Alhambra, ULTEX	213-283-7694
CA	Mountain View, Target Elctrns.	415-961-1170
TX	Dallas, R. D. Spooner Co.	214-357-6636
WA	Kirkland, R. R. Chase & Assocs.	206-823-6500
WI	Milwaukee, Ellsworth Sys.	414-352-1230
Intl	England, Surrey, Woking, Concoat Ltd.	(04862) 6944/14
Intl	France, Paris, Spetelec	686-56-65, 25801
Intl	Japan, Tokyo, Bokusui Brown	572-8851, J22491
Can	Scarborough, Ont., Paisley Prods.	416-755-2216

HUMPHREY, INC., 9212 Balboa Ave., San Diego, CA 92123, Tel: 619-565-6631, TWX: 910-335-2001; Empl.: 220

Local Sales Offices & Reps

CA	Los Angeles, L.L. Stoakes Inc.	213-640-2178
CA	Palo Alto, Harris Assocs.	415-328-3370
CA	San Diego, L.L. Stoakes Inc.	714-452-1600
FL	Orlando, Gra-Mar, Inc.	305-894-3351
IN	Carmel, Carter, McCormic & Peirce	317-844-4175
KS	Wichita, Humphrey, Inc.	316-685-7563
MA	Cochituate, High Tech Sls. Inc.	617-653-3838
MI	Farmington, Carter, McCormick & Peirce	313-477-7700
NY	Plainview, Eastern Metro Assocs.	516-931-1414
OH	Cleveland, Carter, McCormick & Peirce	216-779-5100
OH	Englewood, Carter, McCormick & Peirce	513-836-0951
PA	Philadelphia, Humphrey, Inc., Eastern Div.	215-632-6040
PA	Pittsburgh, Carter, McCormick & Peirce	412-824-3760
TX	Dallas, W.N. Rider Co.	214-357-2246
TX	El Paso, Nokomis of El Paso	915-778-2801
TX	Houston, Humphrey, Inc.	713-774-2004
WA	Nine Mile Falls, H. R. Davis Tech. Sls.	509-466-1532

HUNTER STANLEY ELEC., 208 Russell St., Nashville, TN 37213, Tel: 615-254-6532; FSC No.: 21675; Empl.: 10; *Sls. Mgr.:* W. D. Stanley

HUNTER TOOLS, 6721 Baymeadow Dr., Glen Burnie, MD 21061, Tel: 301-760-2200; Empl.: 450

HUNTINGTON ELECTRIC INC., P.O. Box 366, Dept. EEM 80-81, Huntington, IN 46750, Tel: 219-356-0778; *Sls. Mgr.:* Robert Smith

HUNTRON INSTRS., INC., 15123 Highway 99, Lynnwood, WA 98036, Tel: 206-743-3171, 800-426-9265, Telex: 152951 Hunt Inst, TWX: Lywd; FSC No.: 57705; *Sls. Mgr.:* Jim Crosson; *Dist. Mgr.:* Jim Crosson

HURST MFG. CORP., Box 326, Princeton, IN 47670, Tel: 812-385-2564; Empl.: 200; *Sls. Mgr.:* W. W. Taylor

Local Sales Offices & Reps

AZ	Phoenix, Sierra Ind. Eng.	602-272-0084
CA	Los Angeles, Sierra Ind'l. Engrg. Co.	213-624-3123
CA	San Jose, Sierra Ind'l. Engr. Co.	408-274-7041
CO	Denver, Comp. Sls.	303-759-1666
FL	St. Petersburg, Tech-Rep Assoc.	813-577-2779
IL	Chicago, Jerry Golten Co.	312-792-1991
IN	Indianapolis, Pacer Sls. & Engrg. Co.	317-849-1481
MD	Glen Arm, Hodgins Assoc.	301-592-7047
MA	Lexington, Hathaway Elctrns.	617-861-7010
MI	Grand Rapids, R. Van Riper Sls.	616-452-0464
MN	Minneapolis, Giefer Sls. Co.	612-884-2395
MO	Ferguson, Kinrick Co.	314-521-4877
NJ	Little Falls, D. Carbone	201-256-9191
NM	Phoenix, Sierra Ind. Eng.	602-272-0084
NY	Rochester, W.H. Zimmerman Co.	716-586-4450
NY	Syracuse, W.H. Zimmerman Co.	315-474-4889
NC	Garner, Candor Co.	919-876-4999
OH	Chagrin Falls, Kilroy Sls. Co.	216-247-8997
SC	Myrtle Beach, Candor Co.	803-448-8361
TX	Houston, C.R. Colvin Assoc.	713-961-1262
TX	Richardson, Campion Sales Co.	214-238-8145
UT	Salt Lake City, Comp. Sls.	801-466-8623
WA	Seattle, Rep-West	206-283-8351
WI	Milwaukee, Badgerep Inc.	414-258-6630
EXP	NY, Freeport, Minthorne Int'l.	516-546-4700

HUTSON INDS., 1000 Hutson Cir., Frisco, TX 75034, Tel: 214-377-3557, TWX: 910-860-5051; *Sls. Mgr.:* Bill Giles

HYBRICON CORP., 410 Great Rd., Littleton, MA 01460, Tel: 617-486-3174, TWX: 710-347-0654; Empl.: 62; *Sls. Mgr.:* Richard W. Palmer

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Phoenix, Cristee-Meade Co.	602-267-7197
AR	Little Rock, Beacon Elctrns.	501-224-5449
CA	Inglewood, Basic Sys. Corp.	213-673-4300
CA	San Diego, Basic Sys. Corp.	619-268-8000
CA	Santa Clara, Basic Sys. Corp.	408-727-1800
CO	Lakewood, Cristee-Meade Co.	303-232-0287
FL	Ft. Lauderdale, Beacon Elctrns.	305-491-1054
GA	Atlanta, Beacon Elctrns.	404-256-9640
KS	Wichita, DLE Elctrns.	316-744-2126
MD	Churchville, Atlantic Tech. Sls.	301-879-2236
NH	Salem, OEM Mktg. & Sls.	603-893-0009
NY	Jericho, J-Square Mktg.	516-935-3200
NC	Raleigh, Beacon Elctrns.	919-787-0330
OH	Cincinnati, Applied Data Mgmt.	513-579-8108
OR	Beaverton, Elctrns. Tech. Sls. Assoc.	503-641-5780
PA	Huntingdon Valley, Lynbar Grp. Inc.	215-947-3554
TX	Dallas, Jim D. Gray & Assocs.	214-341-7190
WA	Kirkland, Elctrns. Tech. Sls. Assoc.	206-827-8086

HYBRID ELCTRNS., 142 Adams St., Newton, MA 02158, Tel: 617-527-2711; Empl.: 28; *Sls. Mgr.:* D. Kates

HYBRID SVCS. INC., 38 Main St., North Reading, MA 01864, Tel: 617-664-5500; Empl.: 45; *Sls. Mgr.:* Richard A. Vogel

HYBRID SYSTEMS CORP., 22 Linnell Circle, Billerica, MA 01821, Tel: 617-667-8700, TWX: 710-347-1575; Empl.: 250; *Sls. Mgr.:* H. Diamond

HY-CAL ENGRG., 9650 Telstar Ave., El Monte, CA 91731, Tel: 213-444-4000, Telex: 67-5548; FSC No.: 12199; Empl.: 120

HyComp, Inc.

HYCOMP INC., 75 Union Ave., Box 377, Sudbury, MA 01776, Tel: 617-443-4631, TWX: 710-347-0385; FSC No.: 34707; Empl.: 30; *Sls. Mgr.:* James Chacharone .... **1A**•1658, 1874, 1875

Local Sales Offices & Reps

AL	Huntsville, Magaro & Assocs.	205-882-0827
AZ	Mesa, SEDCO Sls.	602-835-6281
CA	Mountain View, Leddy Assocs.	415-969-6313
CA	Santa Ana, Calif. Elctrn. Mktg.	714-835-2701
CT	Collinsville, Dynamic Sls. of New Eng.	203-693-6567
FL	Clearwater, Cherith Sls.	813-797-3004
GA	Atlanta, Magaro & Assocs.	404-451-8862
IL	Palatine, T-Squared Assocs.	312-991-2144
IN	Ft. Wayne, Scott Elctrns.	219-484-7865
IN	Indianapolis, Scott Elctrns.	317-897-9976
KS	Kansas City, BC Elctrns.	913-342-1211
KS	Wichita, BC Elctrns.	316-942-9840
KY	Louisville, Scott Elctrns.	502-964-0640
MD	Lutherville, Walker-Houck Assocs.	301-296-6021
MA	Burlington, Dynamic Sls. of New Eng.	617-272-5676
MI	Brighton, Michigan Marketing & Sales	313-229-6218
MN	Minnetonka, S.A.I. Mktg. Corp.	612-935-0777
MO	Bridgeton, BC Elctrns.	314-291-1101
NY	Lynbrook, HLJ Comp-Tech	516-599-2999
NY	Rochester, Murcan Sls. Corp.	716-586-445
NY	Syracuse, Murcan Sls. Corp.	315-437-0734
NC	Greensboro, Magaro & Assocs.	919-294-4783
OH	Cincinnati, Scott Elctrns.	513-791-2513
OH	Cleveland, Scott Elctrns.	216-473-505
OH	Kettering, Scott Elctrns.	513-294-0539
OH	Reynoldsburg, Scott Elctrns.	614-863-128
PA	Norristown, Rivco January	215-631-1414
PA	Pittsburgh, Scott Elctrns.	412-963-611
TX	Austin, Dyna Mktg.	512-454-3114
TX	Dallas, Dyna Mktg.	214-438-652
TX	Houston, Dyna Mktg.	713-460-0314
VT	S. Burlington, Dynamic Sls. of New Eng.	802-863-6665
VA	Moneta, Walker-Houck Assocs.	703-297-449
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HYDROCAP CORP., 975 N.W. 95 St., Miami, Fl 33150, Tel: 305-696-2504; Empl.: 5

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CA	Mountain View, Leddy Assocs.	415-969-631
CA	N. Hollywood, Jewett Co.	213-789-81
CO	Commerce City, Williams Assocs.	303-289-564

CT	Bethany, Reps. Corp.	203-393-0024
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NJ	Wayne, G.T. Assocs.	201-694-6040
NM	Albuquerque, Williams Assocs.	505-255-0622
NY	Fayetteville, R. D. Sherman	315-637-9861
NC	Greensboro, JHU Assoc.	919-852-9097
OH	Centerville, Dolfuss-Root & Co.	513-433-6776
OK	Tulsa, Cunningham Comps.	918-492-0390
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TN	Talbot, JHU Assoc.	615-581-4141
TX	Dallas, Cunningham Comps.	214-233-4303
UT	Salt Lake City, Williams Assocs.	801-532-7701
WA	Bellevue, A.I.E. Inc.	206-455-4697

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HY-TEC INDUSTRIES, Div. of Topo Industries, Inc., P.O. Box 91, Shoreham, NY 11786, Tel: 516-744-5062; *Sls. Mgr.:* Tom Poole

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CA	Del Mar, Chapman & Chapman	619-453-0771
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CA	Tarzana, Power Comps. Sls.	213-881-9111
CO	Englewood, Dynatech, Inc.	303-773-2830
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L	Des Plaines, Electron Mktg. Corp.	312-298-2330
L	Elk Grove Village, Micro Sls.	312-956-1000
MD	Glen Burnie, New Era Sls.	301-768-6666
MD	Towson, DGR	301-583-1360
MA	Randolph, Bengal Assocs.	617-961-4120
MA	Tyngsboro, Comptech, Inc.	617-649-3030
MN	Minneapolis, Comps. Grp.	612-374-1250
MN	Roseville, Components Grp.	612-636-5060
NV	Carson City, Hytek Microsystems	702-883-0820
NM	Albuquerque, Power Entprs.	505-298-1918
NM	Albuquerque, Reptronix	505-881-8001
NY	Cazenovia, Naylor Elctrns.	315-655-8174
NY	Rochester, L-Mar Assocs., Inc.	716-323-1000
NY	Wantagh, Tri-Tek	516-221-7600
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OH	Bricksville, W.R.R. Assocs.	216-526-2023
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TX	Dallas, Sundance Sls.	214-699-0451
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TX	Houston, Electronics Mktg.	713-498-8120
WA	Bellevue, Olson, Ferre & Assocs.	206-454-2110
WI	Elm Grove, Key Entprs.	414-784-3390

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AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Fred Board Assocs.	602-994-9388
CA	North Hollywood, ILC Data Device Corp.	818-982-6454
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CT	Canton Center, Dynamic Sls. of New Eng.	203-693-6567
FL	Clearwater Beach, Perrott Assocs.	813-443-5214
FL	Orlando, Perrott Assocs.	305-298-7748
FL	Sunrise, Perrott Assocs.	305-792-2211
GA	Norcross, Montgomery Mktg. Inc.	404-447-6124
IL	Des Plaines, Elctrn. Mktg.	312-298-2330
IN	Fort Wayne, Giesting & Assocs.	219-486-1912
IN	Indianapolis, Giesting & Assocs.	317-271-5183
KS	Lenexa, Dytec/South	913-888-0215
MA	Burlington, Dynamic Sls. of New Eng.	617-272-5676
MI	Coloma, Giesting & Assocs.	616-468-4200
MI	Novi, Giesting & Assocs.	313-348-3811
MN	Minneapolis, Comprehensive Techn.	612-888-7011
MO	Maryland Hgts., Dytec/South	314-569-2990
NJ	Haddonfield, G.L. Williams Assocs.	609-428-6060
NM	Albuquerque, Vermillion Co.	505-883-3668
NM	Albuquerque, Trembly Assocs.	505-266-8616
NY	E. Rochester, Tri Tech Elcttrns.	716-385-6500
NY	Endwell, Tri Tech Elctrns.	607-754-1094
NY	Fayetteville, Tri Tech Elctrns.	315-446-2881
NY	Fishkill, Tri Tech Elctrns.	914-897-5611
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TX	Austin, Bonser-Philhower Sls.	512-346-9186
TX	Houston, Bonser-Philhower Sls.	713-531-4144
TX	Richardson, Bonser-Philhower Sls.	214-234-8438
UT	Salt Lake City, Trembly Assocs.	801-486-5292
VT	Burlington, Dynamic Sls. of New Eng.	802-863-6665
WA	Bellevue, Venture Elctrns.	206-454-4594
WI	Milwaukee, JM Sls.	414-546-0040

ICL TECHNOLOGY, 399 Java Dr., Sunnyvale, CA 94089, Tel: 408-745-7900, TWX: 910-339-9389; *Sls. Mgr.:* Robert Turner;Lynn Reiter

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CA	El Cajon, KCE Corp.	619-588-1198
CA	Palo Alto, Mollard Mktg.	415-961-0456
CA	Woodland Hills, Illinois Capacitor, Inc.	800-323-3652
CO	Denver, Elcom	303-337-2300
CT	Bristol, Technology Prods. Grp.	617-731-0858
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IN	Indianapolis, Fred Dorsey Assoc.	317-842-0060
KY	Louisville, Fred Dorsey Assoc.	502-426-3540
MA	Brookline, Technology Prods. Grp.	617-731-0858
MI	Warren, Dem Elctrns. Sls.	313-575-9444
MN	Golden Valley, Highland Elctrn. Sls. Co.	612-545-4028
MS	Jackson, Welch & Doby, Inc.	601-932-5534
MO	Blue Springs, Kathrinus-Kelly & Co.	816-229-0001
MO	St. Louis, Kathrinus-Kelly	314-647-2400
NJ	Wayne, Richman Sls. Co.	201-694-1115
NY	Commack, Richman Sls. Co.	516-543-5532
NY	De Ruyter, Net Sales, Inc.	315-662-7996
NY	Fairport, Net Sls.	716-467-4538
NY	Troy, Net Sales, Inc.	518-274-4758
NY	Webster, Net Sales, Inc.	716-671-0022
NC	Raleigh, J & B Sls.	919-878-8600
OR	Tigard, Elctrn. Comp. Sls.	503-245-2342
PA	Narberth, J. Bresson Assocs.	215-664-6460
TN	Tullahoma, J & B Sls., Inc.	615-455-7487
TX	Houston, Barry Sls., Inc.	713-784-5860
TX	Richardson, Barry Sls., Inc.	214-234-0255
UT	Salt Lake City, Elcom	801-532-7940
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301
WI	Milwaukee, Erdman Sls. Co.	414-281-1330

Local Distributors

CA	Anaheim, A to Z Elctrns.	714-634-3620
CA	Canoga Pk., Myco/Vickers Elctrn. Supp.	213-340-2025
CA	Santa Ana, Projections Unltd.	714-641-1472
CO	Englewood, Industrial Elctrns.	303-694-9444
IN	Carmel, Altex Elctrns.	317-848-1323
IA	Cedar Rapids, Bergquist Co.	319-366-8733

LA	Harvey, AFG Electrn. Supp.	504-368-9696
MA	Wakefield, Lorcor	617-246-1903
MA	Woburn, Semtex	617-935-2150
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NY	Troy, Trojan Elctrn. Supp.	518-274-4481
NC	Greensboro, Hammond Elctrns.	919-275-6391
OH	Dayton, Semtex Ind. Corp.	513-435-6600
SC	Greenville, Hammond Elctrns.	803-233-4121
TX	Channelview, Henry Elctrns.	713-452-4451
WA	Redmond, Murphy Elctrns.	206-881-1234
WI	Milwaukee, Badger Capacitor Sls.	414-281-1330
EXP	Rexdale, ON, Electrn. Supp., Inc.	416-741-4000
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AZ	Tempe, Desert-West Technical Sls.	602-244-0735
CA	Los Angeles, Universal Comps.	213-641-4255
CA	San Rafael, Wright Assoc.	415-457-9940
IN	Carmel, TMC	317-844-8462
IN	Fort Wayne, TMC	219-432-5553
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MA	Woborn, Boston Electronics Assocs.	617-938-3727
MN	Minneapolis, Jos. Co/Melius	612-861-3343

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CA	Cerritos, El Com Inc.	213-404-2961
CA	Los Altos, Recht Assocs.	415-964-6321
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CT	Middletown, Gerber Sls. Corp.	203-347-3000
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IL	Chicago, D. Dolin Sls. Co.	312-286-6200
MA	Newton Upper Falls, Gerber Sls. Corp.	617-969-2620
MO	Grandview, Harris-Hanson	816-763-6200
MO	St. Louis, Harris-Hanson	314-432-3611
NJ	Haddonfield, Mesa Tech. Assoc.	609-429-9531
NY	Fairport, Net Sales Co.	716-467-4538
NY	Great Neck, Trionics Assocs.	516-466-2300
NC	Greensboro, Beacon Elctrns.	919-275-9997
OH	Dayton, Electrical Systems Co.	513-434-9822
OR	Lake Oswego, Huntley Assocs.	503-636-7558
TN	Oak Ridge, Beacon Elctrns.	615-482-2409
TX	Dallas, Kruvand Assocs.	214-691-4592
VA	Falls Church, Beacon North	703-534-7200
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PA	Glenshaw, H. C. Johnson Agcy.	412-961-0414
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GA	Atlanta, Beacon Elctrns.	404-256-3640
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NY	Great Neck, Trionics Assocs.	516-466-2300
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TX	Dallas, Kruvand Assocs.	214-691-4592
VA	Falls Church, Beacon North	703-534-7200
WA	Everett, Huntley Assocs.	206-353-1833

Local Distributors

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AZ	Tucson, Southwest Sales	602-325-4087
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CA	Gardena, Bell Industries	213-515-1800
CA	Inglewood, Newark Elctrns.	213-671-7387
CA	San Diego, Bell Inds.	619-268-1277
CA	San Diego, El-Com	619-578-0900
CA	Santa Clara, El-Com, Santa Clara Div.	408-496-0880
CA	Sunnyvale, Bell Industries	408-734-8570
CA	Thousand Oaks, Bell Industries	805-499-6821
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CO	Ravada, Denver Wintronics	303-431-7161
CO	Wheatridge, Bell Inds.	303-424-1985
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CT	Wallingford, Sterling Electronics	203-265-9535
CT	Wallingford, Sager Elctrl. Supp. Co.	203-265-4600
FL	Ft. Lauderdale, C.D.I.	305-971-4950
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Norcross, C.D.I.	404-441-3320
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Industries	312-982-9210
IL	Northbrook, Classic Comps.	312-272-9650
IN	Carmel, Altex Elctrns. Inc.	317-848-1323
KS	Wichita, RSC Elctrns.	316-267-5213
LA	Metairie, Sterling Electronics	504-887-7610
MD	Savage, Pyttronic Industries	301-792-0780
MA	Burlington, Lionex Corporation	617-272-9400
MA	Hingham, Sager Elctrl. Supp. Co.	617-749-6700
MA	Norwood, Gerber Elctrns.	617-769-6000
MA	Somerville, Electro Sales	617-666-0500
MA	Waltham, Sterling Elctrns.	617-894-6200
MI	Adrian, Wedemeyer Elctrn. Supp. Co.	517-263-2925
MI	Ann Arbor, Wedemeyer Elctrn. Supp. Co.	313-665-8611
MI	Lansing, Wedemeyer Elctrn. Supp. Co.	517-484-9009
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MO	St. Louis, Olive Elctrns. Inc.	314-426-4500
NJ	Bellmawr, Mid-Atlantic Interstate Industrial Park	609-931-5303
NJ	Fairfield, Lionex Corp.	201-227-7960
NJ	Perth Amboy, Sterling Elctrns.	201-442-8000
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NM	Albuquerque, Sterling Elctrns.	505-884-1900
NM	Albuquerque, Bell Industries	505-292-2700
NY	Buffalo, Summit	716-884-3450
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NY	Mt. Vernon, Q.A.R. Indl. Sls.	914-699-2224
NY	Plainview, Progress Elctrns.	516-433-1700
NY	Rochester, Summit	716-334-8110
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, C.D.I.	919-834-9465
OH	Columbus, Wedemeyer Elctrn. Supp. Co.	614-436-9600
OH	Dayton, Bell Industries Micro-Mil Div.	513-434-8231
OH	Dayton, Esco Elctrns.	513-226-1133
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Youngstown, Newark Elctrns.	216-793-6134
OK	Tulsa, Sterling Elctrns.	918-663-2410
OR	Lake Oswego, Bell Industries	503-241-4115
PA	Braddock, Leff Elctrns.	412-351-5000
PA	Horsham, Lionex Corp.	215-443-5150
PA	McKean, Advacom Inc.	814-476-7774
PA	Montgomeryville, Pyttronic Industries	215-643-2850
PA	Reading, Barbey Elctrns.	215-376-6116
RI	Providence, Wm. Dandreta & Co.	401-861-2800
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Nashville, Electra Distrbg. Co.	615-329-3971
TX	Austin, Sterling Elctrns.	512-863-1341
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Dallas, Heilind Elctrns.	214-351-2050
TX	El Paso, Intl. Elctrns.	915-598-3406
TX	Houston, Sterling Elctrns.	713-623-6600
UT	Salt Lake City, Standard Supp.	801-486-3371
UT	Salt Lake City, Bell Industries	801-972-6969
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Bellevue, Bell Industries	206-747-1515
WI	New Berlin, Classic Comps.	414-786-5300
WI	Waukesha, Bell Industries	414-547-8879

IMC MAGNETICS CORP., Thermal Prods. Grp., 100 Jericho Quad., Ste. 221, Jericho, NY 11753, Tel: 516-938-0800, TWX: 510-221-2126

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Tempe, Gassner & Clark	602-968-9037
CA	Cerritos, El Com Inc.	213-404-2961
CO	Englewood, Thorson Rocky Mountain	303-779-0666
CT	Middletown, Gerber Sls. Corp.	203-347-3000
FL	Coral Springs, Heller Assocs.	305-752-7520
GA	Atlanta, Beacon Elctrns.	404-256-3640
IL	Chicago, D. Dolin Sls. Co.	312-286-6200
MA	Newton Upper Falls, Gerber Sls. Corp.	617-969-2620
MO	Grandview, Harris-Hanson	816-763-6200
MO	St. Louis, Harris-Hanson	314-432-3611
NJ	Haddonfield, Mesa Tech Assoc.	609-429-9531
NY	Fairport, Net Sales Co.	716-467-4538
NY	Great Neck, Trionics Assocs.	516-466-2300
NC	Greensboro, Beacon Elctrns.	919-275-9997
OH	Dayton, Electrical Systems Co.	513-434-9822
OR	Lake Oswego, Huntley Assocs.	503-636-7558
TN	Oak Ridge, Beacon Elctrns.	615-482-2409
TX	Dallas, Kruvand	214-691-4592
VA	Falls Church, Beacon North	703-534-7200
WA	Everett, Huntley Assocs.	206-353-1833

IMC MAGNETICS CORP., Western Div., 12627 Hiddencreek Way, Cerritos, CA 90701, Tel: 213-926-0927, TWX: 910-583-1355; FSC No.: 99743; *Sls. Mgr.:* Joe Gute

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Tempe, Gassner & Clark	602-968-9037
CA	Cerritos, El Com Inc.	213-404-2961
CA	Los Altos, Recht Assocs.	415-964-6321
CO	Englewood, Thorson Rocky Mountain	303-779-0666
CT	Middletown, Gerber Sls. Corp.	203-347-3000
FL	Coral Springs, Heller Assocs.	305-752-7520
GA	Atlanta, Beacon Elctrns.	404-256-3640
IL	Chicago, D. Dolin Sls. Co.	312-286-6200
MA	Newton Upper Falls, Gerber Sls. Corp.	617-969-2620
MO	Grandview, Harris-Hanson	816-763-6200
MO	St. Louis, Harris-Hanson	314-432-3611
NJ	Haddonfield, Mesa Tech. Assoc.	609-429-9531
NY	Fairport, Net Sales Co.	716-467-4538
NY	Great Neck, Trionics Assocs.	516-466-2300
NC	Greensboro, Beacon Elctrns.	919-275-9997
OH	Dayton, Electrical Systems Co.	513-434-9822
OR	Lake Oswego, Huntley Assocs.	503-636-7558
TN	Oak Ridge, Beacon Elctrns.	615-482-2409
TX	Dallas, Kruvand Assocs.	214-691-4592
VA	Falls Church, Beacon North	703-534-7200
WA	Everett, Huntley Assocs.	206-353-1833

IMEC CORP., 2434 Southport Way, National City, CA 92050, Tel: 619-474-8991

MPANDEX, INC., 203 Brookdale St., Maywood, NJ 07607, Tel: 201-845-4664, Telex: 134 656; Empl.: 11; *Sls. Mgr.:* Stanley I. Goldberg; *Dist. Mgr.:* Rober F. Carlson

.M.S. EQUIPMENT, INC., P.O. Box 16909, Irvine, CA 92713, Tel: 714-559-6901, Telex: 678317; *Sls. Mgr.:* W. Charles Davison

MTRONICS INDS., 11930 31st Ct., Clearwater, FL 33520, Tel: 813-577-9010, Telex: 566027 IMTRON CWTR UD; Empl.: 10; *Sls. Mgr.:* Steven B. Cohen

NCOM, INC., 205 Chapin St., P.O. Drawer G, Southbridge, MA 01550, Tel: 617-765-9151, TWX: 710-347-1604; *Sls. Mgr.:* David MacGrath

NCONIX CORP., 10 Tech Circle, Natick, MA 01760, Tel: 617-655-1170, TWX: 710-386-1997; Empl.: 60; *Sls. Mgr.:* Al Vitale

NDEPENDENT CABLE, INC., 43 Broad St., Hudson, MA 01749, Tel: 617-562-9913

NDIANA GENERAL/DIV. EMM CORP., Magnet Prods., 405 Elm St., Valparaiso, IN 46383, Tel: 219-462-3131, Telex: 25-8489, TWX: 910-690-4891; Empl.: 1200; *Sls. Mgr.:* Royce D. Wright

NDUCTIVE PRODS. INC., 11733 Markon Dr., Garden Grove, CA 92641, Tel: 714-891-2572; Empl.: 10; *Sls. Mgr.:* Cary Rosen

Industrial Computer Designs

NDUSTRIAL COMPUTER DESIGNS, INC., 31121 Via Colinas 1005, Westlake Village, CA 91362, Tel: 818-889-3179; *Sls. Mgr.:* David J. Knight .... 3•1110, 1111

Local Distributors

CA	Chatsworth, Priority One Elctrns.	818-709-5111
CA	Irvine, Priority One Elctrns.	714-660-1411; 800-423-5922 (outside CA)

NDUSTRIAL CONDENSER CORP., See Industrial Midwec Capacitors

NDUSTRIAL CONTROL CO., 3100 Pineda Ave., Rockledge, FL 32955, Tel: 305-259-7105; Empl.: 15; *Sls. Mgr.:* I. Nobilio .... 3•1932

NDUSTRIAL DEVICES, INC., Edgewater, NJ 07020, Tel: 201-224-4700, Telex: 12-7459; FSC No.: 91802; Empl.: 200; *Sls. Mgr.:* Michael Diceglie .... 1B•1020, 1064-1083

Local Sales Offices & Reps

AL	Huntsville, E.M.A., Inc.	205-837-7363
AZ	Phoenix, Bill Earl Assoc.	602-994-3813
CA	Los Angeles, Universal Comps.	213-641-4255
CA	Mountain View, Westech Sls.	415-961-1422
CO	Aurora, Sage Sls.	303-750-3501
FL	Casselberry, Southern Elctrn. Mktg.	305-695-3334
FL	Clearwater, Southern Elctrn. Mktg.	813-441-3902
FL	Ft. Lauderdale, Southern Elctrn. Mktg.	305-475-3686
GA	Atlanta, E.M.A., Inc.	404-448-1215
L	Chicago, K. D. Engle	312-539-1820
N	Indianapolis, Elctrn. Mktg. Consits.	317-253-1668
MD	Towson, Ernie Stefkovic Assocs.	301-321-6008
MA	Newton Upper Falls, Anchor Engrg.	617-964-6205
MI	Oak Pk., W. Spenser	313-967-0808
MN	Minneapolis, Elec. Comp. Sls.	612-933-2594
NJ	Cherry Hill, Ernie Stefkovic Assocs.	609-667-4066
NJ	Manville, Dyno Rep	201-685-0135
NY	New York, Drake America Corp.	212-758-5400
NY	Rochester, Apex Assocs.	716-254-6050
NC	Raleigh, E.M.A., Inc.	919-847-8800
OH	Cleveland, Marlow Assocs.	216-991-6500
OH	Columbus, Marlow Assocs.	800-362-2265
OR	Portland, Earl & Brown	503-245-2283
PA	Pittsburgh, Marlow Assocs.	412-367-8886
SC	Greenville, E.M.A., Inc.	803-233-4637
TX	Austin, R. F. Kimball Co.	512-443-5284
TX	Houston, R. F. Kimball Co.	713-840-0590
TX	Richardson, R. F. Kimball Co.	214-231-3447
UT	Salt Lake City, Sage Sls.	801-467-5451
WA	Seattle, Earl & Brown	206-284-1121

Local Distributors

AZ	Phoenix, Dalis Elctrn. Supp.	602-275-2885
CA	Gardena, Calif. Switch & Signal	213-770-2330
CA	Los Angeles, Elec. Switches	213-664-1141
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Pasadena, Empire Elctrn. Distr.	213-681-2711
CA	S. San Francisco, Steven Engrg.	415-588-9200
CA	San Diego, Sigma Elctrns.	714-565-2000
CA	San Diego, Shanks & Wright	619-239-0176
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	San Jose, Cypress Elctrns.	408-727-7080
CA	San Jose, Quement Elctrns.	408-998-5900
CA	Santa Monica, Master Distrs.	213-452-1229
CA	Santa Rosa, Steven Engrg.	707-578-0666
CO	Arvada, Denver Wintronics	303-431-7161
CT	Norwalk, Park Distrs.	800-243-5006
CT	Wallingford, Sager Electrical Supp.	203-265-4600
FL	Longwood, Inter Tec	800-432-1654
FL	Miami, Electro Standard Lab (ESL)	305-633-6973
FL	Tampa, Leader Elctrns.	813-870-3315
GA	Atlanta, Wholesale Indl. Elec.	800-282-1857
HI	Honolulu, Precision Radio	808-537-5291
IL	Bridgeview, Midco Comps.	312-599-7777
IL	Villa Park, Melvin Elctrns.	312-279-5015
IL	Wood Dale, Electro-Kinetics	312-595-6700
IN	East Chicago, ACRO Elctrns.	312-375-1269
IN	Evansville, Hutch & Son	812-425-7201
IN	Fort Wayne, Graham Elctrs.	219-423-3422
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	South Bend, Genesis Elctrns.	219-287-2911
IA	Cedar Rapids, Bergquist Co.	319-366-8733
IA	Cedar Rapids, Iowa Radio Supp.	319-393-4510
KY	Bowling Green, Crescent Elctrns.	502-842-2444
LA	Lafayette, Ralph's	318-234-4507
LA	New Orleans, Wm. B. Allen Supp. Co.	800-462-9520
MD	Rockville, Capitol Radio Whlsrs.	301-881-2270
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	N. Wilbraham, Indl. Comps.	413-596-3854
MA	Norwood, Gerber Elctrns.	617-329-2400
MA	Worcester, RM Elctrns.	617-756-8311
MI	Flint, Shand Elctrns.	313-743-8940
MN	Minneapolis, Bergquist Co.	612-835-2322
MN	Minneapolis, Elctrn. Center	612-371-5200
MN	Minneapolis, Stark Elctrns.	612-332-1325
MO	Kansas City, Olive Indl. Elect.	816-842-8556
MO	St. Louis, Van Sickle Radio-Elec.	314-621-5000
MO	St. Louis, Olive Indl. Elctrns.	314-426-4500
NE	Lincoln, Scott Elctrn. Supp.	402-466-8221
NE	Omaha, Scott Elctrn. Supp.	402-734-6750
NV	Las Vegas, Kiesub Elctrns.	702-733-3888
NJ	Fair Lawn, Relay Spec.	201-797-3313
NJ	Hanover, State Elctrns. Parts	201-887-2550
NJ	Springfield, Route Elctrns.	201-379-7710
NY	Albany, E. E. Taylor Co.	518-438-7811
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Hauppauge, Broadline Elctrns.	516-231-4100
NY	Hempstead, Elctrn. Equip.	800-645-1605
NY	Mt. Vernon, Q.A.R. Indl. Elctrn. Sls.	914-699-2224
NY	New York, Drake America Corp.	212-758-5400
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Rochester, Simcona Elctrns.	716-328-3230
NC	Raleigh, Southeastern Radio Supp.	919-828-2311
OH	Cincinatti, Hughes-Peters	513-351-2000
OH	Cincinnati, United Radio	513-761-4030
OH	Cleveland, REPCO Inc.	216-248-8900
OH	Columbus, Hughes Peters	614-294-5351
OH	Dayton, Stotts-Friedman Co.	513-298-5555
OH	Toledo, Warren Radio	419-248-3364
OK	Oklahoma City, Trice Whls. Elctrns.	405-524-4411
OK	Tulsa, Oil Capitol Elctrns.	918-622-8520
OR	Portland, United Radio Supp.	503-233-7151
PA	Erie, Rem/Mace Elctrns.	814-453-5626
PA	Harrisburg, Cumberland Elctrns.	717-236-5883
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
SC	Columbia, Dixie Radio Supp.	803-779-5332
TN	Knoxville, Roden Elctrl. Supp.	615-546-8755
TN	Memphis, Bluff City Elctrns.	901-345-9500
TN	Nashville, Randolph & Rice	615-255-5601
TX	Fort Worth, Swieco	817-335-6521
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Houston, Altair Co.	713-462-3029
TX	Richardson, Altair Co.	214-231-5166
TX	San Antonio, Sherman Elctrns. Supp.	512-224-1004
UT	Salt Lake City, Standard Supp.	801-486-3371
VA	Arlington, Arlington Elctrn. Whlsrs.	703-524-6256
VA	Glenn Allen, Hermitage Distrs.	804-798-3830
WA	Seattle, United Radio Supp.	206-284-0200
WI	Milwaukee, Marsh Elctrns.	414-475-6000

IEE THE DISPLAY MAKERS
INDUSTRIAL ELECTRONIC ENGINEERS

INDUSTRIAL ELCTRN. ENGRS., INC., 7740 Lemona Ave., Van Nuys, CA 91405, Tel: 818-787-0311, TWX: 910-495-1707; Empl.: 400; *Sls. Mgr.:* C. Doria, J. Hart, I. Minarik; *Dist. Mgr.:* J. Hart .... 1B•1084, 1085, 1781

Local Sales Offices & Reps

AL	Huntsville, TMA Technology Mktg. Assoc.	205-883-7893
AZ	Phoenix, Gramer & Co.	602-995-9455; 602-942-1415
CA	Brea, Masco Elctrns., Inc.	714-529-0866
CA	Campbell, LCO Tech. Sls.	408-378-9900
CA	Los Angeles, Masco Elctrns. Inc.	714-529-0866
CA	Vista, Masco Elctrns., Inc.	619-758-5562
CO	Denver, Lindberg Co.	303-758-9033,34,35,36
CT	North Haven, Kitchen & Kutchin, Inc.	203-239-0212
FL	Melbourne, TMA Technlg. Mktg. Assoc.	305-676-3776
FL	Orlando, TMA Technlg. Mktg. Assoc.	305-857-3760
FL	Pompano Beach, TMA Technlg. Mktg. Assoc.	305-942-0774
GA	Atlanta, TMA Technlg. Mktg. Assoc.	404-257-0374
ID	Boise, Huntley Assocs.	208-343-7588
IL	Highland Park, Bransky Sls.	312-433-2375
IN	Carmel, TMC Techng. Mktg. Corp.	317-844-8462
IN	Ft. Wayne, TMC Techng. Mktg. Corp.	219-432-5553
IA	Cedar Rapids, PMR Penzner/Mankus Reps., Inc.	319-362-9177
KS	Overland Park, PMR Penzner/Mankus Reps., Inc.	913-381-0004
KS	Wichita, PMR Penzner/Mankus Reps., Inc.	316-684-4141
KY	Louisville, TMC Technlg. Mktg. Corp.	502-499-7808
MD	Hunt Valley, Marktron, Inc.	301-626-1111
MD	Rockville, Marktron, Inc.	301-251-8990

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LOGICOMP ELECTRONICS, INC.
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MAMARONECK, NEW YORK 10543
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TOLL FREE (Outside N.Y.)
800/431-2625

MA	Burlington, Kitchen & Kutchin, Inc.	617-229-2660
MI	Southfield, L. H. Dickelman Co.	313-353-8210
NY	Fairport, Reagan/Compar Albany, Inc.	716-271-2230
NY	New Hartford, Reagan/Compar Albany, Inc.	315-732-3775
OH	Cleveland, Geotronix, Inc.	216-526-2535
OH	Trotwood, Geotronix, Inc.	513-854-5939
OR	Beaverton, Huntley Assocs.	503-649-5388
PA	Norristown, RJI	215-631-1414
SC	Greenville, DHR Mktg., Inc.	803-235-3594
TX	Dallas, MGR Electronics, Inc.	214-238-5246; 713-759-0187;817-338-1493
UT	Salt Lake City, Lindberg Co.	801-467-1794,95
VA	Charlottesville, Marktron, Inc.	804-973-5874
WA	Everett, Huntley Assocs.	206-353-1833
WI	Cedarburg, Bransky Sls.	414-377-6837

Local Distributors

AL	Huntsville, C.D.I.	205-883-7501
AZ	Phoenix, Tri-Tek, Inc.	602-995-9352
AZ	Tempe, Circuit Specialists Co.	602-966-0764
AR	Little Rock, C.D.I.	501-227-6278
CA	Cerritos, El-Com, Inc.	213-404-2961
CA	Gardena, California Switch & Signal Co.	213-538-9830
CA	Industry, Ital Elctrn. Sls. Inc.	818-968-8515; 714-990-0922
CA	Lakeside, Mouser Elctrn. Corp.	619-449-2229
CA	San Diego, Richey/Western Elctrns.	619-565-4444
CA	San Diego, El-Com, Inc.	619-578-0900
CA	San Jose, Richey/Western Elctrns.	408-946-6611
CA	Santa Clara, Waltronic Sls.	408-727-1200
CA	Sun Valley, Richey/Western Elctrns.	818-768-3800
CO	Denver, Integrated Elctrns.	303-292-6121
CT	East Haven, U.V. Elctrns.	203-469-2321
FL	Alamonte Springs, Pioneer/Orlando	305-834-9090; 800-432-6094
FL	Ft. Lauderdale, C.D.I.	305-971-4950
FL	Miami, Elctrn. Equip. Co. Inc.	305-871-3500
GA	Norcross, C.D.I.	404-441-3320
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Inds.	312-982-9210
IL	Elgin, Allied Elctrns.	312-697-8200
IL	Elmhurst, Semiconductor Specialists, Inc.	312-279-1005
IL	Northbrook, Classic Comps.	312-272-9650
IN	Carmel, Altex Elctrns., Inc.	317-848-1323; 800-692-6039
KS	Wichita, R.S.C.	316-267-5213
MD	Beltsville, Treeko Sls.	301-937-8260
MD	Gaithersburg, Pioneer/Washington	301-948-0710
MA	Billerica, A. W. Mayer Co., Inc.	617-667-6900
MA	Danvers, Criterion Elctrns.	617-777-4725
MA	Needham, Cronin Elctrns., Inc.	617-449-5000
MI	Grand Rapids, S-F Elctrn. Supp. Inc.	616-459-0216
MI	Southfield, Michigan Lectrols Corp.	313-353-1350
MN	Minneapolis, Stark Elctrns.	612-332-1325
MO	Kansas City, Semiconductor Specialists, Inc.	816-452-3900
MO	St. Louis, Olive Indl. Elctrns.	314-426-4500
NM	Albuquerque, Beatron Elctrns.	505-344-2381
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Farmingdale, S.A.I.	516-293-2710
NY	Mamaroneck, Logicomp Elctrns.	914-698-9332
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rochester, Modutex Corp.	716-424-1620
NC	Greensboro, Hammond Elec.	919-275-6391
NC	Raleigh, So. Eastern. Elctrns.	919-828-2311
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Cleveland, Alpha Distr. Corp.	216-526-3716
OH	Dayton, The Stotts-Friedman Co.	513-298-5555
OK	Oklahoma City, Electro Entrs., Inc.	405-427-6591
PA	Philadelphia, Philadelphia Elctrns. Inc.	215-568-7400
PA	Philadelphia, Herbach & Rademan, Inc.	215-426-1700
SC	Taylors, Cantrell Wholesalers	803-268-1194
TX	Austin, The Altair Co.	512-837-4490
TX	Austin, Southwest Elctrns.	512-837-8971
TX	Fort Worth, Allied Elctrns.	817-336-5401
TX	Houston, Solid State Elctrns.	713-772-8483
TX	Houston, The Altair Co.	713-462-3029
TX	Irving, Solid State Elctrns.	214-438-5700
TX	Richardson, The Altair Co.	214-231-5166
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Richardson, The Altair Co.	214-231-5166
TX	Stafford, Southwest Elctrns.	713-491-4900
WA	Kent, Shannon Ltd.	206-763-0545
WI	Mequon, Taylor Elec. Co.	414-241-4321
WI	Milwaukee, Marsh Elctrns.	414-475-6000

INDUSTRIAL ELCTRN. HARDWARE CORP., 109 Prince St., New York, NY 10012, Tel: 212-677-1881, TWX: 710-581-4338; FSC No.: 97913; Empl.: 430; *Sls. Mgr.:* Louis Roberts; *Dist. Mgr.:* Louis Roberts .... **2**•1329

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Phoenix, Knight Co.	602-582-8506
CA	Los Angeles, Knight Co	213-670-2833
CA	San Diego, Knight Co.	619-693-1806
CA	Sunnyvale, M2 Mktg. Grp.	408-733-1361
CT	Wethersfield, Underwood Sls. Corp.	203-563-3046
FL	St. Petersburg, Tech. Rep. Assoc.	813-577-2779
GA	Atlanta, Beacon Elctrns.	404-256-9640
KS	Wichita, Thunderbird Tech. Sls.	316-684-3941
MD	Ellicot City, Techn. Sls.	301-461-2400
MA	Lowell, Underwood Sls.	617-256-8191
MN	St. Paul, Countryman	612-645-9151
MO	St. Louis, Thunderbird Tech. Sls.	314-567-6488
NJ	Fort Lee, FJK Assocs. Inc.	201-592-1002
NJ	Haddonfield, Mills-Brown Assoc	609-429-1005
NY	Buffalo, Franklin Sls.	716-248-8251
NY	Pittsford, Franklin Sls.	716-248-8251
NY	Ronkonkoma, PMR	516-467-8200
NC	Raleigh, Beacon Elctrns.	919-787-0330
OH	Beachwood, Elctrn. Salesmasters Inc.	216-831-9555
OR	Beaverton, Barrett-Squibb	503-642-1661
RI	Warwick, Monette Eng. & Assoc.	401-885-2205
TX	Dallas, Pro-Mark	214-644-0497
VA	Portsmouth, F.B.D. Sls.	804-484-3162
WA	Redmond, Barrett-Squibb	206-885-6991

INDUSTRIAL FABRICATING CO., 820 Woodend Ave., Stratford, CT 06497, Tel: 203-375-5853; Empl.: 30; *Sls. Mgr.:* Ray Peterson

INDUSTRIAL MIDWEC CAPACITORS, 4902 Tollview Dr., Rolling Meadows, IL 60008, Tel: 312-577-0120, TWX: 910-687-3375; Empl.: 800; *Sls. Mgr.:* Andy Kaluski

Powertron

INDUSTRIAL TEST EQUIP., 21 Yennicock Ave., Port Washington, NY 11050, Tel: 516-883-1700; FSC No.: 99074; *Sls. Mgr.:* Robert Loiacono .... **3**•1886-1888

INERTIAL MOTORS, 280 N. Broad St., Doylestown, PA 18901, Tel: 215-345-1010, Telex: 83-1633; Empl.: 49; *Sls. Mgr.:* Lori Clarkin

INFICON LEYBOLD-HERAEUS, INC., 6500 Fly Rd, E. Syracuse, NY 13057, Tel: 315-437-0377, TWX: 710-541-0594; Empl.: 150; *Sls. Mgr.:* D. A. Di Renzo

InfoCap

INFOCAP, INC., 31119 Via Colinas 502, Westlake Village, CA 91362, Tel: 818-991-1410; *Sls. Mgr.:* David Knight .... **3**•1085

INFODEX, INC., 395 W. Main St., Waterbury, CT 06702, Tel: 203-757-9291, Telex: 178702 IFDX; FSC No.: 09087; Empl.: 42; *Sls. Mgr.:* E. H. Ulm .... **1B**•1086, 1087

Local Sales Offices & Reps

CA	Pasadena, A-F Sales Engrg.	818-681-5631
MA	Boston, Nortech Engrg. Sls.	617-359-6063
MA	Concord, Nortech Engrg. Sls.	617-259-0032

INFO-LITE CORP., See Dio-Rey and Crosspoint

INFORMATION CONTROL, Dept. EM7 9610 Bellanca Ave., Los Angeles, CA 90045, Tel: 213-641-8520, TWX: 910-328-7234; Empl.: 55; *Sls. Mgr.:* Carol J. Smith

INFORMATION CONTROL CORP., Abacus Div. Dept. EM7, 9610 Bellanca Ave., Los Angeles, CA 90045, Tel: 213-641-8520, TWX: 910-328-7234; Empl.: 50

INFORMATION CONTROL CORP., Light Pen Div., Dept. EM7, 9610 Bellanca Ave., Los Angeles, CA 90045, Tel: 213-641-8520, TWX: 910-328-7234; Empl.: 50

INFORMATION TERMINALS, See Verbatim Corp.

iti THE SWITCHING COMPANY

INFORMATION TRANSFER INDL., Box 357, Holcomb, NY 14469, Tel: 716-657-7074; FSC No.: 55137; Empl.: 40; *Sls. Mgr.:* J. E. Wiseman .... **3**•1162, 1163, 1246

Local Sales Offices & Reps

AZ	Scottsdale, Luscombe Engrg.	602-949-9333
CA	Campbell, Luscombe Engrg.	408-370-2020
CA	Pasadena, Luscombe Engrg.	213-684-2000
CA	San Diego, Luscombe Engrg.	714-295-4300
CT	Hamden, Polytek Assocs.	203-288-5246
IL	Schaumburg, Kenneth W. Meyers Co.	312-882-4808
IN	Indianapolis, Kenneth W. Meyers Co.	317-243-6681
IA	Cedar Rapids, Kenneth W. Meyers Co.	319-363-8987
MD	Greenbelt, Riffe Assocs.	301-474-8600
MA	Ashland, Polytek Assocs.	617-881-4741
MN	Minneapolis, Kenneth W. Meyers Co.	612-920-7080
NJ	Oxford, Malin Assocs.	201-689-7398
NY	Albany, R. F. Lamb Co.	518-869-3355
NY	Buffalo, R. F. Lamb Co.	716-874-4900
NY	Rochester, R. F. Lamb Co.	716-323-1250
NY	Syracuse, R. F. Lamb Co.	315-454-2469
OR	Portland, Tasco	503-245-8168
PA	Melrose Park, Robert Meyers Assocs.	215-224-1663
TX	Houston, Sci. Sls. Co.	713-460-9170
TX	Richardson, Sci. Sls. Co.	214-231-6541
WA	Bellevue, Tasco	206-453-1414
WI	Brookfield, Kenneth W. Meyers Co.	414-784-3790

INFOSPHERE, INC., 4730 S.W. Macadam Ave., Portland, OR 97201, Tel: 503-226-3515, Telex: 360312; *Sls. Mgr.:* Wm. David Sharon; *Dist. Mgr.:* Wm. David Sharon

Local Sales Offices & Reps

AZ	Scottsdale, A.S.R.	602-949-8293
CA	Sacramento, Manco	916-985-0370
CA	Santa Clara, Manco	408-496-6611
NM	Albuquerque, A.S.R.	505-243-8454
OH	Cleveland, Dolfuss-Root and Co.	216-238-0300
OH	Columbus, Dolfuss-Root and Co.	513-433-6776
OR	Portland, Cascade Data Mktg.	503-641-9266
PA	Pittsburgh, Dolfuss-Root and Co.	412-221-4420
TX	Houston, Abcor, Inc.	713-486-9251
WA	Seattle, Cascade Data Mktg.	206-747-6190

INFRARED INDS., INC., P.O. Box 14200, Orlando, FL 32857, Tel: 305-282-7700, Telex: 568908; Empl.: 80; *Sls. Mgr.:* Thomas Chisholm

INJECTORALL ELCTRNS., 98-100 Glen St., Glen Cove, NY 11542, Tel: 516-671-6010 .... **2**•1091

Local Sales Offices & Reps

AL	Birmingham, John F. Russell Co.	205-822-2196
CA	Burlingame, Carelli-Ema	415-342-4514
CA	Long Beach, Ross Sls.	213-424-9818
FL	Miami Beach, Everett Wollman Sls.	305-932-1790
MA	Northboro, W. B. Pray Co.	617-393-3434
MI	Livonia, Harvey Sales Co.	313-476-1974
NY	Brooklyn, Moet Maltz & Co.	212-252-1139
OH	Jamestown, Landro-Edwards Sls.	513-675-2059
PA	Library, Landro & Edwards Sls. Co.	412-854-5727
WA	Edmonds, McLaughlin Mktg. Inc.	206-743-1161

Local Distributors

AL	Huntsville, Mock	205-539-2401
AZ	Tucson, Electronic City	
CA	Los Angeles, ITC	213-388-0621
CA	San Jose, Quement	408-998-5900
CA	San Rafael, Elctrns. Plus	415-457-0466
CA	Sunnyvale, Halted Specialties	408-732-1573
FL	Pensacola, Pensacola Elctrns.	904-478-3771
GA	Atlanta, Delta	404-458-4690
IL	Chicago, Tron	
IN	East Chicago, Acro	219-397-8681
KY	Louisville, P.I. Burkes	
MA	Needham, Y.D.I.	617-449-1005
MI	Bay City, KDC	517-892-1594
MI	Port Huron, Main	313-985-5103
NJ	Vineland, Laraco	609-691-2900
NY	Elmsford, Ancar	914-592-7100
NY	Levittown, Edlies Elctrns.	516-735-3330
NY	New York City, Taft	212-575-5194
NY	Richmond Hill, Anchor	212-846-2420
OR	Beaverton, Norvac	503-644-1025
PA	Norristown, Philadelphia Elctrns.	215-275-5550
TX	Dallas, Nanney	

TX	Fort Worth, Sweico	817-335-6521
WA	Seattle, Elctrn. Supermart	206-575-1093
WA	Seattle, Radar	206-282-2511

INLAND MOTOR DIV. KOLLMORGEN, INDL. DRIVES GRP., See Kollmorgen Corp.

INLAND MOTOR, SPECIALTY PRODS. DIV., Kollmorgen Corp., 4020 E. Inland Rd., Sierra Vista, AZ 85635, Tel: 602-459-1150, Telex: 62858, TWX: 910-973-9869; *Sls. Mgr.:* Ken Irvin

INLAND MOTOR SPECIALTY PRODS. DIV., Kollmorgen Corp., 501 First St., Radford, VA 24141, Tel: 703-639-9045, TWX: 710-875-3740; FSC No.: 11384; Empl.: 450

Local Sales Offices & Reps

Specialty/Instrument/Industrial Drive Group

AL	Huntsville, Technology Mktg. Assoc.	205-883-7893
AZ	Phoenix, Thor Engrg. Mfg.	602-437-1463
AZ	Sierra Vista, Inland Motor - SPD	602-459-1150
CA	Alhambra, Thorson Co.	213-281-2280
CA	Goleta, Thorson Co.	805-964-8751
CA	Mountain View, Thorson Co.	415-964-9300
CA	San Diego, Thorson Co.	619-292-8525
CA	Signal Hill, Thorson Co.	213-595-0361
CO	Englewood, Thorson Co.	303-779-0666
CT	Wolcott, Vanguard Elctrns.	203-879-9310
FL	Melbourne, Technology Mktg. Assoc.	305-676-3776
FL	Orlando, Technology Mktg. Assoc.	305-857-3760
FL	Pompano Beach, Technology Mktg. Assoc.	305-942-0774
FL	Winter Park, Magna Engrg. Sls.	305-671-8716
GA	Atlanta, Technology Mktg. Assoc.	404-257-0374
IL	Collinsville, Magna Engrg. Sls.	618-345-5583
IL	Elk Grove, Carlson Elctrn. Sls.	312-956-8240
IN	Indianapolis, Carlson Elctrn. Sls.	317-842-3740
IA	Cedar Rapids, Carlson Elctrn. Sls.	319-377-6341
KS	Wichita, Magna Engrg. Sls.	316-744-0851
MD	Baltimore, Rep-Tron	301-621-1313
MA	Needham Heights, Vanguard Elctrns.	617-449-5578
MI	Detroit, R. P. Urban Assoc.	313-535-2355
MI	Grand Rapids, R. P. Urban Assoc.	616-245-0511
MN	St. Paul, J. J. Exon co.	612-636-5533
NJ	Wayne, S. Howard Lagerveld & Assoc.	201-790-1714
NY	E. Rochester, A & D Devices	716-385-2778
OH	Chagrin Falls, Jerry Kilroy Corp.	216-543-3370
OR	Beaverton, Thorson Co.	503-644-5900
PA	Media, Homer Smith Co.	215-543-2434
TX	Dallas, Magna Engrg. Sls.	214-349-6171
UT	West Valley City, Thorson Co	801-973-7969
WA	Bellevue, Thorson Co.	206-455-9180
WI	Milwaukee, Carlson Elctrn. Sls.	414-476-2790

INMAC, 2465 Augustine Dr., Santa Clara, CA 95051, Tel: 408-727-1970, TWX: 910-338-2091; Empl.: 500

INMARK CORP., 147 West Cedar St., Norwalk, CT 06854, Tel: 203-866-8474, Telex: 99-6419; *Sls. Mgr.:* Lars Giers

INMOS CORP., P.O. Box 16000, Colorado Springs, CO 80935, Tel: 303-630-4000 Ext. 4454, TWX: 910-920-4904; Empl.: 1500; *Sls. Mgr.:* Peter Fowler; *Dist. Mgr.:* Jim O'Sullivan

INNOTRONICS, Brooks Rd., Lincoln, MA 01773, Tel: 617-678-8720; *Sls. Mgr.:* Julio DeCastro; *Dist. Mgr.:* Stephen Scheuer

INNOVATEK MICROSYSTEMS, INC., Smithfield Rd., Millerton, NY 12546, Tel: 914-373-9003, Telex: 750120; Empl.: 8; *Sls. Mgr.:* Paul F. Fitts

INNOVATIVE ELECTRONICS, INC., 4714 N.W. 165th St., Miami, FL 33014, Tel: 305-624-1644, Telex: 80-7121; Empl.: 28; *Sls. Mgr.:* Diane Ruggiero; *Dist. Mgr.:* Diane Ruggiero

INRECO, See Ransco Industries

INRESCO/INSTR. RESISTOR, 2106 Bridge Ave., Pt. Pleasant, NJ 08742, Tel: 201-892-5881; Empl.: 16; *Sls. Mgr.:* G. L. Martin

INSERVCO, INC., Box 106, La Grange, OH 44050

INSTRON CORP., 100 Royall St., Canton, MA 02021, Tel: 617-828-2500, Telex: 924434; Empl.: 1000; *Sls. Mgr.:* S. J. Vinciguerra; *Dist. Mgr.:* Lawrence Frost

INSTRULAB, P.O. B. 98, Dayton, OH 45404, Tel: 513-223-2241; Empl.: 22; *Sls. Mgr.:* Philip C. Alderton

Local Sales Offices & Reps

AZ	Scottsdale, Williams Assocs.	303-289-5647
CA	Los Angeles, Crown Elctrns.	213-877-3550
CA	San Francisco, Paul Rosen Co.	415-526-8286
CO	Denver, Williams Assoc.	303-289-5647
GA	Atlanta, E. G. Holmes & Assoc.	404-451-6161
IL	Chicago, Data Elctrn.	312-283-0300
IN	Indianapolis, Data Elctrns.	317-359-5368
KS	Overland Park, Ramsey Assocs.	913-649-6996
MD	Baltimore, Easter Instr.	301-384-8500
MA	Boston, Addelco Corp.	617-444-4754
MI	Detroit, E.Q.S. Sys.	313-961-3042
MN	Minneapolis, Loren Green Assoc.	612-571-6666
MO	St. Louis, Ramsey Assoc.	314-878-5042
NJ	Cresskill, Eastern Inst. of N Y	201-567-9505
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Syracuse, DB Assocs.	315-446-0220
NC	Raleigh, E. G. Holmes	919-469-8850
OH	Chesterland, E. Q. S. Sys.	216-729-2222
OH	Dayton, E.Q.S. Systems	513-294-2476
PA	Philadelphia, Sci. Devices	215-825-9515
TX	Lewisville, Milstek Inc.	214-436-1597
UT	Salt Lake City, Williams Assocs.	801-485-6511
WA	Seattle, Hood Engrg.	206-453-9375

INSTRU-LEC, 520 Homestead Ave., Mt. Vernon, NY 10550, Tel: 914-668-3754; FSC No.: 13782; Empl.: 10

INSTRUMENTATION & CONTROL SYS., 520 Interstate Rd, Addison, IL 60101, Tel: 312-543-6200, TWX: 910-991-5945; Empl.: 50; *Sls. Mgr.:* Andrew Hart;Ken Horning

INSTRUMENTATION MEASUREMENTS LAB., Div. of Lockheed Electronics Co. Inc., 1501 Rt. 22, Plainfield, NJ 07061, Tel: 201-757-3730; *Sls. Mgr.:* P. Murray Grinnell

INSTRUMENTATION PRODS., 3M Co., 300 S. Lewis Rd., Camarillo, CA 93010, Tel: 805-482-1911, TWX: 910-336-1676; Empl.: 500

INSTRUMENT ENCLOSURES, 9767 Glenoaks Blvd., Sun Valley, CA 91352, Tel: 213-768-4622, Telex: 66-2442; FSC No.: 62012; Empl.: 20; *Sls. Mgr.:* William B. Taylor

INSTRUMENT RESEARCH CO., Box 40207, Santa Barbara, CA 93103, Tel: 805-962-8336; Empl.: 6

INSTRUMENT RESISTOR CO., See INRESCO/ INRESCO/Instr. Resistor

INSTRUMENTS, INC., 7263 Engineer Rd., San Diego, CA 92111, Tel: 619-571-1111, Telex: 695073, TWX: 910-335-1607; FSC No.: 34563; Empl.: 28; *Sls. Mgr.:* Ken Kalbfell

INSTRUMENTS AND CONTROLS DIV., Technology Inc., P.O. Box 3036, Overlook Branch, Dayton, OH 45431, Tel: 513-426-2405, TWX: 810-450-2620; FSC No.: 23978; Empl.: 100

ifi **INSTRUMENTS FOR INDUSTRY**

INSTRUMENTS FOR INDUSTRY, INC., 151 Toledo St., Farmingdale, NY 11735, Tel: 516-694-1414, TWX: 510-222-0876; Empl.: 25; *Sls. Mgr.:* Ron Richards .... **3**•1011

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Phoenix, R. A. Mayes Co.	602-279-5243
CA	Los Altos, DJM Elctrns.	415-966-1680
CA	Valencia, DJM Elctrns.	213-367-9482
CO	Lakewood, Westek Data Prods.	303-989-1900
FL	Clearwater, Beacon Elctrns.	813-796-2378
GA	Atlanta, Beacon Elctrns.	404-256-9640.
MD	Laurel, CSDS, Inc.	301-490-3800
MN	Minneapolis, Deerland Distrs.	612-331-6433
MO	Kansas City, EIR Co.	816-452-7030
MO	Leasburg, EIR Co.	314-895-4100
NJ	N. Plainfield, Brady Co.	201-753-7988
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	Guilderland, Electro Modular Sys.	518-456-2665
NC	Greensboro, Beacon Elctrns.	919-275-9997
OH	Bedford Hgts., Bill Teplitz Assocs.	216-439-3265
OH	Dayton, Bill Teplitz Assocs.	513-277-6531
TN	Johnson City, Beacon Elctrns.	615-282-2421
UT	Salt Lake City, Westek Data Prods.	801-582-1200
WI	Milwaukee, Deerland Distrs.	414-784-1414

INSTRUMENT SPECIALTIES CO., P.O. Box A, Delaware Water Gap, PA 18327, Tel: 717-424-8510, TWX: 510-671-4526; Empl.: 350; *Sls. Mgr.:* James P. May .... **2**•1908, 1909

Local Sales Offices & Reps

AZ	Phoenix, O'Donnell Assocs.	602-274-6072
CA	San Diego, O'Donnell Assocs.	619-578-1645
CA	Sunnyvale, O'Donnell Assocs.	408-745-7043
CA	Torrance, O'Donnell Assocs.	213-328-9710
SC	Greenville, B & B Sls.	803-297-1200
TX	Dallas, J. M. Spell	214-620-0040
WA	Bothell, Temco Northwest	206-488-1254

INTECH, Instruments Div., 282 Brokaw Rd., Santa Clara, CA 95050, Tel: 408-727-0500, TWX: 910-338-0254; Empl.: 120; *Sls. Mgr.:* Howard Randall; *Dist. Mgr.:* Howard Randall

INTECH, Microcircuits Div., 2270 Martin Ave., Santa Clara, CA 95050, Tel: 408-988-4930, TWX: 910-338-2213; FSC No.: 33967; Empl.: 150; *Sls. Mgr.:* D. Arnold

INTEGRA, INC., 2368 Walsh Ave., Santa Clara, CA 95051, Tel: 408-727-9601, TWX: 910-338-0585; FSC No.: 51162

INTEGRAL DATA SYS., INC., Rte. 13 S, Milford, NH 03055, Tel: 603-673-9100, Telex: 95-3032; *Dist. Mgr.:* M. Dude

INTEGRATED CIRCUIT ENGRG. CORP. (ICE), 15022 N. 75th St., Scottsdale, AZ 85260, Tel: 602-998-9780, Telex: 165-755; Empl.: 45; *Sls. Mgr.:* Daniel J. Shelton

INTEGRATED CIRCUITS, INC., 10301 Willows Road, Redmond, WA 98052, Tel: 206-882-3100, TWX: 910-443-2302; FSC No.: 50821; Empl.: 160; *Sls. Mgr.:* B. W. Brugman .... **1A**•1660; **3**•1593-1597

Local Sales Offices & Reps

CA	El Toro, Martronix	714-855-6397
CA	Mountain View, Weseloh-Swanson Sls.	415-961-0565
CO	Parker, Tech. Mktg. Assoc.	303-841-3435
FL	Melbourne, EMS Inc.	305-724-1027
IL	Schaumburg, Gassner & Clark Co.	312-882-8608
IA	Des Moines, Beams Co.	515-255-1148
KS	Shawnee Mission, Beams Co.	913-631-0300
MD	Owings Mills, Neal Deoul Assocs.	301-363-4311
MA	Wakefield, Howard C. Jappe Co.	617-245-9359
MN	Minneapolis, Electromark	612-881-3306
MO	St. Louis, Beams Co.	314-569-1060
NJ	Flanders, K & R Engrg. Sls.	201-584-5235
OH	Cleveland, Arthur H. Baier Co.	216-461-6161
PA	Newtown, Yax Assocs.	215-860-2540
TX	Irving, Kite Elctrn. Sls.	214-438-9336

INTEGRATED COMPUTER SYSTEMS, 6305 Arizona Pl., P.O. Box 45405, Los Angeles, CA 90045, Tel: 213-417-8888, Telex: 4995168 ICS LA; Empl.: 80; *Sls. Mgr.:* Ruth Dordick

INTEGRATED DEVICE TECHNLG., INC., 3236 Scott Blvd., Santa Clara, CA 95051, Tel: 408-727-6116, TWX: 910-338-2070; FSC No.: 61772; Empl.: 240; *Sls. Mgr.:* Lanny Flessas

INTEGRATED MICROWAVE, 11526 Sorrento Valley Rd., San Diego, CA 92121, Tel: 619-457-0277, TWX: 910-335-2037; FSC No.: 60656; *Sls. Mgr.:* Art Brand

INTEL MEMORY SYSTEMS, 1302 N. Mathilda, Sunnyvale, CA 94086, Tel: 408-734-8102, TWX: 910-339-9361; FSC No.: 34649; Empl.: 600; *Sls. Mgr.:* G. Andersen, Mktg. Mgr.

INTERACTIVE
Computer Products, Inc.

INTERACTIVE COMPUTER PRODUCTS, INC., 23591 El Toro Rd., Ste. 180, El Toro, CA 92630, Tel: 714-770-5332, Telex: 469459; *Sls. Mgr.:* Jim Bearden

Local Sales Offices & Reps

AL	Huntsville, 20th Century Mktg.	205-533-9281
CA	Sunnyvale, Industrial Modules	408-737-7727
CA	Van Nuys, Momjian & Associates	213-764-4891
CO	Aurora, Garrett Sls. Co.	303-695-3720
GA	Stone Mountain, 20th Century Mktg.	404-292-7088
MA	Waltham, Benchmark Associates	617-899-3390
NY	Staten Island, Budd-Tronics Sales	212-494-7894
TN	Knoxville, 20th Century Mktg.	615-690-1618
UT	Salt Lake City, Garrett Sls. Co.	801-350-7406

INTERACTIVE MICRO SYS., INC., 644 Davisville Rd., Willow Grove, PA 19090

INTERCONICS, BMC Industries, Inc., 610 Bremer Tower, St. Paul, MN 55101, Tel: 612-228-6512, Telex: 297022; *Sls. Mgr.:* Lee Jamison

INTERCONNECT DEVICES, INC., 5101 Richland Ave., Kansas City, KS 66106, Tel: 913-342-5544, Telex: 437-262; *Sls. Mgr.:* Edward J. Schifman

Local Sales Offices & Reps

AZ	Phoenix, Piper Sls. Co.	602-949-0048
CA	Los Angeles, M.A. Stolaroff Co.	213-295-7781
CA	Santa Clara, Electro Venture	408-727-1553
CO	Denver, Piper Sls. Co.	303-443-5337
CT	Canton, Bell Controls	203-693-8926
FL	Orlando/Ft. Lauderdale, Equipment Sales	305-339-2972
GA	Atlanta, Equipment Sales	404-992-7180
MN	Minneapolis, Mil-Com Marketing	612-944-8030
NH	Nashua, Bell Controls	603-882-6984
NY	New York, Sprung-Nussbaum	201-569-5666
TX	Dallas, R. F. Kimball	214-231-3447

INTERCONNECTION TECHNOLOGY, INC., 5542 Buckingham Drive, Huntington Beach, CA 92649, Tel: 714-891-5305, TWX: 910-596-1879; *Sls. Mgr.:* Ken Rhines ....**2**•1890

Local Sales Offices & Reps

AZ	Scottsdale, Semi-sys. Arizona, Inc.	602-991-1151
CA	El Segundo, Varigon Assocs.	213-322-1120
CA	El Toro, Varigon Assocs.	714-855-0233
CA	San Diego, Varigon Assocs.	619-576-0100
CA	Santa Clara, DC Elctrns.	408-980-1199
IL	Park Ridge, Probe Elctrns.	312-696-2828
MD	Pasadena, Macrotech Assocs.	301-437-5588
NM	Albuquerque, Syntech	505-266-7951
OH	Mansfield, Ralph Meckling Assocs.	419-756-4433
WA	Edmonds, Cunningham Sales, Inc.	206-771-4848

INTERDESIGN, INC., 1500 Green Hills Rd., Scotts Valley, CA 95066, Tel: 408-438-2900, TWX: 910-339-9374; Empl.: 230

Local Sales Offices & Reps

IL	Schaumburg, Interdesign	312-397-1990
MA	Burlington, Interdesign	617-229-5811

INTERDYNE CO., 157 Topaz St., Milpitas, CA 95035, Tel: 408-943-9133; FSC No.: 31598; Empl.: 30

INTERELECTRONICS CORP., Interelectronics Park, 550 U.S. Rte. 303, Congers, NY 10920, Tel: 914-EL8-8000; Empl.: 82; *Sls. Mgr.:* M. H. Pintell; *Dist. Mgr.:* G. Sherwood ....**3**•1598

INTERFACE, 7401 Butherus Dr., Scottsdale, AZ 85260, Tel: 602-948-5555, Telex: 668-394; FSC No.: 32311

INTERFACE ENGRG., 386 Lindelof Ave., Stoughton, MA 02072, Tel: 617-344-7383, Telex: 940-848; FSC No.: 14352; Empl.: 25; *Sls. Mgr.:* Thomas Scanlon ....**3**•1164, 1165

Local Sales Offices & Reps

NY	Great Neck, Industron Assoc.	516-487-2620
VA	Arlington, Gans & Pugh	703-527-3262

INTERFACE TECH. DYNATECH, 150 East Arrow Hill Way,, San Dimas, CA 91773, Tel: 714-592-2971

INTERGALACTIC CORP., Box 7025, Salt Lake City, UT 84107, Tel: 801-262-0094

INTERLOK
ONE OF THE **PURDY** GROUP OF COMPANIES

INTERLOK, 770 Airport Blvd., Burlingame, CA 94010, Tel: 415-348-5625, TWX: 910-374-2353; FSC No.: 55951; Empl.: 30; *Sls. Mgr.:* Ray Vorce ....**2**•1038, 1039, 1334-1337, 1761

Local Sales Offices & Reps

AZ	Tempe, Foley, Tallent & Lee	602-894-2345
AR	Little Rock, J. Y. Schoonmaker	501-375-2168
CA	Anaheim, Impact Elctrns., Inc.	714-553-1351
CA	Burlingame, W. J. Purdy	415-347-7701
CO	Denver, W. J. Purdy	303-777-1411
CT	Hartford, Sturgeon	203-249-7800
IL	Elmhurst, Hill-Gray Assoc.	312-832-4101
IN	Indianapolis, Sukup & Cox	317-253-5501
IA	Marion, MSB Assocs.	319-377-6261
KS	Shawnee Mission, MSB Assocs.	913-432-2131
MD	Lisbon, S. K. MacDonald	301-442-1590
MA	Needham Hgts., P. R. Sturgeon	617-444-6603
MI	Ferndale, Hilltronics	313-398-5556
MO	Hazelwood, MSB Assocs.	314-895-4700
NJ	Englewood, Harold Gray	201-894-0894
NM	Albuquerque, W. J. Purdy	505-266-7959
NY	Syracuse, Paston-Hunter	315-437-2843
OH	Beachwood, Elctrn. Salesmasters	216-831-9555
OK	Tulsa, J. Y. Schoonmaker	918-444-0373
OR	Beaverton, William J. Purdy	503-641-9373
PA	Philadelphia, S. K. MacDonald	215-545-1205
TX	Dallas, J. Y. Schoonmaker	214-349-1650
TX	Houston, J. Y. Schoonmaker	713-738-2427
WA	Redmond, William J. Purdy	206-882-3144

Local Distributors

AZ	Tempe, Anjon Entprs.	602-894-1332
AZ	Tempe, Waltronic Sls.	602-967-1020
CA	Chatsworth, Panel Parts Co.	213-998-5991
CA	Santa Clara, Dynametron	408-727-6531
CA	Santa Clara, Waltronic Sls.	408-727-1200
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Wallingford, Sager Electrical Supp. Co.	203-265-4600
IL	Villa Park, Melvin Elctrns.	312-279-5010
MA	Hingham, Sager Electrical Supp. Co.	617-749-6700
MA	Lynn, Land Elctrn. Supp. Co.	617-592-2220
MA	Waltham, Vantage Elctrns. Corp.	617-894-8690
NJ	Cranford, Garden State Elctrns., Inc.	201-272-6400
NY	Buffalo, Summit Distrs.	716-884-3450
OK	Tulsa, Radio, Inc.	918-587-9123
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
TX	Houston, Lenert Co.	713-225-1465
VA	Richmond, Instrument Tech. Rep.	804-275-1431

INTER-MARKET, 1946 Lehigh Ave., Glenview, IL 60025, Tel: 312-729-5330, TWX: 910-651-1997; FSC No.: 34165; Empl.: 10; *Sls. Mgr.:* Phil Gardanier ....**1B**•1088, 1649

Local Sales Offices & Reps

MA	Braintree, Nova Assoc.	617-848-9330
MN	St. Paul, Kenco Tronics	612-645-7717
PA	Rydal, Espy Sls.	215-576-0780
TX	Irving, Kite Elctrn. Sls.	214-438-9336
WA	Redmond, Elctrn. Mktg.	206-882-0962

Local Distributors

CA	Chatsworth, Mil-Comm Distr.	213-998-3111
CO	Denver, Integrated Elctrns.	303-292-6121
ID	Spirit Lake, A-1 Electronics	800-635-1545
IL	Chicago, Newark Elctrns.	312-638-4411
MI	Grand Rapids, S-F Electronics	616-459-0216
MN	St. Paul, K.D.I. Inc.	612-645-5090
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Fairlawn, Relay Specialties	201-797-3313
OH	Dayton, Stotts-Friedman	513-298-5555
PA	Willow Grove, Resco Electric	215-659-4575
TX	Austin, Galtronics	512-837-7470
WI	Mequon, Lake-View Elctrn.	414-377-8250
WI	Oshkosh, Electronic Inds.	414-235-8930
Can	Montreal, Que., Braydon Electro	514-332-5650

INTERMATIC, Intermatic Plaza, Spring Grove, IL 60081, Tel: 815-675-2321, Telex: 25-265; Empl.: 1000

INTERNATIONAL COMPS. CORP., 105 Maxess Rd., Melville, NY 11747, Tel: 516-293-1500, TWX: 510-224-6409; Empl.: 100; *Sls. Mgr.:* Irwin Okin ....**1A**•1074, 1876, 2096; **2**•1338; **3**•1030

Local Sales Offices & Reps

AL	Huntsville, EMA	205-533-6640
AZ	Tempe, Electronic Dev. & Sls.	602-829-9699
CA	Anaheim, Impact Elctrns.	714-533-1351
CA	Anaheim, Impact Elctrns.	714-533-1351
CA	Redwood City, Hickey Inds.	
CT	Bethel, GM Branch	203-744-1426
CT	Vernon, G-M Assoc.	203-646-4443
FL	Casselberry, HAI	305-752-7520
FL	Coral Springs, HAI	305-752-7550
GA	Atlanta, EMA	404-329-0530
IL	Arlington Heights, MJ Petersen & Assoc.	312-577-8200
IN	Fort Wayne, Jim Finnegan & Co,	219-747-7650
IA	Cedar Rapids, IOWA Tech. Sls.	319-377-5795
MD	Baltimore, Espy Sls. Co,	301-444-6982
MA	Framingham, G-M Assoc.	617-872-4871
MA	Stroughton, GM Assocs.	617-344-0116
MN	Minneapolis, PSI	612-944-8545
NH	Exeter, GM Branch	603-778-7472
NJ	East Brunswick, Winch Sls. Assocs.	201-828-4615
NY	Jericho, Metro Tech. Sls.	516-935-3330
NY	Syracuse, Nycom	315-437-8343
NC	Pineville, EMA	704-541-2628
NC	Winston-Salem, EMA	919-784-7304
OH	Cleveland, Jim Finnegan & Co.	216-238-5905
PA	Camp Hill, ESPY Branch	717-763-9577
PA	Rydal, Espy Sls. Co.	215-576-0780
TN	Donnelson, EMA	615-883-1414
TN	Jonesboro, EMA Branch	615-753-8861
TX	Austin, Mech-tron Mktg.	512-835-0980
TX	Dallas, Mech-tron Mktg.	214-343-3786
TX	Houston, Mech-tron Mktg.	713-462-1432
WA	Edmonds, McLaughlin Mktg. Inc.	206-743-1161

Local Distributors

AZ	Phoenix, ACC	602-269-5655
CA	Canoga Park, Myco Vickers	213-340-2025
CA	Redwood City, Hi-Cor	415-365-5087
CO	Denver, Integrated Elect.	303-623-8713
CT	Danbury, Pilgrim Elect.	203-792-7274
CT	East Haven, JV Elctrns.	203-469-2321
CT	Wallingford, Midstate Elctrns. Co.	203-265-9900
FL	Ft. Lauderdale, National Resistor Co.	305-772-4500
MD	Baltimore, Lorac Elctrns. Co.	301-247-1682
MN	Eden Prarie, Cassidy Elec. Co.	612-944-0100
MN	Minneapolis, Cassidy Elctrns.	612-835-7746
PA	Philadelphia, Mur'Tronics	215-632-4330
PA	Philadelphia, Jan Indl. Elec.	215-WA 2-1321
TX	Ft. Worth, C & W Supp. Co.	817-831-0395

INTERNATIONAL CRYSTAL MFG., 10 N. Lee, P.O. Box 26330, Oklahoma City, OK 73126, Tel: 405-236-3741, Telex: 747-147, TWX: 910-831-3177; Empl.: 165; *Sls. Mgr.:* Paul E. Denwalt ....**1A**•1367

INTERNATIONAL DATA SCIENCES, 7 Wellington Rd., Lincoln, RI 02865, Tel: 401-333-6200, TWX: 710-384-1911; Empl.: 125

INTERNATIONAL DEVICES INC., 3200 Pendleton, Santa Ana, CA 92704, Tel: 714-557-9394, 800-854-7651, Telex: 681387; FSC No.: 53763; *Sls. Mgr.:* Alan J. Vanek; *Dist. Mgr.:* Alan J. Vanek

INTERNATIONAL DIODE, 229 Cleveland Ave., Harrison, NJ 07029, Tel: 201-482-6518; Empl.: 9; *Sls. Mgr.:* Lee Toong

INTERNATIONAL ELECTRO MAGNETICS, INC., 350 N. Eric Dr., Palatine, IL 60067, Tel: 312-358-4622; Empl.: 30; *Sls. Mgr.:* T. Pretto ....**3**•1031

Local Sales Offices & Reps

NY	New York, United Research Labs.	212-751-4660

INTL. ELCTRN. RESCH., 135 W. Magnolia Blvd., Burbank, CA 91502, Tel: 213-849-2481, TWX: 910-498-2206; FSC No.: 98978; Empl.: 116; *Sls. Mgr.:* J.S. Smith

INTERNATIONAL HIGH VOLTAGE ELCTRNS., INC., 98 Mill Plain Rd., Danbury, CT 06810, Tel: 203-792-7820; *Sls. Mgr.:* A. Pellegrino .. **3**•1599-1601

Local Sales Offices & Reps

CT	Waterbury, HLM Assocs.	203-753-9894
NJ	Parsippany, HLM Assocs.	201-263-1535
NY	Northport, HLM Assocs.	516-757-1606

INTERNATIONAL INSTRUMENTATION, 31131-602 Via Colinas, Westlake Vlg., CA 91362, Tel: 213-991-9614; *Sls. Mgr.:* C. D. Morrison; *Dist. Mgr.:* D. Casey

INTERNATIONAL INSTRUMENTS, 88 Marsh Hill Rd., Orange, CT 06477, Tel: 203-795-4711, TWX: 710-465-2897; Empl.; 150; *Dist. Mgr.:* J. Connolly

Local Sales Offices & Reps

AL	Huntsville, Brandel-Stephens	205-883-0445
AZ	Tempe, Gassner & Clark	602-968-9037
CA	Burlingame, Engrg. Rep.	415-348-5042
CA	Los Angeles, Barnard & Assocs.	213-515-2978
CA	San Diego, Engrg. Rep.	714-565-2131
CO	Denver, Nelson	303-573-1516
FL	Deerfield Beach, Brandel-Stephens	305-427-8558
FL	Orlando, Brandel-Stephens	305-425-3202
GA	Atlanta, Brandel-Stephens	404-261-7579
IL	Chicago, Memeco Sls. & Svc.	312-774-0919
KS	Shawnee Mission, Tech. Sls. Assoc.	913-888-3330
MD	Perry Hall, Electra-Tech	301-256-2723
MA	Hingham, Northeast Reps.	617-749-8700
MN	Eden Prairie, Yukon Sls. Assocs.	612-941-8155
MO	Ferguson, Tech. Sls. Assocs.	314-725-5361
NJ	Berkley Heights, NBS Assocs.	201-464-8500
NY	Rochester, H.C. Johnson Agencies	716-586-0777
NY	Williamsville, H.C. Johnson Agencies	716-632-7880

C	Charlotte, D.G.W.	704-334-7090
C	Winston Salem, D.G.W.	919-768-7166
H	Westlake, Advanced Tech. Assocs.	216-835-5050
K	Tulsa, Telstar Instr.	918-628-1011
R	Portland, Garland Affolter Engrg.	503-223-7349
A	Glenshaw, H.C. Johnson Agencies	412-487-1246
A	Paoli, Stitzer Assocs.	215-644-5500
X	Houston, Wilson-Markham Assoc.	713-445-5780
A	Dumfries, Electra-Tech	703-670-6962
A	Kirkland, Garland Affolter Engrg.	206-822-2275

NTERNATIONAL LASER SYS., 3404 N. Orange Blossom Trail, Orlando, FL 32804, Tel: 305-295-4010, TWX: 810-850-0195; Empl.: 408; *Sls. Mgr.:* W. C. Hudson

NTERNATIONAL MFG. SVCS., 50 Schoolhouse La., Portsmouth, RI 02871, Tel: 401-683-9700; Empl.: 25; *Sls. Mgr.:* Jay Benson

NTERNATIONAL MICROELECTRONIC PRODS., 2830 North First Street, San Jose, CA 95134, Tel: 408-262-9100, Telex: 499-1041, TWX: 910-338-2274; *Sls. Mgr.:* Robert Kromer

NTERNATIONAL MICROSYSTEMS, 11554 C Ave., Auburn, CA 95603, Tel: 916-885-7262, TWX: 910-367-3706; Empl.: 12; *Sls. Mgr.:* Gail Jones

NTERNATIONAL MICROTRONICS CORP., 4016 E. Tennessee St., Tucson, AZ 85714, Tel: 602-748-7900, TWX: 910-952-1170; Empl.: 25; *Sls. Mgr.:* Otto Fest; *Dist. Mgr.:* Janice Dougall

NTERNATIONAL POWER MACHINES, 11534 Pagemill Rd., Dallas, TX 75243, Tel: 214-343-6076; *Sls. Mgr.:* Jack Conn

NTERNATIONAL RECTIFIER CORP., Semiconductor Div., 233 Kansas St., El Segundo, CA 90245, Tel: 213-772-2000, Telex: 472-0403, TWX: 910-348-6291; Empl.: 1200; *Sls. Mgr.:* W. Lewis; *Dist. Mgr.:* D. Coppinger

Local Sales Offices & Reps

	Palatine	312-991-5520
N	Edina	612-831-6400
J	Pallisades Park	201-943-4554
H	Independence	216-447-9717
A	Charlottesville	804-973-1316
I	Elm Grove	414-784-2480

NTERNATIONAL RESOURCE SVCS., 7343 N.W. 79th Terr., Miami, FL 33166, Tel: 305-884-2924, Telex: 522261 MIA DEPT 262; Empl.: 5; *Sls. Mgr.:* Richard L. Winn

NTERNATIONAL SENSOR SYSTEMS, INC., Aurora Industrial Pk., Box 345, Aurora, NE 68818, Tel: 402-694-6111; Empl.: 45 .... **1A**•1661

Local Sales Offices & Reps

Z	Tempe, Spectrum Assoc. SW	602-966-1788
A	Claremont, Gandalf Elctrns.	714-626-5481
A	Palo Alto, Tri-Rep	415-965-1822
T	Branford, LJM Assocs.	203-488-4244
	Plantation, Electro-Mechanical Standards	305-587-7146
	Chicago, Esco Assocs.	312-763-0800
A	Westboro, RJC Assocs.	617-366-0399
N	Minneapolis, R-J Inc.	612-866-3661
Y	Syracuse, Labtronics	315-455-7314
Y	Wantagh, Bytec Reps.	516-781-7400
R	Beaverton, Ravencraft	503-646-9261
A	Southampton, Campbell Assocs.	215-322-6630
X	El Paso, Nokomis Consumer Prods.	915-778-2801
X	Euless, Andy Byles Intl.	817-267-4099
A	Fairfax, Schibley Assoc.	703-591-3008

NTERNATIONAL TRANSDUCER, 93 Castilian Dr., Goleta, CA 93117, Tel: 805-685-1441, Telex: 658 495; FSC No.: ID 532; Empl.: 75; *Sls. Mgr.:* Glen E. Liddiard

NTERNATIONAL WIRE PRODUCTS CO., 500 W. Main St., Wyckoff, NJ 07481, Tel: 201-891-5800, Telex: 642580; Empl.: 700; *Sls. Mgr.:* C. D. Abbott

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INTEROPTICS, Purdy Group, 770 Airport Blvd., Burlingame, CA 94010, Tel: 415-347-7727 .... **1B**•1114, 1115

INTERSIL, 10710 N. Tantau Ave., Cupertino, CA 95014, Tel: 408-996-5000, TWX: 910-338-0583; FSC No.: 32293; Empl.: 4102; *Dist. Mgr.:* Bruce Mattern

INTERSTATE ELECTRONICS CORP., Box 3117, 1001 E. Ball Rd., Anaheim, CA 92803, Tel: 714-635-7210, Telex: 655443, TWX: 910-591-1197; FSC No.: 6625, 5985; Empl.: 1500; *Sls. Mgr.:* Darryl Watanabe; *Dist. Mgr.:* R. Sorenson

INTERSWITCH

INTERSWITCH, 770 Airport Blvd., Burlingame, CA 94010, Tel: 415-347-8217, TWX: 910-374-2353; Empl.: 30; *Sls. Mgr.:* Ray G. Vorce .... **1B**•1650

Local Sales Offices & Reps

AZ	Tempe, Foley, Tallent & Lee	602-894-2345
AR	Little Rock, J. Y. Schoonmaker	501-375-2168
CA	Burlingame, W. J. Purdy	415-347-7701
CA	Costa Mesa, Berman-Gravely Co.	714-549-2122
CO	Denver, W. J. Purdy	303-777-1411
CT	Hartford, Sturgeon	203-249-7800
IL	Elmhurst, Hill-Gray	312-832-4101
IN	Indianapolis, Sukup & Cox	317-253-5501
IA	Marion, M-S-B Assocs.	319-377-6261
KS	Shawnee Mission, M-S-B Assocs.	913-432-2131
MD	Baltimore, S. K. MacDonald	301-254-3380
MA	Needham Hgts., P. Sturgeon	617-444-6603
MI	Ferndale, Hilltronics	313-398-5556
MO	Hazelwood, M-S-B Assocs.	314-895-4700
NJ	Englewood, H. Gray	201-894-0894
NM	Albuquerque, W. J. Purdy	505-266-7959
NY	Syracuse, Paston-Hunter	315-437-2843
OH	Beachwood, Elctrn. Salesmasters	216-831-9555
OK	Tulsa, J. Y. Schoonmaker	918-583-0912
OR	Beaverton, William J. Purdy	503-641-9373
PA	Philadelphia, S. K. MacDonald	215-545-1205
TX	Dallas, J. Y. Schoonmaker	214-349-1650
TX	Houston, J. Y. Schoonmaker	713-738-2427
UT	Salt Lake City, William J. Purdy	801-486-8557
WA	Redmond, William J. Purdy	206-882-3144

Local Distributors

AZ	Tempe, Waltronic Sls.	602-967-1020
AZ	Tempe, Anjon Entprs.	602-894-1332
CA	Chatsworth, Panel Parts Co.	213-998-5991
CA	N. Hollywood, Merit Comp. Supp.	213-842-8162
CA	Santa Clara, Waltronic Sls.	408-727-1200
CO	Denver, Ragon	303-744-3601
FL	Ft. Lauderdale, Peerless Radio Corp.	305-973-4141
IL	Addison, L Comp-Chicago	312-628-1400
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
MA	Lynn, Land Elctrn. Supp. Co.	617-592-2220
MN	Minneapolis, Bergquist	612-835-2322
NJ	Englewood, Tech. Elctrn./Powell	201-894-0800
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Rochester, Summit Distrs.	716-334-8110
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Cincinnati, Hughes-Peters, Inc.	513-351-2000
OH	Columbus, Hughes-Peters, Inc.	614-294-5351
PA	Willow Grove, Resco Elctrns.	215-659-4575
TX	Houston, Harrison Equip. Co.	713-879-2600
WI	Mequon, Taylor Elec. Co.	414-241-4321

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WIMA Division

INTER-TECHNICAL GRP., Box 23, Irvington, NY 10533, Tel: 914-591-8822, TWX: 710-564-0802; Empl.: 13; *Sls. Mgr.:* T. A. Galgano .... **1A**•1075-1079

Local Sales Offices & Reps

AL	Huntsville, J. R. Assocs.	205-830-2130
AZ	Scottsdale, Semper Fi Sls. Inc.	602-991-4606
CO	Lakewood, Palmer Assocs.	303-233-9423
CT	Colchester, Normell Assocs.	203-537-5555/3758
FL	Altamonte Springs, "C" Assocs.	305-831-1717
GA	Dunwoody, J. R. Assocs.	404-399-1831
IL	Westchester, W. G. Brouilette & Assocs.	312-345-6500
MA	Newton, Normell Assocs.	617-969-5478
MN	Minneapolis, Intl. Sls.	612-831-8423
NJ	Colonia, H. B. Heft Assocs.	201-381-5193
NY	Lynbrook, H. B. Heft Assocs.	516-LY 9-3351
NY	Rochester, BKT Assocs.	716-586-5814
NC	Kennersville, Naylor Assocs.	919-996-4162
OR	Portland, Harry Levinson Co.	503-245-1902
PA	King of Prussia, R. D. Freedman Assocs.	215-279-5767
PA	W. Conshohocken, Eastern Comps. Sls. Corp.	215-825-8610
TX	Carrollton, Paulsen Elctrn. Sls.	214-386-4785
UT	Salt Lake City, Alpine Entprs.	801-278-6920
VA	Manassas, Eastern Comps. Sls.	800-223-3850
WA	Seattle, H. Levinson Co.	206-323-5100

INTEX MICRO SYSTEMS CORP., 725 S. Adams Rd., Suite L-8, Birmingham, MI 48011, Tel: 313-540-7601, Telex: 230254 WUPUBTLX; *Sls. Mgr.:* R. Thielman

INTRA-COMPUTER, 101 W. 31st St., New York, NY 10001, Tel: 212-947-5533, Telex: 64-5067; Empl.: 9; *Sls. Mgr.:* Art Yaglian

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INTRONICS, INC., 57 Chapel St., Newton, MA 02158, Tel: 617-964-4000, Telex: 200095, TWX: 710-335-6835; Empl.: 130; *Sls. Mgr.:* J. Swartz .... **3**•1602, 1603

Local Sales Offices & Reps

AL	Huntsville, Elctrn. Mfrs. Agts.	205-830-4030
AZ	Tempe, Delta Elctrns.	602-966-9903
CA	Los Altos Hills, HB Marketing	415-941-4080
CA	Temple City, HMC Inc.	213-285-0485
CO	Denver, Anderson Assoc.	303-295-3342
CT	Guilford, Elctrn. Mktg. Assoc.	203-543-5424
FL	Melbourne, Reynolds & Assoc.	305-259-7000
GA	Atlanta, Elctrn. Mfrs. Agts.	404-329-0530
IL	Palatine, Kingston Comps.	312-359-7990
IN	Fort Wayne, Domino Unlimited	219-747-5621
IA	Cedar Rapids, Technical Electronics	319-362-4116
KS	De Soto, Midtec Assoc.	913-441-6565
MD	Severna Park, DelMarva Engr.	301-647-8007
MI	Southfield, Infinity Inc.	313-557-7230
MN	Minneapolis, Dan'l Engr.	612-854-7550
MO	Florissant, Midtec Assoc.	314-837-5200
NH	Salem, Elctrn. Mktg. Assoc.	603-893-5378
NJ	Vincentown, Eastern Sci. Mktg.	609-268-0250
NY	Canandaigua, Bensman/Upstate	716-396-2498
NY	Jericho, J-Square Mktg.	516-935-3200
NC	Pineville, Elctrn. Mfrs. Agts.	919-781-4139
OH	Dayton, Del Steffen & Assoc.	513-293-3145
PA	Chalfont, Eastern Sci. Mktg.	215-822-6503
TN	Jonesboro, Elctrn. Mfrs. Agts.	615-753-5844
TX	Richardson, Scientific Sls.	214-231-6541
WA	Seattle, Data Com. Assoc.	206-285-2525

ION PHYSICS CO., Div. High Voltage Engrg. Corp., P.O. Box 416, So. Bedford St., Burlington, MA 01803, Tel: 617-272-2800, Telex: 951733

IPAC GRP., 3047 Indl. Blvd., Bethel Pk., PA 15102, Tel: 412-831-9200, TWX: 510-697-3935; Empl.: 50; *Sls. Mgr.:* D. T. Cusack

IQ SYSTEMS, Applied Circuit Tech., 2931 La Jolla St., Anaheim, CA 92806, Tel: 714-630-6834; *Sls. Mgr.:* Jim Stedt

IR SCIENTIFIC, Box 110, Carlisle, MA 01741, Tel: 617-369-7118; Empl.: 10; *Sls. Mgr.:* S. J. Sommer

ISC MAGNETICS DIV., See Aeroflex Labs., Inc., Magnetic Prods. Div.

ISKRA ELECTRONICS, INC., 8 Greenfield Rd., Syosset, NY 11791, Tel: 516-364-2616 ....**1A**•1080, 1081, 1877, 2039, 2097; **1B**•1443

ISL PRODUCTS INTL. LTD., 235 P Robbins Lane, Syosset, NY 11791-6093, Tel: 516-822-9601, TWX: 510-221-2109; Empl.: 25,000; *Sls. Mgr.:* Ken Kawaller .... **1A**•1082, 1083, 2098

Local Sales Offices & Reps

IL	Lake Bluff, R & R Marketing	312-295-6660
IN	Noblesville, Newton & Assoc.	317-845-8157
MD	Pikesville, Muncy Sls.	301-484-6376
MA	Topsfield, RFC Assocs.	617-887-8545
TX	Dallas, Dick Bellew Sls.	214-373-4590
VA	Charlottesville, Electronic Sources	804-953-6315

ISOCHEM PRODS. CO., A Sub. of Rohm and Haas Adv. Matls. Co., 99 Cook St., Lincoln, RI 02865, Tel: 401-723-2100; Empl.: 26; *Sls. Mgr.:* Arthur M. Goldfarb

ISOLATION PRODUCTS, INC., 1245 Birchwood Dr., Sunnyvale, CA 94086, Tel: 408-734-4068; *Sls. Mgr.:* Joseph D. Bianco

ISOREG CORP., 410 Great Rd., P.O. Box 486, Littleton, MA 01460, Tel: 617-486-9483, TWX: 710-347-6974 ISOREG LTTN; Empl.: 65; *Sls. Mgr.:* Paul Foss; *Dist. Mgr.:* Paul Foss

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Local Sales Offices & Reps

AZ	Scottsdale, Faser Technical Sls.	602-948-4404
CA	Costa Mesa, EBA Microwave	714-857-6079
CA	Fremont, Wm. Parks & Assocs.	415-490-2011
CA	San Diego, Qualtronics	619-560-8955
CO	Denver, W. H. Howard Assoc.	303-353-7281
IL	Woodridge, Trend-Tronics	312-985-0626
IN	Fort Wayne, Given Corp.	219-432-5585
MD	Columbia, M. Lader Co.	301-730-1550
MD	Conowingo, M. Leader Co.	301-272-3449
NY	Melville, Carnes Assoc.	516-694-1600
PA	Lafayette Hill, M. Lader Co.	215-825-3177

ISOTRONICS, Industrial Park, New Bedford, MA 02745, Tel: 617-998-2000, TWX: 710-344-1961; *Sls. Mgr.:* Mike LoFrumento

ITEK MEASUREMENT SYS., Div. Litton Inds., 27 Christina St., Newton, MA 02161, Tel: 617-969-7300, TWX: 710-335-6783; Empl.: 100 .... **1B**•1845

Local Sales Offices & Reps

CA	Los Angeles, Measurement Sys. Div.	213-641-0476
FL	Orlando, K. S. Chaney	305-293-5656
IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-293-5437
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
MN	Minneapolis, Marsland Assocs.	612-545-4481
NJ	Metuchen, Measurement Sys. Div.	201-548-1500
NM	Las Cruces, BFA Corp.	505-524-9693

Local Distributors

FL	Orlando, Kenneth S. Chaney	305-423-9465
IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-293-5437
MN	Minneapolis, Marsland Assocs.	612-545-4481
NM	Las Cruces, BFA Corp.	505-524-9693
Intl	England, Tadley, Hampshire, Hightech Comps., Ltd.	07356-3922
Intl	France, Paris, Sedeme	580.72.000
Intl	Germany, Munich, Weltronic GmbH	089-49 20 66
Intl	Holland, Rotterdam, Anru	010-137395
Intl	India, Bombay, Echbee Corp.	253489
Intl	Israel, Tel-Aviv, Airtronic Engrg. Ltd.	45 48 71
Intl	Italy, La Spezia, Motordiesel Elec. Instr. & Comp.	36.232
Intl	Japan, Tokyo, Nippon Engrg. Sys.	494-4045
Intl	Norway, Oslo, Ole A. Nordby A/S	02 55 07 50
Intl	Sweden, Bromma, Magnetic AB	08-2904-60

ITHACO, INC., Meas. & Control Instrs. Div., 735 W. Clinton St., P.O. Box 6437, Ithaca, NY 14851-6437, Tel: 607-272-7640, TWX: 510-255-9307; Empl.: 120; *Sls. Mgr.:* Allen Roth

ITOH ELECTRONICS, INC., 5301 Beethoven St., Los Angeles, CA 90066, Tel: 212-682-0420, Telex: 12-5059; Empl.: 100; *Sls. Mgr.:* F.I. Makstein, VP Mktg.

ITT CANNON, 10550 Talbert Avenue, P.O. Box 8040, Fountain Valley, CA 92708, Tel: 714-964-7400, Telex: 65-5358, TWX: 910-596-2620; FSC No.: 71468; Empl.: 2500; *Sls. Mgr.:* Bruce Simpson; *Dist. Mgr.:* Frank Cosentino .... **2**•1339-1354

Local Sales Offices & Reps

AL	Huntsville, Brandel-Stephens & Co.	205-833-0445
AZ	Phoenix, ITT Cannon	602-275-4792
CA	Campbell (San Jose), ITT Cannon	408-559-1777
CA	Fountain Valley, ITT Cannon	714-964-7400
CA	San Diego, ITT Cannon	619-560-0917
CA	Santa Ana, ITT Cannon	714-557-4700
CO	Denver, ITT Cannon	303-778-1855
CO	Littleton, ITT Cannon	303-973-8766
CT	Danbury, ITT Cannon	203-748-5801
CT	Enfield, ITT Cannon	203-749-7246
FL	Deerfield Beach, Brandel-Stephens & Co.	305-427-8558
FL	Orlando, Brandel-Stephens & Co.	305-425-3202
GA	Atlanta, Brandel-Stephens & Co.	404-261-7579
IL	Des Plaines, ITT Cannon	312-297-3150
IN	Fort Wayne, ITT Cannon	219-484-6447
IA	Swisher, ITT Cannon	319-369-9107
KS	Haysville, ITT Cannon	316-529-0127
MD	Baltimore, ITT Cannon	301-254-3707
MD	Baltimore, ITT Cannon	301-882-4760
MA	Wakefield, ITT Cannon	617-246-2510
MI	Sterling Heights, ITT Cannon	313-643-4620
MN	Minneapolis, ITT Cannon	612-854-1973
MO	Bridgeton, ITT Cannon	314-739-6040
NM	Albuquerque, ITT Cannon	505-293-0457
NY	Buffalo, L-Mar Assoc.	716-675-1277
NY	East Syracuse, L-Mar Assoc.	315-437-7779
NY	Henniker, ITT Cannon	603-428-3883
NY	Holbrook, ITT Cannon	215-646-2801
NY	Ithaca, L-Mar Assoc.	607-257-5712
NY	Poughkeepsie, ITT Cannon	914-473-3314
NY	Rochester, L-Mar Assoc.	716-323-1000
NC	Greensboro, Brandel-Stephens & Co.	919-274-6952
OH	Kettering, ITT Cannon	513-434-8181
OH	Uniontown, ITT Cannon	216-494-6749
PA	Blue Bell, ITT Cannon	215-646-2801
PA	Trevose, P.S.A., Inc.	215-245-0513
TX	Dallas, ITT Cannon	214-661-0302
TX	Houston, ITT Cannon	713-777-1177
WA	Bellevue, ITT Cannon	206-454-3903
WI	Waukesha, ITT Cannon	414-544-1018

Local Distributors

AZ	Tempe, Time Elctrns.	602-967-2000
CA	San Diego, Richey/Western	619-271-4511
CA	Sun Valley, Richey Elctrns.	213-875-2862
CA	Sunnyvale, Hall-Mark Elctrns.	408-773-9990
CA	Sunnyvale, Time Elctrns.	408-734-9888
CA	Torrance, Time Elctrns.	213-320-0880
CO	Denver, Arrow Elctrns.	303-758-4585
FL	Ft. Lauderdale, Time Elctrns.	305-974-4800
GA	Atlanta, Electro Air	404-351-3545
IL	Bensenville, Hall-Mark Elctrns.	312-860-3814
IN	South Bend, Genesis Elctrns.	219-287-2911
MA	Woburn, Time Elctrns.	617-935-8080
MO	St. Louis, Time Elctrns.	314-391-6444
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Hauppauge, Time Elctrn. Sls.	516-273-0100
NY	Plainview, A.S.I./Progress	516-433-1700
PA	Broomall, Time Elctrns.	215-359-1200
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Warminster, Henwarr	215-675-4104
TX	Dallas, Hall-Mark	214-343-5000
TX	Stafford, Harrison Equip.	713-879-2600
WA	Bellevue, Almac Elctrns.	206-643-9992

ITT CANNON ELECTRIC, 666 East Dyer Rd., Santa Ana, CA 92702, Tel: 714-557-4700

ITT COMPS. ELECTROMECHANICAL GRP., 3201 So. Standard St., Santa Ana, CA 92705, Tel: 714-751-3900, Telex: 681-389, TWX: 910-595-1744; FSC No.: 61725; Empl.: 35; *Sls. Mgr.:* J Biggs; *Dist. Mgr.:* C. McElroy .... **1B**•1444- 1450, 1489

Local Sales Offices & Reps

AL	Huntsville, Brandel-Stephens & Co.	205-883-0445
AZ	Scottsdale, Semi-Systems	602-991-1151
CA	Anaheim, Spectrum	714-630-6977
CA	Mountain View, Caltron Comps.	415-964-3244
CA	San Diego, C.K. Assocs.	619-279-0420
CO	Denver, I W Strong & Assoc	303-292-6900
CT	Guilford, Data Mark	203-453-0575
FL	Deerfield Beach, Brandel-Stephens & Co.	305-427-8558
FL	Orlando, Brandel-Stephens & Co.	305-425-3202
GA	Atlanta, Brandel-Stephens & Co.	404-261-7579
IL	Rolling Meadows, Sieger Assoc.	312-991-6161
IN	Fort Wayne, M/S Sls.	219-484-1904
KS	Leawood, Thunderbird Tech. Sls.	913-642-7220
MD	Millersville, Trimark	301-987-9103
MA	Southboro, KSA of New England	617-485-9432
MI	Brighton, SAI Mktg.	313-227-1786
MN	Minneapolis, SAI Mktg.	612-935-0777
MO	Maryland Heights, Thunderbird Tech. Sls.	314-567-6488
NM	Albuquerque, Syn Tech	505-266-7951
NY	Manhasset, Wincor Elctrns.	516-627-9474
NY	Rochester, D. L. Eiss Assoc.	716-328-3000
NC	Greensboro, Brandel-Stephens & Co.	919-274-6952
OH	Beachwood, Thompson & Assoc.	216-831-6277
OH	Dayton, Thompson & Assoc.	513-435-7733
OR	Portland, Jas. J. Backer Co.	503-297-8477
PA	Prospect Park, Elf Sls.	215-534-3340
TX	Austin, Norcom	512-451-2757
TX	Dallas, Norcom	214-386-4888
UT	Salt Lake City, I W Strong	810-942-6998
VA	Lynchburg, Trimark	804-528-0681
WA	Seattle, Jas. J. Backer Co.	206-285-1300

Local Distributors

AL	Huntsville, RM Elctrns.	205-852-1550
AZ	Phoenix, Kachina Elctrn. Distr.	602-269-6201
AZ	Tempe, Richey Western Elctrns.	602-894-9251
AZ	Tempe, TIME Elctrns.	602-967-2000
CA	Anaheim, TIME Elctrns.	714-937-0911
CA	Chatsworth, Integrated Elctrns.	213-998-220

CA	Irvine, Integrated Elctrns.	714-660-1055
CA	Los Angeles, Master Distrs.	213-452-1229
CA	Los Angeles, Richey Western Elctrns.	213-820-3777
CA	San Diego, Richey Western Elctrns.	619-271-4511
CA	Santa Clara, Richey Western Elctrns.	408-727-7411
CA	Santa Monica, Distr. Specialists	213-393-9666
CA	Sun Valley, Q.C. Comps.	213-768-6111
CA	Sunnyvale, TIME Elctrns.	408-734-9888
CA	Torrance, TIME Elctrns.	213-320-0880
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Englewood, TIME Elctrns.	303-850-7701
CT	East Haven, J.V. Elctrns.	203-469-2321
CT	New Haven, Greene Shaw Co.	203-397-0710
CT	Norwalk, Pioneer Elctrns.	203-853-1515
CT	Stamford, Bond Elctrns.	203-348-2663
FL	Davie, ARCO Distrs.	305-772-4500
FL	Fort Lauderdale, NRC	305-772-4500
FL	Ft. Lauderdale, TIME Elctrns.	305-974-4800
GA	Atlanta, Prehler Elctrns.	404-447-5540
L	Chicago, NEP Elctrns.	312-625-8400
N	Indianapolis, RM Elctrns.	317-247-9701
A	Cedar Rapids, DEECO	319-365-7551
MD	Baltimore, Resco	301-823-0070
MD	Beltsville, TREEKO Sales	301-792-0112
MD	Beltsville, RESCO-Washington	301-937-9100
MD	Columbia, TIME Elctrns.	301-964-3090
MA	Lexington, Pioneer Elctrns.	617-861-9200
MA	Newton, Greene-Shaw Co.	617-969-8900
MA	Wilmington, R.C. Components	617-273-1860
MA	Woburn, TIME Elctrns.	617-935-8080
MI	Farmington Hills, Prehler Elctrns.	313-473-7200
MI	Grand Rapids, RM Elctrns.	616-531-9300
MI	Livonia, Reptron Elctrns.	313-525-2700
MN	Eden Prairie, Cassidy Elctrns.	612-944-0100
MN	Minneapolis, Industrial Comps.	612-831-2666
MO	St. Louis, TIME Elctrns.	314-391-6444
NV	Las Vegas, Kiesub Elctrns.	702-733-3888
NJ	Pine Brook, Pioneer Elctrns.	201-227-1262
NJ	Rahway, RSR	201-381-8777
NJ	Whippany, Tonar Inds.	201-884-1400
NM	Albuquerque, Betatron Elctrns.	505-344-2381
NM	Albuquerque, International Elctrns.	505-345-8127
NY	Fairport, Pioneer Elctrns.	716-381-7070
NY	Hauppauge, TIME Elctrns.	516-273-0100
NY	Hauppauge, JACO	516-273-5500
NY	Vestal, Pioneer Elctrns.	607-748-8211
NY	Woodbury, Pioneer Elctrns.	516-921-8700
OH	Columbus, Reptron	614-436-6675
OH	Middleburg Hts., Prehler Elctrns.	216-243-5510
OR	Wilsonville, Zepher Elctrns.	503-582-2929
PA	Broomall, TIME Elctrns.	215-359-1200
PA	Essington, Tri-Com	215-521-3080
PA	Horsham, RM Elctrns.	215-674-1181
TX	Addison, Quality Comps.	214-387-4949
TX	Austin, Quality Comps.	512-835-0220
TX	Dallas, RM Elctrns.	214-263-8361
TX	El Paso, International Elctrns.	915-598-3406
TX	El Paso, ERA Elctrns.	915-592-4126
WA	Bellevue, Integrated Elctrns.	206-455-2727
WA	Seattle, Richey Western Elctrns.	206-575-1910
WA	Seattle, Zepher Elctrns.	206-241-1980
WI	New Berlin, RM Elctrns.	414-784-4420
WI	New Berlin, NEP Elctrns.	414-785-9100

TT COMPS. PASSIVE GRP., 3201 S. Standard St., Santa Ana, CA 92705, Tel: 714-751-3900, Telex: 68-1389, TWX: 910-595-1744; FSC No.: 61725; Empl.: 35; *Sls. Mgr.:* Jim Biggs; *Dist. Mgr.:* C. McElroy .... **1A**•1084-1089, 1371

Local Sales Offices & Reps

AL	Huntsville, Brandel-Stephens & Co.	205-833-0445
AZ	Scottsdale, Semi-Systems Arizona	602-991-1151
CA	Anaheim, Spectrum Assocs.	714-630-6977
CA	Mountain View, Caltron Comp. Corp.	415-964-3244
CA	San Diego, C. K. Assocs.	619-279-0420
CO	Denver, T. W. Strong & Assoc.	303-292-6900
CT	Guilford, Data Mark	203-453-0575
L	Deerfield Beach, Brandel-Stephens & Co.	305-427-8558
GA	Atlanta, Brandel-Stephens & Co.	404-261-7579
	Rolling Meadows, Sieger Assoc.	312-991-6161
	Waukegan, Sieger Assoc.	312-991-6161
N	Fort Wayne, M/S Sls. & Assoc.	219-483-4520
KS	Leawood, Thunderbird Tech. Sls.	913-642-7220
MD	Millerville, Tri-Mark	301-987-9103
MA	Southboro, KSA of New England	617-485-9432
MI	Brighton, SAI Mktg.	313-227-1786
MN	Minneapolis, SAT Mktg.	612-935-0777
MO	Maryland Hts., Thunderbird Tech. Sls.	314-567-6488
NM	Albuquerque, Syntech	505-266-7951
NY	Manhasset, Win-Cor Elctrn. Sls.	516-627-9474
NY	Rochester, D. L. Eiss Assoc.	716-328-3000
NY	Syracuse, D. L. Eiss Assoc.	315-457-0492
NC	Greensboro, Brandel-Stephens & Co.	919-274-6952
OH	Beachwood, Thompson Assoc.	216-831-6277
OH	Dayton, Thompson Assoc.	513-435-7733
OR	Portland, Jas J. Backer Co.	503-297-3777
OR	Salem, Jas J. Backer Co.	503-362-0717
PA	Prospect Park, Elf Sls.	215-534-3340
TX	Austin, Norcom	512-451-2757
TX	Dallas, Norcom	214-386-4888
UT	Salt Lake City, I. W. Strong	810-942-6998
VA	Lynchburg, Tri-Mark	804-528-0681
VA	Lynchburg, Tri-Mark	804-528-0681
WA	Seattle, Jas J. Backer Co.	206-285-1300

Local Distributors

AL	Huntsville, RM Elctrns.	205-852-1550
AZ	Phoenix, Kachina Elctrn. Distrs.	602-269-6201
AZ	Tempe, Richey Western Elctrns.	602-894-9251
AZ	Tempe, Time Elctrns.	602-967-2000
CA	Anaheim, Time Elctrns.	714-937-0911
CA	Chatsworth, Shelley Elctrns.	213-998-3333
CA	Chatsworth, Shelley Elctrns.	619-453-7133
CA	Chatsworth, Integrated Elctrns.	213-998-2200
CA	Irvine, Integrated Elctrns.	714-660-1055
CA	Los Angeles, Richey Western Elctrns.	213-820-3777
CA	San Diego, Richey Western Elctrns.	619-271-4511
CA	San Diego, Shelly Elctrns.	619-453-7133
CA	San Jose, Shelley Elctrns.	408-942-9111
CA	San Jose, Integrated	408-263-1100
CA	Santa Ana, Nesco	714-541-6181
CA	Santa Clara, Richey Western Elctrns.	408-727-7411
CA	Sun Valley, G. C. Comps.	213-768-6111
CA	Sunnyvale, Time Elctrns.	408-734-9888
CA	Sunnyvale, Capsco Sls.	408-734-3020
CA	Torrance, Time Elctrns.	213-320-0880
CA	Van Nuys, Nesco	213-781-0505
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Englewood, Time Elctrns.	303-850-7701
CT	East Haven, J.V. Elctrns.	203-469-2321
CT	New Haven, Greene Shaw Co.	203-397-0710
CT	Norwalk, Pioneer Elctrns.	203-853-1515
CT	Stamford, Bond Elctrns.	203-348-2663
FL	Dania, Arco Distrs.	305-462-3370
FL	Fort Lauderdale, Time Elctrns.	305-974-4800
FL	Fort Lauderdale, NRC	305-772-4500
GA	Atlanta, Prehler Elctrns.	404-447-5540
IL	Chicago, NEP Elctrns.	312-625-8400
IL	Elmhurst, Semiconductor Specialists	312-279-1000
IN	Indianapolis, RM Elctrns.	317-247-9701
IA	Cedar Rapids, DEECO	319-365-7551
MD	Baltimore, Resco-Baltimore	301-823-0700
MD	Beltsville, Treeko Sls.	301-792-0112
MD	Beltsville, Resco, Washington	301-937-9100
MD	Columbia, Time Elctrns.	301-964-3090
MA	Burlington, TLC	617-273-0140
MA	Lexington, Pioneer Elctrns.	617-861-9200
MA	Needham, Impact Elctrns.	617-444-3977
MA	Newton, Greene-Shaw Co.	617-969-8900
MA	Wilmington, R.C. Comps.	617-273-1860
MA	Woburn, Time Elctrns.	617-935-8080
MI	Farmington Hills, Prehler elctrns.	313-473-7200
MI	Grand Rapids, RM Elctrns.	616-531-9300
MI	Livonia, Reptron Elctrns.	313-525-2700
MN	Eden Prairie, Cassidy Elctrns.	612-944-0100
MN	Edina, Cassidy Elctrns.	612-835-7747
MN	Minneapolis, Industrial Comps.	612-831-2666
MO	St. Louis, Olive Elctrns.	314-426-4500
MO	St. Louis, Time Elctrns.	314-391-6444
NV	Las Vegas, Klesub Elctrns.	702-733-3888
NJ	Pinebrook, Pioneer Elctrns.	201-227-1262
NJ	Rahway, RSR Elctrns.	201-381-8777
NJ	Whippany, TONAR Inds.	201-884-1400
NM	Albuquerque, Betatron Elctrns.	505-344-2381
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NY	Central Islip, Semicap Elctrns.	516-582-4400
NY	Fairport, Pioneer Elctrns.	716-381-7070
NY	Hauppauge, Time Elctrns.	
NY	Hauppauge, Jaco	516-273-5500
NY	Vestal, Pioneer Elctrns.	607-748-8211
NY	Woodbury, Pioneer Elctrns.	516-921-8700
OH	Columbus, Reptron	614-436-6675
OH	Middleburg Hieghts, Prehler Elctrns.	216-243-5510
OK	Tulsa, The Altair Co.	918-252-5781
OR	Wilsonville, Zepher Elctrns.	503-582-2929
PA	Broomall, Time Elctrns.	215-359-1200
PA	Essington, Tri-Com	215-521-3080
PA	Horsham, RM Elctrns.	215-674-1181
TX	Addison, Quality Comps.	214-387-4949
TX	Austin, Quality Comps.	512-835-0220
TX	Dallas, RM Elctrns.	214-263-8361
TX	Dallas, Captronics	214-340-3592
TX	El Paso, International Elctrns.	915-598-3406
TX	El Paso, ERA Elctrns.	915-592-4126
TX	Ft. Worth, TTI, Inc.	817-831-0441
TX	Houston, The Altair Co.	713-462-3029
TX	Richardson, The Altair Co.	214-231-5166
WA	Bellevue, Integrated	206-455-2727
WA	Seattle, Richey Western Elctrns.	206-575-1910
WA	Seattle, Zepher Elctrns.	206-241-1980
WI	Maguon, Taylor Elec. Co.	414-241-4321
WI	New Berlin, NEP Elctrns.	414-785-9100
WI	New Berlin, RM Elctrns.	414-784-4420

ITT ELECTRON TUBE, Box 100, Easton, PA 18042, Tel: 215-252-7331, Telex: 847494; FSC No.: 20948; Empl.: 550

ITT ELECTRO-OPTICAL PRODS., 7635 Plantation Rd., Roanoke, VA 24019, Tel: 703-563-0371, Telex: 829458; Empl.: 850; *Sls. Mgr.:* R. Moore; *Dist. Mgr.:* P. Williams

ITT GENERAL CONTROLS DIV., Intl. Telephone & Telegraph Corp., 801 Allen Ave., Glendale, CA 91201, Tel: 213-842-6131, Telex: 673147, TWX: 910-498-2225; Empl.: 1545; *Sls. Mgr.:* Phillip Vaughn

Local Distributors

AL	Birmingham, Control Specialists	205-991-7274
AZ	Phoenix, Wisco Equip. Co.	602-243-4361
CO	Englewood, Davis & Davis	303-935-4694
CT	Portland, Flocon, Inc.	203-342-4840
FL	Orlando, Diller-Brown Assocs.	305-851-7830
GA	Atlanta, Automatic Controls Co.	404-266-0130
HI	Honolulu, ARVAK Inc., Machinery Prods. Div.	808-845-9386
MN	Minneapolis, Tech Sls. Co.	612-823-8238
MO	Kansas City, Economy Power & Instr.	816-523-1010
MO	St. Louis, C. M. Tilley Co.	314-878-3353
NE	Omaha, Newton Valve Svc. Div.	402-339-2443
NY	Buffalo, KOM-Lamb	716-874-3530
NC	Charlotte, Genl. Control Equip. Co.	704-588-0484
OH	Cincinnati, M. L. Johnson Co.	513-874-8445
TN	Kingsport, Tenn. Instrmn. Co.	615-247-1148
TX	Corpus Christi, ITT Snyder co.	512-884-3822
TX	Odessa, ITT Snyder Co.	915-332-9408
UT	Salt Lake City, Peterson Co.	801-972-3328
WA	Kirkland, Unit Process Co.	206-827-0433

ITT GILFILLAN, 7821 Orion Ave., Van Nuys, CA 91409, Tel: 818-988-2600, Telex: 651421, TWX: 910-495-1787; FSC No.: 24930; Empl.: 1600; *Sls. Mgr.:* Ted Sprink

ITT-HIGBIE MFG., Wagner Rd., Rochester, MI 48063, Tel: 313-651-5300, TWX: 810-232-1592; Empl.: 1500; *Sls. Mgr.:* C. J. Clemens

ITT JENNINGS, Div. ITT Corp., 970 McLaughlin Ave., San Jose, CA 95122, Tel: 408-292-4025, Telex: 34-6311, TWX: 910-338-0159; FSC No.: 73905; Empl.: 370; *Sls. Mgr.:* E. V. Valehrach .... **1A**•1090-1092; **1B**•1452-1454, 1651; **3**•1247

Local Sales Offices & Reps

AL	Huntsville, Brandel-Stephens	205-883-0445
AZ	Phoenix, Crown Systems	602-274-3180
CA	Granada Hills, C & W Comps.	213-368-4032
CA	Santa Clara, Silicon Valley Sls.	408-371-8814
CO	Denver, Lindberg Co.	303-758-9033
FL	Deerfield Beach, Brandel-Stephens	305-427-8558
FL	Orlando, Brandel-Stephens	305-425-3202
GA	Atlanta, Brandel-Stephens	404-261-7579
IL	Chicago, Berndt Assocs.	312-283-0713
IN	Carmel, Berndt Assocs.	317-844-0114
KS	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
MD	Silver Spring, Marktron	301-460-6100
MD	Timonium, Marktron	301-252-7111
MA	Haverhill, L. K. Harman, Inc.	617-373-1313
MN	Minneapolis, Berndt Assocs.	612-546-2021
MO	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NJ	Englewood, Cooper Assocs.	201-871-4985
NM	Albuquerque, Lindberg Co.	505-881-1006
NC	Greensboro, Brandel-Stephens	919-274-6952
OH	Westlake, Harry W. Applegate Co.	216-331-2960
PA	Huntingdon Valley, Omega Elctrns.	215-947-4135
PA	Pittsburgh, Covert & Newman & Co.	412-531-2022
TX	Houston, Barry Sales	713-784-5860
TX	Richardson, Barry Sales	214-234-0255
UT	Salt Lake City, Lindberg Co.	801-969-2400
VA	Charlottesville, Marktron	804-973-5874
WI	Milwaukee, Berndt Assocs.	414-545-8400

ITT POMONA ELECTRONICS, 1500 E. 9th St., P.O. Box 2767, Pomona, CA 91766, Tel: 714-623-3463, TWX: 910-581-3822; FSC No.: 05276; Empl.: 150; *Sls. Mgr.:* Carl Wm. Musarra; *Dist. Mgr.:* Carl Wm. Musarra .... **2**•1355- 1470

Local Sales Offices & Reps

AL	Madison, South Eastern Assocs.	205-772-9616
AZ	Phoenix, More Sls.	602-274-4558; 602-265-9201

CA	Burlingame, Carelli/EMA	415-342-4514
CA	Culver City, DeAngelo, Rothman & Co.	213-827-2202
CA	Pasadena, Paul Nurches Co.	818-681-8957; 818-796-5844
CA	Santa Clara, Engrg. Assocs. Corp.	408-988-5001
CO	Denver, A-E-S Inc.	303-777-8733
FL	Hialeah, L. Haas Co.	305-822-2300
IL	Northbrook, W. M. Linz	312-498-9600
IN	Indianapolis, Blind Elctrn. Sls. Co.	317-291-0860; 317-293-6205
IA	West Des Moines, Nevco	515-225-9866
MA	Sharon, A Appell Assoc.	617-784-3439
MI	Kentwood, C. Geer	616-534-9449; 616-243-2746
MN	Minneapolis, Hei-lite Sls.	612-861-6051
MO	Kansas City, Nevco	816-421-1751
MO	St. Louis, Nevco	314-843-7406
NJ	Belleville, D. F. Tobias & Co.	201-751-8680
OH	Dayton, Lessis Assocs.	513-294-1551
OH	Mentor, P. Lohse	216-255-1992
OR	Beaverton, Eclipse Mktg. Grp.	503-642-1661
OR	Portland, Eclipse Mktg. Grp.	503-644-2550
PA	Philadelphia, David S. Linz	215-379-0734
SC	Greenville, H. C. Norman	803-244-6254
TX	Dallas, Techno Assocs.	214-357-9212
WA	Redmond, Eclipse Mktg. Grp.	206-885-6991

ITT POWERSYSTEMS DIV., Box 688, Galion, OH 44833, Tel: 419-468-8100, Telex: 24-1401, TWX: 810-248-2907; Empl.: 800; *Dist. Mgr.:* W. E. Fox

ITT ITT Schadow inc

ITT SCHADOW, 8081 Wallace Rd., Eden Prairie, MN 55344, Tel: 612-934-4400, Telex: 29-0556, TWX: 910-576-2469; Empl.: 175; *Sls. Mgr.:* Darrell Wilk; *Dist. Mgr.:* Darrell Wilk .... **1B**•1652-1654

Local Sales Offices & Reps

AL	Huntsville, Brandel-Stephens	205-883-0445
CA	Los Angeles, Ed Landa	213-879-0770
CA	Mountain View, Caltron Comps.	415-964-3244
CA	San Diego, Ed Landa	619-729-7267
CO	Boulder, Component Prod. Sls.	303-442-1100
CT	Farmington, R. Perron & Co.	203-673-4825
CT	Trumbull, R. Perron & Co.	203-268-9631
FL	Deerfield Beach, Brandel-Stephens	305-427-8558
FL	Orlando, Brandel-Stephens	305-425-3202
GA	Atlanta, Brandel-Stephens	404-261-7579
IL	Chicago, IRI	312-647-7755
KS	Wichita, PMR	316-684-4141
MA	Newton, R. Perron & Co.	617-969-8100
MI	Lathrup Village, R. C. Nordstrom Co.	313-559-7373
MN	Edina, Monroe Hanna	612-925-5700
MO	Maryland Heights, PMR	314-569-1220
NH	Bedford, Ray Perron & Co.	603-472-3030
NH	Dover, Ray Perron & Co.	603-742-2321
NM	Albuquerque, Thorson Desert States	505-265-5655
NY	Rochester, Ossmann Comps.	716-424-4460
NY	Syracuse, Ossmann Comps.	315-455-6611
NC	Greensboro, Brandel-Stephens	919-274-6952
OH	Columbus, K. W. Elctrns.	614-888-0483
OH	Dayton, K. W. Elctrns.	513-890-2150
PA	Philadelphia, P.S.A., Inc.	215-245-0513
RI	Mt. Penn, P.S.A., Inc.	215-245-0513
TX	Arlington, W. Pat Fralia Co.	817-640-9101
TX	Houston, W. Pat Fralia Co.	713-772-1572
UT	Salt Lake City, Comp. Prods.	801-262-0000
WA	Seattle, Jas. J. Backer Co.	206-285-1300

Local Distributors

AL	Huntsville, Hallmark	205-837-8700
CA	Los Angeles, Richey Western	213-820-3777
CA	Mountain View, Time Elctrns. Nor/Cal	415-961-1170
CO	Denver, Integrated Elctrns.	303-534-6121
FL	Miami, Hallmark	305-971-9280
FL	Orlando, Hallmark	305-855-4020
IL	Chicago, Hallmark	312-437-8800
KS	Kansas City, Hallmark	913-888-4747
KS	Wichita, Radio Supp.	316-267-5216
MD	Baltimore, Hallmark	301-796-9300
MD	Beltsville, Treeko Sls.	301-937-8260
MA	Boston, Sager Elec.	617-749-6700
MA	Waltham, Impact Sls. Co.	617-964-7740
MI	Kentwood, R.M. Elctrns.	616-531-9300
MN	Bloomington, Hallmark	612-884-9056
MN	Minneapolis, Berquist Co.	612-835-2322
MO	St. Louis, Hallmark	314-291-5350
NY	Lynbrook, Peerless Radio	516-593-2121
NC	Raleigh, Hallmark	919-832-4465
OH	Cincinnati, Schuster Elec.	513-984-1600
OH	Columbus, Hallmark	614-846-1882
OH	Medina, Schuster Elec.	216-722-5531
OK	Tulsa, Hallmark	918-835-8458
PA	Philadelphia, Phila. Elctrns.	215-568-7400
PA	Philadelphia, Hallmark	215-355-7300
TX	Austin, Hallmark	512-837-2814
TX	Dallas, Hall-Mark	214-234-7300
TX	Houston, Hall-Mark	713-781-6100
TX	Stafford, SW Elctrns.	713-494-6021
WA	Seattle, Zepher Elctrn. Sls.	206-575-0922
WI	Milwaukee, Hallmark	414-476-1270

ITT SEMICONDUCTORS, 500 Broadway, Lawrence, MA 01841, Tel: 617-688-1881, Telex: 947413, TWX: 710-342-1357; *Sls. Mgr.:* Ed Burgess; *Dist. Mgr.:* John Flannery

ITT SEMICONDUCTORS, Intl. Telephone & Telegraph, 470 Broadway, Lawrence, MA 01841, Tel: 617-688-1881, Telex: 947413, TWX: 710-342-1357; Empl.: 1600; *Sls. Mgr.:* Del Brand; *Dist. Mgr.:* Del Brand

ITT SURPRENANT DIVISION, 172 Sterling St., Clinton, MA 01510, Tel: 617-365-6331

ITT TELECOMMUNICATIONS, Apparatus Dept., Fulton Dr., Corinth, MS 38834, Tel: 601-287-3771, TWX: 510-984-0211; Empl.: 2000; *Sls. Mgr.:* Charles Yancey

ITT THERMOTECH, Div. IT & T, 1203 S. 5th St., Hopkins, MN 55343, Tel: 612-933-9400, Telex: 29-0414; Empl.: 605

Local Sales Offices & Reps

AZ	Phoenix, Toward Engrg. Assoc.	602-955-3193
AR	Little Rock, Schmidt & Assocs.	501-225-5613
CA	Glendale, Secana	818-240-7570
CA	Oakland, Richard B. Peters Co. (Brush Holder Prods.)	415-835-5135
CO	Denver, Manufacturers Mktg.	303-425-9569
CT	Newington, Interep (Brush Holder Prods.)	203-666-4233
FL	Orlando, Don Wegner (Brush Holder Prods.)	305-894-6206
FL	St. Petersburg, Florida Div.	813-347-2191
IL	Arlington Hgts., Diethert-Angel	312-593-7600
IL	Bannockburn, Heth (Brush Holder Prods.)	312-295-8440
IL	Buffalo Grove, B. Reynolds	312-775-2425
IN	Ft. Wayne, R. McCampbell	219-672-3012
IN	Indianapolis, R & D Sls.	317-842-4768
IA	Cedar Rapids, Seltec Sls.	319-393-1114
IA	Des Moines, I. L. Davidson Co. (Brush Holder Prods.)	515-265-0288
MA	Newton Upper Falls, Anchor Engrg.	617-964-6205
MI	Farmington, L. George	313-474-1505
MN	Minneapolis, W. J. Houlihan	612-544-3023
MO	Maryland Heights, Leander & Co.	314-569-3338
NJ	Union, Plastech	201-687-4810
NY	Penfield, Upstate Comp. Sls.	716-381-6070
OH	Cleveland, W. J. Williams	216-831-6220
PA	Erie, F. W. "Fritz" Schubert (Brush Holder Prods.)	814-899-3740
PA	Wayne, Midlantic Plastic Sls.	215-964-0510
SC	Fort Mill, Eagle Sls.	803-548-2222
TN	Memphis, D. Barry Temple (Brush Holder Prods.)	901-386-3651
TX	Houston, Texstar Sls., Inc.	713-367-0465
VA	Salem, George Headford (Brush Holder Prods.)	703-989-8127
WI	Milwaukee, Indl. Sls. Tech.	414-462-5024

ITW, Cortron Div., 400 W. Grand, Elmhurst, IL 60126, Tel: 312-279-9110

ITW SWITCHES, Tool Works Co., 6615 W. Irving Park Rd., Chicago, IL 60634, Tel: 312-282-4040, Telex: 4330130, TWX: 910-221-0275; *Sls. Mgr.:* A. Steiner; *Dist. Mgr.:* A. Steiner .... **1B**•1656-1667

Local Sales Offices & Reps

AL	Huntsville, Electro Mech	205-533-2100
AZ	Tempe, Spectrum Assoc. Southwest	602-966-1788
AR	Fort Smith, Electra Reps	501-452-4030
CA	Anaheim, Spectrum Assoc.	714-630-6977
CA	San Jose, McKnight	408-942-0880
CO	Denver, High Plains Mktg.	303-751-7150
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Altamonte Springs, Semtronics	305-831-8233
GA	Atlanta, Electro Mech.	404-447-6478
IL	Elk Grove Village, Parcom	312-228-6360
IA	Cedar Rapids, Comstrand	319-377-1575
KS	Kansas City, BC Elctrns.	913-342-1211
MD	Baltimore, MicroComp	301-247-0400
MA	Burlington, Kitchen & Kutchin	617-229-2660
MI	Grand Rapids, Urban & Assoc.	616-245-0511
MN	Minneapolis, Comstrand	612-788-9234
MO	Bridgeton, BC Elctrns.	314-291-1101
NJ	Livingston, Varrelman Gorman	201-992-2505
NY	Syracuse, Fountain, Young & Co.	315-437-7733
NC	Raleigh, Electro Mech	919-851-8165
OH	Dayton, Rockford Controls	513-898-5452
OH	Euclid, Rockford Controls	216-731-5250
OR	Beaverton, Barrett Squibb & Assoc.	503-642-1661
PA	Ardmore, Precision Mktg.	215-649-6301
TN	Nashville, Electro Mech	615-885-0073
TX	Dallas, Electra Reps.	214-387-3594
TX	Houston, Electra Reps.	713-530-2208
WA	Redmond, Barrett Squibb & Assoc.	206-885-6991

IVEK CORP., 43 School St., N. Springfield, VT 05150, Tel: 802-886-8278; Empl.: 4; *Sls. Mgr.:* Gene Williams

IVERON PACIFIC, 1152 Morena Blvd., San Diego, CA 92110-3899, Tel: 619-275-1500; Empl.: 16; *Sls. Mgr.:* Lee Kerl

IVO INDS., INC., P.O. Box 603, 201 Industrial Way W., Eatontown, NJ 07724, Tel: 201-542-5151, Telex: 132-414; Empl.: 20; *Sls. Mgr.:* Nat Garratano

IWATSU®

IWATSU INSTRUMENTS, INC., 430 Commerce Blvd., Carlstadt, NJ 07072, Tel: 201-935-5220, TWX: 710-989-0255 .... **3**•1366-1368

Local Sales Offices & Reps

CA	Garden Grove, Advanced Digital Grp.	213-598-9645
CA	Sunnyvale, Koosen Tech. Sls. Corp.	408-249-5858
CT	Old Saybrook, MJT Assocs.	203-388-5890
FL	Sarasota, Ram-Z Assocs.	813-921-5561
IL	Rolling Meadows, Commodore 1	312-394-5441
MN	Minneapolis, Kodo Assocs.	612-881-1255
MO	St. Louis, Engrg. Svcs. Co.	314-997-1515
NH	Nashua, MJT Assocs.	603-889-5373
NJ	Parsippancy, HLM Assocs.	201-263-1536
NJ	Pennsauken, Sci-Rep Corp.	609-662-5222
NY	Northport, HLM Assocs.	516-757-1606
NY	Rochester, Harmony Labs.	716-458-3376
OH	North Ridgeville, TMS	216-327-3527
OK	Tulsa, Spectra Sls. Corp.	918-663-7188
TX	Houston, Spectra Sls. Corp.	713-747-2798
VA	Fairfax, Sci-Rep Corp.	703-385-0600

Local Distributors

CA	Canoga Park, Rag Elctrns.	213-998-6500
CA	Freemont, Rep Inc.	415-651-4131
CA	Van Nuys, Testek Corp.	213-786-6890
CO	Boulder, Instr. Repair Labs	303-449-2721
CT	Monroe, Connecticut Calibration	203-261-9518
FL	South Daytona, Kapital Instr. Sls.	904-257-4334
IL	Downers Grove, Ames Supply Co.	800-942-1596
MA	Billerica, Hayes Instr. Svc.	617-663-4800
MO	St. Louis, Indl. Svc. Lab. Corp.	314-535-5760
NJ	North Caldwell, Hosica	201-256-7724
NJ	Ocean, Rag Elctrns.	201-544-0666
NJ	Wyckoff, Ames Supply Co.	201-891-9560
NY	Frankfort, Kapital Instr. Sls.	315-894-4245
NY	Great Neck, Instrument Mart	516-487-7430
NC	Pineville, Elctrn. Measuring Instr. Svc.	704-588-4624
OK	Oklahoma City, Houston De Pue Labs.	404-235-5469
TX	Austin, Tinkertronics	512-926-4420
TX	Dallas, Hutton Co.	214-484-0580
VA	Fairfax, Scientific Trading	703-385-0600
WA	Seattle, Vanguard Elctrn. Tool	206-284-6186
WI	Madison, Schrenk Sls.	603-255-7400

IXYS CORP., 3685 Enochs, Santa Clara, CA 95051, Tel: 408-733-4045; *Sls. Mgr.:* Samuel Kory Jr. .... **1A**•1663; **1B**•1231; **3**•1605

JACO MFG. CO., 468 Geiger St., Berea, OH 44017, Tel: 216-234-4000

JAIDINGER MFG., 1921 W. Hubbard St., Chicago, IL 60622, Tel: 312-421-1090; Empl.: 35; *Sls. Mgr.:* John S. Jaidinger

JAMB INDS., Box 281, Rockaway Valley Rd., Boonton, NJ 07005, Tel: 201-263-9295; Empl.: 3

JAMESBURY, 640 Lincoln St., Worcester, MA 01605 Tel: 617-852-0200, Telex: 92-0448, TWX: 710-240-1268; Empl.: 1000; *Sls. Mgr.:* C. A. Richardson

JAMES ELECTRONICS, 4050 N. Rockwell, Chicago, IL 60618, Tel: 312-463-6500, TWX: 910-221-5034; *Sls. Mgr.:* J. R. Ther; *Dist. Mgr.:* J. R. Ther

JANCO CORP., Box 3038-Glenoaks Sta., Burbank, CA 91504, Tel: 818-846-1800, TWX: 910-498-2701; FSC No.: 91812; Empl.: 205; *Sls. Mgr.:* Sam Kay, Jr. ....**1B**•1668, 1669

Local Sales Offices & Reps

AZ	Tempe, Piper Sls.	602-949-0048
AR	Dallas, M. Kruvand	214-691-4592
CA	Cupertino, Codella	408-257-2561
CA	San Diego, Qualtronics	619-560-8955
CO	Longmont, Piper Sls.	303-651-2378
FL	Orlando, MacKay, Smith & Assocs.	305-277-1513
GA	Atlanta, MacKay, Smith & Assocs.	404-449-7444
L	Addison, Engineered Sls.	312-832-8425
N	Ft. Wayne, Aktron Corp.	219-747-3650
KS	Wichita, T-Bird Tech. Sls. & Svc.	316-684-3941
MD	Silver Spring, H.R. Sieber	301-589-9110
MA	Newton, Cornwall, Caron, Fahey	617-332-2042
MN	Minneapolis, Electro-Serv	612-338-3475
MO	Maryland Heights, T-Bird Sls. & Svc.	314-567-6488
NJ	Cherry Hill, Quality Comps.	609-428-6266
NY	Albertson, C.F. Ward	516-742-5561
NC	Charlotte, MacKay, Smith & Assocs.	704-372-1188
OH	Columbus, Tom Mulligan Company	614-457-2242
TX	Dallas, Mark Kruvand	214-691-4592
WA	Seattle, Norwest	206-827-9562

Local Distributors

CA	Burbank, Merit Comp. Supp.	818-842-8162
CA	Westlake Village, Tech-Cable Prods.	818-991-4697

J & S TOOL, 70 Okner Pkwy., Livingston, NJ 07039, Tel: 201-533-0700, Telex: 139229; Empl.: 50; *Sls. Mgr.:* K.F. Swenson

JAN HARDWARE MFG. CO., 47-27 36th St., Long Island City, NY 11101, Tel: 212-361-0800; FSC No.: 99813; Empl.: 60; *Sls. Mgr.:* Irwin E. Wasserman ....**2**•1756, 1762-1779

Local Sales Offices & Reps

AZ	Phoenix, Steve Fisher Assocs.	602-247-7865
CA	Menlo Park, Long Assocs.	415-327-1300
CA	San Diego, Robert Scott Co.	619-420-6446
CA	Thousand Oaks, S.A.R.G.E.	213-991-6706
FL	Seminole, Custom Assembly	813-397-8302
L	Schaumburg, Croydon Elect.	312-980-6766
MD	Woodbine, Naudain Assocs. Southern	301-442-2270
MA	Brookline, Harman Assocs.	617-232-6687
MA	Lee, Harman Assocs. Inc.	413-243-1158
MN	Golden Valley, A.I.M.	612-542-8437
MO	Crestwood, Nevco	314-843-7406
MO	Kansas City, Nevco	816-421-1751
NJ	Englewood, H. Gray Assoc.	201-894-0894
NJ	Marlton, Naudain Assocs.	609-983-5808
OH	Dayton, F. L. Ohmer & Assocs.	513-434-1454
TX	Richardson, AGM Sls.	214-644-1475

JAPANESE PRODS. CORP., 31368 Via Colinas, Suite 103-104, West Lake Village, CA 91362, Tel: 818-991-6111, Telex: 13-1581; Empl.: 8; *Sls. Mgr.:* Don Cassalia ....**1B**•1158

Local Sales Offices & Reps

AZ	Fountain Hills, Halbar Assocs.	602-837-2464
CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Englewood, Integrated Motion Sys. Inc.	303-762-1817
FL	Casselberry, Hilco, Inc.	305-695-6208
GA	Dunwoody, Hilco, Inc.	404-393-1771
L	Rolling Meadows, Sumer Inc.	312-991-8500
MD	Columbia, Versatrol	301-730-5577
MA	Salem, Forbes Engrg	617-744-1693
MI	Brighton, A.P. Assoc.	313-229-6550
MN	Minnetonka, Gibb Electric Sls.	612-935-4600
NY	Syosset, Motion Control Sls	516-921-5656
NC	Charlotte, Hilco, Inc.	704-568-3938
PA	Exton, Kiley Elec.	215-363-8550
PA	Pittsburgh, Exonic Sys.	412-784-8400
SC	Mt. Pleasant, Hilco, Inc.	803-883-9633
TX	Dallas, Automated Motion Control	214-340-4192
WA	Redmond, Halbar Assocs.	206-882-0990
WA	Vancouver, Halbar Assocs.	206-696-0170
WI	Brookfield, Sumer, Inc.	414-784-6641

Local Distributors

CA	Mountain View, Abacus Elctrns.	415-961-1500
CA	Santa Monica, Trojan Inds.	213-829-1735
NY	New York, B&B Motor & Control	212-966-5777
TX	Fort Worth, Allied Elctrns.	817-336-5401

JARO COMPONENTS, INC., 5549 Powerline Rd., Ft. Lauderdale, FL 33309-2883, Tel: 305-771-7000, Telex: 522-334; Empl.: 30; *Sls. Mgr.:* Robert C. Flipse; *Dist. Mgr.:* Floyd Burwell

JAY CONTROL CO., 21 Sequin Dr., Glastonbury, CT 06033, Tel: 203-633-5294; Empl.: 40; *Sls. Mgr.:* Mike Colomonico

JAYCOR, P.O. Box 85154, San Diego, CA 92138, Tel: 619-453-6580, TWX: 910-322-1064; Empl.: 300; *Sls. Mgr.:* Steven Lutjens

JAY-EL PRODS., Sub. Ducommun Inc., 1859 W. 169th St., Gardena, CA 90247, Tel: 213-321-3260, TWX: 910-346-7633; FSC No.: 08719; Empl.: 270

JB ELCTRN. TRANSFORMERS, 2300 W. Armitage Ave., Chicago, IL 60647, Tel: 312-342-0080, TWX: 910-221-1283; FSC No.: 11700; Empl.: 150; *Sls. Mgr.:* F. J. Bussa

JBM ELECTRONICS, INC., 531 Front St., Manchester, NH 03102, Tel: 603-623-0222, Telex: 953134, TWX: 710-220-8978; *Sls. Mgr.:* David Crowley ....**1A**•1529-1536

J-B-T INSTRS., Box 1818, New Haven, CT 06508, Tel: 203-776-1111; Empl.: 25; *Sls. Mgr.:* Virginia Devitt ....**3**•1332

Local Sales Offices & Reps

MN	Minneapolis, Hei-Lite Sls.	612-861-6051
TX	Dallas, Forner Sls.	214-241-2166

Local Distributors

AL	Montgomery, Southern Controls	800-633-8796
CA	Glendale, Western Elctrns.	213-246-4861
CA	Los Angeles, Metermaster	213-685-4340
CA	San Francisco, Pacific Elctrns.	415-543-3104
CA	Wilmington, Wilmington Instrs.	213-834-1133
CO	Denver, E.I.L. Instrs.	303-534-4160
CT	New Haven, Hatry Elctrns.	203-787-5921
FL	Miami, Florida Precision	305-324-1731
GA	Augusta, Speciality Distributing	404-873-2521
IL	Bridgeview, E.I.L. Instrs.	312-430-2292
IL	Elk Grove Village, Metermaster	312-593-8650
LA	Lafayette, Ralph's Elctrns.	318-234-4507
MD	Sparks, E.I.L. Instrs.	301-771-4800
MA	Hingham, Sager Elec.	617-749-6700
MN	Minneapolis, Instrument Controls	612-871-2514
MS	Jackson, Ellington Elctrn. Supp.	601-355-0561
NJ	Belleville, Miscorp	201-751-8680
NJ	North Caldwell, Hosica Labs	201-256-7724
NY	Long Island City, Metermod	212-726-4850
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Maspeth, Harry Alter	212-366-0123
NC	Winston-Salem, Kirkman Elctrns.	919-722-9131
OH	Bluffton, Bluffton Prods.	419-358-7891
OH	Cleveland, Weschler Elec.	216-238-2550
OK	Oklahoma City, Trice Wholesale	405-524-4411
PA	Reading, Barbey Elctrns.	215-376-7451
RI	Providence, William Dandreta	401-861-2800
TN	Nashville, Electra Distributing	615-329-3971
TX	Ft. Worth, Swieco	817-335-6521
TX	Garland, Metermaster	214-271-5671
TX	Houston, Harrison Equip.	713-879-2600
TX	Houston, Quality Instrs.	713-524-0528
WA	Seattle, Eicher-Richards	206-523-7888
WV	St. Albans, Preiser Scientific	304-727-2902

J-B-T SWITCHES, CUTLER-HAMMER PRODS., EATON CORP., Box 1904, New Haven, CT 06509, Tel: 203-772-2220; FSC No.: 55459; Empl.: 160; *Sls. Mgr.:* C. A. Peffer

Refer to Eaton Corp./Cutler-Hammer Prods., Aerospace/Commercial Controls Div. for distributor information.

JDK CONTROLS, INC., 2630 Lavery Ct., Suite F, Newbury Park, CA 91320-1593, Tel: 805-499-7779; *Sls. Mgr.:* Reece Kendall ....**1A**•2040

JEFFERS ELCTRNS., Grand Plaza, 945 Grand Ave., Nogales, AZ 85621, Tel: 602-287-5851, TWX: 910-973-9794; FSC No.: 59474; Empl.: 400; *Sls. Mgr.:* Ken Shobert; *Dist. Mgr.:* Steve Morris

Local Sales Offices & Reps

AL	Huntsville, Cartwright & Bean	205-830-1540
AZ	Phoenix, O'Donnell Assoc.	602-944-9542
CA	Santa Clara, I Squared	408-988-3400
CO	Boulder, R.G. Entprs.	303-447-9211
CT	Middletown, Gerber Sls.	203-347-3000
FL	Tampa, APM Assoc.	813-886-2457
GA	Atlanta, Cartwright & Bean	404-233-2939
IL	Arlington Hgts., C.L. Greenslade Sls.	312-253-9620
IN	Ft. Wayne, J.F. Kilfoil	219-436-7233
KS	Overland Park, Advanced Techn. Sls.	913-642-6675
LA	Kenner, Cartwright & Bean	504-666-0020
MA	Newton Upper Falls, Gerber Sls.	617-969-2620
MI	Lathrup Village, R. C. Nordstrom	313-559-7373
MN	Edina, Grayden & Flemmer	612-941-1120
NM	Albuquerque, Power Entprs.	505-298-1918
NY	E. Fishkill, Tri-Tech Elctrns.	914-897-5611
NY	E. Rochester, Tri-Tech Elctrns.	716-385-6500
NY	Great Neck, MOS Assoc.	516-487-3966
NC	Raleigh, Cartwright & Bean	919-781-6560
OH	Cincinnati, J.F. Kilfoil Co.	513-791-6150
OR	Beaverton, Barrett & Squibb	503-642-1661
PA	Ardmore, Wm. K. Metz	215-896-7300
TN	Memphis, Cartwright & Bean	901-276-4442
TX	Lewisville, Jim Hughes	214-221-1536
PR	Puerto Rico, Hato Rey, M. Anderson Co.	809-751-2026
WA	Redmond, Barrett & Squibb	206-885-6991

JEFFERSON ELEC., Litton Inds., 840 25th Ave., Bellwood, IL 60104, Tel: 312-626-7700, Telex: 72-8402; Empl.: 1200; *Sls. Mgr.:* Nick Shah; *Dist. Mgr.:* C. Travis

Local Sales Offices & Reps

AK	Anchorage, Alaska Elect. Agents	907-563-8699
AZ	Phoenix, Ross-Bloom & Assoc.	602-955-5024
AR	Little Rock, Southland Sls	501-753-4013
CA	Mountain View, TSR	415-961-5655
CA	Pasadena, A-F Sls. Eng'r.	213-681-5631
CO	Denver, E-O Sls.	303-778-1900
FL	Tampa, SRT Mktg.	813-884-4805
HI	Honolulu, Atlas Elec. Co.	808-524-5866
IL	Wood Dale, Power Prods. Co.	312-595-1142
IN	Indianapolis, Clyde Warble & Assoc.	317-632-1465
KY	Louisville, Bryan, Haley & Hackman	502-491-9984
LA	New Orleans, Corrigan Mktg.	504-626-5231
MA	Framingham, Gerald Rosen Co.	617-879-5505
MA	Stoughton, North Coast Sls.	617-344-1007

J-B-T
Division of CUTLER-HAMMER
AUTHORIZED DISTRIBUTOR
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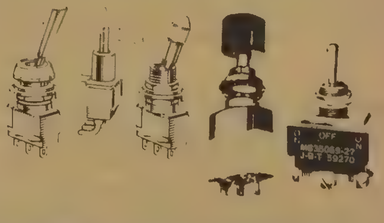
ELECTRIC SWITCHES
INCORPORATED
2478 Fletcher Drive, Los Angeles, Calif. 90039
(213) 660-1310
TOLL FREE WATS
NATIONAL: 800-421-8855
CALIFORNIA: 800-252-4640
TWX 910-321-2971


SEE COMPLETE PRODUCT LINE UNDER
SWITCHES — SECTION 5100
FREE LINECARD AND CATALOG ON REQUEST

MI	Detroit, Electrical Materials	313-541-1650
MI	Grand Rapids, Electrical Materials	313-942-0128
MN	Minneapolis, Boerger & Assoc.	612-560-3435
MS	Jackson, Welch & Doby	601-932-5534
MO	Kansas City, Forristal-Young	816-358-6771
MO	St. Louis, Schaeffer Sls.	314-647-1000
NE	Omaha, Boyle & Williamson	402-553-1666
NJ	Edison, Bizzarro Elect. Sls.	201-757-7010
NY	New Hartford, F. W. Laver & Son	315-724-2304
NC	Charlotte, W. H. Lassister Sls.	704-523-2736
NC	Raleigh, DHR Mktg.	919-876-5450
OH	Cincinnati, Bryan, Haley & Hackman	513-561-0500
OH	Cleveland, Marlow Assoc.	216-991-6500
PA	Philadelphia, Electrical Sls. Assn.	609-456-7110
PA	Pittsburgh, Robert Colley Assoc.	412-331-3121
TX	Dallas, SW Mktg.	214-341-8631
UT	Sandy, Pete Farley Agcy.	801-278-4082
WA	Seattle, Bangs Assoc.	206-262-0262
WI	Butler, J. F. Nolan & Assoc.	414-781-1140

JENSEN

JENSEN TOOLS, INC., Axia, Inc., 7815 S. 46th St., Phoenix, AZ 85040, Tel: 602-968-6241, TWX: 910-950-0115; Empl.: 100; *Sls. Mgr.:* Tom Fenzel …… **2**•1931

JEROME INDUSTRIES CORPORATION

JEROME INDUSTRIES CORP., Power Supply Div., B 730 Division St., Elizabeth, NJ 07201, Tel: 201-353-5700, Telex: 132001-JEROME, ELIZ; Empl.: 150; *Sls. Mgr.:* Anthony Di Girolamo …. **3**•1606, 1607

Local Sales Offices & Reps

MN	St. Paul, Countrymen Assocs.	612-645-9151

JEROME INDUSTRIES CORP., Transformer Div., 730 Division St., Elizabeth, NJ 07201, Tel: 201-353-5700, Telex: 132001-JEROME, ELIZ; *Sls. Mgr.:* Anthony Di Girolamo …… **1A**•2177

JERSEY SPECIALTY CO., See JSC Wire & Cable

Distributor

JERSEYSWITCH, INC., 129A Gaither Dr., Mt. Laurel, NJ 08054, Tel: 609-778-8190 …… **1B**•1742

JETTRON PRODS., P.O. Box 337, E. Hanover, NJ 07936, Tel: 201-887-0571; FSC No.: 04435; Empl.: 30; *Sls. Mgr.:* J. M. Schill …… **2**•1471

Local Sales Offices & Reps

CA	El Cajon, A-Tronics	619-444-1501
CA	Woodland Hills, A-Tronics	818-703-7212
NY	New York, Eltron Export Co.	212-944-7635

Local Distributors

Intl	England, Slough, Berks, LPPI	44-753-77788
Intl	France, Le Chesnay, LPPI	33 3 955 2104
Intl	Italy, Cinisello Balsamo (Milano), LPPI	2-6127821
Intl	Netherland, Krimpen a.d. Yssel, LPPI	31-1807-1 8555
Intl	Sweden, Stockholm, LPPI	46-8-132030
Intl	Switzerland, Zurich, Litton Precision Prods. Intl. Inc. (LPPI)	1 312 35 44

JEWELL ELECTRICAL INSTRS., Grenier Field, Manchester, NH 03108, Tel: 603-669-6400, Telex: 943435; Empl.: 400; *Sls. Mgr.:* W. P. Bolia …… **3**•1333

Local Sales Offices & Reps

AL	Huntsville, Currie, Peak & Frazier	205-536-1506
AZ	Phoenix, The Knight Co.	602-582-8506
AR	Little Rock, J. Y. Schoonmaker	501-375-2168
CA	Fremont, William Parks Assocs.	415-490-2011
CA	Los Angeles, Knight Co.	213-670-2833
CA	San Diego, Knight Co.	619-571-7903
CT	Middletown, Gerber Sls.	203-347-3000
FL	Orlando, Currie, Peak & Frazier	305-855-0843
GA	Duluth, Currie, Peak & Frazier	404-476-3107
GA	Norcross, Currie, Peak & Frazier Inc.	404-449-7662
IL	Chicago, Berndt Assocs.	312-283-0713
IN	Carmel, Berndt Assocs.	317-844-0114
IA	Cedar Rapids, Gassner & Clark Co.	319-393-5763
MA	Ludlow, Gerber Sls.	413-589-9837
MA	Newton Upper Falls, Gerber Sls.	617-969-2620
MI	Troy, C. B. Jensen	313-643-0506
MN	Edina, M. Foster Co.	612-941-9790
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NM	Albuquerque, C. T. Carlberg	505-888-3883
NY	Buffalo, Rudell-Merrifield Assocs.	716-634-4300
NY	Melville, Comtronics Assocs.	516-249-0505
NC	Greensboro, Currie, Peak & Frazier	919-373-0380
NC	Raleigh, Currie, Peak & Frazier Inc.	919-787-0808
OH	Cleveland, Marlow Assocs.	216-991-6500
OH	Columbus, Marlow Assocs.	614-885-7643
OK	Oklahoma City, J. Y. Schoonmaker	405-685-4477
OR	Portland, Frank Jackson	503-292-2638
TX	Austin, J. V. Schoonmaker Co., Inc.	512-480-9257
TX	Dallas, J. Y. Schoonmaker	214-349-1650
TX	Houston, J. Y. Schoonmaker	713-738-2427
WA	Redmond, F. Jackson	206-881-7277
WI	Milwaukee, Berndt Assocs.	414-545-8400

Local Distributors

AL	Birmingham, Brownell Electro Inc.	205-322-3374
AL	Mobile, Brownell Electro Inc.	205-479-8581
AZ	Phoenix, Metermaster Inc.	602-243-4111
CA	Lamirada, Stevens Instr. Co.	714-994-5111
CA	Los Angeles, Metermaster, Inc.	213-685-4340
CA	Los Angeles, E.I.L. Instrs., Inc.	213-685-7020
CA	Palo Alto, Metermaster Inc.	415-968-0313
CA	San Diego, Metermaster, Inc.	619-560-4844
CA	Santa Clara, Dynametron Inc.	408-727-6531
CA	Santa Clara, E.I.L. Instrs. Inc.	408-727-0396
CA	Santa Clara, Fisher-Brownell	408-988-6041
CO	Denver, Metermaster Instr. Inc.	303-722-5766
CO	Denver, E.I.L. Instrs., Inc.	303-534-4160
CT	Middletown, E.I.L. Instrs. Inc.	203-346-6646
FL	Miami, Brownell Electro Inc.	305-591-3215
FL	Orlando, Brownell Electro Inc.	305-843-6770
FL	Palm Bay, E.I.L. Instrs., Inc.	305-725-8300
GA	Atlanta, Brownell Electro Inc.	404-762-5181
IL	Bridgeview, E.I.L. Instrs. Inc.	312-430-2292
IL	Elk Grove Village, Metermaster Inc.	312-593-8650
IL	Oak Park, Pacific Indicator Co.	312-383-0220
IN	Evansville, Electro-Lab Svcs., Inc.	812-423-5211
IN	Indianapolis, E.I.L. Instrs., Inc.	317-545-1373
KY	Louisville, E.I.L. Instrs., Inc.	502-454-3420
LA	Kenner, Breard-Gardner	504-466-3401
MD	Baltimore, Sunshine Sci. Instr., Inc.	301-661-5900
MD	Gaithersburg, Pioneer/Instrmn.	301-921-0660
MD	Sparks, E.I.L. Instrs., Inc.	301-771-4800
MA	Burlington, E.I.L. Instrs., Inc.	617-272-9450
MA	Waltham, Calibron Corp.	617-894-6440
MA	Woburn, Brownell Electro Inc.	617-935-7820
MN	Minneapolis, Process Measurement Co.	612-544-4035
NJ	Pennsauken, E.I.L. Instrs., Inc.	609-488-0474
NC	Charlotte, Trott Electronics, Inc.	704-376-2237
NC	Raleigh, Brownell Electro Inc.	919-876-6524
OH	Dayton, E.I.L. Instrs., Inc.	513-435-2134
OH	Dayton, Pioneer Std. Elctrn.	513-236-9900
OK	Tulsa, Combined Technlg. Co.	918-665-3002
PA	Pittsburgh, E.I.L. Instrs., Inc.	412-731-5230
PA	Pittsburgh, CAM/RPC Instrmn.	412-782-3770
TN	Knoxville, Brownell Electro Inc.	615-966-3441
TN	Nashville, Brownell Electro Inc.	615-889-8230
TX	Dallas, E.I.L. Instrs., Inc.	214-931-1236
TX	Dallas, Ultra Instr. Lab, Inc.	214-357-0297
TX	El Paso, McNicol Elctrns.	915-566-2936
TX	Houston, Quality Instr. Lab	713-524-0528
TX	Houston, E.I.L. Instrs., Inc.	713-271-3100
WA	Richland, Branom Instr. Co.	509-943-6664
WA	Seattle, E.I.L. Instrs., Inc.	206-762-0880
WV	Alexandria, E.I.L. Instrs., Inc.	703-354-4330
WV	Virginia Beach, E.I.L. Instrs., Inc.	804-499-3746

JFD ELCTRNS., See Murata Erie No. Amer., Inc.

JFW INDS., INC., 2719 E. Troy Ave., Indianapolis, IN 46203, Tel: 317-783-9875; Empl.: 30; *Sls. Mgr.:* Joetta Walker; *Dist. Mgr.:* Joetta Walker …… **1A**•1705-1707

Local Distributors

CA	Sunnyvale, Electronic Resources	408-745-1420

JKL COMPS., 13343 Paxton St., Pacoima, CA 91331, Tel: 818-896-0019, Telex: 910-496-1504; FSC No.: 55335; Empl.: 14; *Sls. Mgr.:* Bob Brandt

JMJ TECHNICAL PRODS., P.O. Box 26, Kendall Park, NJ 08824, Tel: 201-589-4257; Empl.: 8; *Sls. Mgr.:* John Stefiuk …… **2**•1780

JMK

JMK, INC., 15 Caldwell Dr., Amherst, NH 03060, Tel: 603-886-4100, Telex: 955329 TLY SRVC; Empl.: 200; *Sls. Mgr.:* J. Kennedy …… **1A**•1600

Local Sales Offices & Reps

AL	Huntsville, JWL Assoc.	205-881-0413
CA	Santa Clara, Cummings & Assoc.	408-247-8656
CA	Woodland Hills, Cummings & Assoc.	213-340-6035
CO	Denver, Arkco Sls.	303-758-1151
IL	Downers Grove, Momak Sls.	312-963-6400
IN	Indianapolis, Gorny Sls.	317-271-7504
MA	Framingham, STS	617-620-0195
MI	Novi, Lektronics	313-349-3304
MN	St. Paul, Arkco Sls.	612-777-7454
NJ	Ridgewood, Ballou Assoc.	201-444-6990
NY	Rochester, Elcom Sls.	716-385-1400
NY	Syracuse, Elcom Sls.	315-685-8245
NC	Charlotte, JWL Assoc.	704-523-3001
OH	New Lebanon, J. N. Bailey	513-226-0512
OK	Tulsa, Barry Sls.	918-749-7775
OR	Portland, Cummings & Assoc.	503-761-4411
TX	Austin, Barry Sls.	512-837-3616
TX	Houston, Barry Sls.	713-784-5860
TX	Richardson, Barry Sls.	214-234-0255
WA	Edmonds, Cummings & Assoc.	206-775-1421
WI	Muskego, Momak Sls.	414-363-7744

Local Distributors

CA	Woodland Hills, C & A Elctrns.	213-340-6022
IL	Chicago, Voyager Elctrns.	312-773-4900
MN	St. Paul, Voyager Elctrns.	612-571-7766
NH	Hudson, C & H Electronics	603-882-1133

JM TRANSFORMER CO., INC., 112 Florida St., Farmingdale, NY 11735, Tel: 516-293-0475; Empl.: 13; *Sls. Mgr.:* J. Millman …… **1A**•2178 - 2181

JOBMASTER CORP., 9008 Liberty Rd., Randallstown, MD 21133, Tel: 301-655-1400; Empl.: 12; *Sls. Mgr.:* Robert H. Goldman …… **2**•1792

JOHANSON DIELECTRICS

JOHANSON DIELECTRICS, 2220 Screenland Dr., Burbank, CA 91505, Tel: 213-848-4465, TWX: 910-498-2735; Empl.: 154 …… **1A**•1094

Local Sales Offices & Reps

AZ	Phoenix, Compass Mktg. & Sls.	602-266-5400
CA	Anaheim, Westrep	213-404-3381
CA	Mountain View, Straube Assocs.	415-969-6060
FL	Orlando, Delmac Sls.	305-898-4688
IL	Park Ridge, Metcom Assocs.	312-696-1490
IN	South Bend, C-S Electronic Sls	219-291-6258
MA	Wethersfield, Compac Sls.	203-563-4784
MN	Minneapolis, Bill Deming & Assocs.	612-888-5000
NC	Greensboro, L & D Inc.	919-292-3201
PA	Trevose, PSA	215-245-0513
TX	Arlington, W. Pat Fralia Co.	817-640-9101
WA	Seattle, Northmar Inc.	206-524-5170

Local Distributors

CA	Los Alamitos, SEMI DICE	213-594-4631
CA	Santa Clara, SEMI DICE	408-980-9777
NJ	Fairfield, CHPS Inc.	201-882-0997

JOHANSON MFG. CORP., 400 Rockaway Valley Rd., Boonton, NJ 07005, Tel: 201-334-2676, TWX: 710-987-8367; FSC No.: 91293; Empl.: 200 …… **1A**•1095

Local Sales Offices & Reps

AZ	Phoenix, Compass Mktg. & Sls.	602-266-5400
CA	Anaheim, Westrep	213-404-3881
CA	Mountain View, Straube Assocs.	415-969-6060
CO	Westminster, Straube Assoc., Mt. States	303-426-0890
FL	Orlando, Perrott Assocs.	305-298-7748
IL	Northfield, Johanson Mfg.	312-446-4021
IN	South Bend, Schillinger Assocs.	219-282-4570
IA	Cedar Rapids, ARD Sales Co.	319-393-6392
MA	Seekonk, J. Murphy Assocs.	617-761-7153
MN	Bloomington, Bill Deming & Assoc.	612-888-5000

J	Boonton, Johanson Mfg. Corp.	201-334-2676
Y	Mount Vernon, Friedman-Smith Elctrn. Sls.	914-664-4866
Y	Pittsford, NHA, Inc.	716-586-9002
C	Winston-Salem, Murcota Corp.	919-722-9445
H	Cleveland, Baehr, Greenleaf & Assoc.	216-221-9030
A	Trevose, P.S.A.	215-245-0513
X	Arlington, W. Pat Fralia Co.	817-640-9101
A	Seattle, Northmar	206-524-5170

Local Distributors

Z	Tempe, Shelley Elctrns.	602-894-2058
Z	Tempe, Bell Inds.	602-267-7774
A	Chatsworth, Shelley Elctrns.	213-998-3333
A	Chatsworth, Integrated Electronics	213-998-2200
A	Gardena, Bell Inds.	213-515-1800
A	Irvine, Integrated Electronics	714-660-1055
A	San Diego, Shelley Elctrns.	619-453-7133
A	San Jose, Shelley Elctrns.	408-942-9111
A	San Jose, Integrated Electronics	408-263-1100
A	Sunnyvale, Bell Inds.	408-734-8570
A	Sunnyvale, Diplomat/Westland	408-734-1900
A	Van Nuys, CW Swift & Assocs.	213-989-1133
O	Boulder, Shelley Elctrns.	303-442-2718
O	Wheatridge, Bell Inds.	303-424-1985
L	Orlando, Pelcor Co.	305-299-1541
L	Chicago, Bell Inds.	312-982-9210
L	Chicago, Newark Elctrns.	312-638-4411
D	Baltimore, Radio Elec. Svc.	301-823-0070
D	Beltsville, Radio Elec. Svc.	301-937-9100
A	Medford, Blake Assocs.	617-391-7890
A	Woburn, Diplomat Elctrns.	617-935-6611
M	Albuquerque, Bell Inds.	505-292-2700
Y	Hauppauge, Jaco Elctrns.	516-273-5500
Y	Mt. Vernon, ASAP Elctrns.	914-699-2727
Y	Syracuse, Newark Elctrns.	315-437-6611
R	Lake Oswego, Bell Inds.	503-241-4115
A	Philadelphia, Philadelphia Elctrns.	215-568-7400
X	Ft. Worth, PATCO Supplies	817-429-8596
X	Richardson, Jaco Elctrns.	214-235-9575
T	Salt Lake City, Bell Inds.	801-972-6969
A	Bellevue, Bell Inds.	206-747-1515
A	Bellevue, Integrated Electronics	206-455-2727

JOHNSON, E. F., CO., 299 Johnson Ave., Waseca, MN 56093, Tel: 507-835-6222, Telex: 290470, TWX: 910-565-2161; Empl.: 1400; *Sls. Mgr.:* G. Mena

JOHNSON CONTROLS, Globe Battery Div., 5757 N. Green Bay Ave., Milwaukee, WI 53201, Tel: 414-228-1200, TWX: 910-262-3084; Empl.: 20,000

JOLO INDS., 13921 Nautilus Dr., Garden Grove, CA 92643, Tel: 714-554-6840, TWX: 910-595-1138; Empl.: 20; *Sls. Mgr.:* J.S. Giampiccolo, Jr.

JONARD INDS. CORP., 134 Marbledale Rd., Tuckahoe, NY 10707, Tel: 914-793-0700, Telex: 996570, TWX: 710-562-0107; Empl.: 65; *Sls. Mgr.:* R. Fersen

JONATHAN MFG., 1101 So. Acacia Ave., Fullerton, CA 92631, Tel: 714-526-4651, Telex: 910 592-1241; Empl.: 265

JONES, HIRAM, ELCTRNS. INC., See Hiram Jones Elctrns. Inc.

JORDAN ELEC., 2380 Camino Vida Roble, Carlsbad, CA 92008, Tel: 619-438-6876; FSC No.: 5905; Empl.: 75; *Sls. Mgr.:* B. M. Barton

JORI RESOURCES, 2128 Knoll Dr., Ventura, CA 93003, Tel: 805-642-2266; Empl.: 4

JOSLYN ELCTRN. SYS., 6868 Cortona Dr., Goleta, CA 93017, Tel: 805-968-3551, TWX: 910-334-3464; FSC No.: 23663; Empl.: 210; *Sls. Mgr.:* A. deSouza

JRW INDS., INC., 2312 N Second St., Harrisburg, PA 17110, Tel: 717-236-1418; Empl.: 4; *Sls. Mgr.:* James Thorbahn

JSC WIRE & CABLE, Box 248, Burgess Pl., Wayne, NJ 07470, Tel: 201-694-6200; Empl.: 40; *Sls. Mgr.:* R. D. Foster; *Dist. Mgr.:* J. Freeman ....**2**•2103

Local Sales Offices & Reps

CA	Van Nuys, Art Szerlip Sls. Co.	213-782-1765
CO	Denver, Mountain Reps.	303-623-0972
DE	Newark, F. S. Carmine Co.	302-731-0697
FL	Crystal River, Foster Sls.	904-795-7831
IL	Chicago, Lassers & Co.	312-539-0170
IA	Burlington, J. S. Ridge Entprs.	319-754-8745
KY	Louisville, Mid Central Sls. Co.	502-239-5614
MA	Lynn, Keene Sls. Co.	617-595-2300
MI	Livonia, Harvey Sls.	313-476-1974
NJ	Teaneck, Fisher Elctrn. Assocs.	201-837-1200
NY	Rochester, Warren Kaufman	716-266-2728
NC	Charlotte, D. Austin Co.	704-334-0174
OH	Columbus, Benchmark	614-861-2070
OR	Portland, R. M. Minthorne	503-246-4556
TX	Dallas, Crockett Sls. Co.	214-748-8209
WI	Minneapolis, John E. M. Anderson	612-823-6459
EXP	NY, New York, Roburn Agencies	212-989-5939

JUDCO MFG. INC., P.O. Box 487-E84, 24030 Frampton Ave., Harbor City, CA 90710, Tel: 213-534-0959 ....**1B**•1671

Judd Wire

DIVISION OF HIGH VOLTAGE ENGINEERING

JUDD WIRE, High Voltage Engrg., 57 Turnpike Rd., Turners Falls, MA 01376, Tel: 413-863-4357, TWX: 510-290-2147; FSC No.: 3357; Empl.: 148; *Sls. Mgr.:* Jack Allen ....**1B**•1011; **2**•2104, 2105

Local Sales Offices & Reps

AL	Huntsville, Hughes Assocs.	205-533-9108
CA	Los Altos, Ewing Foley	415-941-4525
CO	Denver, Duffy Assocs.	303-595-4244
FL	Orlando, Donato & Assocs.	305-352-0727
GA	Norcross, Hughes Assocs.	404-449-1177
IL	Chicago, Rozner Sls. Co.	312-283-0022
MA	Marlborough, O.K. Engrg.	617-481-6400
MI	Southfield, C. H. Schmidt Co.	313-353-6000
MN	Brooklyn Center, Willman Assoc.	612-566-5010
MS	Corinth, Hughes Assocs.	601-287-2915
NJ	Haddonfield, Mesa Tech. Assocs.	609-429-9531
NY	Attica, B. H. Tollefson Assoc.	716-591-1219
NY	Auburn, B. H. Tollefson Assoc.	315-253-4109
NY	Rochester, B. H. Tollefson Assoc.	716-271-4141
NC	Research Triangle Park, Naylor Assocs.	919-836-0478
OH	Worthington, Simcox Assocs.	614-885-8995
OR	Portland, Jas. J. Backer Co.	503-297-8744
SC	Greenville, Naylor Assocs.	803-297-9969
TN	Morristown, Hughes Assocs.	615-587-2433
TX	Dallas, Stevens Sls. Co.	214-350-2476
UT	Salt Lake City, Electrodyne	801-486-3801
WA	Seattle, Jas. J. Backer Co.	206-285-1300

Local Distributors

AL	Madison, Sea Wire & Cable	205-772-9616
AZ	Tempe, Pacer Elctrns.	602-267-0299
CA	Anaheim, Innovative Sys.	714-632-8800
CA	Concord, Control Master	415-939-3600
CA	Harbor City, Falmat	213-530-3333
CA	Mountain View, Sonic Wire	415-965-4646
CA	Torrance, Blake Wire & Cable	213-515-0561
CA	Valencia, Wirenetics Co.	805-257-2400
CT	East Hartford, E. J. Stephens Co.	203-568-1927
CT	Manchester, I.M.S.	203-649-4415
FL	Ft. Lauderdale, Simcona Elctrn.	305-485-4455
FL	Ft. Lauderdale, Pacer Elctrns.	305-462-0902
GA	Clarkston, Lance Engrg.	404-292-4404
MD	Hanover, Vertex Elctrns.	301-796-5000
MA	Burlington, QPL Elctrn. Dist.	617-229-2424
MA	Woburn, Pacer Elctrns.	617-935-8330
MN	Bloomington, K. L. Tannehill	612-881-6700
NH	Amherst, North Country Wire & Cable	603-889-0063
NH	Manchester, Yankee Elctrn.	603-625-9746
NJ	Dover, Electro Spec.	201-361-5079
NJ	Fairfield, Olympic Wire & Cable	201-227-7996
NY	Fairport, Pacer Elctrns.	716-377-0462
NY	Farmingdale, Welco Elctrns.	516-293-0050
NY	Farmingdale, Vertex Elctrns.	516-293-9880
NY	Rochester, Simcona Elctrn.	716-328-3230
NY	Ronkonkoma, Zenith Wire	516-585-1444
OH	Dayton, Astro Inds.	513-429-5900
PA	Harleysville, Omega Wire & Cable	215-256-6577
PA	Montgomeryville, Pyttronic Ind.	215-242-6700
TX	Garland, Interstate Wire	214-271-0541
WA	Seattle, Anixter	206-251-5287
WI	New Berlin, Indl. Elec. Wire & Cable	414-782-2323

JUDD WIRE, High Voltage Engrg., 870 Los Vallecitos Blvd., San Marcos, CA 92069, Tel: 619-744-7720, TWX: 910-322-1149; FSC No.: 3357 ....**1B**•1011; **2**•2104, 2105

Refer to Judd Wire, Turners Falls, MA for sales office and distributor information.

JRL JULIE RESEARCH

JULIE RESCH. LABS., 211 West 61st St., New York, NY 10023, Tel: 212-245-2727, TWX: 710-581-5138; Empl.: 45; *Sls. Mgr.:* Pamela Spencer ....**1A**•1878; **3**•1248-1252

Local Sales Offices & Reps

Instruments

CO	Boulder, Instr. Repair Labs	303-449-2721

Resistors

CA	Northridge, Craig Assocs.	213-993-4060

JUNCTION DEVICES, INC., 2488-A Townsgate Rd., Westlake Village, CA 91361-2594, Tel: 213-889-4030, 805-497-4421, TWX: 910-336-1293; FSC No.: 60858; Empl.: 70; *Sls. Mgr.:* N. Pena

Local Sales Offices & Reps

CA	Burbank, MCA Repco	213-843-4096
CA	Cupertino, Allis Assoc.	408-252-2883
CA	Dana Point, MCA Repco	714-661-1300
CA	Westlake Village, MCA Repco	213-889-5553
FL	Palm Bay, Spartech Assoc.	305-727-8045
GA	Smyrna, Spartech Assoc.	404-432-3644
MA	Lowell, Matrix Sls.	617-458-2096
MO	Kansas City, E I R Company	816-452-7030
MO	Leasburg, E I R Company	314-245-6860
NY	Hartsdale, Spectrum Sls.	914-472-8600
TX	Richardson, Southwest Microwave Elctrns.	214-669-1195
VA	Fairfax, Schibley Assocs.	703-591-3008
EXP	NJ, Wayne, Expo Intl. Co.	201-956-7037

JUPITER SYSTEMS, 1100 Marina Village Parkway, Alameda, CA 94501, Tel: 415-523-9000; *Sls. Mgr.:* Richard MacElhiney

KAHGAN Electronics Corp.

KAHGAN ELCTRNS. CORP., 556 Peninsula Blvd., Hempstead, NY 11550, Tel: 516-538-2300, TWX: 510-222-4347; Empl.: 39 ....**1A**•1119

Local Sales Offices & Reps

AL	Huntsville, BCI, Inc.	205-539-4411
AZ	Phoenix, Sanford Sls. Assocs.	602-957-3570
CA	Anaheim, Micrometals	714-630-7420
CA	Huntington Beach, Corcoran Assoc.	714-841-4759
CA	Los Angeles, Corcoran Assoc.	213-823-4589
CA	Santa Clara, Maxim Elctrn. Sls.	408-946-6001
CO	Aurora, High Tech Assocs.	303-695-1990
CO	Denver, Walter Engrg. Assocs.	303-777-5585
FL	Casselberry, Southern Elctrn. Mktg. (A/K/A Semi)	305-695-3334
FL	Ft. Lauderdale, Southern Elctrn. Mktg. (A/K/A Semi)	305-475-3686
GA	Chamblee, BCI, Inc.	404-455-0405
IL	Palatine, Technology Sls.	312-991-6600
KS	Overland Park, J. F. Guernsey Co.	913-381-2225
MA	Lexington, Del-Con Sls.	617-938-1929
MN	Minneapolis, Smiley-Scott Assoc.	612-888-5551
NM	Albuquerque, Nelco Electronix	505-293-1399
NC	Raleigh, BCI, Inc.	919-781-9426
PA	King of Prussia, Emerald Elctrns.	215-265-1360
TX	Dallas, Marcom	214-351-4532
TX	Houston, Marcom	713-271-5635
VA	Reston, Tytronics Tech. Sls.	703-471-0440
WA	Vancouver, Ray Over Sls.	206-695-6179
WI	Wauseka, Techn. Sls.	414-787-5015

KAHLE ENGRG., Div. Joule Machinery Grp., 3344 Hudson Ave., P.O. Box 877, Union City, NJ 07087, Tel: 201-867-6500, Telex: 42-7757, TWX: 710-992-8835; Empl.: 50; *Sls. Mgr.:* Carl A. Napor

KAISER ELCTRNS., Kaiser Aerospace & Elctrns., 2701 Orchard Pkwy., San Jose, CA 95134, Tel: 408-946-3000, TWX: 910-338-0196

KAISER ELECTROPRECISION, Kaiser Aerospace & Elctrns., 1700 S. Redhill Ave., Irvine, CA 92714, Tel: 714-540-6810, Telex: 678467; FSC No.: 86831; *Sls. Mgr.:* Archie M. Cardwell

KAISER SYSTEMS, INC., 33 Cherry Hill Drive, Danvers, MA 01923, Tel: 617-777-5102 .... 3•1608-1610

KALART VICTOR CORP., Hultenius St., Plainville, CT 06062, Tel: 203-747-1663; *Sls. Mgr.:* J. J. Costag

KALGLO ELCTRNS. CO., INC., 6584 Ruch Rd., E. Allen Twp., Bethlehem, PA 18017, Tel: 215-837-0700; *Sls. Mgr.:* Joe H. Ungerer

KALMUS & ASSOCS., INC., 2424 S. 25th Ave., Box 525, Broadview, IL 60153, Tel: 312-343-7004, TWX: 910-226-0713; Empl.: 290; *Sls. Mgr.:* D.R. Capparelli, Sr., V.P. Sls. & Mktg. .... 2•1093

Local Sales Offices & Reps

AL	Huntsville, Alpha Mktg.	205-533-0766
CA	Pasadena, Black & White, Inc.	818-792-2133
CA	San Diego, Varigon Assocs.	619-576-0100
CA	Sunnyvale, M2 Mktg. Grp.	408-746-3630
CO	Boulder, Comp. Product Sls.	303-530-2800
FL	Plantation, Gallagher & Assocs.	305-473-2101
GA	Tucker, Alpha Mktg.	404-491-9430
IL	Arlington Heights, M. J. Petersen & Assocs.	312-577-8200
IL	Chicago, W. F. Hamilton Co.	312-867-5030
IN	Ft. Wayne, F. J. Campisano Co.	219-747-2633
IN	Indianapolis, F. J. Campisano Co.	317-253-7651
MA	Braintree, Nova Assocs.	617-848-9330
MI	Jackson, Jim Jordan Assocs.	517-750-2677
MN	Minneapolis, Northstar Components	612-553-1888
MS	Meridian, Alpha Mktg.	601-483-9306
MO	Independence, Engrg. Svcs. Co.	816-254-3600
MO	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Mountainside, Henry G. Richter Co.	201-233-4615
NY	Fayetteville, Henry G. Richter Co.	315-637-6713
NY	Rochester, Henry G. Richter Co.	716-436-0300
NC	Charlotte, T. C. Sales, Inc.	704-364-8996
OH	Cincinnati, F. J. Campisano Co.	513-574-7111
OH	Cleveland, F. J. Campisano Co.	216-749-5550
PA	Corapolis, F. J. Campisano Co.	412-264-5151
TN	Austin, C. R. Colvin Assocs.	512-474-8698
TN	Houston, C. R. Colvin Assocs.	713-961-1262
TN	Oak Ridge, Alpha Marketing	615-482-4681
TX	Richardson, McCoy Assocs. Co.	214-238-1017
UT	Salt Lake City, Comp. Product Sls.	801-262-0000

K&L MICROWAVE, INC., 408 Coles Circle, Salisbury, MD 21801, Tel: 301-749-2424, TWX: 710-864-9683; FSC No.: 50140; Empl.: 320; *Sls. Mgr.:* Charles J. Schaub

K & L QUARTZTEK, K & L Microwave, 20 S. 48th Ave., Phoenix, AZ 85043, Tel: 602-272-7944, TWX: 910-951-1305; FSC No.: 59492; *Sls. Mgr.:* Mark H. Story

K & M ELCTRNS., 123 Interstate Dr., W. Springfield, MA 01089, Tel: 413-781-1350, TWX: 710-350-6463; Empl.: 500; *Sls. Mgr.:* Allan Mallanik .... 1A•1883

Local Distributors

MA	West Springfield, Moldcon	413-736-0371

KANTZ ELCTRN. IND., 1804 Wall Church Rd., Wall Township, NJ 07719, Tel: 201-974-0090; Empl.: 12; *Sls. Mgr.:* L. Herold

KAPPA NETWORKS, 165 Roosevelt Ave., Carteret, NJ 07008, Tel: 201-541-1600, Telex: 139408 KAPPA CRET; Empl.: 125; *Sls. Mgr.:* M. Pearl .1A•1538-1553

Local Sales Offices & Reps

CA	Alhambra, M. W. Riedel & Co.	213-283-7694
CA	Alhambra, Kappa Networks	213-283-2048
CA	Santa Clara, Emerging Technology Sls.	408-727-1771
CO	Englewood, White Sales Co.	303-694-9555
CT	Cheshire, Selmark Assocs.	203-573-9088
IA	Grandview, R.R. Burton & Assocs.	816-762-5285
MA	Millis, Selmark Assocs.	617-376-2914
MN	Osseo, Gaffney Sls. Co.	612-425-5484
MO	Grandview, R.R. Burton & Assocs.	816-765-5385
NH	Hopkinton, Selmark Associates	603-746-3299
NJ	Madison, Livera-Polk Assocs.	201-377-3220
NY	Glen Head, Livera-Polk Assocs.	516-759-9300
NC	Raleigh, Leigh Sls.	919-872-1484
PA	Wynnewood, Metz-Benham Assocs.	215-896-7300
TX	Dallas, Technlg. Sls.	214-380-0200
TX	Houston, Technlg. Sls.	713-266-2473
EXP	Carteret NJ, Kappa Networks	800-223-0603

Local Distributors

CA	Alhambra, Delay Line Distrs. Co.	213-283-2058

KAPPA SCIENTIFIC CORP., Box 30585, Santa Barbara, CA 93105, Tel: 805-687-9648; Empl.: 4

KARKAR ELECTRONICS, INC., 245 Eleventh St., San Francisco, CA 94103, Tel: 415-552-1247, TWX: 910-372-7754; FSC No.: 017857; *Sls. Mgr.:* A. Slikkerveer

Local Sales Offices & Reps

NJ	Ocean Township, Karkar Elctrns., Inc.	201-493-3303
TX	Richardson, Karkar Elctrns., Inc.	214-680-9854

KARL HOPT CO, See Hopt, Karl, Co.

KATES SCI. INSTRS., 142 Adam St., Newton, MA 02158, Tel: 614-527-2711; Empl.: 28; *Sls. Mgr.:* D. Kates

KAUFMAN DATA COMMS., INC., Orange Nassau Elctrns. Co., 145 E. Dana St., Mountain View, CA 94041, Tel: 415-962-8811, TWX: 910-379-5021

KAVLICO CORP., 20869 Plummer St., Chatsworth, CA 91311-5096, Tel: 818-882-2400, FAX 818-998-2050, Telex: 65-1481; Empl.: 250; *Sls. Mgr.:* Vic Cetta; *Dist. Mgr.:* Rudi Kettler .... 1B•1846

Local Sales Offices & Reps

CO	Lakewood, Loritz Controls	303-232-7803
FL	Winter Park, James T. Conklin, P.E.	305-629-1739
MN	Minneapolis, Industra Co.	612-835-5535
NM	Albuquerque, Indl. Prods. Corp. (IPC)	505-256-3561
NY	Thompson Ridge, Neville & Vespo Corp.	914-457-9209
PA	King of Prussia, FLW of PA	215-337-4343
SC	Greenville, E. C. Capell & Assocs.	803-297-6550
TX	Ft. Worth, UTM Engineering	817-429-2456
TX	Houston, Collinsystems Pro-Quip	713-464-9428

KAYE INSTRUMENTS, 15 De Angelo Dr., Bedford, MA 01730, Tel: 617-275-0300, Telex: 6817183, TWX: 710-326-1598; Empl.: 170 .... 3•1166

Local Sales Offices & Reps

AL	Birmingham, Hile Controls of Alabama	205-879-2990
AL	Mobile, Hile Controls of Alabama	205-476-7258
AZ	Phoenix, Southwest Controls Inc.	602-267-1171
AZ	Tucson, Southwest Controls Inc.	602-299-8981
AR	El Dorado, Kemp Engineering Co. Inc.	501-862-5869
CA	Costa Mesa, FLW, Inc.	714-751-7512
CA	Hayward, FLW, Inc.	415-487-2222
CA	San Diego, FLW, Inc.	619-277-0993
CA	Van Nuys, FLW, Inc.	213-989-5236
CO	Lakewood, Tech. Mktg. Mfg.	303-232-1516
CT	North Haven, Pat Jenks Assoc.	203-239-6201
FL	Tampa, Lewis & Assocs.	813-988-2104
GA	Marietta, Hile Controls of Georgia	404-424-8372
IL	Chicago, Comtel Midwest	312-539-4838
IN	Indianapolis, Comtel Midwest	317-253-1681
IA	Cedar Rapids, Comtel Midwest	319-377-9434
KS	Shawnee Mission, Comtel Midwest	913-722-1030
LA	Baton Rouge, Rise Inc.	504-776-4645
ME	Brewer, Leen Co.	207-989-7363
ME	Portland, Leen Co.	207-774-6266
MD	Burtonsville, Eastern Instrmn.	301-384-8500
MA	Woburn, Pat Jenks Assoc.	617-938-0488
MI	Farmington Hills, Carter, McCormic & Peirce	313-477-7700
MI	Southfield, Comtel Midwest	313-358-2510
MN	Wayzata, Comtel Midwest	612-476-1551
MO	St. Louis, Comtel Midwest	314-991-5363
NJ	Emerson, Instrumentation Prods.	201-265-6330
NJ	Metuchen, FLW, Inc.	201-548-4343
NM	Albuquerque, Tech. Mktg. Mfg.	505-298-6893
NY	Syracuse, Labtronics	315-455-7314
NC	Matthews, W. K. Hile Co.	704-847-9125
OH	Cleveland, Fox & Dole	216-476-2625
OH	Englewood, Carter, McCormic & Peirce	513-836-0951
OK	Tulsa, Kemp Engrg. Co.	918-663-4501
PA	King of Prussia, FLW, Inc.	215-337-4343
PA	Murrysville, Data Acquisition Sys.	412-327-8979
TN	Knoxville, Hile Controls of TN	615-584-0208
TN	Memphis, Hile Controls of TN	901-372-0451
TX	Lubbock, Summit Controls	806-792-2072
TX	Plano, Summit Controls	214-867-6056
TX	Sugar Land, Pan/Tech Engrg. Corp.	713-240-1220
UT	Salt Lake City, Tech. Mktg. Mfg.	801-487-7676
WA	Issaquah, DCI/Alpha	206-392-7521
WA	Vancouver, DCI/Alpha	206-693-7447
WI	New Berlin, Comtel Midwest	414-544-6042

KAY ELEMETRICS CORP., 12 Maple Ave., Pine Brook, NJ 07058-9797, Tel: 201-227-2000, TWX: 710-734-4347; FSC No.: 80138; Empl.: 70; *Sls. Mgr.:* Stephen P. Crump .... 1A•1708

KAY-TOWNES ANTENNA, P.O. Box 593, Rome, GA 30161, Tel: 404-291-9871, TWX: 810-764-4809; Empl.: 85; *Sls. Mgr.:* Charles S. Ford; *Dist. Mgr.:* James A. Sheffiled

KB ELCTRNS., 73 Wortman Ave., Brooklyn, NY 11207, Tel: 212-257-3300, TWX: 710 584 2308; Empl.: 125; *Sls. Mgr.:* A Bueller

KBI, A Div. of Cabot Corp., PO Box 1462, Reading, PA 19603, Tel: 215-371-3600, Telex: 902251, TWX: 510-651-0106; Empl.: 600; *Sls. Mgr.:* Robert J. Longenecker

KCK AMERICA INC., 1245 Forest Ave., Ste. 10, Des Plaines, IL 60018, Tel: 312-297-5435, Telex: 726481; *Sls. Mgr.:* Carl Bronder; *Dist. Mgr.:* Carl Bronder

KD COMPONENTS, INC., 3016 S. Orange Ave., Santa Ana, CA 92707, Tel: 714-545-7108, TWX: 910-595-2678; Empl.: 25

KDI ELECTRONICS, INC., 60 S. Jefferson Rd., Whippany, NJ 07981, Tel: 201-887-8100, TWX: 710-986-8220; Empl.: 250; *Sls. Mgr.:* William M. Dodge; *Dist. Mgr.:* William M. Dodge .... 1A•1879

Local Sales Offices & Reps

AZ	Phoenix, Toward Engrg. Assocs.	602-955-3193
CA	Los Angeles, Elsco	714-891-4621
CA	Mountain View, Gene Woempner Co., Inc.	415-578-1581
CA	Mountain View, J.I. Tech. Sls.	415-969-5552
CA	Mountain View, Gene Woempner	415-578-1581
CO	Denver, High Plains Mktg.	303-751-7150
FL	PalmBay, Spartech Assocs., Inc.	305-727-8045
GA	Smyrna, Spartech Assocs., Inc.	404-432-3644
IL	Northfield, Imex Ltd.	312-446-8934
IL	Park Ridge, Probe Elctrns.	312-698-2044
MD	Owings Mills, Neal Deoul Assocs.	301-363-4311
MA	Ashland, John O'Donnell	617-881-1380
MA	N. Andover, Torrey Assocs.	617-687-0099
MN	New Brighton, TWC Sls.	612-636-1770
MO	Grandview, Harris - Hanson	816-763-6200
MO	St. Louis, Harris - Hanson	314-432-3611
NJ	Madison, Livera-Polk Assocs.	201-377-3220
NY	Bridgeport, Lightstone Corp.	315-699-5747
NY	Glen Head, Livera-Polk Assocs.	516-759-9300
NY	Huntington, CDB Entrps., Inc.	516-692-5200
NY	Syracuse, T-Squared Elctrns.	315-463-8592
OH	Dayton, Frederick L. Ohmer & Assoc.	513-434-1454
PA	Doylestown, Lou Adezio	215-249-9729
TX	Dallas, Texas Avionics	214-386-3566
TX	Garland, Carey, McMahill & Zerbe Co., Inc.	214-681-1414
TX	Sherman, Repmasters	214-247-6236
WA	Vancouver, Ray Over Sls.	206-695-4697

Local Distributors

CA	Chatsworth, MIL-COMM Distrs.	213-998-311
CA	Mountain View, Target Elctrns.	415-961-117
FL	Tampa, Impala Elctrns.	813-885-474
NJ	Englewood, Tech. Elctrn. Distrs.	201-894-080
NY	Farmingdale, Command Elctrns.	516-293-121
TX	Houston, Lenert Co.	713-225-146

KEC ELECTRONICS, INC.

KEC ELCTRNS., INC., 20817 Western Ave., Torrance, CA 90501, Tel: 213-320-3902, TWX: 910-349-6962; Empl.: 8; *Sls. Mgr.:* Frank Chase .... **3**•1613-1616

Local Sales Offices & Reps

AZ	Tempe, Quatra	602-894-2802
CA	Cupertino, Costar	408-446-9339
CA	Los Alamitos, Power Specialists	213-594-9418
CO	Fort Collins, Vic Myers Assoc.	303-223-8907
FL	Cocoa Beach, Teqspec	305-748-9292
FL	Hobe Sound, Teqspec	305-746-4987
FL	Palm Harbor, Teqspec	813-785-2276
GA	Atlanta, Teqspec	404-455-7222
IL	Elk Grove Village, Loren Green Assoc.	312-593-0282
IN	Indianapolis, Loren Green Assoc.	317-293-9827
MA	Danvers, C. H. Burnham Assocs.	617-774-0111
MI	Jenison, R. C. Nordstrom & Co.	616-457-5762
MI	Southfield, R. C. Nordstrom & Co.	313-559-7373
MN	Minnetonka, Chris-Tek	612-934-1334
NH	Durham, C. H. Burnham Assocs.	603-868-2282
NJ	Springlake, Neville & Vespo	201-974-1520
NM	Albuquerque, Vic Myers Assocs. Inc.	505-884-6878
NY	Binghamton, TAE-Rep.	607-772-6952
NY	Rochester, TAE-Rep.	716-586-8710
NY	Thompson Ridge, Neville & Vespo	914-457-9209
NC	Winston Salem, Teqspec	919-723-8102
OH	Chesterland, KT/DEPCO	216-729-3588
PA	Erdenheim, Omni Sls.	215-233-4600
PA	Pittsburg, KT/Depco	412-487-8777
RI	Johnston, C. H. Burnham Assocs.	401-231-7475
TN	Morristown, Teqspec	615-587-0980
VA	Fairfax, Nine Assocs.	703-273-1803
WA	Bellevue, Elctrn. Mktg. Grp.	206-746-5915

KEENE LAMINATES, Keene Corp., 199 Amaral St., E. Providence, RI 02914, Tel: 800-556-7683, Telex: 927524

KEDMAN CO., Box 25667, Salt Lake City, UT 84125, Tel: 801-973-9112, TWX: 910-925-4116; Empl.: 100

KEENE RAY PROOF, Keene Corp., 50 Keeler Ave., Norwalk, CT 06878, Tel: 203-838-4555, Telex: 96-5812; *Sls. Mgr.:* Robert C. Barbour; *Dist. Mgr.:* Ken Makowski

KEITHLEY INSTRS., 28775 Aurora Rd., Cleveland, OH 44139, Tel: 216-248-0400, Telex: 98-5469; Empl.: 461; *Sls. Mgr.:* Ron Ruiz; *Dist. Mgr.:* T. A. Hayden

KEL-AM, 308 E. 5th, P.O. Box 313, Eldon, MO 65026, Tel: 314-392-7174, Telex: 42-301; FSC No.: 57856; Empl.: 67; *Sls. Mgr.:* Bob Riemer; *Dist. Mgr.:* Bob Riemer .... **2**•1472-1483

Local Sales Offices & Reps

AZ	Scottsdale, BH&B Sls.	602-994-4455
CA	Placentia, Local Sls.	714-993-1800
CA	Santa Clara, Acclaim	408-745-7416
CO	Parker, Mikro Sls.	303-841-4131
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Sarasota, Phoenix Comps.	813-371-1163
GA	Atlanta, Electro Sls.	404-394-1122
IL	Arlington Heights, Diethert/Angel	312-593-7600
IN	Fort Wayne, Temple Engrg.	219-743-0362
IA	Davenport, Electro Tech.	319-386-1134
MD	Baltimore, Faion Lott, Inc.	301-744-4611
MA	Lexington, Kitchen & Kutchin	617-862-8230
MI	Ypsilanti, Tamco, Inc.	313-572-1950
MN	Minneapolis, Electro-Tech	612-927-5878
MO	N. Kansas City, Weisler & Assocs.	314-394-4543
MO	St. Louis, Weisler & Assocs.	
NJ	Clark, R. E. Breuer Co.	201-388-5045
NM	Albuquerque, Nelco Elctrns.	505-293-1399
NY	Port Washington, R. E. Breuer Co.	516-883-7810
NY	Rochester, Tech. Comps.	716-342-2406
OR	Portland, SPS Engrg.	503-297-6919
PA	Downingtown, MCCoy, Inc.	215-363-0350
PA	McKean, ECCO Sls.	814-476-1376
SC	Greer, Sunbelt Sls.	803-877-9088
TN	Chattonooga, Electro Sls.	615-267-4260
TX	Grapevine, Elctrn. Mktg. Assoc.	817-481-7502
TX	Houston, Elctrn. Mktg. Assoc.	713-498-8120
WA	Redmond, SPS Elctrns.	206-392-5264

Local Distributors

AZ	Tempe, Anjon	602-894-1332
CA	Belmont, LO-DAN Elctrns.	415-592-4600
CA	Corona, Konex Corp.	714-371-1200
CA	Glendale, Remco	714-558-3202
CA	Mountain View, Cornett Elctrns.	415-969-5420
CA	San Diego, Mann	619-578-1550
CA	San Fernando, REMCO	213-365-1176
CA	Santa Ana, Mann S.W.	714-558-3202
CA	Santa Clara, Mann Elctrns.	408-988-6061
CO	Denver, CSID Intergrated Elctrns.	303-893-9594
CT	Stratford, Utronics	203-378-4201
FL	Ft. Lauderdale, Intertec Comps.	305-975-8644
FL	Largo, Lo Dan Elctrns.	813-586-2851
FL	Longwood, Intertec Comps.	305-834-7777
IL	Arlington Hgts., Lo Dan Elctrns.	312-398-5311
IL	Hoffman Estates, Intercomp	312-843-2040
IN	Indianapolis, Graham Elctrns.	317-634-8202
KS	Shawnee, Besco Elctrns.	913-268-7633
KS	Wichita, Radio, Inc.	316-264-2798
MA	Lowell, Bay State Wire & Cable	617-454-2444
MA	Woburn, Elctrn. Packaging Comps.	617-935-0400
MI	Farmington Hills, Ambur Elctrns.	313-477-8670
MI	Southfield, LSI Mktg.	313-356-7002
MN	Farmington, Tel-Tek, Inc.	612-460-6299
MN	Minneapolis, Wilde, Inc.	612-941-4825
MO	Independence, H.F. Signalling	816-833-4448
NE	Lincoln, Scott Elctrns.	402-466-8221
NE	North Platte, Scott Elctrns.	308-532-9260
NE	Omaha, Scott Elctrns.	402-734-6750
NH	Hampstead, Astrum Elctrns.	603-329-5656
NJ	Roselle, Lectron Inds.	201-245-5858
NM	Albuquerque, Elctrn. Devices	505-293-1935
NY	Port Washington, Connector Concepts	516-883-3800
OK	Oklahoma City, Radio, Inc.	405-789-0741
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Beaverton, Zepher Elctrns.	503-643-1980
PA	McKean, Advacom	814-476-7774
PA	Montgomeryville, Pyttronics	215-643-2850
TX	Addison, Connec/Tek	214-239-7552
WA	Redmond, Mann N.W.	206-881-0440
WA	Seattle, Zepher Elctrns.	206-241-1980

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AZ	Phoenix, J. Smith Assoc.	602-267-0981
CA	Los Angeles, Cain Technology	213-476-2251
CA	Orange, Cain Technology	714-997-7311
CA	Sunnyvale, Loeswick's	408-745-6751
CO	Colorado Springs, J. Smith Assoc.	303-597-5343
IN	Ossian, Science Sls.	219-622-7383
IA	Cedar Rapids, Palatine Sls.	319-365-8071
KS	Goddard, Palatine Engrg. & Sls.	316-788-5521
KS	Mission, Palatine Sls.	913-831-0555
MD	Ellicott City, VPI	301-461-2525
MA	Needham Hgts., O'Sullivan & Murphy	617-449-4141/4142/4144
MO	Hazelwood, Palatine Sls.	314-893-0800
NJ	Danville, Metro-MICS	201-625-5959
NJ	Westfield, Metro MICS	201-233-6116
NM	Albuquerque, J. Smith Assoc.	505-265-3406
NY	Melville, Metro MICS	516-433-3333
NY	N. Tonawanda, Labtronics	315-454-9314
NY	New York, Landseas Corp.	212-265-8323
NY	Syracuse, Labtronics	315-455-7314
OH	Brunswick, Science Sls.	216-273-4429
PA	Montgomerysville, VPI	215-474-3200
TX	Richardson, Lear Assocs.	214-231-5388
TX	Spring, Lear Assocs.	713-370-7449

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AZ	Scottsdale, D.H. Entprs.	602-990-0452
CA	Mountain View, G. C. Woempner Co.	415-964-5454
CA	Van Nuys, Wes-K Assoc.	213-989-3070
CO	Boulder, R-G Entprs.	303-447-9211
CT	Milford, Todino Engrg. Sls.	203-874-6643
FL	Ft. Lauderdale, Electro-Comp.	305-491-4141
IL	Deerfield, Walt Krueger	312-945-3720
MD	Reisterstown, Massey Assocs.	301-833-2039
MA	Needham Hgts., Todino Engrg.	617-444-7925
MI	Birmingham, Forand Sls.	313-644-0087
MN	Minneapolis, Parker Shoap	612-755-6904
NJ	Medford, Jack McCoy Inc.	609-953-0770
NY	Fayetteville, Foster & Wager	315-637-5427
NY	Great Neck, Trionic	516-466-2300
NY	Webster, Foster & Wager	716-265-2072
OH	New Lebanon, J. N. Bailey & Assoc.	513-687-1325
OR	Beaverton, General Elctrns.	503-641-5288
TX	Austin, C. R. Colvin Assoc.	512-474-8698
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CA	Marina del Rey, Union Carbide	213-821-8824
CA	Mountain View, Union Carbide	415-969-9390
CA	San Diego, Union Carbide	619-560-0768
CO	Englewood, Union Carbide	303-773-0494
FL	Ft. Lauderdale, Union Carbide	305-731-2187
FL	Orlando, Union Carbide	305-855-8886
FL	Pompano Beach, Union Carbide	305-785-1990
FL	Tampa, Union Carbide	813-872-1861
IL	Schaumburg, Union Carbide	312-843-1030
IN	Carmel, Union Carbide	317-844-7756
IA	Ceder Rapids, Seltec Sls.	319-393-1114
MD	Columbia, Union Carbide	301-992-5600
MA	Woburn, Union Carbide	617-938-5400
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AZ	Tempe, Bell Inds.	602-966-7800
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AZ	Tempe, Hamilton/Avnet Elctrns.	602-231-5100
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CA	San Diego, Fisher-Brownell	619-560-8545
CA	San Diego, Hall-Mark Elctrns. Corp.	619-268-1201
CA	San Diego, Hamilton/Avnet Elctrns.	619-571-7510
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CA	Santa Clara, Schweber Elctrns.	408-748-4700
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CA	Sunnyvale, Hamilton/Avnet Elctrns.	408-743-3355
CA	Sunnyvale, Bell Inds. (Corp. Off.)	408-734-8570
CA	Woodland Hills, Avnet Elctrns.	213-884-3333
CO	Englewood, Hall-Mark Elctrns. Corp.	303-694-1662
CO	Englewood, Hamilton/Avnet Elctrns.	303-740-1000
CO	Wheatridge, Bell Inds.	303-424-1985
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GA	Norcross, Schweber Elctrns.	404-449-9170
GA	Norcross, Hamilton/Avnet Elctrns.	404-447-7500
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IL	Bensenville, Hall-Mark Elctrns. Corp.	312-860-3800
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IL	Elk Grove Village, Schweber Elctrns.	312-364-3750
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IN	Indianapolis, Graham Elctrns.	317-634-8202
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MI	Livonia, Pioneer/Michigan Elctrns.	313-525-1800
MI	Livonia, Hamilton/Avnet Elctrns.	313-522-4700
MI	Livonia, Schweber Elctrns.	313-525-8100
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NJ	Fairfield, Hamilton/Avnet Elctrns.	201-575-3390
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NM	Albuquerque, Bell Inds.	505-292-2700
NM	Albuquerque, Hamilton/Avnet Elctrns.	505-765-1500
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NY	Rochester, Schweber Elctrns.	716-424-2222
NY	Rochester, Hamilton/Avnet Elctrns.	716-475-9130
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J	Paterson, Feldman Bros.	201-742-7329
Y	Hauppauge, E.I.L. Instrs.	516-231-6333
Y	Maspeth, Babco	212-446-5120
Y	Rochester, E.I.C.	716-424-5750
Y	Rochester, E.I.L. Instrs.	716-424-5750
Y	Rockaway Park, Metropolitan Sls.	212-634-3100
C	Asheville, Elec. Supp. Co.	704-255-8899
C	Charlotte, Carolina Elec. Supp. Co.	704-333-7526
C	Charlotte, Count Inc.	704-392-7496
C	Gastonia, J.M.T. Elctrn.	704-867-4401
H	Chagrin Falls, RPM Sales	216-247-3295
H	Cleveland, Metermaster	216-651-4100
H	Cleveland, Pioneer Std.	216-587-3600
H	Dayton, Pioneer	513-236-9900
H	Dayton, E.I.L. Instrs.	513-435-2134
H	Tipp City, Tech. Comp. Sls.	513-667-1216
K	Tulsa, Tri-State	918-836-0286
R	Portland, Westcon	503-283-0132
A	Exton, Valey Assocs.	215-363-2650
A	Havertown, Quarracino	215-449-7500
A	Media, W. Reeves Assocs.	215-566-6709
A	Pittsburgh, E.I.L. Instrs.	412-731-5230
A	Pittsburgh, CAM RPC	412-782-3770
C	Columbia, Control Specialists	803-254-8087
X	Dallas, Solid State	214-438-5700
X	Dallas, E.I.L. Instrs.	214-931-1236
X	Fort Worth, Allied Electrns.	817-336-5401
X	Ft. Worth, Swieco Inc.	817-335-6512
X	Garland, Metermaster	214-271-5671
X	Houston, Quality Inst. Labs	713-524-0528
X	Houston, E.I.L. Instrs.	713-271-3100
T	Fillmore, Stuart	801-743-5861
T	Salt Lake City, Stuart	801-466-8603
A	Alexandria, E.I.L. Instrs.	703-354-4330
A	Virginia Beach, E.I.L. Instrs.	804-499-3746
A	Seattle, E.I.L. Instrs.	206-762-0880
A	Seattle, C. B. Parsons	206-762-7373
I	Fond du Lac, Englewood Elctrl.	414-922-4240
I	Green Bay, Englewood Elctrl.	414-432-2000
I	Oconomowoc, Atlas Instrs.	414-367-8759
I	Schoefield, Englewood Elctrl.	715-359-0454

ESTER SOLDER DIV., 4201 Wrightwood Ave., Chicago, IL 60639, Tel: 312-235-1600; Empl.: 350; *Sls. Mgr.:* Mack J. Haraburd .... 2•1084, 1929

Local Sales Offices & Reps

A	Ananeim	714-871-0280
J	Newark	201-589-0246

EUFFEL & ESSER/KRATOS, 20 Whippany Rd., Morristown, NJ 07960, Tel: 201-285-5181, Telex: 136425; Empl.: 1800

EVLIN MICROWAVE CORP., 26 Conn St., Woburn, MA 01801, Tel: 617-935-4800, TWX: 710-393-1239; FSC No.: 25634; *Sls. Mgr.:* James E. Riley

EYAN INDS., INC., P.O. Box 1228, Middleboro, MA 02346, Tel: 617-947-7719; Empl.: 11; *Sls. Mgr.:* Tris Klingenberg; *Dist. Mgr.:* Herb Holt

EYEX, J. B. Man Corp., 838 S. Main St., Hampstead, MD 21074, Tel: 301-239-6777; *Sls. Mgr.:* Karl M. Yatovitz; *Dist. Mgr.:* Karl M. Yatovitz

EYSTONE CARBON, Thermistor Div., St. Marys, PA 15857, Tel: 814-781-1591, Telex: 91-4517; FSC No.: 75-263; Empl.: 1200; *Sls. Mgr.:* John A. Brock; *Dist. Mgr.:* John A. Brock .... 1B•1804-1807

Local Sales Offices & Reps

A	San Carlos, Electro Pacific	415-592-3114
A	Sierra Madre, McCornack & Assocs.	213-355-0466

CO	Littleton, Omega Ltd.	303-798-7040
CT	Wethersfield, L.J. Labant	203-529-0048
GA	Marietta, J.J. Arnold	404-427-1062
IL	West Dundee, W. S. Heffron	312-426-6472
IN	Fort Wayne, R.O. Whitesell & Assoc.	219-432-5591
IN	Indianapolis, R.O. Whitesell & Assoc.	317-359-9283
IN	Kokomo, R.O. Whitesell & Assoc.	317-457-9127
KS	Shawnee, Benson Engrg.	913-642-4442
KY	Louisville, R.O. Whitesell & Assoc.	502-426-7696
MI	Grand Rapids, J.L. Montogomery Co.	616-774-9308
MI	Southfield, J.L. Montgomery Assoc.	313-358-2616
MN	Minneapolis, Stoss Assocs.	612-925-2757
NY	Fayetteville, S.F. Foster Co.	315-637-5427
NY	Webster, S.F. Foster Co.	716-265-2072
NC	Greensboro, DHR Mktg.	919-273-2671
NC	Raleigh, DHR Mktg.	919-876-5450
OH	Cincinnati, R.O. Whitesell & Assoc.	513-521-2290
OH	Cleveland, R.O. Whitesell & Assoc.	216-447-9020
OH	Columbus, R.O. Whitesell & Assoc.	614-888-9396
OH	Dayton, R.O. Whitesell & Assoc.	513-298-9546
PA	Pittsburgh, R.O. Whitesell & Assoc.	412-963-6161
PA	Plymouth Meeting, J. E. Shea	215-825-2046
SC	Greenville, DHR Mktg.	803-235-3594
TN	Greenville, R.O. Whitesell & Assocs.	615-639-6154
TX	Dallas, Benson Engrg.	214-352-7541
TX	Houston, Benson Engrg.	713-861-1551
WA	Seattle, Northmar Inc.	206-524-5170
WI	New Berlin, T. L. Labant	414-425-7157
EXP	NY, Freeport, Minthorne Int'l.	516-546-4700

Local Distributors

AZ	Scottsdale, Allied Elctrns.	602-990-9549
CA	Garden Grove, Allied Elctrns.	714-554-0731
CA	Inglewood, Newark Elctrns.	213-671-7066
CA	Santa Clara, Allied Elctrns.	408-727-1690
CO	Wheatridge, Allied Elctrns.	303-425-7144
FL	Ft. Lauderdale, Allied Elctrns.	305-486-0500
GA	Atlanta, Allied Elctrns.	404-237-3366
IL	Elgin, Allied Elctrns.	312-697-8200
MA	Wilmington, Allied Elctrns.	617-942-0150
MI	Westland, Allied Elctrns.	313-595-6565
MN	Minneapolis, Allied Elctrns.	612-559-9545
MO	Maryland Hgts., Newark Elctrns.	314-739-0133
MO	St. Louis, Allied Elctrns.	314-878-1229
NJ	Springfield, Newark Elctrns.	212-349-7087
NY	Mineola, Allied Elctrns.	516-248-2360
NC	Cary, Allied Elctrns.	919-467-0720
OH	Willoughby, Allied Elctrns.	216-951-0908
OK	Tulsa, Allied Elctrns.	918-663-7630
PA	Bala Cynwyd, Allied Elctrns.	215-667-6940
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Houston, Allied Elctrns.	713-445-7123
VA	Alexandria, Allied Elctrns.	703-836-5002
WA	Seattle, Allied Elctrns.	206-767-5772
WI	Brookfield, Newark Elctrns.	414-781-2450
WI	Milwaukee, Allied Elctrns.	414-463-2662

KEYSTONE ELCTRNS. CORP., 49 Bleecker St., New York, NY 10012, Tel: 212-475-4600, TWX: 710-581-2861; FSC No.: 91833; Empl.: 80; *Sls. Mgr.:* J. Magnuson; *Dist. Mgr.:* M. Barry .... 2•1484-1495

Local Sales Offices & Reps

CA	Mountain View, Del Bucchia & Assoc. (North)	415-965-8045
CA	N. Hollywood, Bassett Sls. Corp. (South)	213-877-7129; 714-539-4000
CO	Denver, William J. Purdy Co.	303-777-1411
FL	Lighthouse Point, Jack Krutek Assocs.	305-941-6544
GA	Atlanta, DHR Marketing	404-451-9848
IL	Wilmette, Joel Wasserman Assoc.	312-256-3566
IN	Carmel, Brainard-Wilson Mktg. Inc.	317-844-2800
MA	Needham Heights, The Newscott Co. Inc.	617-444-1923
MN	Minneapolis, Donald Luger & Assoc.	612-553-1122
MO	St. Louis, KKB & Co.	314-647-2400; 816-229-0001
NJ	South Orange, Sonny Simberkoff Assoc.	201-763-7900
NM	Albuquerque, William J. Purdy Co.	505-266-7959
NC	Raleigh, DHR Marketing	919-876-5450; 919-273-2671
OH	Beachwood, Elctrn. Salesmasters	216-831-9555; 800-321-1848
OR	Beaverton, William J. Purdy Co.	503-641-9373
UT	Salt Lake City, William J. Purdy Co.	801-486-8557
WA	Redmond, William J. Purdy Co.	206-882-3144

KEYTEK DIV., 6424 Warren Dr., Norcross, GA 30093, Tel: 404-449-6040, Telex: 810-766-4529; Empl.: 50; *Sls. Mgr.:* Ron Inneckin

KEYTEK INSTR. CORP., 12 Cambridge St., Burlington, MA 01803, Tel: 617-272-5170, Telex: 951389 KEYTEK BURL; *Sls. Mgr.:* Michael J. Hopkins

Local Sales Offices & Reps

AL	Huntsville, Kemp Instrs.	205-837-4304
AZ	Tempe, Cantec Sls., Inc.	601-829-0191
CA	Cupertino, Patterson Control Sys.	408-973-1050
CA	Long Beach, Measurement Assocs.	213-433-0977
CO	Englewood, F. G. Mktg. Co.	303-795-9176
CT	Mt. Carmel, Scientific Devices - CONN	203-248-9361
FL	Cocoa Beach, Teqspec, Inc.	305-783-3444
FL	Hobe Sound, Teqspec, Inc.	305-746-4987
FL	Palm Harbor, Teqspec, Inc.	813-785-2276
GA	Atlanta, Kemp Instrs.	404-452-8050
IL	LaGrange, PVA Co.	312-579-9300
KS	De Soto, Midtec Assocs., Inc.	913-441-6565
MA	Waltham, Scientific Devices N.E.	617-890-2252
MN	Minneapolis, HEI-LITE Sls.	612-861-6051
NJ	Englewood Cliffs, Scientific Devices - East	201-871-3916
NC	Winston-Salem, Radco Co.	919-722-9671
OR	Beaverton, Eicher Richards Co.	503-641-3300
PA	Blairsville, Measurement Instrs. East, Inc.	412-459-8090
PA	Oreland, Technical Instr. Sls.	215-836-2222
TX	Dallas, True Tech. Co.	214-691-7870
VA	McLean, WWB Assocs.	703-893-6516
WA	Seattle, Eicher Richards Co.	206-523-7888
WI	Glendale, Stapelman Corp.	414-352-5777

KEY TRONIC, P.O. Box 14687, Spokane, WA 99214, Tel: 509-928-8000, TWX: 510-773-1885; FSC No.: 52833; Empl.: 1350

KGS ELECTRONICS, INC., GAR Entprs., 2029 N. Lincoln Ave., Pasadena, CA 91103, Tel: 818-798-0786; Empl.: 25 .... 3•1890, 1891

Local Sales Offices & Reps

TN	Memphis, Memphis Group	901-362-8600
TX	Dallas, Foxtronics	214-358-4425
TX	Dallas, Mark Hutton	214-484-0580
TX	Hurst, McGarrah & Assocs.	817-268-3557
EXP	NJ, Rahway, REA Intl.	201-382-7100

WALTER KIDDE, Div. of Kidde, Inc., P.O. Box 1147, Wake Forest, NC 27587, Tel: 919-556-6811, Telex: 802569 WALTKIDDE; Empl.: 250; *Sls. Mgr.:* Frank Lindsey

KIKUSUI INTL. CORP., 17819 S. Figueroa St., Gardena, CA 90248, Tel: 213-515-6432, 800-421-5334, TWX: 910-346-7648; *Sls. Mgr.:* Bill White .... 3•1370, 1371, 1645

Local Sales Offices & Reps

AL	Huntsville, Morard & Co.(MOCO)	205-881-5968
AZ	Phoenix, Cherry Assoc.(Scopes Only)	602-242-1922
AZ	Scottsdale, Power Specialist	602-996-4100
CA	Carson, Amasco South	213-516-8561
CA	Sunnyvale, Amasco North	408-733-8690
CO	Aurora, R & R Instrmn.	303-340-8728
FL	Melbourne, EMS, Inc.	305-724-1027
HI	Honolulu, EMC Corp.	808-836-1138
IL	Elmhurst, Sector Engrg. Sls.	312-530-7850
IN	Indianapolis, Sector Engrg. Sls.	317-842-1120
KS	Olathe, Rush & West Assoc. (Power Supp.)	913-764-2700
KS	Overland Park, Ramsey Assocs. (Scopes Only)	913-649-6996
MD	Burtonsville, Eastern Instrmn.	301-384-8500
MD	Wheaton, Brimberg Sls. (Power Supp.)	301-946-2670
MA	Bedford, Eastronix	617-275-5775
MI	Warren, Dietrich & Assocs.	313-751-4990
MN	Minneapolis, Sector Engrg. Sls.	612-888-6920
MO	Ballwin, Rush & West Assoc. (Power Supp.)	314-394-7271
MO	Maryland Hgts., Ramsey Assocs. (Scopes Only)	314-878-5042
NJ	Englewood Cliffs, Sci. Devices East	201-871-3916
NM	Albuquerque, Cleveland Entprs.	505-265-7893
NY	Syracuse, Martindale - Paul	315-432-1141
OH	Cleveland, Dietrich & Assocs.	216-781-1855
OH	Dayton, Dietrich & Assocs.	513-223-6042
OR	Portland, Westcon	503-283-0132
PA	Pittsburgh, Dietrich & Assocs.	412-892-2992

PA	Springhouse, Sci. Devices East	215-643-3335
TX	Houston, Sci. Devices S.W.	713-864-1711
TX	Richardson, Sci. Devices S.W.	214-231-8106
VT	Shelburne, Eastronix	802-985-3743
WI	Milwaukee, Sector Engrg. Sls.	414-352-8280
PR	San Juan, David S. Ternent	809-762-2688

Kilovac®
Corporation

KILOVAC CORP., Box 4422-EM, Santa Barbara, CA 93103, Tel: 805-684-4560, TWX: 910-336-1141; FSC No.: 18741; Empl.: 130; *Sls. Mgr.:* Jerry L. Dysart; *Dist. Mgr.:* Jack Dysart .... **1B**•1456, 1457

Local Sales Offices & Reps

AZ	Tempe, Gassner & Clark	602-968-9037
CA	Campbell, Kottmeier Assocs.	408-866-5153
CT	Yalesville, Kanan Assocs.	203-265-2404
FL	St. Petersburg, David A. King	813-381-1893
IL	Schaumburg, Gassner & Clark	312-882-8608
IA	Cedar Rapids, H. R. Brown Sls. Co.	319-366-0635
KS	Olathe, M. E. Bettis Co.	913-649-7142
KS	Wichita, M. E. Bettis Co.	316-265-8250
MD	Columbia, Tyler Griffin Co.	301-995-1215
MA	Reading, Kanan Assocs.	617-944-8484
MN	St. Paul, De Beck	612-835-4649
NJ	Colts Neck, Trionic Assoc.	201-431-0415
NM	Albuquerque, Data Handling	505-884-0284
NY	Cazenovia, S. T. Woolard Co.	315-655-8145
NY	Great Neck, Trionic Assoc.	516-466-2300
NY	Rochester, Lamb	716-323-1250
NC	Charlotte, DGW, Inc.	704-334-7090
NC	Winston-Salem, DGW, Inc.	919-768-7166
OH	Cleveland, Components, Inc.	216-243-9200
OH	Miamisburgh, Components, Inc.	513-866-0661
OK	Tulsa, Norcom, Inc.	918-832-7747
OR	Tigard, Components West	503-684-1671
PA	Paoli, Tyler Griffin	215-647-1550
TX	Austin, Norcom, Inc.	512-451-2757
TX	Dallas, Norcom, Inc.	214-386-4888
TX	Houston, Norcom, Inc.	713-778-0392
WA	Renton, Components West	206-271-5252

KIMCO, 150 Vallecitos de Oro, San Marcos, CA 92069, Tel: 619-744-5671, TWX: 910-322-1168; Empl.: 43; *Sls. Mgr.:* W. P. Byrnes

KINEMETRICS, INC., 222 Vista Ave., Pasadena, CA 91107, Tel: 818-795-2220, Telex: 67-5402; Empl.: 110; *Sls. Mgr.:* Steve Pauly

Local Sales Offices & Reps

CA	Santa Rosa, Kinemetrics/TrueTime	707-528-1230
OK	Tulsa, Kinemetrics/Monitron	918-836-6831

KINEMETRICS TRUETIME INSTR. CO., 3243 Santa Rose Ave, Santa Rosa, CA 95401, Tel: 707-528-1230, Telex: 176687 (TRUETIME SORO); Empl.: 30; *Sls. Mgr.:* Victor Kunkel

KINETIC SYS., 11 Maryknoll Dr., Lockport, IL 60441, Tel: 815-838-0005, TWX: 910-638-2831; Empl.: 160; *Sls. Mgr.:* Pat Kirby

KINEX CORP., Sub. of the Nokia Corp. - Helsinki, 6950 Bryan Dairy Rd., Largo, FL 33543, Tel: 813-541-6404, TWX: 810-863-0362; Empl.: 100; *Sls. Mgr.:* W. L. Huston (Vice President); *Dist. Mgr.:* Steve Ridge

KINGS ELCTRNS., 40 Marbledale Rd., Tuckahoe, NY 10707, Tel: 914-793-5000, Telex: 13-7449, TWX: 710-562-0110; FSC No.: 91836; Empl.: 465; *Sls. Mgr.:* F. Pack; *Dist. Mgr.:* Fred Della Iacono

KINGSLEY MACHINE CO., 850 Cahuenga Blvd., Hollywood, CA 90038, Tel: 213-469-7243, Telex: 910-3214581; *Sls. Mgr.:* John M. Butler

KING-WAY ASSOC., 16400 Ventura Blvd., Encino, CA 91316, Tel: 213-788-4124

KING WIRE & CABLE CORP., 179-45 110 Ave., Jamaica, NY 11433, Tel: 212-657-4422, 800-221-0144, Telex: 96-8858; FSC No.: 06145; *Sls. Mgr.:* Ira M. Lash; *Dist. Mgr.:* Ira M. Lash

KIPP & ZONEN, 390 Central Ave., Bohemia, NY 11716, Tel: 516-589-2885, Telex: 0960250; Empl.: 25; *Sls. Mgr.:* Wm. Novack; *Dist. Mgr.:* Wm. Novack

KISTLER-MORSE, 10201 Willows Road NE, Redmond, WA 98052, Tel: 206-881-8000, Telex: 15-2223; *Sls. Mgr.:* Jim Beaton

KLC CORP., 2234 East Colorado, Pasadena, CA 91107, Tel: 818-796-0525; Empl.: 6; *Sls. Mgr.:* Chris Connelly

KLC/KARL LAMBRECHT CORP., 4204 N. Lincoln Ave., Chicago, IL 60618, Tel: 312-472-5442, Telex: 759819

KLM ELECTRONICS, 16890 Church St., P.O. Box 816, Morgan Hill, CA 95037, Tel: 408-779-7363, TWX: 910-590-4468; Empl.: 250; *Sls. Mgr.:* Chuck McKinney

KLOCKNER MOELLER, 4 Strathmore Rd., Natick, MA 01760, Tel: 617-655-1910, Telex: 94-8434; Empl.: 250; *Sls. Mgr.:* George Tamer

Local Sales Offices & Reps

CA	Cerritos	213-926-2355
CA	Concord	415-676-5353
GA	Marietta	404-952-0258
IL	Elk Grove	312-593-0980
NJ	Fairfield	201-227-3140
NY	New York	212-697-1184
OK	Tulsa	918-627-0676
TX	Stafford	713-491-2687

KMC SYSTEMS INC., 140 Greenwood Ave. (Bldg. 3), Midland Pk., NJ 07432, Tel: 201-447-0007, Telex: 642-374; Empl.: 120; *Sls. Mgr.:* E. Verder

Local Sales Offices & Reps

NJ	Mt. Laurel, Control Equip.	215-676-1460
UT	Bountiful, Lectrol, Inc.	801-292-7674

KNOL ENTERPRISES, 3468 Sacramento Dr., San Luis Obispo, CA 93401, Tel: 805-544-4881; Empl.: 6; *Sls. Mgr.:* Dave Bone

KNOWLES ELCTRNS., INC., 3100 N. Mannheim Rd., Franklin Park, IL 60131, Tel: 312-455-3600, Telex: 72-8397; *Sls. Mgr.:* Reginald G. Garratt, VP-Mktg.

KOA

KOA SPEER ELCTRNS., Bolivar Dr., P.O. Box 547, Bradford, PA 16701, Tel: 814-362-5536, Telex: 91-4404, TWX: 510-695-5921; Empl.: 50; *Sls. Mgr.:* L. G. Holzwarth; *Dist. Mgr.:* L. Rice .... **1A**•1885-1888

Local Sales Offices & Reps

AL	Huntsville, Cartwright & Bean	205-830-1540
AZ	Phoenix, O'Donnell Assocs.	602-944-9542
CA	Anaheim, Westrep	213-404-3881
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, I2 Inc.	408-988-3400
CO	Boulder, R. G. Entprs.	303-447-9211
CT	Middletown, Gerber Sls.	203-347-3000
FL	Ft. Lauderdale, APM Assocs.	305-565-0056
FL	Longwood, APM Assocs.	305-869-6831
FL	Tampa, APM Assocs.	813-886-2457
GA	Atlanta, Cartwright & Bean	404-233-2939
IL	Arlington Hgts., C. L. Greenslade Sls.	312-253-9620
IN	Fort Wayne, John F. Kilfoil	219-436-7233
KS	Overland Park, Advanced Techn. Sls.	913-642-6675
LA	Kenner, Cartwright & Bean	504-466-0020
MA	Ludlow, Gerber Sls.	413-589-9837
MA	Newton Upper Falls, Gerber Sls.	617-969-2620
MI	Troy, C. B. Jensen & Assocs.	313-643-0506
MN	Edina, Grayden & Flemmer	612-941-1120
MS	Jackson, Cartwright & Bean	601-981-1170
MO	Ellisville, Advanced Techn. Sls.	314-227-4448
NM	Albuquerque, Power Entprs.	505-298-1918
NY	East Rochester, Tri-Tech Elctrns.	716-385-6500
NY	Endwell, Tri-Tech Elctrns.	607-754-1094
NY	Fayetteville, Tri-Tech Elctrns.	315-446-2881
NY	Fishkill, Tri-Tech Elctrns.	914-897-5611
NY	Great Neck, MOS Assocs.	516-487-3966
NC	Charlotte, Cartwright & Bean	704-377-5673
NC	Raleigh, Cartwright & Bean	919-781-6560
OH	Cincinnati, John F. Kilfoil	513-791-6150
OR	Beaverton, Barrett-Squibb & Assoc.	503-642-1661
PA	Wynnewood, Metz-Benham Assocs.	215-896-7300
TN	Knoxville, Cartwright & Bean	615-693-7450
TN	Memphis, Cartwright & Bean	901-276-4442
TX	Lewisville, Jim Hughes	214-221-1536
TX	Stafford, Jim Hughes	713-343-0673
WA	Redmond, Barrett-Squibb & Assoc.	206-885-6991
PR	Hato Rey, M. Anderson	809-751-2026

Local Distributors

AZ	Phoenix, Sterling Elctrns.	602-258-4531
AZ	Phoenix, Kachina	602-269-6201
AZ	Tucson, Kachina	602-792-2223
AR	Little Rock, Carlton-Bates	501-562-9100
CA	Chatsworth, IEC/JACO	213-998-2200
CA	Fountain Valley, Comps. Ctr.	714-979-0433
CA	Irvine, KELEX	714-957-3247
CA	Irvine, Ryno Elctrns.	714-557-5021
CA	San Diego, Ryno Elctrns.	619-292-6022
CA	San Jose, Eric Elctrns.	408-262-1111
CA	Santa Clara, Components Ctr.	408-988-3751
CA	Sun Valley, QC Comps.	213-768-6111
CO	Boulder, R. G. Entprs.	303-447-9211
CO	Denver, Integrated Elctrns.	303-534-6121
CT	Stratford, Utronics	203-378-4201
CT	Wallingford, Midstate Elctrns.	203-265-9900
FL	Orlando, TTI	305-859-1000
FL	W. Palm Beach, Nurmi Elctrn. Supp.	305-684-0320
GA	Roswell, Quality Comps.	404-993-8146
IL	Elk Grove Village, GBL/Goold Elctrns.	312-593-3220
IL	Northbrook, Classic Comp. Supp.	312-272-9650
IL	Rosemont, Advent Elctrns.	312-298-4210
IN	Indianapolis, Advent Elctrns.	317-872-4910
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
LA	Baton Rouge, Indl. Elctrn. Supp.	504-926-0513
LA	Shreveport, Indl. Elctrn. Supp.	318-222-9459
MD	Baltimore, Radio Elec. Svc. Co.	301-823-0070
MD	Beltsville, Radio Elec. Svc.	301-937-9100
MA	Billerica, Baldwin Comp. Ctr.	617-667-6710
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	Norwood, Gerber Elctrns.	617-769-6000
MA	Waltham, Sterling Elctrns.	617-894-6200
MI	Ann Arbor, Wedemeyer	313-665-8611
MI	Farmington Hills, Prehler Elctrns.	313-476-7084
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Livonia, Reptron	313-525-2700
MN	St. Paul, Ragon Elctrns.	612-642-2828
NE	Lincoln, Scott Elctrns.	402-466-8221
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NJ	Pennsauken, Resco Elctrns.	609-662-4000
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NY	Bohemia, Justin Elctrns.	516-589-4000
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Farmingdale, SAI	516-293-2710
NY	Hauppauge, Prime Comps.	516-582-6258
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NY	Ronkonkoma, Baldwin Comp. Ctr.	516-588-5700
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NC	Raleigh, Southeastern Radio	919-828-2311
OH	Cleveland, Repco	216-248-8900
OH	Cleveland, Roberts Elect. Corp.	216-238-1711
OH	Columbus, Reptron/Ohio	614-436-6675
OH	Dayton, Stotts-Friedman Elctrns.	513-298-5555
OH	Solon, Hart Elctrns.	216-248-8855
OK	Tulsa, Altair Co.	918-252-5781
PA	Braddock, Leff Elctrns.	412-271-2800
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PA	Harrisburg, Cumberland Elctrns.	717-233-5883
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
RI	Providence, Wm. Dandreta Co.	401-861-2800
SC	Columbia, Dixie Radio Supp.	803-779-5332
TN	Kingsport, Radio Elctrn. Supp.	615-247-8111
TN	Memphis, Bluff City Elctrns.	901-345-9500
TN	Nashville, Bluff City Elctrns.	615-242-8000
TX	Ft. Worth, T.T.I. Inc.	817-429-1440
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Houston, Altair Co.	713-462-3029
TX	Richardson, Altair Co.	214-231-5166
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WI	Hartland, G W Elctrns.	414-367-6003
WI	New Berlin, RM-Wisconsin	414-784-4420

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FL	Tampa, Gentry Assocs.	813-886-0720
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L	Chicago, Berndt Assocs.	312-283-0713
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LA	Gretna, Gentry Assocs.	504-367-3975
MD	Baltimore, Sci-Rep	703-385-0600
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MN	Minneapolis, Berndt Assocs.	612-546-2021
MO	St. Louis, Ramsey Assocs.	314-878-5042
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NY	Saratoga Springs, Ossmann Instrs.	518-584-6519
NY	Syracuse, Ossmann Instrs.	315-437-7052
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OH	Chesterland, EQS Sys.	216-729-2222
OH	Columbus, EQS Sys.	614-228-3453
OH	Dayton, EQS Sys.	513-294-2476
OK	Tulsa, Kemp Engrg.	918-663-4501
OR	Portland, McLaren	503-297-2248
PA	Pittsburgh, EQS Sys.	412-261-2604
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TN	Knoxville, Gentry Assocs.	615-584-0281
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TX	Houston, Kemp Engrg.	713-466-1465
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WI	Milwaukee, Berndt Assocs.	414-545-8400

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CA	Sunnyvale, Permag Sierra Corp.	408-738-1080
GA	Norcross, Permag Dixie Corp.	404-448-4998
IL	Elk Grove Vl., Permag Central Corp.	312-956-1140
MA	Billerica, Permag Northeast Corp.	617-273-2890
MN	Eden Prairie, Permag Minnesota Corp.	612-934-4635
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OH	Toledo, Permag Magnetics Corp.	419-385-4621
TX	Richardson, Permag S.W.	214-699-1121

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FL	Osprey, Dick Ridgewell Co.	813-484-2020
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IN	Indianapolis, EIA, Inc.	317-257-7231
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MA	Waltham, Daner-Hayes	617-894-7290
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MN	New Hope, Trask Engrg.	612-537-2434
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NY	Rochester, Daner-Hayes, Inc.	617-894-7290
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OH	Dayton, WKM Assocs	513-434-7500
OK	Edmond, Data Aids Assocs.	405-478-5000/01
PA	Doylestown, Daner-Hayes, Inc	617-894-7290
PA	Pittsburgh, WKM Assocs.	412-892-2953
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TX	Dallas, Data Aids Assocs.	214-620-1551
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CA	Redwood City, Hickey Ind. Sls.	415-368-3849
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MA	Needham Hgts., Coakley, Boyd & Abbett	617-444-5470
MO	St. Louis, Lowell-Kangas & Assocs.	314-821-4050
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WI	Milwaukee, D. Dolin Sls.	414-482-1111

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AZ	Phoenix, Parts Elctrns.	602-258-6476
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CA	Buena Park, Control Design	213-802-1371
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CA	San Diego, Elcom	213-404-2961
CA	San Diego, Fisher/Brownell	619-560-8545
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CT	Stratford, Utronics	203-378-4201
CT	Wallingford, Midan	203-265-2077
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FL	Largo, Electronic Precepts	813-596-2742
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FL	Winter Park, Electronic Equip. Co.	305-644-4833
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IN	Indianapolis, Graham Elctrn. Supp.	317-634-8202
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IA	Cedar Rapids, Vrbik-Berquist	319-366-8733
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KS	Wichita, Radio Supp. Co.	316-267-5213
KY	Louisville, Peerless Elctrn. Equip.	502-637-7677
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MN	Minneapolis, Control Design	612-721-6555
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MO	Kansas City, Walters Radio Supp.	816-531-7015
MO	Maryland Hgts., L-Comp	314-291-6200
MO	St. Louis, Control Design	314-426-3150
NE	Omaha, Scott Elctrns. Supp.	402-466-8221
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NM	Albuquerque, Walker Radio	505-247-2288
NY	Buffalo, Summit Distrs.	716-884-3450
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NY	Mt. Vernon, Qar Indl. Elctrns.	914-699-2224
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NY	Rochester, Summit Distrs.	716-334-8110
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NC	Raleigh, Southeastern Radio Supp.	919-828-2311
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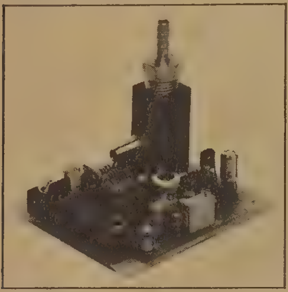

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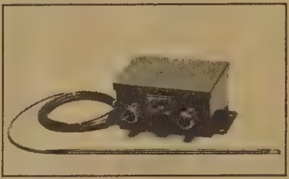

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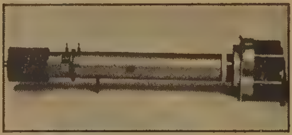

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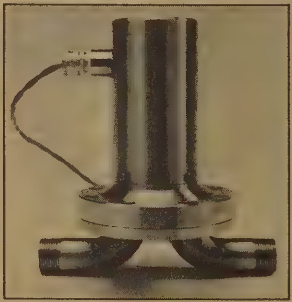

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Local Sales Offices & Reps

CA	Lomita, Comp. Mktg. Assocs.	213-326-1460
CA	San Mateo, Comp. Mktg. Assocs.	415-345-7373
FL	Orlando, Over & Over Florida, Inc.	305-857-4057
GA	Norcross, Spada & Assocs.	404-448-4028
IL	Addison, Engineered Sls.	312-832-8425
IN	Noblesville, Newton & Assocs.	317-845-8157
NJ	Medford, McCoy, Inc.	609-953-0770
OH	Westlake, T. C. Sales & Mktg.	216-871-8832
TN	Antioch, Over & Over, Inc.	615-834-0140
TX	Austin, Rendell Elctrns.	512-835-5784
WA	Woodinville, Intl. Equip.	206-827-5402
EXP	Crystal Lake, Illinois, Lamptronix Co., Ltd.	815-455-0400

LANCE INDS., P.O. Box 4156, Sylmar, CA 91342-0156, Tel: 818-367-1811, Telex: 66-2443; *Sls. Mgr.:* Jerry Updyke; *Dist. Mgr.:* Joe Barris

Local Sales Offices & Reps

IL	Chicago	312-275-7000

LANDIS & GYR, INC., 4 Westchester Plaza, Elmsford, NY 10523, Tel: 914-592-4400, Telex: 137345; Empl.: 65; *Sls. Mgr.:* R. W. Strohm; *Dist. Mgr.:* R. W. Strohm

L & L SPECIAL FURNACE, 166 Kent Rd., Aston, PA 19014, Tel: 215-459-9216, Telex: 753264; Empl.: 20; *Sls. Mgr.:* Greg Lewicki; *Dist. Mgr.:* Stephen Lewicki

L & R MFG., 577 Elm St., Kearny, NJ 07032, Tel: 201-991-5330, Telex: 642078 Ellanar Krny.; Empl.: 220; *Sls. Mgr.:* Albert Stein

LANGLEY, P.O. Box 2911, San Diego, CA 92112, Tel: 619-264-3181; FSC No.: 83549; Empl.: 140; *Sls. Mgr.:* A. Kremm

LANSING

LANSING RESEARCH CORP., 705 Willow Ave., P.O. Box 730, Ithaca, NY 14850, Tel: 607-272-3265; *Sls. Mgr.:* Fred B. Widding .... **2**•1040

LA POINTE INDUSTRIES, INC., Electronics Products Div., 155 W. Main St., Rockville, CT 06066, Tel: 203-872-8581, TWX: 710-435-1663; FSC No.: 70117; Empl.: 650

LARK ELECTRONICS, INC., Box 390, New York, NY 10040, Tel: 212-569-0430; FSC No.: 52682

LARK ENGINEERING CO., 26401 Calle Rolando, San Juan Capistrano, CA 92675, Tel: 714-493-9501, TWX: 910-596-1411; FSC No.: 33175; Empl.: 40

LARSON INSTR., Greenbush Rd., Orangeburg, NY 10962, Tel: 914-359-3800; Empl.: 18; *Sls. Mgr.:* A. D. Stephens

Local Sales Offices & Reps

CA	Irvine, Metercraft Inc.	714-261-7135

LASER APPLICATIONS, 91 Carver Ave., Westwood, NJ 07675, Tel: 201-664-7636; Empl.: 5

LASER CONCEPTS, Omega Organization Intl., P.O. Box 687, Mercer Island, WA 98040, Tel: 206-232-6256; *Sls. Mgr.:* Sheila Chatelaine

LASER DIODE LABS, 1130 Somerset St., New Brunswick, NJ 08901, Tel: 201-249-7000, TWX: 710-998-0597; *Sls. Mgr.:* Richard Klein

LASER INC., Laser Lane, Box 537, Sturbridge, MA 01566, Tel: 617-347-7314; Telex: 95-1806; Empl.: 110; *Sls. Mgr.:* William H. Shiner

LASER PRECISION CORP., 1231 Hart St., Utica, NY 13502, Tel: 315-797-4449, Telex: 646803; Empl.: 110; *Sls. Mgr.:* Don Sypek

LASER TECHN., 10624 Ventura Blvd., N. Hollywood, CA 91604, Tel: 213-763-7091; Empl.: 18; *Sls. Mgr.:* H.B. McLaughlin

LATTIN RADIO LABS., 1431 Sweeney, P.O. Box 44, Owensboro, KY 42301, Tel: 502-683-2868; Empl.: 3; *Sls. Mgr.:* Wm J. Lattin

LAWRENCE-CROW ELCTRNS. INC., 2100 Stemmons, Dallas, TX 75207, Tel: 214-749-5440, Telex: 730213; *Sls. Mgr.:* Jesse Hall; *Dist. Mgr.:* Michael T. McAndrews

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Local Sales Offices & Reps

AL	Huntsville, DHR Mktg. Inc.	205-533-5165
AZ	Scottsville, OEM Specialties	602-991-6967
CA	Anaheim, R. D. Brunnemer & Assoc.	714-525-1644
CA	Santa Clara, Acclaim	408-745-7416
CO	Denver, CEC	303-751-3252
FL	Apopka, G. F. Bohman Assoc., Inc.	305-886-1882
GA	Atlanta, DHR Mktg. Inc.	404-451-9848
IN	Fort Wayne, Denton Mktg. Inc.	219-627-5515
KS	Kansas City, BC Elctrns.	913-342-1211
MN	Minneapolis, Boerger & Assoc.	612-560-3435
MO	Bridgeton, BC Elctrns.	314-291-1101
NJ	Marlton, Naudain Assoc.	609-983-5300
NY	Great Neck, F & F Metro, Inc.	516-482-4080
NY	Rochester, R.F. Lamb Co., Inc.	716-323-1250
NC	Raleigh, DHR Mktg. Inc.	919-876-5450
OR	Portland, SPS	503-643-4705
SC	Greenville, DHR Mktg. Inc.	803-235-3594
TX	Houston, Repmasters-Houston	713-692-8204
TX	Sherman, Repmasters-Dallas	214-247-6236
UT	Salt Lake City, CEC	801-355-8424
VA	Reston, Ty-Tronics	703-471-0440

LDJ INCORPORATED, 2200 Stephenson Hwy., P.O. Box 219, Troy, MI 48099-0219, Tel: 313-528-2202, TWX: 810-232-1509 LDJ TRMI; Empl.: 63; *Sls. Mgr.:* Stephen Barry .... **3**•1256

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Local Sales Offices & Reps

AZ	Phoenix, Chopporal Elctrns.	602-252-0897
CA	Granada Hills, C & W Comps. Sls.	213-368-4032
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Englewood, Dynatech	303-773-2830
FL	Orlando, Donato & Assoc.	305-352-0727
KS	Wichita, BAKA Corp.	316-262-0179
MD	Hunt Valley, Marktron	301-628-1111
MD	Rockville, Marktron	301-251-8990
MA	Woburn, Comp. Techn.	617-933-5390
MN	Minneapolis, Comprehensive Tech. Sls.	612-888-7011
NJ	Englewood Cliffs, Leach Corp.	201-567-6795
NY	Fayetteville, R. D. Sherman	315-637-9861
OH	Cincinnati, Giesting and Assocs.	513-521-8800
PA	Trevose, PSA, Inc.	215-245-0513
TX	Dallas, Caton Sls.	214-661-5792
VA	Charlottesville, Marktron	301-460-6100
WA	Bellevue, Leach Corp.	206-746-7263

Local Distributors

AZ	Tempe, Time Elctrns.	602-967-2000
CA	Anaheim, Time Elctrns.	714-937-0911
CA	Sunnyvale, Time/Nor-Cal.	408-734-9888
CA	Torrance, Time Elctrns. West	213-320-0880
FL	Ft. Lauderdale, Time Elctrns.-Florida	305-974-4800
GA	Atlanta, Electro Air Corp.	404-351-3545
MD	Columbia, Time Elctrns.	301-964-3090
MA	Woburn, Time/New England	617-935-8080
MO	St. Louis, Time Midwest	314-391-6444
NY	Hauppauge, Time Elctrn. Sls.	516-273-0100
PA	Broomall, Time/Mid-Atlantic	215-359-1200
TX	Dallas, Electro Air Corp.	214-385-0566
WA	Bellevue, Electro-Air/Northwest	206-641-3640
WA	Redmond, Pan Pacific Elctrns.	206-881-7252

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Local Sales Offices & Reps

CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Englewood, Dynatech, Inc.	303-773-2830
FL	Orlando, Donato & Assoc.	305-352-0727
GA	Atlanta, Craft Assocs.	404-256-0420
KS	Wichita, BAKA Corp.	316-262-0179
MD	Silver Spring, Marktron	301-460-6100
MD	Timonium, Marktron	301-252-7111
MA	Woburn, Comp. Techn.	617-933-5390
MN	Minneapolis, Comprehensive Tech. Sls.	612-888-7011
MO	Ferguson, Leach Corp.	314-524-2880
NJ	Englewood Cliffs, Leach Corp.	201-567-6795
NY	Fayetteville, R. D. Sherman	315-637-9861
OH	Dayton, Leach Corp.	513-434-8151
PA	Trevose, PSA, Inc.	215-245-0513
TX	Dallas, Caton Sales	214-661-5792
VA	Charlottesville, Marktron	301-460-6100
WA	Bellevue, Leach Corp.	206-746-7263

Local Distributors

AZ	Tempe, Time Elctrns.	602-967-2000
CA	Anaheim, Time Elctrns.	714-937-0911
CA	Sunnyvale, Time/Nor-Cal	408-734-9888
CA	Torrance, Time Elctrns. West	213-320-0880
FL	Ft. Lauderdale, Time Elctrns.-Florida	305-974-4800
GA	Atlanta, Electro Air Corp.	404-351-3545
MD	Columbia, Time Elctrns.	301-964-3090
MA	Woburn, Time/New England	617-935-8080
MO	St. Louis, Time/Midwest	314-391-6444
NY	Hauppauge, Time Elctrn. Sls.	516-273-0100
PA	Broomall, Time/Mid-Atlantic	215-359-1200
TX	Dallas, Electro Air	214-385-0566
WA	Bellevue, Electro-Air/Northwest	206-641-3640
WA	Redmond, Pan Pacific	206-881-7252

LEADER INSTRS. CORP., 380 Oser Ave., Hauppauge, NY 11788-3694, Tel: 516-231-6900, TWX: 510-227-9669; Empl.: 42; *Sls. Mgr.:* Bruce Storch

LEA, INC., A DYNATECH CO., 12516 Lakeland Rd., Santa Fe Springs, CA 90670-9990, Tel: 818-944-0916, TWX: 910-586-1381; FSC No.: 57499; Empl.: 35; *Sls. Mgr.:* David Sinn; *Dist. Mgr.:* E. Alvin Rich

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AL	Huntsville, FM Assocs. Ltd.	205-882-0689
AZ	Phoenix, Indl. Prods. Corp.	602-954-7300
CA	Burbank, Biztek Co., Inc.	213-766-4890
CA	Mountain View, Leddy Assocs.	415-969-6313
CO	Boulder, Abco, Inc.	303-444-1173
CT	Hamden, Applied Meas.	203-288-5288
DC	Washington, Instrucom	202-223-1759
FL	Jupiter, FM Assocs. Ltd.	305-746-2996
GA	Atlanta, FM Assocs. Ltd.	404-451-2293
HI	Honolulu, Nustate Aircon	808-839-1212
IL	Chicago, Homad Engrg.	312-446-4875
IN	Fort Wayne, Century Dynamics, Inc.	219-486-2681
KS	Lenexa, C & C Sls.	913-888-6200
LA	Baton Rouge, Fogarty Engrg. Co.	504-928-3372
ME	Waterville, Kentrol	207-873-7741
MA	Acton, Applied Meas. Inc.	617-263-2766
MI	Birmingham, Thibodeau Engrg.	313-642-6620
MN	St. Paul, Knox Assocs.	612-488-5402
MO	Bridgeton, Electro Mechanical Assoc.	314-291-7661
NM	Albuquerque, Industrial Prods. Corp.	505-256-3561
NY	Lynbrook, Puleo Elctrns., Inc.	516-599-4875
NY	Williamsville, Terryberry Sls.	716-632-7404
NC	Ramseur, FM Assocs., Ltd.	919-824-2196
OH	Wickliffe, Walter J. Brauer & Assoc.	216-943-0601
PA	Warminster, Multi-Meas., Inc.	215-675-3082
TX	Houston, Texas Tech. Prods. Co.	713-526-0656
TX	Midland, Tex-Mex Inds. Inc.	915-684-5841
VT	Bennington, Applied Meas., Inc.	802-422-2222
WA	Seattle, R. W. Campbell, Inc.	206-622-3403
WY	Casper, ABCO, Inc.	307-577-1851

LEAR SIEGLER, INC., 2850 Ocean Park Blvd., P.O. Box 2158, Santa Monica, CA 90406, Tel: 213-452-6000, TWX: 910-343-6463; Empl.: 21,983

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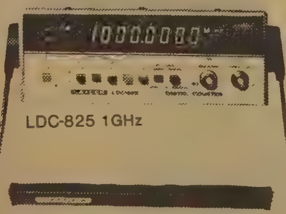

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Local Sales Offices & Reps

CA	Riverside, Rickenbob Assoc.	714-681-4922
CA	San Diego, Qualtronics	619-560-8955
CO	Denver, Moss Mktg.	303-455-7205
CO	Greeley, Gordon Moss Elctrns.	303-455-7205
GA	Atlanta, Grady Duckett	404-451-3529
IL	Chicago, Mauer Co.	312-677-4771
IL	Skokie, Mauer Co.	312-677-4771
IN	Indianapolis, Elctrn. Sls. & Engr.	317-849-4260
MA	Haverhill, L.K. Harmon	617-373-1313
MI	Detroit, Hummon Assoc.	313-474-0661
MN	Minneapolis, Paul Ericson & Assoc. Inc.	612-884-1969
NJ	Bellmawr, Mid Atlantic Corp.	609-931-5303
NJ	Tenafly, ABC Elec.	201-568-2354
NM	Albuquerque, Moss Elec.	505-256-3622
NY	Syracuse, C. W. Floring & Assoc.	315-478-2149
NY	Williston Park, ABC Elec.	516-747-6610
OH	Cleveland, Geotronix	216-526-2535
OH	Columbus, Geotronix	614-457-8472
TX	Houston, Alpha Tech	214-423-4570

Local Distributors

Intl	Eng., Eastleigh Hants, Vero Elctrns.	TWX 851-47-551
Intl	Japan, Tokyo, Hakuto Co.	TWX 78-12-2912
Can	Ontario, Elctrn. Pkg. Sys.	613-549-5152

LEASAMETRIC, INC., 1164 Triton Dr., Foster City, CA 94404, Tel: 415-574-4441; *Sls. Mgr.:* David Sobo

LEBOW CO., 38 Gerald Cass Pl., Goleta, CA 93117, Tel: 805-964-7117; *Sls. Mgr.:* Sharon J. Neiman

LEBOW PRODUCTS, Eaton Corp., 1728 Maplelawn Rd., Troy, MI 48237, Tel: 313-643-0220; *Sls. Mgr.:* Richard C. Phillips

LECROY RESCH. SYS. CORP., 700 S. Main St., Spring Vly., NY 10977, Tel: 914-425-2000, TWX: 710-577-2832; Empl.: 300; *Sls. Mgr.:* Richard Eandi

LECROY RESCH. SYS. CORP. (CAL.), 1806 Embarcadero Rd., Palo Alto, CA 94303, Tel: 415-856-1800, TWX: 910-373-1791; *Sls. Mgr.:* Andy Keyser

LECTROHM DIV. OF CAPCO, INC., Box 1028, Grand Junction, CO 81502, Tel: 303-243-8480, TWX: 910-929-6989; Empl.: 200

LECTRO MAGNETICS, INC., 6056 W. Jefferson Blvd., Los Angeles, CA 90016, Tel: 213-870-9383, 800-325-9814; FSC No.: 29098; Empl.: 45; *Sls. Mgr.:* Terry Cantine

LECTROTECH, INC., 5810 N. Western Ave., Chicago, IL 60659, Tel: 312-769-6262; Empl.: 42

LEDCO DIV., 240 Plato Blvd., St. Paul, MN 55107, Tel: 612-222-2791, TWX: 910-563-3699; FSC No.: 55292; Empl.: 300; *Sls. Mgr.:* Greg Larson

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Local Sales Offices & Reps

AL	Huntsville, A. B. Andrews & Co.	205-539-6817
AZ	Scottsdale, Arcom Sls.	602-947-5745
CA	San Diego, Interstate Mktg. Assoc.	619-292-8117
CA	Saratoga, Testco Co.	408-253-1900
CA	Woodland Hills, Interstate Mktg. Assocs.	213-883-7606
CO	Boulder, Front Range Mktg.	303-443-4780
CT	Bloomfield, SIR Assoc.	203-243-9343
FL	Melbourne, Techn. Mktg. Assocs.	305-676-3776
FL	Orlando, Techn. Mktg. Assocs.	305-857-3760
FL	Pompano Beach, Techn. Mktg. Assocs.	305-942-0774
IL	Elk Grove Village, Control Sls.	312-595-2110
IN	Greenwood, Valentine & Assoc.	317-888-2260
IN	South Bend, Valentine & Assoc.	219-288-7070
KS	Leawood, Thunderbird Tech. Sls. & Svcs.	913-642-7220
KS	Wichita, Thunderbird Tech. Sls. & Svcs.	316-684-3941
MA	Bedford, SIR Assocs.	617-275-5550
MI	Jenison, R. C. Nordstrom & Co.	616-457-5762
MI	Lathrup Village, R. C. Nordstrom & Co.	313-559-7373
MN	Bloomington, Merrill Franklin Co.	612-854-9446
MO	Maryland Heights, Thunderbird Tech. Sls. & Svcs.	314-567-6488
NY	Clark Mills, KLM-Garner Co.	315-853-6126
NY	N. Syracuse, KLM-Garner Co.	315-458-6214
NY	Oceanside, Bittan Assocs.	516-678-6222
NY	Pittsford, KLM-Garner Co.	716-381-8350
NC	Research Triangle Park, A. B. Andrews & Co.	919-544-1762
OH	Cleveland, Del Steffen & Assoc.	216-461-8333
OH	Dayton, Del Steffen & Assoc.	513-293-3145
OH	Lexington, Del Steffen & Assoc.	419-884-2313
PA	King of Prussia, Freedman-Malta Assoc.	215-337-9211
PA	Pittsburgh, Del Steffen & Assoc.	412-276-7366
TX	Richardson, Thunderbird Tech. Sls. & Svcs.	214-690-0763
UT	Salt Lake City, Front Range Mktg.	801-364-6481
VA	Vinton, A. B. Andrews & Co.	703-890-1128
WA	Bellevue, Testco	206-454-7422
WI	Thiensville, Control Sls.	414-242-4580

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Local Sales Offices & Reps

AL	Huntsville, L & D, Inc.	205-837-1469
AZ	Tempe, Tempe Assocs.	602-829-1901
CA	Los Angeles, Hartfield-Kennan-Freytag	213-225-1318
CO	Arvada, Arrowhead Sls. Co.	303-423-5556
CT	Bloomfield, Zaslow Sls.	203-242-7781
FL	Lighthouse Point, J. Krutek & Assoc.	305-941-6544
GA	Atlanta, L & D, Inc.	404-455-3483
ID	Boise, Doran Sls. Assoc.	208-343-9969
IL	Elmhurst, Hill Gray	312-832-4101
IN	Indianapolis, Needler Sls. Co.	317-255-8056
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NY	Rochester, B. H. Tollefson Assoc.	716-271-4141
NC	Greensboro, L & D, Inc.	919-292-3201
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PA	Pittsburgh, Covert & Newman	412-531-2002
RI	Providence, Zaslow Sls.	401-351-0070
TN	Franklin, Groover & Assocs.	615-794-6344
TX	Arlington, Fralia & Assocs.	817-640-9101
TX	Stafford, Fralia & Assocs.	713-772-1572
UT	Salt Lake City, Arrowhead Sls.	801-261-1661
VA	Richmond, L & D, Inc.	804-794-7915
WA	Redmond, Doran Sls. Assocs.	206-885-1885
EXP	NY, Long Island City, Leecraft Intl. Corp.	212-392-8800

Local Distributors

CA	Alhambra, Fisher Brownell	213-289-0255
CA	El Monte, Kimball & Stark	213-444-2594
CA	Los Angeles, Western Electromotive	213-820-3777
CA	Sacramento, Sacramento Elec.	916-441-4821
CA	Santa Clara, Fisher Brownell	408-988-6041
CO	Denver, Denver Wintronics	303-934-2406
CT	Hartford, Allied Electric	203-527-6405
FL	Casselberry, Afcom	305-831-6630
FL	Miami, Electronic Equip.	305-871-3500
GA	Atlanta, Specialty Dist.	404-873-2521
IL	Champaign, Klaus Radio	217-356-1896
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Niles, Industribution	312-966-5630
IL	Northbrook, Classic Comps.	312-272-9650
IN	Evansville, Hutch & Son	812-425-7201
IN	Fort Wayne, Graham Elect.	219-423-3422
IN	Indianapolis, Genesis Elect.	317-637-5571
IN	Indianapolis, Graham Elctrns.	317-634-8202
KS	Wichita, RSC Electronics	316-267-5213
KY	Louisville, P. I. Burks	502-589-3960
LA	New Orleans, Southern Radio	504-524-2343
MD	Beltsville, Treeko Sls.	301-937-8260
MD	Rockville, Capitol Radio	301-881-2270
MA	Hingham, Sager Electrical Supp.	617-749-6700
MI	Ann Arbor, Wedemeyer Elect. Supp.	313-665-8611
MI	Grand Rapids, SF Elctrns.	616-459-0216
MI	Livonia, LWC Distrs.	313-464-7700
MI	Livonia, RS Elctrns.	313-525-1155
MN	Minneapolis, Newark Elect.	612-331-6350
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MO	Kansas City, LCOMP	816-221-2400
MO	Maryland Hgts., LCOMP	314-291-6200
NH	Hudson, C & H Elect.	603-882-1133
NJ	E. Hanover, State Elctrn. Parts	201-887-2550

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NY	Hempstead, Electronic Equip.	516-538-5510
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NY	Rochester, Summit Elec. of Roch.	716-334-8110
NY	Rockville Centre, Midway Ind. Elctrns.	516-764-2400
NC	Greensboro, Hammond Elctrns.	919-275-6391
OH	Akron, Sun Radio	216-434-2171
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OH	Westlake, KRW Sls.	216-871-7521
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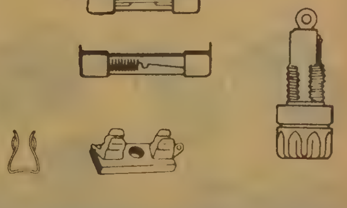

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OH	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assocs.	513-439-0724
OR	Portland, Jos. V. Belusko Co.	503-222-4279
PA	Huntingdon Valley, Inacker Sls.	215-947-5660
TX	Dallas, J. Y. Schoonmaker	214-349-1650
TX	Houston, J. Y. Schoonmaker	713-738-2427
WI	Thiensville, Control Sls.	414-242-4580

MAGNUM MICROWAVE CORP., 365 Ravendale Dr., Mountain View, CA 94043, Tel: 415-968-9281, Telex: 171596; FSC No.: 59277; *Sls. Mgr.:* Gordon W. Graham

MAGNUM OPUS CUSTOM ELCTRN. ENGRG., 284 Kennedy St., Iselin, NJ 08830, Tel: 201-283-4925; *Sls. Mgr.:* R. Galanty ....3•1112

MAGNUSONIC DEVICES, 290 Duffy Ave., Hicksville, NY 11801, Tel: 516-938-4700, TWX: 510-221-1850; Empl.: 275; *Sls. Mgr.:* M. Stamouli

MAGTON INC., 1977 O'Toole Ave., San Jose, CA 95131, Tel: 408-943-9319; FSC No.: 52495; *Sls. Mgr.:* Robert C. Meyer

MAIDA DEVELOPMENT CO., 20 Libby St., Hampton, VA 23663, Tel: 804-723-0785, Telex: 82-3443; Empl.: 299; *Sls. Mgr.:* Edward T. Maida, Frank Thompson ....1A•1121-1123

Local Sales Offices & Reps

CA	Los Angeles, High Voltage Sls.	213-881-9194
CA	Mountain View, West/Mark Assocs.	415-969-1700
FL	Vero Beach, John Hansen & Assocs.	305-562-2328
MA	Burlington, Conti-Younger	617-273-1582
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NC	Cary, FBD Sls.	919-467-7595

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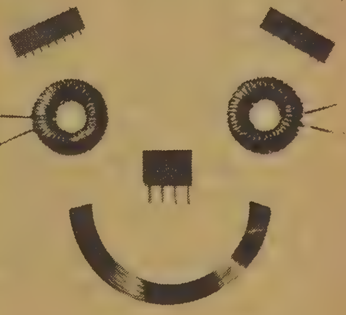

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WA	Seattle, ECCO Mktg.	206-364-0200

MALCO, DIV. MICRODOT CONNECTOR GRP., 12 Progress Dr., Montgomeryville, PA 18936, Tel: 215-699-5373, TWX: 510-661-8206; Empl.: 400; *Sls. Mgr.:* C. H. Becker; *Dist. Mgr.:* M. Smith .... **2**•1520-1522

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MALLORY CAPACITOR CO., Mallory Comps. Grp., 3029 E. Washington St., Indianapolis, IN 46201, Tel: 317-636-5353, Telex: 27-2155, TWX: 687-6015; FSC No.: 317-261-1581; Empl.: 1900; *Dist. Mgr.:* Frank Vendely ...... **1A**•1124-1133; **3**•1032-1035

Local Sales Offices & Reps

AZ	Scottsdale	602-949-7788
CA	Los Angeles	714-523-7992
CA	San Francisco	415-856-1136
CO	Denver	303-457-9373
FL	Orlando	305-855-6353
IL	Chicago	312-364-5750
IN	Indianapolis	317-636-5353
KS	Overland Park	913-362-7099
MA	Boston	617-965-5011
MI	Detroit	313-524-0015
MN	Minneapolis	612-884-2881
MO	St. Louis	314-291-8223
NJ	Hillsdale	201-666-3600
NY	Syracuse	315-437-9921
NC	Raleigh	919-836-0401
OH	Dayton	513-299-5505
OR	Portland	503-643-1203
PA	Carnegie	412-279-4248
PA	Willow Grove	215-657-4250
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MANAGE, INC., Fibre Optics Elctrns. Sys. Grp., P.O. Box 175, 40 Nichols Rd., Chicopee, MA 01014, Tel: 413-598-8204, 592-3834; *Sls. Mgr.:* David Menard

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CA	San Francisco, Pacific Signal, Inc.	415-397-5995
CA	Woodlin Hills, Cal-Ward Sls. Co.	213-883-2202
IL	Downer Grove, Physic Equip.	312-960-4054
IN	Ossian, Science Sls.	219-622-7383
MA	Sudbury, Poulin Assoc, Inc.	617-443-7333
MO	St. Louis, Engrg. Svcs. Co.	314-997-1515
NM	Albuquerque, Southwestern Eng. & Equip. Co.	505-881-3677
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NC	Fayetteville, ZIM-TEK	919-485-2222
TX	Dallas, Southwestern Eng. & Equip. Co.	214-340-1741
VA	Fairfax, Schibley Assocs., Inc.	703-591-3008
WA	Seattle, SJI Corp.	206-763-8981

M & T CHEMICALS INC., Woodbridge Rd. & Randolph Ave., Rahway, NJ 07065, Tel: 201-499-0200, Telex: 710-996-5841, TWX: 710-996-5842; Empl.: 1650

MANGER ELEC. CO., INC., W. Henry St., Stamford, CT 06902, Tel: 203-348-7761; Empl.: 100; *Sls. Mgr.:* J. V. Judge

MANHATTAN ELECTRIC CABLE, 225 Passaic St., Passaic, NJ 07055, Tel: 201-779-8900, Telex: 137-387; Empl.: 125; *Sls. Mgr.:* Ed Harvey; *Dist. Mgr.:* Allan Marconi

MANHATTAN ELEC. CABLE CORP., 1 Station Plaza, Rye, NY 10580, Tel: 914-967-8000, Telex: 137-387; Empl.: 125; *Sls. Mgr.:* Edward J. Harvey

MANN, HENRY, INC., 3983 Mann Road, Huntingdon Valley, PA 19006, Tel: 215-355-7200, Telex: 6851160; Empl.: 105; *Sls. Mgr.:* Jacques Werth; *Dist. Mgr.:* James P. Massi

MANNESMANN TALLY CORP., 8301 S. 180th St., Kent, WA 98032, Tel: 206-251-5500, Telex: 32-0200

MANTEX CORP., 1800 Metamora Rd., P.O. Box 15E, Oxford, MI 48051, Tel: 313-628-9711; Empl.: 100; *Sls. Mgr.:* Dennis J. Stepien .... **1B**•1783

Local Sales Offices & Reps

AZ	Phoenix, Cristee-Meade Co.	602-267-7197
CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Diego, Mesa Engr. Sls. Assoc.	619-278-8021
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Lakewood, Christee-Meade Co.	303-232-0287
IL	Highland Park, Thomas B. Hunter Assoc.	312-433-7000
IN	Indianapolis, S.A.I. Mktg. Corp.	317-241-9276
KS	Leawood, Thunderbird	913-642-7220
KS	Wichita, Thunderbird	316-684-3941
MD	Baltimore, Muncy Sls. Assocs.	301-484-6376
MI	Brighton, S.A.I. Mktg. Corp.	313-227-1786
MN	St. Louis Park, Lestronix	612-926-8466
MO	Leawood, Thunderbird	913-642-7220
MO	Maryland Hgts., Thunderbird	314-567-6488
NH	Salem, Sales Engrg.	603-893-5521
OH	Columbus, S.A.I. Mktg. Corp.	614-454-8942
OH	Dayton, S.A.I. Mktg. Corp.	513-435-3181
OH	Shaker Hgts., S.A.I. Mktg. Corp.	216-751-3633
PA	Pittsburgh, S.A.I. Mktg. Corp.	412-261-0482
TX	Richardson, Thunderbird	214-690-0763
VA	Richmond, Muncy Sales Assoc.	804-288-5720

MANUFACTURING SYS., Div. LeDoux Inds., Inc., 2022-C S. Grand Ave., Santa Ana, CA 92705, Tel: 714-540-6630; Empl.: 6; *Sls. Mgr.:* Larry LeDoux

MARATHON BATTERY CO., 8301 Imperial Dr., Waco, TX 76714, Tel: 817-776-0650, TWX: 910-894-5203 MARATHON WAC; *Sls. Mgr.:* Walter H. Harder

MARATHON FLITE-TRONICS COMPANY, A Marathon Battery Co., 2525 N. Naomi St., Burbank, CA 91504, Tel: 213-841-3210, Telex: 69-1487; Empl.: 65

MARATHON SPECIAL PRODS., 13300 Van Camp Rd., Bowling Green, OH 43402, Tel: 419-352-8441, TWX: 810-499-2988; Empl.: 150; *Sls. Mgr.:* J. Campisi

MARCONI INSTRS., 100 Stonehurst Ct., Northvale, NJ 07647, Tel: 201-767-7250, TWX: 710-991-9752; *Sls. Mgr.:* A. Ramsden .... **3**•1258-1260

Local Sales Offices & Reps

AL	Huntsville, Beacon Electronics Assoc.	205-881-5031
CA	Los Alamitos, Scientific Devices—West	213-598-7678
CA	San Jose, Scientific Devices—West	408-554-0455
CA	Westminster, Marconi (Sls. Off.)	714-895-7182
FL	Ft. Lauderdale, Beacon Electrns. Assocs.	305-491-1054
GA	Atlanta, Beacon Electrns. Assocs.	404-256-9640
IL	Chicago, K.W. Meyers	312-882-4808
IN	Indianapolis, K. Meyers	317-243-6681
MD	Burtonsville, Bekr Inds.	301-421-1200
MA	Framingham, Marketing East	617-879-3355
MA	Stoneham, Ken Corp.	617-926-5525
MN	Minneapolis, K.W. Meyers	612-920-7080
MO	Grandview, P. A. C.	816-737-3030
NJ	Elmwood Park, L & M Assocs.	201-797-0441
NM	Albuquerque, Scientific Devices	505-883-3666
NY	Binghamton, Tae-Rep	607-772-6952
NY	New York City, L & M Assocs.	212-243-6155
NC	Raleigh, Beacon Electrns. Assoc.	919-787-0330
OH	Chesterland, EQS Systems	216-729-2222
OR	Portland, Marconi Sales Office	714-895-7182
PA	Andalusia, L & M	215-245-6658
TX	Dallas, Bradenco	214-243-7261

MAREL INSTR. CO., 907 South East 13th Pl., Cape Coral, FL 33904, Tel: 813-574-8788; Empl.: 14; *Sls. Mgr.:* T. Swift

MARINE ELECTRIC RPD, INC., See CML Macarr Div. Marine Electric RPD, Inc.

MARINE INDUSTRIAL CABLE CORP., P.O. Box 29207, New Orleans, LA 70189, Tel: 504-254-0754

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MARKAT DIV., Wild Oats Corp., 3 Country Dr., Plainview, NY 11803, Tel: 516-549-9272; Empl.: 228; *Sls. Mgr.:* K. L. Campbell; *Dist. Mgr.:* W. B. Heather

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MARKEM CORP., 1000 Congress St., Keene, NH 03431, Tel: 603-352-1130, TWX: 710-366-1800; Empl.: 1200; *Sls. Mgr.:* Jack Lyman

MARKENRICH CORP., 14946-A Shoemaker Ave., Santa Fe Springs, CA 90670, Tel: 213-921-0250, Telex: 298727 MARK UR; Empl.: 6

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FL	Melbourne, Electro Mech. Standards	305-724-1027
IL	Palatine, Somers-Reagan	312-991-1108
MD	Timonium, Heller Sls. Co.	301-252-4780
MA	Reading, Lincoln Tech. Sls.	617-944-9594
MN	Edina, EPA, Inc.	612-835-9022
NY	Syracuse, I. A. Hotze Assocs.	315-479-6641
OR	Hillsboro, CompRepco	503-796-1350
PA	Chalfont, Eastern Sci. Mktg.	215-822-6503
TX	Richardson, Spectra Sls.	214-234-3600

MARKETING ENGINEERS, INC., 9860 Michigan Rd., Carmel, IN 46032

MARK EYELET & STAMPING, 202 Wakelee Rd., Wolcott, CT 06716, Tel: 203-756-8847, Telex: 69-6191; Empl.: 60

MARLEE SWITCH CO., 933-D N. Central Ave., Upland, CA 91786, Tel: 714-982-8988; *Sls. Mgr.:* LeRoy Tichy

MARLOW INDS., 10451 Vista Park Rd., Dallas, TX 75238, Tel: 214-340-4900, TWX: 910-860-5161; FSC No.: 55686; Empl.: 123; *Sls. Mgr.:* Richard J. Buist; *Dist. Mgr.:* Raymond Marlow

MARQUARDT SWITCHES INC., 67 Albany St., EEM, Cazenovia, NY 13035, Tel: 315-655-8050, Telex: 703-287-40; FSC No.: 315-655-8042; *Sls. Mgr.:* J. J. Kennedy; *Dist. Mgr.:* R. A. Philipchik .... **1B**•1675

MARTEL ELCTRNS. CORP., 13 Heritage Hill Rd., Windham, NH 03087, Tel: 603-893-0886, Telex: 95-1232; *Sls. Mgr.:* David DeVries

MARTIN SOUND PRODS., 28 Alpha Park, Cleveland, OH 44143-2297, Tel: 216-442-2286; Empl.: 2; *Sls. Mgr.:* DeWayne (Bud) Martin; *Dist. Mgr.:* DeWayne (Bud) Martin

MARWAY PRODS. INC., 311 N. Clara St., Santa Ana, CA 92703, Tel: 714-973-1800; FSC No.: 60955; *Sls. Mgr.:* Wayne Whitney .... **3**•1892, 1893

MASTER APPLIANCE CORP., 2420 18th St., Box 68, Racine, WI 53403, Tel: 414-633-7791, Telex: 269-505; FSC No.: 83284; Empl.: 50; *Sls. Mgr.:* G. E. Mertins; *Dist. Mgr.:* G. E. Mertins

MASTER BOND, P.O. Box 522, Teaneck, NJ 07666, Tel: 201-343-8983; FSC No.: 59504; Empl.: 16; *Sls. Mgr.:* James Brenner

MASTER DYNAMICS CORP., 922 California Ave., Sunnyvale, CA 94086, Tel: 408-245-9040

MASTER ELCTRN. CONTROLS, P.O. Box 25905, Los Angeles, CA 90025, Tel: 213-452-1336, Telex: 182041; Empl.: 64; *Sls. Mgr.:* I. Nizam; *Dist. Mgr.:* Bob Kent

MASTERITE CORPORATION, 2841 Lomita Blvd., Torrance, CA 90505, Tel: 213-775-3471, TWX: 910-347-6237; FSC No.: 05041; Empl.: 680; *Sls. Mgr.:* C.J. Huebert; *Dist. Mgr.:* G. Peterson

MASTER LOGIC, 761 E. Evelyn, Sunnyvale, CA 94086, Tel: 408-732-7777; *Sls. Mgr.:* Stephen Allen

MSC PRODS./EATON CORP., 1640 Monrovia St., Costa Mesa, CA 92627, Tel: 714-642-2427, Telex: 67-8433; Empl.: 350; *Sls. Mgr.:* J. McDorough

MATERIALS RESCH., Route 303, Orangeburg, NY 10962, Tel: 914-359-4200, Telex: 221862 MRC UR; Empl.: 700; *Sls. Mgr.:* Joseph Peoples

Local Sales Offices & Reps

AZ	Scottsdale	602-949-8311
CA	Carson	213-538-9032
CA	Santa Clara	408-748-0902
MO	Bridgeton	314-739-3326
NY	Pearl River	914-735-6100
TX	Dallas	214-235-9008

MATH ASSOCS., 2200 Shames Dr., Westbury, NY 11590, Tel: 516-334-6800; Empl.: 25; *Sls. Mgr.:* Robert DeLia

MATHEMATICAL SYSTEMS DESIGN, INC., 2850 Ocean Park Blvd., Ste. 300, Santa Monica, CA 90405, Tel: 213-450-9851; *Sls. Mgr.:* William E. Schaff

MATRIX CORP., 2260 Distributors Dr., Indianapolis, IN 46241, Tel: 317-248-2036; Empl.: 10 .... **3**•1086

MATRIX CORP., 1639 Green St., Raleigh, NC 27603, Tel: 919-833-2837; *Sls. Mgr.:* Ron Zweben

MATRIX ENGINEERING CORP., 17000 S. Western Ave. 19, Gardena, CA 90247, Tel: 213-770-0521; Empl.: 7

MATRIX SCIENCE CORP., 435 Maple Ave., Torrance, CA 90503, Tel: 213-328-0271

MATRIX SYS. CORP., 5177 N. Douglas Fir Rd., Calabasas, CA 91302, Tel: 213-992-6776, TWX: 910-494-4975; Empl.: 40; *Sls. Mgr.:* Jack Singleton .... **1A**•1709

Local Sales Offices & Reps

AZ	Scottsdale, Faser Techn. Sls.	602-948-4404
CA	Mountain View, IFM	415-961-2828
CA	N. Hollywood, Crown Elctrns.	213-877-3550
CO	Boulder, Sci. Dvcs.	303-449-9466
CT	Hamden, Poly Tek Assocs.	203-288-5246
FL	Melbourne, Reynolds & Assocs.	305-259-7000
GA	Acworth, RJC Assocs.	800-255-1965
IL	Chicago, Comtel Midwest	312-539-4838
IN	Indianapolis, Comtel Midwest	317-253-1681
IA	Cedar Rapids, Comtel Midwest	319-377-9434
KS	Shawnee Mission, Comtel Midwest	913-722-1030
MA	Ashland, Poly Tek Assocs.	617-881-4741
MI	Southfield, Comtel-Instr.	313-258-2505
MN	Wayzata, Comtel Midwest	612-476-1551
MO	St. Louis, Comtel Midwest	314-991-5363
NY	Mamaroneck, Bassin Tech. Sls. Co.	914-698-9332
NC	Winston Salem, Reynolds Assoc.	800-255-1965
OH	Cleveland, Comtel-Instr. Assocs.	216-442-8080
OH	Dayton, Comtel-Instr. Assocs.	513-298-7573
PA	Pittsburgh, Comtel-Instr. Assocs.	412-922-5720
TX	Carrollton, Seaton Corp.	214-380-0414
VA	Fairfax, Schibley Assocs.	703-591-3008
WA	Bellevue, Topp Engrg. Sls.	206-747-5400
WI	New Berlin, Comtel Midwest	414-544-6042

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AL	Huntsville, Pentech Assocs.	205-881-9298
AZ	Phoenix, P.A.R. Assocs.	602-243-4267
CA	Santa Clara, Indl. Modules	408-988-1911
CA	Torrance, High-Tech Digital	213-378-5131
CO	Denver, P.A.R. Assoc.	303-371-4140
FL	Deerfield Beach, Pentech Assocs.	305-421-4989
GA	Marietta, Pentech Assocs.	404-424-1931
IL	Schaumburg, Micro-Tex	312-885-1131
IL	Waukesha, Micro-Tex	414-542-5352
IN	Indianapolis, Giesting & Assocs.	317-271-5183
MD	Baltimore, Burgin-Kreh	301-265-8500
MA	Lexington, Nova Sls.	617-861-1820
MI	Novi, Giesting & Assocs.	313-348-3811
MN	Minneapolis, Jen-Ray Sys.	612-831-5060
NY	Clark Mills, KLM Garner	315-381-8350
NY	North Syracuse, KLM Garner	315-458-6214
NY	Pittsford, KLM Garner	716-381-8350
NY	Pleasantville, ABC Elctrn. Sls.	914-796-8088
NY	Williston Park, ABC Elctrn. Sls.	516-747-6610
NC	Greensboro, Pentech Assocs.	919-852-6000
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OH	Mentor, Giesting & Assocs.	216-942-3407
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TX	Houston, Mycrosystems Mktg.	713-270-7198
TX	Richardson, Mycrosystems Mktg.	214-669-2380
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WA	Bellevue, Westerberg & Assoc.	206-453-8881

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MAUREY INSTR. CORP., 4555 W. 60th St., Chicago, IL 60629, Tel: 312-581-4555, TWX: 910-221-6025; FSC No.: 03942; Empl.: 50; *Sls. Mgr.:* E. Maurey; *Dist. Mgr.:* Louis Derdzinski .. **1A**•2041-2045; **1B**•1162

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FL	Orlando, ASI	305-851-7929
FL	Plantation, Innovative Mktg.	305-583-8895
WA	Vancouver, Sls. & Engrg. Assoc.	206-573-5161

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CA	Santa Clara, Allied Elctrns.	408-727-1690
CO	Wheatridge, Allied Elctrns.	303-425-7144
CT	Ridgefield, PIC	203-451-1533
FL	Margate, Allied Elctrns.	305-973-3070
IL	Elgin, Allied Elctrns.	
MA	Wilmington, Allied Elctrns.	617-942-0150
MI	Westland, Allied Elctrns.	313-595-6565
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NY	Mineola, Allied Elctrns.	516-248-2360
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MAURY MICROWAVE, 8610 Helms Ave., Cucamonga, CA 91730, Tel: 714-987-4715, TWX: 910-581-3408; FSC No.: 13047; Empl.: 40; *Sls. Mgr.:* D. A. Smith

MAXI-SWITCH CO., 9697 East River Rd., Minneapolis, MN 55433, Tel: 612-755-7660, TWX: 910-576-2690; Empl.: 100; *Sls. Mgr.:* Craig Stout

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MAXON PRECISION MOTORS, INC., 838 Mitten Rd., Burlingame, CA 94010, Tel: 415-697-9614, TWX: 910-375-2049; Empl.: 270; *Sls. Mgr.:* Steven E. Buller .... **1B**•1163

MAXWELL LABS., 8835 Balboa Ave., San Diego, CA 92123, Tel: 619-279-5100, TWX: 910-335-2063; Empl.: 300; *Sls. Mgr.:* William Fox (Prods.);Mike Plum (Magneform)

MCCOY ELECTRONICS CO., Sub. Oak Technology Inc., 100 Watts St., P.O. Box B, Mt. Holly Springs, PA 17065, Tel: 717-486-3411, TWX: 510-650-3548; Empl.: 600 .... **1A**•1374-1382

Local Sales Offices & Reps

AL	Huntsville, Oak Southeast	205-882-9296
CA	Huntington Bch., Oak Southwest	714-846-6691
CA	Los Altos, Oak Western	415-941-1237
CO	Colorado Springs, I. W. Strong & Assocs.	303-576-1962
CO	Denver, I. W. Strong & Assocs.	303-292-6900
CT	Meriden, JMG, Inc.	203-235-0819
FL	Altamonte Springs, Oak Southeast	305-831-5411
IL	Rolling Meadows, Oak Inds./Illinois	312-255-6150
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
MA	Norwood, JMG, Inc.	617-762-5333
MN	St. Louis Pk., Wagner Conslts. Co.	612-922-6330
MO	N. Kansas City, Automatic Gen. Elctrn. Sls.	816-421-0426
NJ	Haddonfield, Gray Assocs.	609-429-5300
NY	Fayetteville, S. F. Foster Co.	315-637-5427
NY	New Rochelle, Ascor Elctrns.	914-235-8838
NY	Webster, S. F. Foster Co.	716-265-2072
NC	Raleigh, Oak Northeast	919-876-7591
OH	Cincinnati, Oak Inds./Ohio	513-851-4411
OR	Beaverton, Oak Northwest	503-643-0127
TX	Austin, R. F. Kimball Co.	512-443-5284
TX	Houston, R. F. Kimball Co.	713-840-0590
TX	Richardson, R. F. Kimball Co.	214-231-3447
EXP	NJ, Oradell, Sylvan Ginsbury Ltd.	201-261-3200

MCE SEMICONDUCTOR, 1111 Fairfield Dr., West Palm Beach, FL 33407, Tel: 305-845-2837, Telex: 513463; Empl.: 140

MCFADDEN SYS., INC., 8956 S. Atlantic Ave., South Gate, CA 90280-9990, Tel: 213-564-5958, Telex: 677161; FSC No.: 25750; Empl.: 28

MCG ELCTRNS., 12 Burt Dr., Deer Park, NY 11729, Tel: 516-586-5125, Telex: 645518; FSC No.: 29779; Empl.: 30 .... **1B**•1277-1280

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CT	Norwalk, Gemini Grp.	203-852-8173
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NC	Greensboro, The Saylor Assocs.	919-292-0452

MCGILL MFG. CO., INC., Bearing Div., 909 N. Lafayette St., Valparaiso, IN 46383; Tel: 219-465-2200, Telex: 25-8446

MCGILL MFG. CO., INC., Electrical Div., 1002 N. Campbell St., Valparaiso, IN 46383, Tel: 219-465-2200, TWX: 910-690-4982; Empl.: 295; *Sls. Mgr.:* David Rickards (OEM Switch), Thomas Frary (Control Prods.); *Dist. Mgr.:* Thomas F. Morris .... 1B•1676

Local Sales Offices & Reps

AL	Decatur, Tenn Tech Sls.	205-350-0630
CA	S. El Monte, HMC Inc.	213-442-7970
CA	Santa Clara, Logan Sls.	408-496-0660
IN	Indianapolis, A. E. Fred Schaab	317-253-8689
MD	Baltimore, R. A. Wafer Assocs.	301-744-1133
MA	Needham, Hgts. Newscott Co.	617-444-1923
MI	W. Bloomfield, OBE, Inc.	313-332-4900
MN	Minneapolis, Elec. Comp. Sls.	612-933-2594
MO	Ellisville, Larco Sls.	314-394-7141
NJ	Cherry Hill, Danco Elctrn. Sls.	609-424-5590
NY	Baldwin, C. Glianna	516-378-2700
NY	N. Syracuse, Advanced Comp. Corp.	315-699-2671
OH	Cleveland, Allied Entprs.	216-779-0080
SC	Columbia, H. Heaton	803-256-9230
TX	Dallas, Erickson Sls.	214-739-5833
UT	Salt Lake City, Sage Sls.	801-467-5451
WA	Seattle, SPS Elctrns.	206-323-4140

MCGUIRK ELECTRONICS CO. INC., York St. P.O. Box 101 S.V., Andover, MA 01810, Tel: 617-933-3500; FSC No.: 55902; Empl.: 10; *Sls. Mgr.:* V. James Stabile

MCI TRANSFORMER DIV., See Magnetic Coils Inc.

MCKINSTRY METAL WORKS, INC., 285 McKinstry Ave., Chicopee, MA 01013; Empl.: 80

MCL, INC., 10 North Beach Ave., La Grange, IL 60525, Tel: 312-354-4350, TWX: 910-683-1899; FSC No.: 16469; Empl.: 60; *Sls. Mgr.:* Frank Morgan .... 3•1390, 1391

Local Sales Offices & Reps

CA	Los Angeles, RF Associates	213-478-1586
CA	Palo Alto, RF Associates	415-494-3331
GA	Riverdale, MCL, Inc./Bob Lundy	404-996-6632
MA	Reading, Geder Assocs.	617-944-3105

MCLEAN ENGRG., Div. of Zero Corp., 70 Washington Rd., Princeton Junction, NJ 08550, Tel: 609-799-0100, TWX: 510-685-2543; FSC No.: 03522; Empl.: 135; *Sls. Mgr.:* William L. Sly; *Dist. Mgr.:* Craig A. Reed .... 2•1824, 1825

Local Sales Offices & Reps

CA	Cupertino, T. Snitzer Co.	408-257-8333
CA	Del Mar, T. Snitzer Co.	714-226-0305
CA	L.A., T. Snitzer Co.	213-836-6170
CO	Boulder, Component Prod. Sls.	303-530-2800
CT	North Haven, John E. Boeing Co.	800-343-4331
FL	Clearwater, R.I. Smith Assocs.	813-581-1492
FL	Ft. Lauderdale, R.I. Smith Assocs.	305-772-5100
FL	Orlando, R.I. Smith Assocs.	305-365-8077
IL	Elmhurst, Scott Assocs.	312-279-5681
LA	Gretna, M. F. Sls.	504-361-4343
MD	Hunt Valley, Marktron	301-628-1111
MD	Rockville, Marktron	301-251-8990
MA	Lexington, John E. Boeing Co.	617-862-2500
MI	East Detroit, J. Thorpe Co.	313-779-6363
MN	Minneapolis, Scott Elctrn. Sls.	612-929-2985
MO	Grandview, Harris-Hanson	816-763-6200
MO	St. Louis, Harris-Hanson	314-432-3611
NJ	Ridgewood, Hansen & Hughes	201-652-7055
NM	Albuquerque, Fry-Gates	505-262-1525
NY	Albany, Reagan/Compar Albany	518-489-4777
NY	Binghamton, Reagan/Compar	607-754-8946
NY	Fairport, Reagan/Compar Albany	716-271-2230
NY	New Hartford, Reagan/Compar Albany	315-732-3775
NY	New York, Hansen & Hughes	800-526-5114
OH	Cleveland, Marlow Assocs.	216-991-6500
OH	Columbus, Marlow Assocs.	614-885-7643
OR	Wilsonville, R.T.S.	503-638-5670
PA	Huntingdon Valley, Inacker Sls.	215-947-5660
PA	Pittsburgh, Marlow Assocs.	412-367-8886
SC	Greenville, Sunbelt Sls.	803-877-9088
TN	Taft, Sunbelt Sls.	615-425-6164
TX	Dallas, J.A. Green Co.	214-631-7450
TX	Houston, Milco Mktg.	713-946-2841
UT	Salt Lake City, Component Prod. Sls.	801-262-0000
VA	Charlottesville, Marktron	804-973-5874
WA	Vashon, R.T.S.	206-285-1363

Local Distributors

CA	Los Angeles, Snitzer Supply	213-836-6170
MI	Ann Arbor, Wedemeyer Elctrn. Supp. Co.	313-665-8611
TX	Houston, R. V. Weatherford	713-688-7406
Can	Guelph, Ontario, Hammond Mfg. Co.	519-822-2960

MCLEAN MIDWEST, 4000 83rd Ave. N., Brooklyn Pk., MN 55443, Tel: 612-561-9400, Telex: 29-0883, TWX: 910-576-2951; *Sls. Mgr.:* J. Buyse .... 2•1826, 1827

3M CO., Carbonless/Related Prods Div Ind'l Optics, 3M Center, Bldg. 225-3S, St. Paul, MN. 55144, Tel: 612-733-4403, Telex: 29-7023, TWX: 910-563-3712; *Sls. Mgr.:* A. Rivard

3M-ELECTRONIC PRODUCTS DIVISION, 3M Center, Bldg. 225-1N-06, St. Paul, MN 55144, Tel: 612-733-7408 .... 2•1514, 1515

Local Sales Offices & Reps

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CA	Los Angeles	213-726-6300
CA	So. San Francisco	415-761-1155
GA	Atlanta	404-447-7000
HI	Honolulu	808-422-2721
IL	Chicago	312-496-6500
MA	Boston	617-449-0300
MI	Detroit	313-477-5000
MN	St. Paul	612-733-3300
MO	St. Louis	314-997-8500
NJ	West Caldwell	201-575-2000
NC	High Point	919-889-7181
OH	Cincinnati	513-482-3100
OH	Cleveland	216-362-1700
PA	Philadelphia	215-728-5300
TX	Dallas	214-324-8100
WA	Seattle	206-244-7200

Local Distributors

AL	Huntsville, RM Alabama	205-852-1550
AL	Huntsville, Powell Electronics	205-539-2731
AZ	Tempe, Richey/Western Elctrns., Inc.	602-894-9251
AZ	Tempe, Acacia Sls.	602-894-2874
CA	Irvine, Ratel Elctrns.	714-549-8611
CA	Irvine, Acacia Sls.	714-549-0954
CA	Los Angeles, Richey/Western Elctrns., Inc.	213-820-3777
CA	San Diego, Acacia Sls.	619-565-4365
CA	San Diego, Richey/Western Elctrns., Inc.	619-271-4511
CA	San Jose, Ratel Elctrns.	408-946-4300
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Santa Clara, Richey/Western Elctrns., Inc.	408-727-7411
CA	Sun Valley, Richey/Western Elctrns., Inc.	818-768-3800; 213-875-2862
CA	Sunnyvale, Acacia Sls.	408-745-7200
CO	Denver, Ragon Electronic Parts	303-744-3601
CO	East Haven, JV Elctrns.	203-469-2321
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Hamden, Impact Sls. Co.	203-281-1331
FL	Ft. Lauderdale, Power Elctrns.	305-979-5000
FL	Winter Park, Deanco	305-671-5100
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IL	Lombard, RM Illinois	312-932-5150
IL	Mt. Prospect, Magnuson Elctrns.	312-956-0700
MD	Columbia, Powell Elctrns.	301-995-0410; 301-621-4070 in D.C.
MD	Gaithersburg, Deanco	301-948-5444
MA	Burlington, Schaal Assoc./Deanco	617-272-1506
MA	Canton, Impact Sls.	617-821-1500
MA	Westboro, Powell Elctrns.	617-366-6100
MI	Grand Rapids, RM Michigan	616-531-9300
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MO	Independence, Ragon Elctrns.	816-254-3410
MO	St. Charles, Lectronix	314-946-6424
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NY	Ronkonkoma, Zenith Wire & Cable	516-585-1444
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NC	Charlotte, Elctrns. Mktg. Corp.	704-394-6195
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OH	Middleburg Heights, Prehler	216-826-0110
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TX	Houston, Kent Elctrns.	713-780-7770
TX	Houston, Norvell Elctrns.	713-777-1666
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3M CO., STATIC CONTROL SYS. DIV., 3M Center, Bldg. 225-4S-04, St. Paul, MN 55144, Tel: 612-733-9420, TWX: 910-563-3712; Empl.: 300; *Sls. Mgr.:* Mike Martin .... 3•1924, 1925

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FL	Orlando	800-241-3669
GA	Atlanta	800-241-3670
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NJ	West Caldwell	800-221-1454
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MDB SYS., 1995 N Batavia St., Orange, CA 92665, Tel: 714-998-6900, TWX: 910-593-1339; Empl.: 200; *Sls. Mgr.:* William Wollam

MDF PRODUCTS INC., 7 Johnson Dr., Danbury, CT 06810, Tel: 203-743-3579, Telex: 499-8051; FSC No.: 60628; Empl.: 5 .... 3•1262

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IA	Cedar Rapids, S & O Sls.	319-393-1845
MD	Columbia, Robert Elctrn. Sls.	301-995-1900
MA	Hudson, Data Rep.	617-481-0333
PA	Melrose Park, R. Meyers Assocs.	215-224-1663
VA	Richmond, Robert Elctrn. Sls.	804-276-3979

MEC A/S, Industriparken 23, Ballerup, DK-2750, Denmark, Tel: 452-973366, Telex: 35323

Local Sales Offices & Reps

AZ	Phoenix, Eltron	602-266-2164
CA	Brea, Masco	714-529-0867
CA	Mountain View, Switches Inc.	415-962-8649
CA	Orange County, Pacific Switch Controls Inc	714-953-1254
CA	Van Nuys, Pacific Switch Controls Inc	213-873-4802
CO	Aurora, Mountain View Mktg.	303-360-9641
FL	Fort Lauderdale, KSM Elctrns. Inc	305-971-5900
GA	Atlanta, KSM Elctrns. Inc	404-458-2013
IL	Downers Grove, Richmar Elctrns.	312-968-0118
IN	Indianapolis, Insul Reps	317-842-5203
MA	Needham, A&M Elctrns.	617-444-8170
MI	Brighton, AP Assocs.	313-229-6550
MN	Minneapolis, Elctrn. Comps. Grp.	612-559-0720
NY	Great Neck, M.O.S. Assocs.	516-487-3966
PA	Glenside, Wyncote Instrmn.	215-572-6500
TX	Richardson, Southern States Mktg.	214-238-7500
VA	Fairfax	701-591-1300
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301

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CT	Huntington, Richard Jonassen & Assocs.	203-929-7987
IL	Chicago, Zinsmaster & Assocs.	312-870-7347
IL	Moline, Louis Turilli	309-797-2307
MO	Kansas City, Zinsmaster & Assocs.	816-333-6233
NH	Hillsboro, Richard Jonassen and Assocs.	603-464-3264

MECHANICAL ENTPRS., 461 Carlisle Dr., Herndon, VA 22070, Tel: 703-435-9496, TWX: 710-832-0942; Empl.: 25; *Sls. Mgr.:* R.H. Twyford ....1B•1677, 1784, 1785

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CA	Irvine, Vale Elctrn.	714-551-4821; 619-693-0113;213-886-7101
CT	Bristol, Technlg. Prods.	203-583-0703
FL	Casselberry, Semi	305-695-3334
FL	Clearwater, SEMI	813-441-3902
FL	Ft. Lauderdale, SEMI	305-475-3686
IL	Arlington Heights, Coombs Assoc.	312-439-9810
IN	Ft. Wayne, Coombs Assoc.	219-747-7661
IA	Cedar Rapids, Coombs Assoc.	319-362-4116
MA	Brookline, Technlg. Prods.	617-731-0858
MI	Jackson, Norwood Scroggs Co.	517-750-1170
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NY	Cooperstown, Fitzelle Assoc.	607-547-9333
NY	East Setauket, JMR Sls., Inc.	516-689-8871
NY	Rochester, Lloyd Hart Assoc.	716-225-4455
TX	Dallas, Stasco	214-239-4517
WI	Milwaukee, Coombs Assoc.	414-351-6123

Local Distributors

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IL	Wheeling, Hawk Elctrns.	312-459-4030
NY	Mt. Vernon, Kintronics	914-668-9885

MECHANICAL PRODUCTS, Amstar, 1824 Kiver St., P.O. Box 729, Jackson, MI 49204, Tel: 517-782-0391, TWX: 810-253-0827; *Sls. Mgr.:* Bob Vangermeersch

MECHANICAL TECHN., 968 Albany Shaker Rd., Latham, NY 12110, Tel: 518-785-2353, TWX: 710-443-8150; Empl.: 1000; *Sls. Mgr.:* David W. Bender; *Dist. Mgr.:* David W. Bender

MECHANIZED ELECTRONIC ASSEMBLY DIV., Universal Instrs. Corp., P.O. Box 825, Binghamton, NY 13902, Tel: 607-772-7522, TWX: 510-252-1990; *Sls. Mgr.:* Gene Exley ....3•1926

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NY	Binghamton, Universal Instrs. Corp.	607-772-7472
PA	Hollidaysburg, Universal Instrs. Corp.	814-695-7324

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Local Sales Offices & Reps

CA	San Francisco, Media Recovery	415-572-0167
CA	Van Nuys, Media Recovery of Cal	213-782-8978
CT	Hartford, Media Recovery of N.J.	203-528-9776
GA	Atlanta, Media Recovery	404-441-1547
MA	Boston, Media Recovery Inc.	617-843-8400
MI	Livonia, Media Recovery	313-421-4244
TX	Dallas, Media Recovery of Tex	214-630-9625
TX	Houston, Media Recovery of Tex	713-681-5464
TX	San Antonio, Media Recovery of Texas	512-349-5854

MEGA LOGIC, 9659 Natl. Rd., Brookville, OH 45309, Tel: 513-833-5222

MEGATEK CORP., 9605 Scranton Rd., San Diego, CA 92121, Tel: 619-455-5590, TWX: 910-335-2056; Empl.: 500; *Sls. Mgr.:* Robert A. Becker, Dir., North Amer. Sls.; *Dist. Mgr.:* Michel Schwab, Dir., International Sls.

MEGATEST, 880 Fox La., San Jose, CA 95131, Tel: 408-998-7110, TWX: 910-338-0259; Empl.: 225; *Sls. Mgr.:* Rick Carmichael

MEGATRAN ELECTRONIC POWER, Rising Sun Rd., Bordentown, NJ 08505, Tel: 609-298-7300, TWX: 510-685-3645; Empl.: 25; *Sls. Mgr.:* C. W. Harrison

MEISSNER INDS., 551 Rte. 10, Dover, NJ 07801, Tel: 201-366-1700; Empl.: 10 ....1A•1889

MELCOR/MATERIALS ELCTRN. PRODS., 994 Spruce St., Trenton, NJ 08648, Tel: 609-393-4178, Telex: 84-3314; FSC No.: 32333; Empl.: 100; *Sls. Mgr.:* M.A. Levine ....2•1828, 1829

MELCO SLS., See Mitsubishi Elctrns.

MELLES GRIOT, 1770 Kettering St., Irvine, CA 92714, Tel: 714-556-8200, Telex: 678-447; Empl.: 90; *Sls. Mgr.:* Richard P. Gluch

MEL-RAIN CONTROLS, 42974 M-43 Hwy., Paw Paw, MI 49079, Tel: 616-657-2527; FSC No.: 639; Empl.: 20; *Sls. Mgr.:* Howard F. Walter

MEL TEC, Div. Epsco, Inc., 411 Providence Hwy., Westwood, MA 02090, Tel: 617-329-1508, Telex: 95-1110, TWX: 710-348-0484; Empl.: 180

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AL	Huntsville, Currie, Peak & Frazier	205-536-1506
AZ	Scottsdale, Carl Carlburg Assocs.	
FL	Orlando, Currie, Peak & Frazier	305-855-0843
GA	Duluth, Currie, Peak & Frazier	404-476-3107
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MD	Towson, Arbotek	301-825-0775
MI	Troy, C. B. Jensen	313-643-0506
MO	Maryland Heights, Kebco	314-576-4111
NM	Alburqueque, C. T. Carlburg & Assocs.	505-888-3883
NY	Melville, Long Island, Comtronic	516-249-0505
NC	Greensboro, Currie, Peak & Frazier	919-373-0380
WI	Greenfield, Olympic	414-281-9294

MEMODYNE, 220 Reservoir St., Needham Hgts., MA 02194, Tel: 617-444-7000, Telex: 92-2537; Empl.: 40; *Sls. Mgr.:* N.H. Renaud ....3•1087

Local Sales Offices & Reps

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AZ	Tempe, Mar Tech Assocs., Inc.	602-968-4944
CA	Fullerton, Elctrn. Comp. Mktg.	714-879-9460
CA	Santa Clara, Nelson Elctrns. Sls.	408-980-1950
CO	Englewood, F. G. Mktg. Co.	303-795-9176
CT	Hamden, Burton Forrester Associates	203-248-4380
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MEMOREX CORP., San Thomas at Central Expwy., Santa Clara, CA 95052, Tel: 408-987-1000; Empl.: 12,284

MEMORY PROTECTION DEVICES INC., 320 Broad Hollow Rd., Farmingdale, NY 11735, Tel: 516-454-0340; *Sls. Mgr.:* Lou Asighieri; *Dist. Mgr.:* Sandy Silvani ....2•1519

Local Sales Offices & Reps

AL	Huntsville, REP Inc.	205-881-9270
AZ	Phoenix, Stitzer & Dodd	602-944-2237
CA	Pleasonton, Moulthrop Sls.	415-846-0550
CA	San Diego, Tauber Assoc.	619-274-7242
CO	Denver, Comp. Sls. Inc.	303-759-1666
FL	Melbourne, Reynolds	305-259-7000
GA	Tucker, Rep Inc.	404-938-4358
IL	Chicago, Brock & Cushman	312-622-4110
IN	Indianapolis, Marketing Engr.	317-872-5665
KS	Olathe, Rush & West	913-764-2700
MA	Burlington, Conti Younger	617-273-1582
MI	Birmingham, Favco	313-644-0173
MN	Minneapolis, Electro Mark	612-881-3306
MO	Ballwin, Rush West	314-394-7271
NJ	Mt. Laurel, Comtek	609-235-8505
NY	Pittsford, Andres Comp.	716-381-3818
NY	Westchester Great Neck, Cooper Simon	516-487-1142
NC	Raleigh, Rep Inc.	919-851-3007
OH	Cleveland, Del Steffen	216-461-8333
OR	Tigard, Electronic Sources	503-684-0040
PA	Pittsburgh, Del Steffen	412-276-7366
TN	Jefferson City, Rep. Inc.	716-475-4105
TX	Dallas, Dunbar	214-239-7151
UT	Salt Lake City, Comp. Sls.	801-466-8623
WA	Bellevue, Elctrn. Sources	206-451-3500
WI	Menomonee Falls, Brock Cushman	414-255-2166

Local Distributors

AL	Huntsville, Resistacap, Inc.	205-881-9270
CA	Burlingame, Rose Elect	415-348-0483
CA	San Diego, Fauber Elect	619-272-7242
CA	San Jose, Cypress Elect	408-945-8400
CA	Van Nuys, Nesco	213-781-0505
CO	Denver, Denver/Wentronics	303-934-2406
FL	Dania, Summit Distr	305-920-6253
FL	Longwood, Intertec	305-834-7777
IL	Chicago, Prehler Elec	312-384-6100
IN	Indianapolis, Graham Elec	317-634-8202
MA	Canton, Impact Sales	617-821-1500
MA	Sharon, Adcour	617-784-9123
MI	Brighton, A. P. Sales	313-229-6550
MI	Farmington Hills, Prehler Elec	313-476-7084
MN	Burnsville, Power Group	612-890-1360
MN	Thief River Falls, Digi Key	218-681-6674
NJ	Bellmawr, Mid-Atlantic	609-931-5303
NJ	Plainfield, Mars Elec	201-757-4332
NY	Buffalo, Summit Dist	716-887-2800
OH	Cincinnati, Hughes Peters	513-351-2000
OH	Columbus, Hughes Peters	614-294-5351
OR	Beaverton, Almac	503-641-9070
PA	Allentown, Lehigh Elec	215-433-3045
TX	Dallas, Computer Comps.	214-239-0271
WA	Bellevue, Almac Elec	206-643-9997

Mepco//Electra

A NORTH AMERICAN PHILIPS COMPANY

MEPCO/ELECTRA, INC., North American Philips Corp., Corporate Headquarters, Columbia Rd., Morristown, NJ 07960, Tel: 201-539-2000, TWX: 710-986-7437; *Sls. Mgr.:* Michael F. Kirkowski; *Dist. Mgr.:* Robert G. Elko

MEPCO/ELECTRA, INC., North American Philips Corp., 11468 Sorrento Valley Rd., San Diego, CA 92121, Tel: 619-453-0332, TWX: 910-337-1120 .... **1A•2046; 1B•1012**

Potentiometers (Cermet, Carbon) Industrial & Military

MEPCO/ELECTRA, INC., North American Philips Corp., 5900 Australian Ave., West Palm Beach, FL 33407, Tel: 305-842-3201, TWX: 510-952-7618 .... **1A•1134; 1B•1013**

Tantalum Capacitors (Solid, Wet Slug, Chip) Military & Industrial

MEPCO/ELECTRA, INC., North American Philips Corp., Columbia Rd., Morristown, NJ 07960, Tel: 201-539-2000, TWX: 710-986-4737 .... **1A•1136, 1890, 1891; 1B•1012**

Metal Film Resistors (Established Reliability-Hermetic) Thick Film Chips, Thick Film Networks, Non-Linear Resistors, Film Trimmer Capacitors

MEPCO/ELECTRA, INC., North American Philips Corp., 6071 St. Andrews Rd., Columbia, SC 29210, Tel: 803-772-2500, TWX: 810-666-2662 .... **1A•1134-1136; 1B•1013**

DC Aluminum Electrolytic Capacitors (Computer Grade, Axial, Radial) Military, Industrial & Consumer, AC Motor Starts, Film Capacitors (Film/Foil, Metallized), Tantalum Capacitors (Foil)

MEPCO/ELECTRA, INC., North American Philips Corp., Airport Road, P.O. Box 760, Mineral Wells, TX 76067, Tel: 817-325-7871, TWX: 910-890-5855 .... **1A•1891; 1B•1012**

Metal Film Resistors (General Purpose, Standard Precision, Ultra Precision, Standard Military, Established Reliability) Carbon Film Resistors, Precision Matched Sets

Local Sales Offices & Reps

AL	Huntsville, Macro-Mktg. Assoc.	205-883-9630
AZ	Tempe, Mepco/Electra	602-968-9573
CA	Harbor City, Refrigeration Comp.	213-325-3420
CA	Milpitas, Mepco/Electra	408-945-1020
CA	N. Hollywood, Mepco/Electra	818-982-7470
CA	San Diego, The Rep Co.	619-292-9001
CA	Santa Clara, I-Squared	408-988-3400
CO	Englewood, Thorson Rocky Mountain	303-779-0666
FL	Fern Park, Mepco/Electra	305-339-5073
FL	Ft. Lauderdale, Mepco/Electra	305-485-0115
GA	Norcross, Over & Over, Inc.	404-449-6205
IL	Bannockburn, Heth	312-295-8440
IL	Elk Grove Village, Oasis Sls.	312-640-1850
IL	Itasca, Mepco/Electra	312-773-3399
IN	Fort Wayne, Corrao Marsh, Inc.	219-637-5548
IN	Greenfield, Corrao Marsh, Inc.	317-894-0377
IN	Indianapolis, Corrao Marsh, Inc.	317-872-7157
IN	Indianapolis, Leslie M. Devoe Co.	317-842-3245
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
KS	Leawood, H. C. Heyde	913-649-8628
KS	Overland Park, PMR Corp.	913-381-0004
KS	Wichita, PMR Corp.	316-684-4141
MD	Columbia, Delta III Assoc.	301-730-4700
MA	Woburn, Mepco/Electra	617-935-6920
MI	Grand Rapids, Miltimore Sls.	616-942-9721
MI	Novi, Miltimore Sls.	313-349-0260
MN	Burnsville, Heth, Inc.	612-435-7876
MN	Edina, Mepco/Electra	612-835-5935
MN	Minneapolis, Comprehensive Technical Sls.	612-888-7011
MO	Maryland Heights, PMR Corp.	314-569-1220
NE	Lincoln, Lorenz Sls.	402-475-4660
NJ	Englewood Cliffs, Ed Glass Assocs.	201-592-0200
NJ	Marlton, B.G.R. Assocs.	609-983-1020
NJ	Morristown, Mepco/Electra	201-539-2000
NJ	Springfield, Gebhardt Mktg.	201-376-4415
NY	Rochester, Electra Sls. Corp.	716-461-5252
NY	Syracuse, Electra Sls. Corp.	315-463-1248
NC	Charlotte, Over & Over, Inc.	704-527-3070
NC	Raleigh, Over & Over	919-872-2262
OH	Dayton, Mepco/Electra	513-278-5842
OR	Beaverton, Mepco/Electra	503-643-5516
PA	Greensburg, Pro Mark	412-832-3800
TX	Richardson, Mepco/Electra	214-231-8274
UT	West Valley City, Thorson Rocky Mountain	801-973-7969
VA	Richmond, Mepco/Electra	804-359-1416
WA	Bellevue, Mepco/Electra	206-643-4555
WI	Wauwatosa, Larsen Assoc.	414-258-0529

Local Distributors

AL	Huntsville, Hamilton/Avnet	205-837-7210
AZ	Tempe, Shelley Elctrns., Inc.	602-894-2058
AZ	Tempe, Hamilton/Avnet	602-231-5100
AZ	Tempe, T.T.I.-AZ	602-966-1616
CA	Chatsworth, Shelley Elctrns., Inc.	213-998-3333
CA	Compton, Harper, S.I.D.	213-979-5090
CA	Costa Mesa, Hamilton Electro Sls.	714-641-4100
CA	Costa Mesa, Avnet Elctrns.	714-754-6077
CA	Culver City, Hamilton Electro Sls.	213-558-2131
CA	Culver City, Hamilton/Avnet	213-558-2020
CA	Garden Grove, Hi-Rel Distrs.	714-898-9858
CA	Los Angeles, Western Electromotive	213-820-3777
CA	Mountain View, Shelley Elctrns., Inc.	415-969-1820
CA	N. Hollywood, T.T.I. West	213-982-0201
CA	Sacramento, Hamilton/Avnet	916-920-3120
CA	San Diego, Hamilton/Avnet	619-571-7500
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Jose, TTI, Inc.	408-943-9155
CA	San Jose, Ratel Elctrns.	408-946-4300
CA	San Jose, Eric Elctrns.	408-262-1111
CA	Santa Clara, Western Electromotive	408-727-7411
CA	Sun Valley, Q.C. Comps.	213-768-6111
CA	Sunnyvale, Hamilton/Avnet	408-743-3355
CA	Woodland Hills, Avnet Elctrns.	818-700-8668
CO	Boulder, Shelley Elctrns., Inc.	303-442-2718
CO	Denver, Ragon Elctrns.	303-774-0527
CO	Englewood, Hamilton/Avnet	303-740-1000
CT	Danbury, Hamilton/Avnet	203-797-2800
CT	New Haven, Greene Shaw Co.	203-397-0710
FL	Ft. Lauderdale, Dielco	305-973-8700
FL	Ft. Lauderdale, Hamilton/Avnet	305-971-2900
FL	Orlando, T.T.I. II	305-859-1000
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	St. Petersburg, Hamilton/Avnet	813-576-3930
FL	Tampa, Impala Elctrns.	813-885-4747
GA	Norcross, Hamilton/Avnet	404-447-7507
IL	Bensenville, Hamilton/Avnet	312-860-7700
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Nep Elctrns.	312-625-8400
IL	Rosemont, Advent Elctrns.	312-298-4210
IN	Carmel, Altex Elctrns., Inc.	317-848-1323
IN	Carmel, Hamilton/Avnet	317-844-9603
IN	Indianapolis, Advent Elctrns.	317-872-4910
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
KS	Overland Park, Hamilton/Avnet	913-888-8900
MD	Baltimore, Resco/Baltimore	301-823-0070
MD	Beltsville, Resco/Washington	301-937-9100
MD	Columbia, Hamilton/Avnet	301-995-3500
MD	Columbia, Aztech Elctrns.	301-995-1760
MA	Burlington, TLC Elctrns.	617-273-0140
MA	Newton, Greene-Shaw Co.	617-969-8900
MA	Woburn, Hamilton/Avnet	617-273-7500
MA	Woburn, T.T.I.	617-938-8800
MI	Grand Rapids, Hamilton/Avnet	616-243-8805
MI	Livonia, Hamilton/Avnet	313-522-4700
MI	Livonia, RepTron Elctrns.	313-525-2700
MN	Minneapolis, Merit Elctrns.	612-546-5383
MN	Minneapolis, Merit Elctrns.	612-546-5383
MN	Minnetonka, Hamilton/Avnet	612-932-0600
MN	St. Paul, Ragon Elctrns.	612-642-2828
MO	Earth City, Hamilton/Avnet	314-344-1200
MO	Independence, Ragon Elctrns.	816-254-3410
NJ	Cherry Hill, Hamilton/Avnet	609-424-0100
NJ	Clifton, J-Mar Elctrns.	201-772-6400
NJ	Fairfield, Hamilton/Avnet	201-575-3390
NM	Albuquerque, Hamilton/Avnet	505-765-1500
NY	Bohemia, T.T.I. Inc.	516-567-1500
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Central Islip, Semi-Cap Elctrns.	516-582-4400
NY	East Syracuse, Hamilton/Avnet	315-347-2641
NY	Farmingdale, Command Elctrns. Corp.	516-293-1212
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Hauppauge, Fairmont Elctrns.	516-231-3313
NY	Hempstead, Kahgan Comps.	516-538-2300
NY	Melville, Hamilton/Avnet	516-454-6060
NY	Rochester, Summit Distrs.	716-334-8110
NY	Rochester, Hamilton/Avnet	716-475-9130
NY	Rome, Rome Elctrns.	315-337-5400
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Hamilton/Avnet	919-829-8030
OH	Cleveland, Hamilton/Avnet	216-831-3500
OH	Columbus, RepTron Elctrns.	614-436-6675
OH	Dayton, Hamilton/Avnet	513-433-0610
OH	Englewood. Argent Electra	513-836-8633
OH	Fairborn, Aschbacher & Assocs.	513-252-7785
OK	Tulsa, Altair Co.	918-252-5781
OR	Beaverton, Almac Elctrns.	503-641-9076
OR	Lake Oswego, Hamilton/Avnet	503-635-8157
PA	McKean, Advacom, Inc.	814-476-7774
PA	Norristown, Century Elctrn. Corp.	215-631-5400
SC	Greenville, Hammond Elctrns.	803-233-4121
TX	Austin, Altair Co.	512-837-4470
TX	Austin, Hamilton/Avnet	512-837-8911
TX	Dallas, Computer Comp.	214-239-0271
TX	El Paso, Era Elctrns.	915-592-4126
TX	Ft. Worth, T.T.I. Inc.	817-429-1440
TX	Houston, Altair Co.	713-462-3029
TX	Houston, Hamilton/Avnet	713-780-1771
TX	Irving, Hamilton/Avnet	214-659-4111
TX	Richardson, Jaco Elctrns.	214-235-9575
TX	Richardson, Altair Co.	214-231-5166
UT	Salt Lake City, Hamilton/Avnet	801-972-2800
VA	Arlington, Arlington Elctrns.	703-52[illegible]-2412
VA	Charlottesville, Virginia Radio Supp. Co.	804-296-4184
WA	Bellevue, Almac Elctrns. Corp.	206-643-9992
WA	Bellevue, Hamilton/Avnet	206-643-3950
WA	Kent, Shannon Ltd.	206-763-0545
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	New Berlin, NEP Elctrns., Inc.	414-785-9100
WI	New Berlin, R.M. Elctrns.	414-784-4420
WI	New Berlin, Hamilton/Avnet	414-784-4510

MERCURY PLASTICS, A UNIT OF ZERO CORP., 672 Fuller Rd., Chicopee, MA 01020, Tel: 413-592-5118, 413-267-5561, TWX: 710-354-1450; Empl.: 100; *Sls. Mgr.:* Douglas W. Griffith; *Dist. Mgr.:* Douglas W. Griffith

MERECO PRODUCTS DIV., Metachem Resins Corp., 1505 Main St., West Warwick, RI 02893, Tel: 401-828-4550; Empl.: 100; *Sls. Mgr.:* John E. Powell, Jr.

MERET, INC., 1815 24th St., Santa Monica, CA 90404-4998, Tel: 213-828-7496, Telex: 371-9305; Empl.: 23; *Sls. Mgr.:* David Medved .... **1B•1116**

Local Sales Offices & Reps

CA	Carmichael, Acquironics	916-487-9070
CA	West-Covina, Eureka Tech. Sls.	213-331-8766
CO	Wheatridge, C-Tech	303-431-7025
FL	Melbourne, Star-Tec	305-727-2247
GA	Snellville, Oliver Engrg. Svcs.	404-972-2249
IL	Des Plaines, Synmark Sls. Co.	312-296-0180
MA	Brookline, Boston Elctrn. Corp.	617-566-3821
TX	Seabrook, Q-Max Mktg.	713-474-2233

MERIX CHEM. CO., 2234 East 75th St., Chicago, IL 60649, Tel: 312-221-8242; Empl.: 15; *Sls. Mgr.:* E. O. Sonneman; *Dist. Mgr.:* E. O. Sonneman

MERRILL, POB 308, 1316 Sumneytown Pike, Gwynedd Valley, PA 19437, Tel: 215-643-2116; FSC No.: 58624; Empl.: 10; *Sls. Mgr.:* Skip Hartman

MERRIMAC INDS., 41 Fairfield Pl., West Caldwell, NJ 07006, Tel: 201-575-1300, Telex: 6853128, TWX: 710-734-4314; FSC No.: 12457; Empl.: 225; *Sls. Mgr.:* Gary Tahlmore; *Dist. Mgr.:* T.V.R.O. Prods. Only - Laurie Festa

Local Distributors

AL	Birmingham, Long's Electrns.	205-956-9341
AR	Beebe, Odom Antenna	501-882-6485
AR	Littlerock, Intl. Video Comms.	501-771-2800
CO	Englewood, Echosphere Corp.	303-935-1909
KS	Oakley, Precision Satellite	913-672-3247
NC	Oxford, Channel Master	919-693-3141
OR	Bend, Wespercom Corp.	503-389-0996
PA	Bensalem, Eastern Instr.	215-245-6660

MERRIMACK MAGNETICS CORP., 121 Hale St., Lowell, MA 01851, Tel: 617-458-1487; Empl.: 450; *Sls. Mgr.:* L. J. Woods; *Dist. Mgr.:* R. O. Ross

MESUR-MATIC ELCTRNS., 50 Grove St., Salem, MA 01970-2294, Tel: 617-745-7000; Empl.: 29; *Sls. Mgr.:* Kosma L. Evangelidis

Local Sales Offices & Reps

AZ	Phoenix, Richard A. Mayes Co.	602-279-5243
CA	Claremont, Gandalf Elctrns.	714-626-5481
CO	Denver, Richard A. Mayes Co.	303-761-9447
IL	Maywood, KGA Engrg. Co.	312-343-6500
KS	Wichita, Electro Mechanical Assocs.	316-682-9433
MD	Glen Burnie, Macrotech Assocs.	301-437-5588
MO	Bridgeton, Electro Mechanical Assocs.	314-291-8661
NM	Albuquerque, Richard A. Mayes Co.	505-292-2330
NY	Latham, L-Tron Corp.	518-785-5032
PA	Glenside, Wyncote Instr.	215-572-6500

METAVAC, INC., 45-68 162nd St., Flushing, NY 11358, Tel: 212-HI5-0400; Empl.: 52; *Sls. Mgr.:* Clifford E. Sisler

METEREX CORP., 25 Industrial Park Rd., Hingham, MA 02043, Tel: 617-749-8100; Empl.: 5; *Sls. Mgr.:* K. Sharples

Distributor

METERMASTER, 5645 Jullson St., Los Angeles, CA 90040, Tel: 213-685-4340 ....pgs. 611, 675, 678, 715, 736, 769, 792

METHODE ELCTRNS., INC., 7444 W. Wilson Ave., Chicago, IL 60656, Tel: 312-867-9600, TWX: 910-221-2468; Empl.: 900; *Sls. Mgr.:* John Klimek; *Dist. Mgr.:* K. Lindsey

METHODE ELECTRONICS, INC., Interconnect Prods Div, 1700 Hicks Rd, Rolling Meadows, IL 60008, Tel: 312-392-3500, TWX: 910-687-0760; FSC No.: 95354; Empl.: 250; *Sls. Mgr.:* L. W. Ekstrom; *Dist. Mgr.:* L. W. Ekstrom

METHODS RESEARCH, 54D Asbury Ave., Farmingdale, NJ 07727, Tel: 201-938-6000; *Sls. Mgr.:* J. James Mandy

METIER MANAGEMENT SYS., INC., 10175 Harwin Dr., Ste. 100, Houston, TX 77449, Tel: 713-988-9100, Telex: 774367 (Metier Hou); *Sls. Mgr.:* Don Gammon

METIS, P.O. Box 1499, Bowie, MD 20716, Tel: 301-249-1702; Empl.: 2; *Sls. Mgr.:* Eric K. Pritchard

METRA INSTRS., 2056 Bering Dr., San Jose, CA 95131, Tel: 408-297-8530; Empl.: 16; *Sls. Mgr.:* Gary Heil

Local Sales Offices & Reps

AL	Birmingham, Regal Controls	205-991-6340
CA	Anaheim, R. D. Brunnemer & Assocs., Inc.	714-525-1644
CO	Wheatridge, Emcar Mktg., Inc.	303-424-0108
FL	Jacksonville, W. K. Hile Co., Inc.	904-731-5595
GA	Marietta, W. K. Hile Co., Inc.	404-424-8372
IL	Chicago, Synergy Sys., Inc.	312-2021
MI	Detroit, Automatic Controls Co.	313-533-8890
MO	Penton, Hi-Tech Elec. Inc.	314-343-6060
NH	Portsmouth, The Valve Co.	603-431-5251
NY	Buffalo, Robert F. Lamb Co., Inc.	716-874-4900
NY	Rochester, Robert F. Lamb Co., Inc.	716-323-1250
NC	Matthews, W. K. Hile Co., Inc.	704-847-9125
OH	Cincinnati, Automatic Controls Co.	513-522-1118
OH	Cleveland, Automatic Controls Co.	216-631-0333
PA	Jenkintown, PCD Corp.	215-887-9610
TX	Houston, Abcor	713-486-9251

METRAPLEX CORP., Berkshire Indl. Park, Bethel, CT 06801, Tel: 203-748-0606, TWX: 710-456-3959; *Sls. Mgr.:* Charles B. Weaver

METRIC SYS., 645 Anchors St., Ft. Walton Beach, FL 32548, Tel: 904-244-9600, Telex: 70-2447; FSC No.: 12339; Empl.: 437

METRIX INSTRUMENT CO., 1711 Townhurst, Houston, TX 77043, Tel: 713-461-2131, Telex: 77-5486; Empl.: 50; *Sls. Mgr.:* A. J. Bahry

METRON OPTICS INC., P.O. Box 690, Solana Beach, CA 92075-0690, Tel: 619-755-4477; Empl.: 12; *Sls. Mgr.:* P. S. Kempf

METROPOLE PRODUCTS INC., P.O. Box 10275, Alexandria, VA 22310, Tel: 703-971-8606, 703-971-7082, Telex: 908041 BAL; FSC No.: 55908; *Sls. Mgr.:* John DePaola

METROSONICS, Box 23075, Rochester, NY 14692-3075, Tel: 716-334-7300, Telex: 978330; Empl.: 80; *Sls. Mgr.:* W. Whitford; *Dist. Mgr.:* W. Whitford

METUCHEN CAPACITORS, INC., 420 Park Ave., Perth Amboy, NJ 08861, Tel: 201-442-0500, TWX: 710-998-0892; FSC No.: 55969; Empl.: 25; *Sls. Mgr.:* George Wolter ....**1A**•1138-1146, 1602, 1603; **2**•1524-1527

MEYERCORD, 365 E. North Ave., Carol Stream, IL 60187, Tel: 312-682-6200, Telex: 72-2449; Empl.: 500; *Sls. Mgr.:* J. O'Briskie

MFE CORP., Instr. Div., Keewaydin Dr., Bldg. #1, Salem, NH 03079, Tel: 603-893-1921, Telex: 94-7477, TWX: 710-366-1887; *Sls. Mgr.:* Peter Schwartz; *Dist. Mgr.:* Jim Muckenhoupt

MF ELCTRNS. CORP., 10 Renewal Pl., New Rochelle, NY 10801, Tel: 914-576-6570, TWX: 710-563-0643; FSC No.: 08111; Empl.: 65; *Sls. Mgr.:* Bill Braverman; *Dist. Mgr.:* Bill Braverman ....**1A**•1384-1386

Local Sales Offices & Reps

AL	Huntsville, E.M.A.	205-837-7363
CA	Irvine, J. V. Earley & Assocs.	714-833-1806
CA	Sunnyvale, W. W. Posey Co.	408-746-0771
CO	Littleton, Quatra Inc.	303-795-3187
CT	Meriden, Orion Group	203-621-8371
FL	Hollywood, APM Assocs.	305-987-6720
FL	Longwood, APM Assocs.	305-869-6831
FL	Tampa, AMP Assocs.	813-886-2457
GA	Norcross, E.M.A.	404-448-1215
IL	Addison, Banner Tech. Sls.	312-279-6070
MI	Brighton, A.P.J. Assocs.	313-229-6550
MN	Minneapolis, Peterson Sls. & Assoc.	612-884-3483
NJ	Perth Amboy, Astro Rep.	201-826-8050
NY	Rochester, Sweetco Assocs.	716-225-2383
NY	Utica, Sweetco Assocs.	315-733-6721
NY	W. Babylon, Astro Rep.	516-422-2500
NC	Greenville, E.M.A.	803-233-4637
NC	Winston-Salem, E.M.A.	919-722-5151
OH	Dayton, APJ Assoc.	216-356-2424
OR	Portland, Controltek Sls.	503-641-0877
PA	Prospect Park, ELF Sls.	215-534-3340
TX	Austin, Matthews & Assocs.	512-479-0028
TX	Dallas, Matthews & Assocs.	214-931-0167
WA	Bellevue, Controltek Sls.	206-451-8163
WI	Mukwonago, Banner Tech. Sls.	414-363-5086

Local Distributors

CA	Sunnyvale, Pacesetter	408-734-5470

MG ELECTRONICS

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Local Sales Offices & Reps

AZ	Glendale, Method Engrg.	602-846-7901
CA	Sunnyvale, The Mica Corp.	408-738-1020
FL	Sarasota, James N. Lordi	813-365-2992
MA	Pinehurst, Mica	617-272-1558
MN	Hopkins, Mica	612-933-3811
NC	Greensboro, DMI	919-885-4634
TX	Dallas, Stevens Sls.	214-350-2476

MICAP ELCTRNS., INC., 592 Oak St., Copiague, NY 11726, Tel: 516-842-8866; FSC No.: 61544; Empl.: 6; *Sls. Mgr.:* Bernard Lefenfeld

MICHIGAN MAGNETICS, 203 W. Third St., Vermontville, MI 49096, Tel: 517-726-0590; Empl.: 95; *Sls. Mgr.:* B. L. Killinger ....**3**•1038, 1039

Local Sales Offices & Reps

CT	Kensington, N. Stachelek Co.	203-828-4587
MN	Minneapolis, Countryman Assoc.	612-645-9151
WA	Bellevue, Panoco	206-454-2503

MICOM SYSTEMS, INC., 20151 Nordhoff Street, Chatsworth, CA 91311, Tel: 818-998-8844, Telex: 687-497, TWX: 910-494-4910; *Sls. Mgr.:* Mark Vonarx; *Dist. Mgr.:* Mark Vonarx

MICREL, INC., 1235 Midas Way, Sunnyvale, CA 94086, Tel: 408-245-2500, TWX: 910-379-0007; Empl.: 120

MICROAVIONICS CORP., 3198-K Airport Loop Dr., Costa Mesa, CA 92626, Tel: 714-957-6904; Empl.: 15; *Sls. Mgr.:* B. H. Corzine ....**2**•1781

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AZ	Phoenix, Finn-Pat Co.	602-954-0301
TX	Houston, RCG Entprs.	713-955-7200

MICROBAR SYS., INC., 1121 San Antonio Rd., Palo Alto, CA 94303, Tel: 415-964-2862, TWX: 910-373-2047; *Sls. Mgr.:* Rich Boberg

MICROBOND DIV., PO Box 689, Altamonte Springs, FL 32701, Tel: 305-339-8298, Telex: 56-4303; *Sls. Mgr.:* William S. Hodges

MICROCAP, 11120 Roselle St., San Diego, CA 92121, Tel: 619-452-9812, Telex: 695073, TWX: 910-335-1607; *Sls. Mgr.:* Debbie Toscano ....**1A**•1186-1188

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MICRO-CIRCUITS CO., INC., Route 1 - Box 518, New Buffalo, MI 49117, Tel: 616-469-2727

MICRO COMPONENT TECHNLG., INC., P.O. Box 64013, St. Paul, MN 55164, Tel: 612-482-5100, Telex: 297422; Empl.: 500; *Sls. Mgr.:* James Gibson

MICROCOMPUTER POWER, 2272 Calle de Luna, Santa Clara, CA 95050, Tel: 408-988-0265, TWX: 910-338-7694; Empl.: 60; *Sls. Mgr.:* Jim Armstrong; *Dist. Mgr.:* Jim Armstrong

MICRO COMPUTER RENTALS, 742D Hampshire Rd., Westlake Village, CA 91361, Tel: 213-991-1704

MICRODATA CORP., 17481 Red Hill Ave., Irvine, CA 92705, Tel: 714-540-6730, TWX: 910-595-1764; Empl.: 375

MICRO DEVICES PRODUCT GROUP, Therm-O-Disc, Inc., 1320 South Main Street, P.O. Box 3538, Mansfield, OH 44907, Tel: 419-756-5005, Telex: 987455; *Sls. Mgr.:* J. A. Kight ....**1B**•1823

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MICRODRY CORP., Golden Grain Macaroni Co., 3111 Fostoria Way, San Ramon, CA 94583, Tel: 415-837-9106, Telex: 33-5320; Empl.: 40; *Sls. Mgr.:* Al Katskee

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MICROFLECT, 3575 25th S.E., Salem, OR 97302-0985, Tel: 503-363-9267, TWX: 510-599-0107; Empl.: 98; *Sls. Mgr.:* John J. Kranitz

MICRO INSTR., 2250 Micro Pl., Escondido, CA 92025, Tel: 619-746-2010, Telex: 882205 MICROINST ESCD; FSC No.: FSCM 24836; Empl.: 45; *Sls. Mgr.:* C. Marks

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GA	Atlanta, Teqspec II	404-455-7222
MA	Natick, Wayland Engr. Sls.	617-655-6080
MO	Platte City, Stantec Sales	816-464-2211
NJ	Englewood Cliffs, Power Conversion & Conts.	201-569-0015
NC	Winston Salem, Teqspec III	919-723-8102
TX	Allen, Harris Tech. Sls.	214-727-2182

MICROLAB/FXR, 10 Microlab Rd., Livingston, NJ 07039, Tel: 201-992-7700, TWX: 710-994-4850; FSC No.: 00929; Empl.: 80

MICRO LAMPS, INC., 1N111 Linlar Rd., La Fox, IL 60147, Tel: 312-232-6001; *Sls. Mgr.:* R. Marimatsu

MICRO LOGIC CORP., P.O. Box 174, 100 2nd St., Hackensack, NJ 07602, Tel: 201-342-6518

MICROLOGIC, INC., 123 Water St., Watertown, MA 02172, Tel: 617-923-1700; *Sls. Mgr.:* Erick Kapust

MICROMETALS, 1190 N. Hawk, Anaheim, CA 92807, Tel: 714-630-7420, TWX: 910-591-1690; FSC No.: 12856; Empl.: 40; *Sls. Mgr.:* K. Baker, Jr.

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MA	Newton Upper Falls, Anchor Engrg.	617-964-6416
NY	Hempstead, Kahgan Sls.	516-538-2300
TX	Dallas, Southwest Elctrns.	214-690-9881

MICRO MODE PRODS., 1870 John Towers Ave., El Cajon, CA 92020, Tel: 619-449-3844, TWX: 910-331-1673; FSC No.: 15907; Empl.: 40; *Sls. Mgr.:* L. Moore; *Dist. Mgr.:* L. Moore

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MICRO-MOUNTING DEVICES, 4092 Keith Dr., Campbell, CA 95008, Tel: 408-866-4626; FSC No.: 59058

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MICRO NETWORKS, 324 Clark St., Worcester, MA 01606, Tel: 617-852-5400, Telex: 951808, TWX: 710-340-0067; Empl.: 300

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MA	Woburn, Pat Jenks Assoc.	617-938-0488
NM	Albuquerque, IMEC	505-344-2212
NY	Huntington Station, Metro-Mic	516-GE3-3333
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CA	Rancho Cordova, Alpha Omega Grp.	916-638-0480
CA	San Diego, Cerco	619-450-1754
CA	San Marino, Walls Assoc.	213-287-7276
CO	Denver, William Purdy Co.	303-777-1411
FL	DeBary, DJE Assoc.	305-668-6827
IL	Woodridge, Trend-Tronics	312-985-0626
MA	Canton, N E E S Co.	617-828-4835
NM	Albuquerque, Wm. J. Purdy Co.	505-266-7959
OH	Cleveland, Jim Finnigan & Co.	216-238-5905
OR	Beaverton, Wm. J. Purdy Co.	503-641-9373
UT	Salt Lake City, Wm. J. Purdy Co.	801-486-8557

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CA	Burlingame, Rose Elctrns.	415-348-2740
CA	Canoga Park, Myco-Vickers	213-340-2025
CA	Costa Mesa, Orange County Comps.	714-979-3597
CA	Industry, Ital Elctrn. Sls.	213-968-8515
CA	San Diego, Shelley Elctrns.	619-453-7133
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IL	Des Plaines, Circuit Svc.	312-296-4412
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NE	Omaha, Radio Equip. Co.	402-341-7700
NH	Hampstead, Astrum Elctrns.	603-329-5656
NY	New Rochelle, Derf Elctrns.	914-235-4600
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OH	Toledo, J R Inds.	419-865-1408
PA	McKean, Advacom	814-476-7774
TX	Ft. Worth, Industrial Elect.	817-731-7321
UT	Provo, Central Utah Elctrns. Supp.	801-373-7522
UT	Salt Lake City, Nytronics	800-242-7612
Intl	Japan, Tokyo, Yoshico Intl.	03-230-2641

MICROPAC INDS., 905 E. Walnut St., Garland, TX 75040, Tel: 214-272-3571, TWX: 910-860-5186; Empl.: 135; *Sls. Mgr.:* Dick Schlueter

MICROPAC INDS., INC., General Sensors Div., 905 E. Walnut St., Garland, TX 75040, Tel: 214-272-3571, TWX: 910-860-5186; Empl.: 120; *Sls. Mgr.:* Richard Schlueter

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MICRO PLASTICS INC., 20821 Dearborn St., Chatsworth, CA 91311

MICRO PLASTICS INC., Highway 178 N., Flippin, AR 72634, Tel: 501-453-2261, Telex: 783-036; FSC No.: 13764; *Sls. Mgr.:* James H. Beijen; *Dist. Mgr.:* James H. Beijen

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MICRO-PRODUCTS ENGRG. CO., 230 Ridgewood Ave., Newark, NJ 07108, Tel: 201-824-8467; Empl.: 100; *Sls. Mgr.:* Gerald Muller

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MICRO SEMICONDUCTOR, 2830 S. Fairview St., Santa Ana, CA 92704, Tel: 714-979-8220, TWX: 910-595-1576; FSC No.: 14552; Empl.: 250; *Sls. Mgr.:* M. Gregson; *Dist. Mgr.:* M. Gregson

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CA	Orange	714-558-7400
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CT	Hartford	203-695-4011
GA	Atlanta	404-982-2565
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IA	Bettendorf	319-359-3441
MA	Newton	617-969-0265
MI	Southfield	313-424-3569
MN	Minneapolis	612-830-3516
MO	St. Louis	314-576-2518
NJ	Westfield	201-233-9200
NY	Elmsford	914-592-3200
NY	Rochester	716-424-2700
NC	Charlotte	704-364-4770
OH	Brooklyn Heights	216-459-6075
OH	Dayton	513-237-4075
PA	Valley Forge	215-666-8340
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GA	Stone Mountain, Dixie Tech. Mktg.	404-962-2530
IN	Ft. Wayne, Augnat	219-483-0259
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NY	New Rochelle, Alto Assocs.	914-834-3771
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CA	El Monte, Cook Entprs.	213-686-2120
CO	Littleton, Omega, Ltd.	303-798-7040
FL	Orlando, Over & Over, Inc./Florida	305-857-4057
GA	Norcross, Over & Over	404-449-6205
IL	Wheaton, Chadra-Schilke Assoc.	312-653-8126
IN	Noblesville, R & D Elctrn. Sls.	317-849-2026
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LA	New Orleans, Coastal Sls. Co.	504-737-8074
MA	Reading, Meco, Inc.	617-944-6660
MN	Minnneapolis, RK Sales	612-786-5713
MO	Florissant, John F. Guernsey Co.	314-921-5720
NJ	Englewood Cliffs, E. Glass Assocs.	212-586-8440
NM	Albuquerque, C. T. Carlberg & Assoc.	505-888-3883
NY	Rochester, J.G. Welch Assocs.	716-244-1100
NY	Utica, J.G. Welch Assocs.	315-736-7821
NC	Raleigh, Over & Over	919-872-2262
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VA	Alexandria, Vanguard Engrg.	703-768-1660
WA	Seattle, Jon B. Jolly	206-938-4166

MICROWAVE DIODE CORP., Washington St-Box 250, W. Stewartstown, NH 03597, Tel: 603-246-3362/3362/3363, TWX: 710-321-8901; Empl.: 15

MICROWAVE FILTER INC., 6743 Kinne St., East Syracuse, NY 13057, Tel: 315-437-4529, 800-448-1666, TWX: 710-541-0493; FSC No.: 27834; Empl.: 125; *Sls. Mgr.:* E. Bostick, V.P. Mktg.

MICROWAVE SEMICONDUCTOR CORP., 100 School House Rd., Somerset, NJ 08873, Tel: 201-469-3311, Telex: 833473, TWX: 710-480-4730; Empl.: 430; *Sls. Mgr.:* Carl Lump

MICROWAVE/SYS., 1 Adler Dr., E. Syracuse, NY 13057, Tel: 315-437-9951, Telex: 710-541-0408; FSC No.: 26058; Empl.: 4; *Sls. Mgr.:* Michael P. Busse

MICTRON INC., 6050 Porter Way, Sarasota, FL 33582, Tel: 813-371-6659; *Sls. Mgr.:* M. Weinstein

MIDDLEBURG CORP., Middco Connectors, 220 Albany Turnpike, Canton, CT 06019, Tel: 203-693-8361; Empl.: 20; *Sls. Mgr.:* Betty-Lou Berube

Local Sales Offices & Reps

CA	Placentia, Local Sls.	714-993-1800
CO	Denver, Aspen Sales	801-467-2401
FL	Winter Park, E.M.A., Inc.	305-671-6800
LA	Mandeville, Design Mktg.	504-294-3076
NH	Nashua, Bell Controls	603-882-6984
NJ	Manville, DynoRep	201-685-0135
OH	Aurora, E.M.A.	216-562-6104
OH	Centerville, EMA	513-433-2800
OK	Broken Arrow, Design Mktg.	918-258-8656
PA	Horsham, Dalbrook	215-441-8380
TX	Dallas, Design Mktg.	214-680-9767
TX	Hurst, Design Mktg.	817-268-2004
TX	Round Rock, Design Mktg.	512-255-9896
UT	Salt Lake City, Aspen Sls.	801-467-2401

MIDGARD ELCTRNS., See Transkinetic Sys.

MIDGET LOUVER, 800 Main Ave., Norwalk, CT 06852, Tel: 203-866-2342; Empl.: 10; *Sls. Mgr.:* Frank J. Scallon; *Dist. Mgr.:* Frank J. Scallon

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2478 Fletcher Drive, Los Angeles, Calif. 90039

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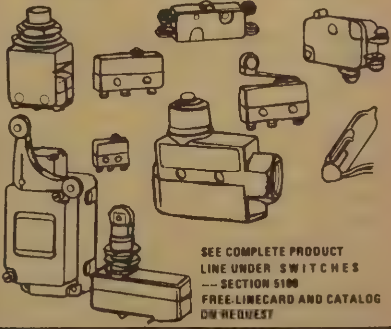

SEE COMPLETE PRODUCT LINE UNDER SWITCHES -- SECTION 5100
FREE LINECARD AND CATALOG ON REQUEST

MIDLAND ROSS

MIDLAND-ROSS CORP., CAMBION DIV., One Airwife Place, Cambridge, MA 02140, Tel: 617-491-5400, Telex: 92-1480, TWX: 710-320-6399; FSC No.: 71279; Empl.: 900; *Sls. Mgr.:* Jim Gomes; *Dist. Mgr.:* Karen McMillian

Local Sales Offices & Reps

AZ	Tempe, Cambion Div.	602-966-4444
CA	Campbell, Cambion Div.	408-371-0585
CA	Torrance, Cambion Div.	213-326-7822
CO	Parker, A5 Co.	303-841-3651
FL	Orlando, Publicover Assocs.	305-898-9361
IL	Downers Grove, Richmar Elex.	312-968-0118
IN	W. Lafayette, Richmar Elex.	317-846-6383
KS	Shawnee Mission, B.C. Elctrn. Sls.	913-888-6680
KS	Wichita, BC Elctrn. Sls.	316-942-9840
MI	Brighton, A.P. Assocs.	313-229-6550
MN	Edina, Peterson & Wolff Co.	612-933-3393
MO	Bridgeton, BC Elctrn. Sls.	314-291-1101
NC	Raleigh, J & B Sls.	919-772-3546
OH	Dayton, Dolfuss-Root & Co.	513-433-6776
OH	Strongsville, Dolfuss-Root & Co.	216-238-0300
OR	Wilsonville, RTS Inc.	503-638-5670
PA	Philadelphia, K.B. Erdman Co.	215-224-1833
PA	Pittsburgh, Dolfuss-Root & Co.	412-221-4420
TX	Austin, R.F. Kimball	512-443-5284
TX	Houston, R.F. Kimball	713-840-0590
TX	Richardson, R.F. Kimball	214-231-3447
UT	Sandy, Aspen Sls.	801-943-1346
VA	Alexandria, Cambion Div.	703-941-5470
WA	Vashon, RTS Inc.	206-285-1363
WI	Butler, Richmar Elex.	414-781-1730
PR	San Juan, Elctrn. Techn. Sls.	809-781-8000

MIDLAND-ROSS CORP., Grimes Div., 515 N. Russell St., Urbana, OH 43078, Tel: 513-652-1431

MIDLAND-ROSS CORP., Midcom Unit, P.O. Box 3328, N. Mankato, MN 56001, Tel: 507-625-6521, TWX: 910-565-2244; Empl.: 200

MIDLAND-ROSS CORP., Midtex Div., P.O. Box 3328, No. Mankato, MN 56001, Tel: 507-625-6521, TWX: 910-565-2244; Empl.: 1008

MIDLAND-ROSS CORP., NEL Unit, 357 Beloit St., Burlington, WI 53105, Tel: 414-763-3591, TWX: 910-278-2450; FSC No.: 00815; Empl.: 300; *Sls. Mgr.:* Boyd Recknagel

Local Sales Offices & Reps

CA	Santa Clara, Midtex, NEL	408-727-2401
GA	Marietta, Midtex, NEL	404-971-6778
MD	Phoenix, Midtex, NEL	301-666-7150
WI	Brookfield, Midtex, NEL	414-785-9366

MIDLAND STANDARD, INC., 603 E. Chicago St., Box 38, Elgin, IL 60120, Tel: 312-741-6600; Empl.: 38

MIDWAY MFR. CO., 10750 W. Grand Ave., Franklin Park, IL 60131, Tel: 312-451-1360, Telex: 72-1596; Empl.: 2000; *Dist. Mgr.:* Allan Stearns

MIDWEC, See Industrial Midwec Capacitors

MCI

MIDWEST COMPS., 1981 Port City Blvd., Muskegon, MI 49443, Tel: 616-777-2602, TWX: 510-394-4130; FSC No.: 50157; Empl.: 125; *Sls. Mgr.:* J. E. Saling .... **1B**•1810-1817

Local Sales Offices & Reps

AL	Huntsville, Glen White Assoc.	205-883-7938
CA	Saratoga, Testco	408-253-1900
FL	Light House Pt., R. C. Simon	305-941-2757
GA	Norcross, Glen White Assoc.	404-441-1447
IL	Chicago, D. Dolin Sls.	312-286-6200
IN	Carmel, Rich Mktg.	317-844-8462
MD	Timonium, Glen White Assoc.	301-252-6360
MN	St. Paul, R. G. Ragon	612-488-0201
NJ	Burlington, Mallon Sls.	609-387-4044
NJ	Ft. Lee, Necco	201-461-2789
NY	Endicott, Tech-Mark	607-748-7473
NY	New York, Necco	201-461-2789
NC	Raleigh, Glen White Assoc.	919-787-7023
OH	Dayton, Jay Engrg.	513-253-2151
OH	N. Royalton, Jay Engrg.	216-237-4235
OK	Tulsa, Norcom	918-664-9526
TN	Gray, Glen White Assoc.	615-477-8850
TX	Dallas, Norcom	214-386-4888
TX	Houston, Norcom	713-988-0022
VA	Lynchburg, Glen White Assoc.	804-237-6291
WA	Bellevue, Testco	206-454-7422
WI	Milwaukee, D. Dolin Sls.	414-482-1111

MIKRON INSTR., Box 211, Ridgewood, NJ 07451, Tel: 201-891-7330, TWX: 710-988-5821; Empl.: 40; *Sls. Mgr.:* K. Irani

MIL ELECTRONICS, INC., 1 Mill St., Dracut, MA 01826, Tel: 617-453-8000; FSC No.: 07862; Empl.: 30; *Sls. Mgr.:* Mark Ryan

MILFORD RIVET & MACH., 857 Bridgeport Ave., Milford, CT 06460, Tel: 203-878-4631, Telex: 964363, TWX: 710-462-0538; Empl.: 400; *Sls. Mgr.:* Robert E. Kranz, Jr.

MILLEN COMPONENTS, Electronic Instr. & Specialty Corp., 42 Pleasant St., Stoneham, MA 02180, Tel: 617-438-6951, Telex: 948-025; FSC No.: 57285; Empl.: 50; *Sls. Mgr.:* R. A. Boisseau; *Dist. Mgr.:* Gardner Gray

MILLER DIAL CORP., 4400 N. Temple City Blvd., El Monte, CA 91734, Tel: 818-283-5111, TWX: 910-587-3438; *Sls. Mgr.:* Doug Hazelip

MILLER, J.W., CO., See Bell Inds.

MILLER, L.C., CO., 717 Monterey Pass Rd., Monterey Pk., CA 91754, Tel: 213-268-3611; Empl.: 42

MILLER, SANFORD, CORP., See Sanford-Miller Corp.

MILLER, W. A., CO., Mingo Loop, Oquossoc, ME 04964, Tel: 207-864-3344; Empl.: 18; *Sls. Mgr.:* D. Hunger

MILLER-STEPHENSON CHEM. CO., INC., George Washington Hwy., Danbury, CT 06810, Tel: 203-743-4447, Telex: 643-711

MILLIFLECT, 7752 B Enterprise Dr., Newark, CA 94560, Tel: 415-791-5188; Empl.: 13; *Sls. Mgr.:* J. F. Rutschow

MILLI-SWITCH CORP., Box 67, Gladwyne, PA 19035, Tel: 215-MI2-9222; Empl.: 15

MILLIVAC INSTRS., Box 997, Curry Rd. Ext., Schenectady, NY 12301, Tel: 518-355-8300; FSC No.: 85711; Empl.: 26; *Sls. Mgr.:* (Mrs.) Pola Metzger .... **3**•1263

Local Sales Offices & Reps

CA	Costa Mesa, Didion Entprs.	714-557-3063
MA	Needham, Addelco Corp.	617-444-4754
NY	Fayetteville, Martin P. Andrews	315-637-5191
NY	Melville, Paul W. Steen Assocs.	516-427-1114
PA	Media, S & S Div. of Klinetics	215-565-5388
TX	Houston, Scientific Sales	713-666-5318
TX	Richardson, Scientific Sales	214-231-6541

MILL-MAX MFG. CORP., P.O. Box 300, Oyster Bay, NY 11771, Tel: 516-922-6000, TWX: 510-221-1820; *Sls. Mgr.:* Therese Malhame .... **2**•1523

MILLS RESISTOR CO., 3840 Catalina St., Los Alamitos, CA 90720, Tel: 213-598-2454; FSC No.: 34238; Empl.: 50

MILTON ROSS CO., 511 Second St. Pike, Southampton, PA 18966, Tel: 215-355-0200, TWX: 510-667-1702; Empl.: 165; *Sls. Mgr.:* M. I. Ross

MILTOPE CORP., 1770 Walt Whitman Rd., Melville, NY 11747, Tel: 516-420-0200, TWX: 510-221-1803; *Sls. Mgr.:* Robert Ceonzo; *Dist. Mgr.:* William Jennings

MRC

MILWAUKEE RESISTOR CORP., 700 W. Virginia St., Milwaukee, WI 53204, Tel: 414-271-9900; FSC No.: 82807; Empl.: 100; *Sls. Mgr.:* W. R. Pollock; *Dist. Mgr.:* W. R. Pollock .... **1A**•1898-1901

Local Sales Offices & Reps

IL	La Grange, PVA Co.	312-579-9300
NY	Rochester, Gislason Sls.	716-454-4741

MILWAUKEE TRANSFORMER CO., MTE Corporation, 7901 W. Clinton Avenue, Milwaukee, WI 53223, Tel: 414-438-5300; *Sls. Mgr.:* Richard T. Armantrout; *Dist. Mgr.:* Richard T. Armantrout

MIMIC, INC., P.O. Box 921, Acton, MA 01720, Tel: 617-263-2101; Empl.: 5; *Sls. Mgr.:* S. Thurston

MINCO PRODS., 7300 Commerce La., Minneapolis, MN 55432, Tel: 612-571-3121, TWX: 910-576-2848; FSC No.: 09359; Empl.: 400; *Sls. Mgr.:* J. Anderson

MIN-E-CON, 17815 F Sky Park Blvd., Irvine, CA 92714, Tel: 714-250-0474, TWX: 910-595-1144; *Sls. Mgr.:* Wendell Jacob

MINELCO INC. - A TALLEY IND., 135 S. Main St., Thomaston, CT 06787-9985, Tel: 203-283-8261, TWX: 710-475-1091; FSC No.: 07479; Empl.: 61; *Sls. Mgr.:* John Pfingsten

Local Sales Offices & Reps

AL	Huntsville, L & D Inc.	205-837-1469
AZ	Phoenix, Stitzer-Dodd	602-944-2237
CA	Alhambra, M.W. Riedel & Co.	213-283-7694
CA	Hayward, Avionics Liaison	415-783-1131
CO	Denver, West Inc.	303-692-0131
CT	Thomaston, Minelco	203-283-8261
FL	Orlando, Delmac	305-898-4688
GA	Atlanta, L & D, Inc.	404-455-3483
IL	Elk Grove Village, Midwest Meridian	312-640-9540
IA	Cedar Rapids, J.R. Sls. Engrg.	319-393-2232
MD	Severna Park, DelMarva Eng. Assoc.	301-647-8007
MA	Winchester, F.J.S. Assocs.	617-729-3135
MN	New Brighton, TWC Sls.	612-636-1770
MO	Maryland Heights, Midwest Meridian	314-878-4441
NJ	Hasbrouck Hgts., Comp-Tech Sls.	201-288-7400
NY	Syracuse, J. R. Costello	315-472-0322
NC	Greensboro, L & D, Inc.	919-292-3201
OH	Fairborn, Midwest Meridian	513-879-7100
OR	Beaverton, Caruso-Northcutt	503-646-4973
PA	Downingtown, McCoy, Inc.	215-363-0350
TX	Fort Worth, Midwest Meridian	817-654-2132
UT	Salt Lake City, West, Inc.	801-466-2888
WA	Bellevue, Caruso-Northcutt	206-454-9699

MINI-CIRCUITS LAB., 2625 E. 14th St., Brooklyn, NY 11235, Tel: 212-769-0200, Telex: 125460, 620156 (Intl.); FSC No.: 15542 .... **1A**•1684, 1710-1773

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Phoenix, Crown Elctrns.	602-944-3721
AR	Little Rock, Beacon Elctrns.	501-224-5449
CA	Los Altos, Cain-White & Co.	415-948-6533
CA	N. Hollywood, Crown Elctrns.	213-877-3550
FL	Clearwater, Beacon Elctrns.	813-796-2378
FL	Ft. Lauderdale, Beacon Elctrns.	305-491-1054
FL	Maitland, Beacon Elctrns.	305-647-3498
FL	Melbourne, Beacon Elctrns.	305-724-8010
GA	Atlanta, Beacon Elctrns.	404-256-9640
IL	Mount Prospect, Cain Forlaw Co.	312-253-3578
MD	Columbia, M. Lader & Co.	301-730-1550
MD	Conowingo, M. Lader & Co.	301-378-3449
MA	Waltham, Scientific Devices	617-890-2252
NY	Hartsdale, Spectrum Sales	914-997-1166
NY	Skaneateles, Robtron	315-685-5731
NC	Greensboro, Beacon Elctrns.	919-275-9997
OH	Lancaster, Cain Forlaw Co.	614-654-4800
PA	Lafayette Hill, M. Lader & Co.	215-825-3177
TX	Dallas, Cain & Co.	214-233-6809

Local Distributors

AL	Huntsville, Components Distrs.	205-883-7501
AR	Little Rock, Components Distrs.	501-227-6278
CA	Los Altos, Pen Stock	415-948-6552
CA	N. Hollywood, Crown Elctrns.	213-877-3550
FL	Ft. Lauderdale, Components Distrs.	305-971-4950
IL	Mt. Prospect, CFC Distributors	312-253-3578
NC	Raleigh, Components Distrs.	919-781-0262
PA	Lafayette Hill, MLC Distrs.	215-825-3177

MINI COMPUTER TECHNLG., 696 E. Trimble Rd., San Jose, CA 95131, Tel: 408-942-1616, TWX: 910-338-2281; Empl.: 30; *Sls. Mgr.:* Doug Vincent; *Dist. Mgr.:* Ed Hagenbuch

MINI-SYSTEMS, INC., 20 David Rd., North Attleboro, MA 02761, Tel: 617-695-0203, TWX: 710-348-0564; FSC No.: 50316; Empl.: 150 .... **1A**•1902

Local Sales Offices & Reps

FL	Coral Springs, Marks Tech. Sls. Assocs.	305-753-3830
MA	Newton, Normell Assocs.	617-969-5478
TX	Lewisville, C & J Assocs.	214-539-0140

MINI-SYSTEMS, INC., Electronic Package Div., 168 E. Bacon St., P.O. Box 1597, Plainville, MA 02762, Tel: 617-695-2000, TWX: 710-348-0564 .... **1A•1666**

MITEC ELCTRNS., 15 Commerce St., Williston, VT 05495, Tel: 802-864-0064, TWX: 610-421-3572; *Sls. Mgr.:* Elayne Bernstein

MITEL SEMICONDUCTOR, P.O. Box 13089, Kanata, ON K2K 1X3, Canada, Tel: 613-592-5280, Telex: 053-3221, TWX: 610-562-8529; Empl.: 200

MITEQ INC., 100 Ricefield La., Hauppauge, NY 11788, Tel: 516-543-8873, TWX: 510-226-3781; Empl.: 140

MITRONICS, 18039 Crenshaw Blvd., Torrance, CA 90504, Tel: 213-323-7934

MITSUBISHI ELCTRNS. AMERICA, Computer Peripheral Div., 991 Knox St., Torrance, CA 90502, Tel: 213-515-3993; *Sls. Mgr.:* Mike Foster

MITSUBISHI ELCTRNS., Industrial Electronics Div., 991 Knox Street, Torrance, CA 90502, Tel: 213-515-3993, Telex: 06-4703-M USA LSA, TWX: 66-4787-MELA TRNC; *Sls. Mgr.:* Don Aarons

MITSUBISHI ELCTRNS. AMERICA, INC., Semiconductor Div., 777 N. Pastoria Ave., Sunnyvale, CA 94086, Tel: 408-730-5900; *Sls. Mgr.:* John Zucker

MITSUMI ELEC. CO., LTD., 8-2, 8-Chome, Kokuryo, Chofu-City, Tokyo, Japan, Tel: 489-5333, Telex: J28846/J24935; Empl.: 1700; *Sls. Mgr.:* H. Sato; *Dist. Mgr.:* U. Nishimura

MIZAR INC.

MIZAR INC., 302 Chester St., St. Paul, MN 55107, Tel: 612-224-8941, Telex: 469542; Empl.: 11; *Sls. Mgr.:* Susan Roth .... **3•1113**

Local Sales Offices & Reps

AZ	Tempe, Foley, Tallent & Lee Inc.	602-894-2345
CA	Long Beach, B. K. & Associates	213-596-1233
CA	San Jose, Data-Rep Inc.	408-279-1212
FL	Melbourne, Star-Tec Co.	305-727-2247
MA	Waltham, Com-Sls. Inc.	617-890-0011
MN	Minneapolis, D. A. Case & Assoc.	612-888-8666
NJ	Springfield, Gebhardt Mktg. Inc.	201-376-4415
OH	Strongsville, Dolfuss Root & Co.	216-238-0300
PA	Hatboro, Electro-Rep Engrg.	215-674-4421
PA	Ivyland, Technico	215-322-5966
TX	Austin, Acudata, Inc.	512-346-4033
TX	Houston, Acudata, Inc.	713-580-2451

MKC ELCTRNS., 454 E. Donovan Rd., Kansas City, KS 66115, Tel: 913-371-1351; Empl.: 26

MKS INSTRS., INC., 22 Third Ave., Burlington, MA 01803, Tel: 617-272-9255, Telex: 94-9375; Empl.: 130

MOBILE-TRONICS CO., INC., Box 1022, Tustin, CA 92680, Tel: 714-768-4271; Empl.: 2

MODICON PROGRAMMABLE CONTROL DIV., Gould Inc., P.O. Box 83 S.V.S., Andover, MA 01810, Tel: 617-475-4700, Telex: 94-7402, TWX: 710-347-6610; *Sls. Mgr.:* Steven Mader (PC's); John Pemble (Motion Control); *Dist. Mgr.:* George Dannecker (Micro 84)

MODULAR COMPUTER SYSTEMS, P.O. Box 6099, Ft. Lauderdale, FL 33310, Tel: 305-974-1380, Telex: 52-2564, TWX: 510-956-9414; Empl.: 950

MODULAR AUDIO PRODS., Modular Devices Inc., 50 Orville Dr., Bohemia, NY 11716, Tel: 516-567-9620; *Sls. Mgr.:* S. Summer .... **3•1012**

Local Sales Offices & Reps

CA	San Diego, Total Elctrns. Intl., Inc.	619-224-3291

MODULAR DEVICES, 50 Orville Dr., Bohemia, NY 11716, Tel: 516-567-9620; FSC No.: 52202; Empl.: 40; *Sls. Mgr.:* Julius Brick .... **3•1012, 1933**

Local Sales Offices & Reps

NY	Rochester, T.T.A. North-Div. Tri-Tek Assoc.	716-271-6764
NY	Wantaugh, Tri-Tek Assocs.	516-221-7600
EXP	CA, San Diego, Total Elctrns. Int'l.	619-224-3291

MODULAR POWER SYS. INC., P.O. Box 180579, Austin, TX 78718-0579, Tel: 512-834-9262, Telex: 752-890; FSC No.: 58480; Empl.: 86; *Sls. Mgr.:* Manard Overall; *Dist. Mgr.:* Manard Overall

MODULAR SYSTEMS, 905 Albemarle St., Charlottesville, VA 22901, Tel: 804-295-7882; Empl.: 5; *Sls. Mgr.:* G. L. Blencowe

MODUTEC, 18 Marshall St., Norwalk, CT 06854, Tel: 203-853-3636, TWX: 710-468-2039; Empl.: 300; *Sls. Mgr.:* Lester A. Velez; *Dist. Mgr.:* William J. Betz .... **3•1335-1337**

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns. Assocs.	205-881-5031
AK	Anchorage, Denali Indl. Sls.	907-243-6283
AZ	Scottsdale, Luscombe Engrg. Co.	602-949-9333
AR	Little Rock, Beacon Elec. Assoc.	501-224-5449
CA	Campbell, Luscombe Engrg. Co.	408-370-2020
CA	Pasadena, Luscombe Engrg. Co.	213-684-2000
CO	Arvada, Arrowhead Sls. Co.	303-423-5556
FL	Clearwater, Beacon Elec. Assoc.	813-796-2378
FL	Ft. Lauderdale, Beacon Elctrn. Assoc.	305-491-1054
FL	Maitland, Beacon Elctrn. Assocs.	305-647-3498
FL	Melbourne, Beacon Elec. Assoc.	305-724-8010
GA	Atlanta, Beacon Elctrn. Assocs.	404-256-9640
HI	Honolulu, Aloha Assocs.	808-941-1574
IL	Arlington Hgts., Brainard-Wilson Mktg.	312-437-2700
IN	Carmel, Carter, McCormic & Peirce	317-844-4175
IN	Carmel, Brainard-Wilson Mktg.	317-844-2800
IA	Marion, M-S-B Assocs.	319-377-6261
KS	Shawnee Mission, M-S-B Assocs.	913-432-2131
MD	Randallstown, Beacon Elec.	703-534-7200
MA	Canton, New England Elctrn. Sls. Corp.	617-828-4835
MI	Farmington, Carter, McCormic & Peirce	313-477-7700
MN	Minneapolis, R.J. Inc.	612-866-3661
MO	St. Charles, M-S-B Assocs.	314-946-5577
NJ	Englewood, Sprung/Nussbaum	201-569-5666
NJ	Marmora, Holdsworth & Co.	609-398-4340
NM	Albuquerque, Amonette Entprs.	505-344-4143
NY	Bainbridge, R. W. Mitscher	607-697-7192
NY	Buffalo, R. W. Mitscher	716-633-7970
NY	N. Syracuse, R. W. Mitscher	315-458-1321
NY	Pittsford, R. W. Mitscher	716-586-4012
NY	Red Hook, R. W. Mitscher	914-758-8375
NY	Rochester, R. W. Mitscher	716-227-0839
NC	Greensboro, Beacon Elctrn. Assoc.	919-275-9997
NC	Raleigh, Beacon Elctrn.	919-787-0330
OH	Cleveland, Carter, McCormic & Peirce	216-779-5100
OH	Englewood, Carter, McCormic & Peirce	513-836-0951
OR	Beaverton, Barrett-Squibb & Assoc.	503-644-2550
PA	Monroeville, Carter, McCormic & Peirce	412-372-4415
PA	Newtown Square, Holdsworth & Co.-SWR	215-356-8550
TX	Houston, Scientific Sls. Co.	713-460-9170
TX	Richardson, Scientific Sls. Co.	214-231-6541
UT	Salt Lake City, Arrowhead Sls.	801-261-1661
VA	Fairfax, Beacon Elctrns.	703-591-1300
VA	Forrest, Beacon North	804-239-8486
WA	Redmond, Barrett Squibb, Inc.	206-885-6991
WI	Colgate, Rep-1 Assoc.	414-628-4016
EXP	Freeport, Minthorne	516-546-4700

Local Distributors

AL	Birmingham, Brownell Electro	205-322-3374
AL	Huntsville, Component Distrs.	205-883-7501
AL	Mobile, Brownell Electro	205-479-8581
AR	Little Rock, Component Distrs.	501-227-6278
CA	Inglewood, Force Elctrns.	213-776-1324
CA	Los Angeles, Erlanger Sls.	213-731-2238
CA	Los Angeles, Erlanger Sls. Co.	213-731-2238
CA	Santa Clara, Fisher-Brownell	408-988-6041
FL	Ft. Lauderdale, Component Distrs.	305-971-4950
FL	Miami, Brownell Electro	305-591-3215
FL	Orlando, Brownell Electro	305-843-6770
GA	Hapeville, Brownell Electro	404-762-5181
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Elk Grove Village, Meter Master	312-593-8650
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Graham Elctrns.	317-634-8202
MD	Gaithersburg, Pioneer Instrumentation	301-921-0660
MA	Canton, E.D.S. Inc.	617-828-4835
MA	Woburn, Brownell Electro	617-935-7820
MA	Woburn, Abbott Elctrns.	617-935-2040
MI	Ferndale, RAM Meter	313-398-6767
MO	St. Louis, Olive Elctrns.	314-426-4500
NJ	Belleville, Miscorp	201-751-1190
NJ	Fairfield, Ampower Elctrn. Instr.	201-227-7720
NJ	S. Plainfield, Brownell Electro	201-753-4600
NY	Clarence, Trott Elctrns.	716-634-8500
NY	New York, Brownell Electro	212-691-1171
NY	Pittsford, Trott Elctrns.	716-586-8251
NC	Charlotte, Brownell Electro	704-597-1270
NC	Raleigh, Brownell Electro	919-876-6524
NC	Raleigh, Component Distrs.	919-781-0262
OH	Cleveland, Weschler Elec. Co.	216-238-2550
OH	Cleveland, Pioneer Instrumentation	216-587-3600
OH	Dayton, Pioneer Instrumentation	513-236-9900
PA	Norristown, Kimberly-James Co.	215-666-7286
SC	Columbia, Brownell Electro	803-772-6111
TN	Chattanooga, Techni-Tronics	615-875-5449
TN	Knoxville, Brownell Electro	615-966-3441
TN	Memphis, Brownell Electro	901-795-8483
TN	Nashville, Brownell Electro	615-889-8230
TX	Dallas, Inotek Corp.	214-243-7000
TX	Ft. Worth, Inotek Corp.	817-831-2126
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Houston, Brownell Electro	713-699-1981
TX	Houston, Inotek Corp.	713-688-4494
TX	Houston, American Analog	713-941-7265
WA	Seattle, Eicher-Richards Co.	206-523-7888
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Milwaukee, E-M Instrs.	414-272-7799

MODU-TEL CORP., 1429 N. Halstead, Hutchinson, KS 67501, Tel: 316-662-3302, Telex: 469331 COMTRON CI; Empl.: 5; *Sls. Mgr.:* Paul Bascom

MOHAWK DATA SCIENCES, MDS Center, Herkimer, NY 13350, Tel: 315-866-5300, Telex: (71)662032; Empl.: 4500

MOHAWK WIRE & CABLE CORP., 9 Mohawk Drive, Leominister, MA 01453, Tel: 617-537-9961

MOLDCON CORP., 221 Interstate Dr., W. Springfield, MA 01089, Tel: 413-736-0371, TWX: 710-350-6463; *Sls. Mgr.:* James Loeffler

MOLDING TECHNOLOGY INC., See MTI

MOLDTRONICS, INC., 707 Roger St., Downers Grove, IL 60515, Tel: 312-968-7000, TWX: 910-695-3537; Empl.: 140; *Sls. Mgr.:* Jim Arnold

Local Sales Offices & Reps

CA	Topauga, S-J-N Sales	213-455-1813
FL	Vero Beach, Peter Martinet	305-567-8413
IL	Downers Grove, Momak Sales	312-963-6400
IN	Indianapolis, Butler Sls. & Engrg.	317-253-5143
MN	St. Paul, PDO Comps.	612-690-5215
OH	Dayton, H. G. Lake Co.	513-277-8181
PA	Lancaster, Thomas G. Armstrong Assoc.	717-397-2942
RI	Wickford, R. P. Morrison Co.	401-295-5692

MOLECU-WIRE, P.O. Box 495, Farmingdale, NJ 07727, Tel: 201-938-9473, TWX: 710-723-6943; Empl.: 175

Local Sales Offices & Reps

CA	Montrose, Roger D. Dahl	213-245-3817
CT	Orange, KLS Sls.	203-795-6210
IL	Northbrook, Jack Norlie Assocs.	312-498-3657
KS	Shawnee Mission, B.C. Elctrn. Sls.	913-342-1211
NC	Charlotte, QED	704-525-3053
PA	Ligonier, Patterson Elec.	412-238-6238
WA	Seattle, Comptronics	206-284-4842
WI	Mequon, Robco	414-241-3348

MOLEX, 2222 Wellington Ct., Lisle, IL 60532, Tel: 312-969-4550, TWX: 910-695-3227; Empl.: 2,200; *Sls. Mgr.:* Gregg Johnson; *Dist. Mgr.:* Pat Weber

Local Sales Offices & Reps

AL	Huntsville, Dennis Andrew	404-396-6120
AZ	Scottsdale, Luscombe Engrg. Co.	602-949-9333
AR	Little Rock, Glenn Montgomery	501-666-0260
CA	Costa Mesa, Molex (W Reg. Off.)	714-241-8588
CA	Encino, Dow Lebowski	714-241-8588
CA	Mission Viejo, Tony Scutetta	714-241-8588
CA	San Diego, Al Batza	619-241-8588
CA	Sunnyvale, Molex	408-773-0505
CO	Englewood, Thorson Rocky Mountain	303-779-0666
CT	West Hartford, Randy Stone	617-935-8983
FL	North Palm Beach, Chuck Vincent	404-396-6120
FL	St. Petersburg, Molex	404-396-6120
GA	Atlanta, Molex (SE Reg. Off.)	404-396-6120
IL	Crystal Lake, E.S. Healy & Assocs.	815-459-4386
IN	Connersville, George Allen	317-844-8986
IN	Indianapolis, Steve Byrne	317-844-8986
IA	Cedar Rapids, J.R. Sls. Engrg.	319-393-2232
KY	Louisville, Glen Towater	404-396-6120
KY	Taylorsville, Jim Lieb	404-396-6120
MD	Bethesda, Molex	404-396-6120
MA	Mansfield, Paul Hansen	617-935-8983
MA	Marblehead, Pete Evans	617-935-8983
MA	Woburn, Molex (E Reg. Off.)	617-935-8983
MI	Grand Rapids, Mark Fluga	616-957-1205
MI	Royal Oak, Schwegman & Assocs.	313-542-6767
MN	Edina, Mark Boe	612-893-9029

MO	Gladstone, Mark Rider	214-247-7117
MO	Independence, Dy-Tronix Inc.	816-373-6600
NJ	Washington, Oscar Cobian	201-267-8014
NY	Webster, Joe Schmitt	716-223-6899
NC	Raleigh, Molex Inc.	404-396-6120
OH	Geneva, Bill Hyslop	216-466-9244
OR	Lake Oswego, Gary Rohde	503-636-7558
PA	Rosemont, Ed M. Sullivan	617-935-8983
TN	Knoxville, Insul Reps.	615-691-7586
TX	Austin, Daniel Daneff	512-453-1398
TX	Dallas, Dale Otten	214-247-7117
TX	Manchaca, Max Bassler	512-453-1398
UT	West Valley, Thorson Rocky Mountain	801-973-7969
WA	Redmond, Molex	206-881-2042
PR	Hato Rey, Max Anderson Co.	809-751-2202

MOLON MOTOR & COIL CORP., 3737 Industrial Ave., Rolling Meadows, IL 60008, Tel: 312-259-8700, TWX: 910-687-0428; Empl.: 350; *Sls. Mgr.:* J. Bailey

MONITOR LABS, INC., 10180 Scripps Ranch Blvd., San Diego, CA 92131, Tel: 619-578-5060, Telex: 182794

MONITOR
PC

MONITOR PRODS. CO., INC., 502 Via Del Monte, Oceanside, CA 92054, Tel: 619-433-4510, TWX: 910-322-1381; FSC No.: 54331 .... **1A**•1387-1389

Local Sales Offices & Reps

AL	Huntsville, CSR Elctrns.	205-533-2444
AZ	Phoenix, Eltron	602-266-2164
CA	Encino, Great American Rep Co.	818-990-4870
CA	Mountain View, West Mark Assocs.	415-969-1700
CA	San Diego, Rep Co.	619-292-9001
CA	Tustin, Great American Rep. Co.	714-832-8113
CO	Aurora, Electrodyne	303-695-8903
CT	Woodbury, Lindco Assocs.	203-263-0629
FL	Lake Worth, Tech-Rep Assocs.	305-968-7792
FL	Melbourne Beach, Tech-Rep Assocs.	305-725-4655
FL	St. Petersburg, Tech-Rep Assocs.	813-577-2779
GA	Atlanta, CSR Elctrns.	404-396-3720
IL	Downers Grove, Momak Sls.	312-963-6400
IA	Davenport, Ensco Rep	319-386-6600
KS	Overland Park, Ensco Rep	913-381-7557
KS	Wichita, Ensco Rep	316-683-1070
MA	Stow, Today Comps. Sls.	617-897-7500
MN	Eden Prairie, Elctrn. Innovators	612-941-0830
MO	Maryland Heights, Ensco Rep	314-423-3935
NY	Nekvukke, Parallax	516-351-1000
NC	Matthews, CSR Elctrns.	704-847-1927
NC	Raleigh, CSR Elctrns.	919-878-9200
OH	Dayton, Berberich & Assocs.	513-433-0342
OR	Aloha, Micro Sales	503-642-1818
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
TX	Austin, Mil-Rep Assocs.	512-258-2828
TX	Houston, Mil-Rep Assocs.	713-937-0127
TX	Richardson, Mil-Rep Assocs.	214-644-6731
UT	Salt Lake City, Electrodyne	801-486-3801
VA	Fairfax, Beacon North	703-591-1300
WA	Bellevue, Micro Sales	206-451-0568
WI	Mukwonago, Momak Sls.	414-363-7744

MONOLITHIC COMPONENTS CORP., 6828 Nancy Ridge Drive, San Diego, CA 92121, Tel: 619-457-1727

MONOLITHIC SYS., 84 Inverness Circle E., Englewood, CO 80112, Tel: 303-790-7400, Telex: 45-4498; Empl.: 100; *Sls. Mgr.:* Mike Hart

MONSANTO CO., 800 N. Lindbergh Blvd., St. Louis, MO 63167, Tel: 314-694-1000, Telex: 44-7282 .... **2**•1085-1087

MONSANTO-ELECTRONICS DIV., See General Instr., Optoelctrns. Div.

MOODY TOOLS, 43 Crompton Ave., E. Greenwich, RI 02818, Tel: 401-885-0911; Empl.: 11; *Sls. Mgr.:* J. H. Moody; *Dist. Mgr.:* D .H. Moody

Local Sales Offices & Reps

CA	San Carlos, W. M. S. Co.	415-591-7043
CO	Denver, A-E-S	303-777-8733
FL	Winter Park, Floritronics	305-886-4818
IL	Palatine, Witz-Knight, Inc.	312-358-5990
KS	Overland Park, Modern Mktg. Co.	913-341-2426
MD	Baltimore, Coastline Sls. Co.	301-828-8520
NY	New York, Lane-Mizner Assocs.	212-889-9711
NY	Orchard Park, S & B Indl. Sls.	716-662-5988
OH	St. Marys, Thomas Shelby & Co.	419-394-3377
OR	Portland, Joseph V. BeLusko Co.	503-222-4279
RI	Barrington, Kilburn Assocs.	401-437-1839
EXP	IL, Northbrook, Vaco/Intl.	312-564-3300

MORRIS, J. I., CO., 372 Elm St., Southbridge, MA 01550, Tel: 617-764-4394; Empl.: 45

MORRIS ENTPRS., 16799 Schoenborn St, Sepulveda, CA 91343, Tel: 213-894-9103, Telex: 6-74681, TWX: 910-496-1525; FSC No.: 54918; Empl.: 40; *Sls. Mgr.:* J. Dumpert

MOSS CO., See Electron General

MOTION CONTROL DEVICES, INC., 80 Steadman St., Lowell, MA 01851, Tel: 617-454-3704, Telex: 955318-INTL-DIV-ATTEN-MCD-I; Empl.: 25; *Sls. Mgr.:* Joe Laliberte

MOTOROLA INC., Auto. & Indl. Elctrns. Grp., 1299 E. Algonquin Rd., Schaumburg, IL 60196, Tel: 312-576-4850, Telex: 722443; *Sls. Mgr.:* Jay A. Bonk

MOTOROLA INC.

Component Products

MOTOROLA, INC., Compt. Divs. Clock Oscillator Dept., 2553 N. Edgington, Franklin Park, IL 60131, Tel: 312-451-1000, TWX: 910-227-0799; Empl.: 1400; *Sls. Mgr.:* Barnie Ill; *Dist. Mgr.:* Ted Hoffman .... **1A**•1390, 1391; **3**•1413

Local Sales Offices & Reps

AL	Huntsville, R. O. Whitesell	205-883-5110
AZ	Scottsdale, Thorson Desert States	602-998-2444
AR	Ft. Smith, Electra Reps.	501-452-4030
CA	Campbell, Kottmeier Assocs.	408-866-5153
CA	Fullerton, Groh Assoc.	714-738-7150
CO	Englewood, Thorsen Co.	303-779-0666
FL	Clearwater, Perrott Assocs.	813-443-5414
FL	Orlando, Perrott Assocs.	305-298-7748
FL	Sunrise, Perrott Assocs.	305-792-2211
GA	Norcross, Glen White Assoc.	404-441-1447
IL	Rolling Meadows, KMA Sls. Co.	312-398-5300
IN	Fort Wayne, R. O. Whitesell	219-432-5591
IN	Indianapolis, R. O. Whitesell	317-359-9283
IA	Cedar Rapids, Comstrand	319-377-1575
MD	Timonium, Glen White Assoc.	301-252-6360
MA	Natick, Wayland Engrg. Sls.	617-655-6080
MI	Southfield, R. O. Whitesell Assoc.	313-559-5454
MI	St. Joseph, R. O. Whitesell Assoc.	616-983-7337
MN	Minneapolis, Comstrand	612-788-9234
MO	St. Louis, Abrams Assoc.	314-569-0447
NM	Albuquerque, Thorsen Desert States	505-293-8555
NY	Great Neck, Trionic Assoc.	516-466-2300
NY	Rochester, Ossmann Comp. Sls.	716-442-4460
NY	Syracuse, Ossmann Comp. Sls.	315-455-6611
NC	Raleigh, Glen White Assoc.	919-787-7016
OH	Cincinnati, R. O. Whitesell	513-521-2290
OH	Cleveland, R.O. Whitesell & Assoc.	216-447-9020
OH	Columbus, R. O. Whitesell	614-888-9396
OH	Dayton, R. O. Whitesell	513-298-9546
OK	Tulsa, H. J. Daly Co.	918-494-7711
OR	Tigard, Elctrn. Sources	503-684-0040
PA	Glenside, Koebert Assoc.	215-887-2310
PA	Pittsburgh, R. O. Whitesell	412-963-6161
TN	Gray, Glen White Assoc.	615-477-8850
TX	Dallas, Electra Reps.	214-387-3594
TX	Houston, Electra Reps.	713-530-2208
UT	West Valley City, Thorsen Co.	801-973-7969
VA	Colonial Beach, Glen White Assoc.	804-224-7764
VA	Lynchburg, Glen White Assoc.	804-237-6291
WA	Bellevue, Electronic Sources	206-451-2530
WI	Milwaukee, KMA Sls. & Co.	414-259-1771
EXP	IL, Franklin Pk., Motorola	312-451-1000

MOTOROLA INC.

MOTOROLA SEMICONDUCTOR PRODS. SECTOR, Adv. 72, Box 20912, Phoenix, AZ 85036, Tel: 602-244-6900, TWX: 910-951-1334; FSC No.: 04713; *Sls. Mgr.:* Brian Hilton; *Dist. Mgr.:* John Dunleavy . **1A**•1667-1677, 2086, 2099-2105; **1B**•1117; **3**•1114-1116

Local Sales Offices & Reps

AL	Huntsville	205-830-1050
AZ	Phoenix, (General Motors Grp.)	602-244-7125
AZ	Phoenix	602-244-7100
CA	Encino/Sherman Oaks	213-986-6850, 213-872-1504
CA	Los Angeles	213-445-5585
CA	Orange	714-634-2844
CA	San Diego	619-560-4644
CA	San Jose	408-985-0510
CO	Colorado Springs	303-599-7404
CO	Denver	303-773-6800
CT	New Haven/Hamden	203-281-0771
DC	Washington	301-577-2600
FL	Casselberry/Maitland	305-831-3422
FL	Pompano Bch./Ft. Lauderdale	305-491-8141
FL	St. Petersburg	813-576-6030
GA	Atlanta	404-256-0222
IL	Chicago/Schaumburg	312-576-7800
IN	Ft. Wayne	219-484-0436
IN	Indianapolis	317-849-7060
IN	Kokomo	317-457-6634
IA	Cedar Rapids	319-373-1328
KS	Kansas City/Mission	913-384-3050
MD	Hyattsville	301-577-2600
MA	Berlin	617-562-3856
MA	Burlington	617-273-5020
MI	Detroit/Westland	313-261-6200
MN	Minneapolis	612-545-0251
MO	St. Louis	314-872-7681
NJ	River Edge	201-488-1200
NY	Hauppauge	516-231-9000
NY	Pittsford	716-248-5494
NY	Poughkeepsie/Fishkill	914-473-8102
NY	Syracuse	315-455-7373
NC	Raleigh	919-876-6025
OH	Cleveland	216-461-3160
OH	Columbus/Worthington	614-846-9460
OH	Dayton	513-294-2231
OK	Tulsa	918-664-5227
OR	Portland	503-641-3681
PA	Philadelphia/Horsham	215-443-9400
TN	Knoxville	615-690-5592
TX	Austin	512-452-7673
TX	Dallas	214-931-9222
TX	Houston	713-783-6400
UT	Salt Lake City	801-539-1190
VA	Charlottesville	804-977-3691
WA	Bellevue	206-454-4160
WA	Seattle Access	206-622-9960
WI	Milwaukee/Wauwatosa	414-476-5554

Motorola Systems Reps.

AL	Huntsville, EMA	205-830-4030
CA	Inglewood, Basic Sys. Corp.	213-673-4300
CA	San Diego, Basic Sys. Corp.	619-999-6566
CA	Santa Clara, Basic Sys. Corp.	408-727-1800
CT	Goshen, Northern Computer Sls.	203-491-3585
GA	Norcross, EMA	404-329-0530
IL	Northbrook, Marketech Assoc.	312-291-0315
IN	Carmel, Carter, McCormic & Peirce	317-844-4175
MA	Westwood, Northern Computer Sls.	617-326-3454
MI	Farmington Hills, Carter, McCormic & Peirce	313-477-7700
MN	Minneapolis, P.S.I. Co.	612-944-8545
MO	Independence, Dy-Tronix	816-373-6600
NY	Elmont, Crane & Egert Corp.	516-872-0800
NC	Raleigh, EMA	919-781-9369
OH	Cleveland, Carter, McCormic & Peirce	216-779-5100
OH	Dayton, Carter, McCormic & Peirce	513-836-0951
OR	Beaverton, Thorson Co. Northwest	503-644-5900
PA	King of Prussia, K.S.I.	215-783-6440
PA	Monroeville, Carter, McCormic & Peirce	412-372-4415
TN	Jonesboro, EMA	615-753-5844
WA	Bellevue, Thorson Co. Northwest	206-455-9180

Local Distributors

AL	Huntsville, Schweber Elctrns.	205-882-2200
AL	Huntsville, Hamilton/Avnet Elctrns.	205-837-7210
AL	Huntsville, Hall-Mark Elctrns.	205-837-8700
AL	Huntsville, Pioneer/Huntsville	205-837-9300
AZ	Phoenix, Hall-Mark Elctrns.	602-243-6601
AZ	Phoenix, Kierulff Elctrns.	602-243-4101

AZ	Tempe, Hamilton/Avnet Elctrns.	602-231-5100
AZ	Tucson, Kierulff Elctrns.	602-624-9986
CA	Anaheim, Zeus Comps. West	714-632-6880
CA	Canoga Park, Schweber Elctrns.	213-999-4702
CA	Costa Mesa, Hamilton Electro Sls.	714-641-4111
CA	Costa Mesa, Avnet	714-754-6155, 213-558-2345
CA	Culver City, Hamilton Electro Sls./L.A.	213-558-2000
CA	Culver City, Hamilton/Avnet	213-558-2000
CA	Irvine, Schweber Elctrns.	213-537-4321
CA	Los Angeles, Kierulff Elctrns.	213-725-0325
CA	Palo Alto, Kierulff Elctrns.	415-968-6292
CA	Roseville, Bell Inds.	916-969-3100
CA	Sacramento, Hamilton/Avnet Elctrns.	916-925-2216
CA	Sacramento, Schweber Elctrns.	916-929-9732
CA	San Diego, Hall-Mark Elctrns.	619-268-1201
CA	San Diego, Hamilton/Avnet Elctrns.	619-571-7510
CA	San Diego, Kierulff Elctrns.	619-278-2118
CA	Santa Clara, Schweber Elctrns.	408-748-4700
CA	Sunnyvale, Hall-Mark Elctrns.	408-773-9990
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Sunnyvale, Hamilton/Avnet Elctrns.	408-743-3360
CA	Tustin, Kierulff Elctrns.	714-731-5711
CA	Woodland Hills, Hamilton/Avnet Elctrns.	213-887-2353
CO	Denver, Hall-Mark Elctrns.	303-694-1662
CO	Denver, Kierulff Elctrns.	303-790-4444
CO	Denver, Hamilton/Avnet Elctrns.	303-740-1017
CO	Wheatridge, Bell Inds.	303-424-1985
CT	Danbury, Hamilton/Avnet Elctrns.	203-797-2800
CT	Danbury, Schweber Elctrns.	203-792-3500
CT	Norwalk, Pioneer-Harvey/Norwalk	203-853-1515
FL	Altamonte Springs, Pioneer/Florida	305-834-9090
FL	Altamonte Springs, Schweber Elctrns.	305-331-7555
FL	Ft. Lauderdale, Pioneer/Ft. Lauderdale	305-771-7520
FL	Ft. Lauderdale, Kierulff Elctrns.	305-486-4004
FL	Ft. Lauderdale, Hamilton/Avnet Elctrns.	305-971-2900
FL	Ft. Lauderdale, Hall-Mark Elctrns.	305-971-9280
FL	Hollywood, Schweber Elctrns.	305-927-0511
FL	Orlando, Hall-Mark Elctrns.	305-855-4020
FL	St. Petersburg, Hamilton/Avnet Elctrns.	813-576-3930
FL	St. Petersburg, Kierulff Elctrns.	813-576-1966
GA	Atlanta, Schweber Elctrns.	404-449-9170
GA	Norcross, Kierulff Elctrns.	404-447-5252
GA	Norcross, Hall-Mark Elctrns.	404-447-8000
GA	Norcross, Hamilton/Avnet Elctrns.	404-447-7507
GA	Norcross, Pioneer/Atlanta	404-448-1711
IL	Bensenville, Hall-Mark Elctrns.	312-860-3800
IL	Bensenville, Hamilton/Avnet Elctrns.	312-860-7700
IL	Chicago, Bell Inds.	312-982-9210
IL	Chicago, Newark Elctrns. Corp.	312-638-4411
IL	Elk Grove Village, Pioneer/Chicago	312-437-9680
IL	Elk Grove Village, Kierulff Elctrns.	312-640-0200
IL	Elk Grove Village, Schweber Elctrns.	312-364-3750
IN	Indianapolis, Hamilton/Avnet Elctrns.	317-844-9333
IN	Indianapolis, Pioneer/Indiana	317-849-7300
IN	Indianapolis, Graham Elctrns. Supp.	317-634-8202
IA	Cedar Rapids, Schweber Elctrns.	319-373-1417
KS	Overland Pk., Hamilton/Avnet Elctrns.	913-888-8900
KS	Shawnee Mission, Hall-Mark Elctrns.	913-888-4747
MD	Baltimore, Kierulff Elctrns.	301-636-5800
MD	Baltimore, Hall-Mark Elctrns.	301-796-9300
MD	Gaithersburg, Schweber Elctrns.	301-840-5900
MD	Gaithersburg, Pioneer/Washington	301-948-0710
MD	Hanover, Hamilton/Avnet Elctrns.	301-621-5410
MA	Bedford, Schweber Elctrns.	617-275-5100
MA	Boston, Kierulff Elctrns.	617-667-8331
MA	Boston, Lionex Corp.	617-272-9400
MA	Burlington, Zeus Comps.	617-273-0750
MA	Needham, Impact Sls. Co.	617-821-1500
MA	Woburn, Hamilton/Avnet Elctrns.	617-935-9700
MI	Grand Rapids, Hamilton/Avnet Elctrns.	616-243-8805
MI	Livonia, RS Elctrns.	313-525-1155
MI	Livonia, Schweber Elctrns.	313-525-8100
MI	Livonia, Hamilton/Avnet Elctrns.	313-522-4700
MI	Livonia, Pioneer/Michigan	313-525-1800
MI	Madison Hgts., McNaughton-McKay Elec. Co.	313-399-7500
MN	Bloomington, Hall-Mark Elctrns.	612-854-3223
MN	Eden Prairie, Schweber Elctrns.	612-941-5280
MN	Edina, Kierulff Elctrns.	612-941-7500
MN	Minnetonka, Pioneer/Twin Cities	612-935-5444
MN	Minnetonka, Hamilton/Avnet Elctrns.	612-932-0600
MO	Earth City, Hall-Mark Elctrns.	314-291-5350
MO	Earth City, Hamilton/Avnet Elctrns.	314-344-1200
MO	Maryland Hgts., Kierulff Elctrns.	314-739-0855
MO	St. Louis, Schweber Elctrns.	314-739-0526
NJ	Cherry Hill, Hall-Mark Elctrns.	609-424-7300
NJ	Cherry Hill, Hamilton/Avnet Elctrns.	609-424-0110
NJ	Fairfield, Hall-Mark Elctrns.	201-575-4415
NJ	Fairfield, Kierulff Elctrns.	201-575-6750
NJ	Fairfield, Schweber Elctrns.	201-227-7880
NJ	Fairfield, Hamilton/Avnet Elctrns.	201-575-3390
NJ	Pinebrook, Pioneer-Harvey/Pinebrook	201-227-1262
NM	Albuquergue, Alliance Elctrns.	505-292-3360
NM	Albuquerque, Bells Inds.	505-292-2700
NM	Albuquerque, Hamilton/Avnet Elctrns.	505-765-1500
NY	Binghamton, Pioneer-Harvey/Binghamton	607-748-8211
NY	E. Syracuse, Hamilton/Avnet Elctrns.	315-437-2641
NY	Fairport, Pioneer-Harvey/Rochester	716-381-7070
NY	Hauppauge, Pioneer/Military	516-231-9200
NY	Hauppauge, Lionex Corp.	516-273-1660
NY	Melville, Hamilton/Avnet Elctrns.	516-454-6060
NY	Port Chester, Zeus Comps.	914-937-7400
NY	Rochester, Hamilton/Avnet Elctrns.	716-475-9130
NY	Rochester, Schweber Elctrns.	716-424-2222
NY	Westbury, Schweber Elctrns.	516-334-7474
NY	Woodbury, Pioneer-Harvey/Woodbury	516-921-8700
NC	Greensboro, Kierulff Elctrns.	919-872-8410
NC	Raleigh, Hall-Mark Elctrns.	919-872-0712
NC	Raleigh, Hamilton/Avnet Elctrns.	919-878-0810
OH	Beachwood, Schweber Elctrns.	216-464-2970
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OH	Cincinnati, Graham Elctrns.	513-772-1661
OH	Cleveland, Pioneer/Cleveland	216-587-3600
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OH	Cleveland, Hamilton/Avnet Elctrns.	216-831-3500
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OH	Dayton, Pioneer/Dayton	513-236-9900
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OK	Tulsa, Hall-Mark Elctrns.	918-665-3200
OK	Tulsa, Kierulff Elctrns.	918-252-7537
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OR	Lake Oswego, Hamilton/Avnet Elctrns.	503-635-8831
OR	Portland, Kierulff Elctrns.	503-641-9150
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PA	Horsham, Schweber Elctrns.	215-441-0600
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
PA	Pittsburgh, Schweber Elctrns.	412-782-1600
TX	Austin, Pioneer/Austin	512-835-4000
TX	Austin, Hall-Mark Elctrns.	512-258-8848
TX	Austin, Schweber Elctrns.	512-458-8253
TX	Austin, Kierulff Elctrns.	512-835-2090
TX	Austin, Hamilton/Avnet Elctrns.	512-837-8911
TX	Dallas, Hall-Mark Corp.	214-343-5000
TX	Dallas, Schweber Elctrns.	214-661-5010
TX	Dallas, Kierulff Elctrns.	214-343-2400
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Dallas, Hall-Mark Elctrns.	214-341-1147
TX	Houston, Pioneer/Houston	713-988-5555
TX	Houston, Hall-Mark Elctrns.	713-781-6100
TX	Houston, Schweber Elctrns.	713-784-3600
TX	Houston, Kierulff Elctrns.	713-530-7030
TX	Houston, Hamilton/Avnet Elctrns.	713-780-1771
TX	Irving, Hamilton/Avnet Elctrns.	214-659-4111
UT	Salt Lake City, Kierulff Elctrns.	801-973-6913
UT	Salt Lake City, Hamilton/Avnet Elctrns.	801-972-2800
UT	Salt Lake City, Bell Inds.	801-972-6969
WA	Bellevue, Hamilton/Avnet Elctrns.	206-643-3950
WA	Seattle, Almac Elctrns. Corp.	206-643-9992
WA	Tukwila, Kierulff Elctrns.	206-575-4420
WI	Brookfield, Schweber Elctrns.	414-784-9020
WI	New Berlin, Hamilton/Avnet Elctrns.	414-784-4510
WI	Oak Creek, Hall-Mark Elctrns.	414-761-3000
WI	Waukesha, Bell Inds.	414-784-0235
WI	Waukesha, Kierulff Elctrns.	414-784-8160

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MOTRONICS CORP., Riverside Indl. Pk., Little Falls, NY 13365, Tel: 315-823-4050; Empl.: 90; *Sls. Mgr.:* Thomas J. Breach .... **1B**•1169

Local Sales Offices & Reps

CA	San Jose, McFarland Assocs. Corp.	408-286-9333
CO	Englewood, Integrated Motion Sys.	303-762-1817
FL	Melbourne, R-Concept	305-725-6993
IN	Beech Grove, Control Sls.	317-353-6094
KS	Shawnee Mission, L.S.C. Inc.	913-362-2121
MA	Southborough, Motion Engrg.	617-485-2144
MI	Livonia, Electrolines	313-591-2428
MN	St. Paul, Northstar Motion & Control Co.	612-770-5311
NY	Clark Mills, KLM Garner	315-853-6126
OH	Chesterland, KT/Depco	216-729-3588
PA	Audubon, Holmes Assocs.	215-666-0636
PA	Pittsburgh, Greye Glass Assocs.	412-366-6664
VA	Roanoke, Engrg. & Mktg. Corp. of Virginia	703-986-1410
WI	Milwaukee, Schreiber-Arterburn	414-545-7800

Distributor

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MOUSER ELECTRONICS, 2401 Hwy. 287 North, Mansfield, TX 76063, Tel: 817-483-4422 .... p.731

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CA	El Segundo, Fetty/Schoenduve	213-322-4991

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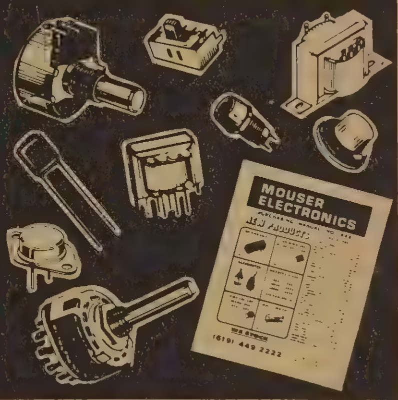

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GA	Keenesaw, BWS Mktg.	404-448-7759
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MD	Laurel, CSDS Inc.	301-490-3800
MA	Framingham, Stone Comp. Sls.	617-875-3266
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PA	Jenkintown, Arnold Assocs.	215-887-7870
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Local Sales Offices & Reps

AL	Huntsville, 20th Century Mktg.	205-533-9281
AZ	Tempe, SSA Sales	602-829-9338
CA	San Diego, Bestronics	619-452-5500
CA	Santa Ana, SC Cubed	714-731-9206
CA	Santa Clara, Criterion Mfg.	408-988-6300
CA	Thousand Oaks, SC Cubed	805-496-7307
CO	Littleton, Simpson Assoc.	303-794-8381
CT	Ridgefield, Phoenix Sls.	203-438-9644
FL	Apopka, G.F. Bohman	305-886-1882
FL	Ft. Lauderdale, Bohman Assoc.	305-979-0008
GA	Stone Mountain, 20th Century	404-292-7088
IL	Arlington Hgts., Micro Sls.	312-956-1000
IN	Fort Wayne, Given Corp.	219-432-5585
IA	West Des Moines, SPS Assoc.	515-225-0607
KS	Olathe, SPS Assoc.	913-764-4460
MD	Ellicott City, Marketing Tech Inc.	301-862-1882
MA	Reading, Kanan	617-944-8484
MI	Detroit, Rathsburg Assoc.	313-882-1717
MN	Bloomington, Com-Tek Sls.	612-888-7011
NE	Panama, SPS Assoc.	800-228-3018
NJ	Englewood, Sprung/Nussbaum	201-569-5666
NJ	Marlton, BGR	609-983-1020
NM	Albuquerque, SSA	505-881-8877
NC	Smithfield, ADI	919-934-8136
OH	Dayton, Lyons Corp.	513-278-0714
OH	Richfield, Lyons Corp.	216-659-9224
SC	Fort Mill, ADI	803-547-2115
TN	Knoxville, 20th Century	615-966-3608
TX	Austin, Mech-Tron Mktg.	512-835-0980
TX	Dallas, Mech-Tron Mktg.	214-343-3786
TX	Houston, Mech-Tron Mktg.	713-462-1432
UT	Midvale, Simpson Assoc.	801-566-3691
VA	Lynchburg, Marketing Tech Inc.	804-384-6459
WA	Redmond, Quadra Sls.	206-883-3550

Local Distributors

AL	Huntsville, Pioneer Elctrns.	205-837-9300
AZ	Phoenix, Wyle Distr. Grp.	602-249-2232
AZ	Phoenix, Sterling Elect.	602-258-4531
AZ	Tempe, CSC Distr.	602-966-0764
AZ	Tempe, Bell Inds.	602-966-7800
AR	Little Rock, Carlton-Bates	501-562-9100
CA	Fullerton, Pyramid Elctrns.	714-773-0781
CA	Irvine, Ryno Elctrns.	714-261-2500
CA	San Diego, Ryno Elctrns.	619-292-6022
CA	Santa Clara, Capacitors Unltd.	408-946-7676
CA	Santa Clara, Wyle Distr. Grp.	408-727-2500
CA	Tustin, Image Elctrns.	714-730-0303
CO	Thornton, Wyle Distr. Grp.	303-457-9953
CO	Wheatridge, Bell Inds.	303-424-1985
CT	E. Haven, J. V. Elctrns.	203-469-2321
CT	Norwalk, Pioneer Elctrns.	203-853-1515
CT	Orange, Milgray Elctrns.	203-795-0711
CT	Wallingford, Mid-State Elect.	203-265-9900
FL	Orlando, Pioneer Elctrns.	305-834-9090
FL	Winter Park, Milgray Elctrns.	305-647-5747
GA	Norcross, Pioneer Elctrns.	404-448-1711
IL	Elk Grove, Pioneer Elctrns.	312-437-9680
IL	Hoffman Estates, Inter Comp	312-843-2040
IN	Indianapolis, Advent	317-872-4910
IN	Indianapolis, Pioneer/IN	317-849-7300
KS	Overland Park, Milgray Elctrns.	913-236-8800
MD	Beltsville, Resco/Wash.	301-937-9100
MD	Gaithersburg, Pioneer	301-921-0660
MD	Rockville, Milgray Elctrns.	301-468-6400
MA	Burlington, Milgray Elctrns.	617-272-6800
MA	Burlington, J.V. Elctrns.	617-273-4300
MA	Lexington, Pioneer Elctrns.	617-861-9200
MI	Livonia, RS Elctrns.	313-525-1155
MI	Livonia, Pioneer Elctrns.	313-525-1800
MN	Bloomington, NWR	612-854-7329
MN	Minneapolis, Stark Elctrns.	612-832-1325
MN	Minnetonka, Pioneer Elctrns.	612-935-5444
MO	St. Louis, Olive Elctrns.	314-426-4500
NJ	Berlin, GCI	609-768-6767
NJ	Marlton, Milgray Elctrns.	609-983-5010
NJ	Mt. Laurel, P.A.C. Elctrns.	609-778-1526
NJ	Pinebrook, Pioneer Elctrns.	201-575-3510
NM	Albuquerque, Sterling Elect.	505-884-1900
NY	Binghamton, Pioneer Elctrns.	607-748-8211
NY	Farmingdale, Milgray Elctrns.	516-420-9800
NY	Woodbury, Pioneer Elctrns.	516-921-8700
NC	Charlotte, Pioneer Elctrns.	704-527-8188
NC	Raleigh, Century Elctrns.	918-872-2203
OH	Cleveland, Milgray Elctrns.	216-447-1520
OH	Cleveland, Pioneer Elctrns.	216-587-3600
OH	Dayton, Pioneer Elctrns.	513-236-9900
OK	Tulsa, Radio Inc.	918-587-9123
OR	Hillsboro, Wyle Distr. Grp.	503-640-6000
OR	Portland, Radar Elctrns.	503-232-3404
PA	Horsham, Pioneer Elctrns.	215-674-4000
PA	Pittsburgh, Pioneer Elctrns.	412-782-2300
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TX	Dallas, Solid State Elctrns.	214-438-5700
TX	Houston, Powerline Elctrns.	713-578-3222
UT	Salt Lake City, Standard Supp.	801-486-3371
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AL	Huntsville, Cartwright & Bean	205-533-3509
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AZ	Phoenix, Heath Group	602-944-4340
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CA	Gardena, Ungar Sales Co.	213-538-2811
CA	Reseda, Ungar Sls. Assocs.	213-342-2671
CA	San Francisco, Maddox Sls.	415-647-5560
CO	Colorado Springs, Norris & Warren Co.	303-576-8697
CO	Denver, Norris & Warren	303-759-1676
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FL	Orlando, Cartwright & Bean	305-422-4531
FL	Tampa, Cartwright & Bean Inc.	305-422-4531
GA	Atlanta, Cartwright & Bean	404-233-2939
IL	Libertyville, R. Klipp Assocs.	312-367-4676
IN	Indianapolis, Sukup & Cox	317-253-5501
KS	Shawnee Mission, K & M Sls.	913-262-1444
MA	Lynn, Keene Sls.	617-595-2300
MA	Springfield, Keene Sls. Co. Inc.	413-785-1158
MI	Ferndale, Hilltronics	313-398-5556
MN	Minneapolis, Boerger & Associates	612-560-3435
MS	Jackson, Cartwright & Bean	601-981-1368
NJ	Medford, Champion Elctrn. Sls.	609-654-0475
NY	Port Washington, Joseph Assocs.	516-883-1829
NY	Webster, Bieniek & Assocs.	716-872-0387
NC	Charlotte, Cartwright & Bean	704-377-5673
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OH	Mogadore, Arrow Mktg. Co.	216-733-8901
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AR	Little Rock, Erickson Sls. Inc.	501-225-7379
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CA	El Monte, Cook Entprs	213-686-2120
FL	Coral Springs, PC Electronic Sales	305-755-3980
GA	Atlanta, Elctrn. Mfrs. Agts.	404-529-0530
IL	Chicago, Esco Assoc.	312-763-0800
IN	Frankfort, C-S Elctrns. Sls.	317-659-1874
KS	Overland Park, Electri-Rep	913-649-2168
LA	Chalmette, Erickson Sls. Inc.	504-271-1976
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MI	Jenison, R.C. Nordstrom & Co	616-457-5762
MI	Southfield, R. C. Nordstrom & Co.	313-559-7373
MN	St. Paul, Proud Industries	612-646-9428
NJ	Cedar Grove, Legtonics Assoc.	201-239-4098
NJ	Cedar Grove, Legtronics Assoc.	201-239-4098
NC	Raleigh, Elctrns. Mfg. Agent	919-781-4139
OK	Oklahoma City, Erickson Sls. Inc.	405-682-2947
OR	Portland, Eltech	503-238-0805
PA	Albrightsville, Centurion Linear	717-722-0166
TN	Knoxville, Elctrn. Mfrs. Agents	615-966-1286
TX	Austin, Erickson Sls. Inc.	512-445-2952
TX	Dallas, Erickson Sls. Inc.	214-739-5833
TX	Houston, Erickson Sls. Inc.	713-980-9606
WA	Bellevue, Eltech	206-643-4330

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Local Sales Offices & Reps

CA	Anaheim, Multiwire West	714-632-7770
NH	Nashua, Multiwire New England	603-889-0083
NY	Hicksville, Advanced Mfg. Grp.	516-938-2000
NY	Hicksville, Multiwire	516-933-8300; 800-447-0007

MUPAC, 10 Mupac Dr., Brockton, MA 02401, Tel: 617-588-6110, TWX: 710-345-8458; Empl.: 100

Local Distributors

CA	San Francisco, Peters - de Laet, Inc.	415-873-9595
CA	Santa Clara, Peters - de Laet, Inc.	408-727-9440
CT	Wallingford, Sager Electrical Supp. Co.	203-265-4600
MA	Hingham, Sager Electrical Supp. Co.	617-749-6700

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CA	Los Alamitos, Santana Sls.	714-827-9100
CA	San Diego, Littlefield & Smith Assocs.	619-455-0055
CA	San Jose, Frequency Control Assocs.	408-446-0200
CA	Saratoga, Frequency Control Assocs.	408-446-0200
CT	Manchester, G. M. Assocs.	203-646-4443
FL	Casselberry, HAI Elctrns., Inc.	305-831-4892
FL	Coral Springs, HAI	305-752-7520
GA	Atlanta, DHR Mktg.	404-451-9848
IL	Highland Park, Bransky Sls.	312-433-2375
IN	Indianapolis, Elctrn. Reps.	317-894-1414
IA	Bettendorf, Weisler & Assocs., Inc.	319-346-0566
IA	Davenport, Weisler Assocs.	319-386-5905
LA	Manderville, Design Mktg.	713-237-2319
MA	Framingham, G.M. Assocs.	617-872-4871
MN	Minneapolis, O.E.M. Elctrl. Sls., Inc.	612-559-2448
MS	Jackson, Welch & Doby, Inc.	601-932-5534
MO	Ellisville, Weisler Assocs.	314-394-4543
MO	N. Kansas City, Weisler Assocs.	816-421-1679
NH	Exeter, G. M. Assocs.	603-778-7472
NY	Jericho (Downstate), J-Square Mktg., Inc.	516-935-3200
NC	Charlotte, DHR Mktg., Inc.	704-335-1215
NC	Greensboro, DHR Mktg., Inc.	919-273-2671
NC	Raleigh, DHR Mktg.	919-876-5450
OH	Cleveland, Arthur H. Baier & Assocs.	216-461-6161
OH	Dayton, Arthur H. Baier & Assocs.	513-276-4128
OK	Broken Arrow, Design Mktg., Inc.	918-258-8656
OR	Portland, Jas J. Backer Co.	503-297-2218
OR	Salem, Jas J. Backer Co.	503-362-0717
PA	Stewartstown, Eastern Comps.	301-323-7104
PA	W. Conshohocken, Eastern Comps.	215-825-8610
SC	Greenville, DHR Mktg.	803-235-3594
TN	Knoxville, DHR Mktg., Inc.	615-584-5286
TN	Memphis, Welch & Doby, Inc.	901-683-8099
TX	Conroe, Design Mktg., Inc.	713-273-2319
TX	Dallas, Design Mktg., Inc.	214-680-9767
TX	Hurst, Design Mktg.	817-268-2004
TX	Round Rock, Design Mktg., Inc.	512-255-9896
VA	Manassas, Eastern Comps.	703-471-1025
WA	Seattle, Jas J. Backer Co.	206-285-1300
WI	Cedarburg, Bransky Sls.	414-377-6837

Local Distributors

AZ	Phoenix, Elctrn. Parts	602-277-7281
AR	Little Rock, Carlton-Bates	501-462-9100
CA	Costa Mesa, Marvac Elec.	714-540-3280
CA	Dublin, Valley Elctrns.	415-829-5960
CA	Lakeside, Mouser Corp.	714-449-2220
CA	Mt. View, U-DO Elctrns.	415-968-8894
CA	N. Hollywood, Mitchell Co.	213-875-1552
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Sacramento, Sacramento Elctrns.	916-441-4821
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	Sunnyvale, Com-Kyl	408-734-9660
CO	Colorado Springs, Colorado Springs Walker Elec.	303-636-1661
CO	Denver, Fistell's	303-629-1312
CO	Denver, Denver Walker Elec.	303-935-2401
CO	Denver, Elctrn. Parts	303-744-1992
CT	W. Hartford, Signal Center	203-233-8551
FL	Ft. Lauderdale, Southeastern Elctrns.	305-536-4131
FL	Miami, Gulf Elctrns.	305-592-6538
FL	Miami, Electro Standards	305-663-6973
FL	Tallahassee, Dell Elctrns.	904-224-5145
ID	Twin Falls, Idaho Central Elctrns.	
IL	Chicago, McMaster-Carr	312-834-9600
IL	La Salle, Warren Radio	815-223-4028
IL	Rockford, Jay Tronics	851-965-8786
IN	Evansville, Ohio Valley Sound	812-425-6173
IN	Evansville, Hutch & Son	812-425-7201
IN	Michigan City, Tri-State Elctrns.	219-872-5551
IA	Des Moines, Mid State Dist.	515-244-7231
LA	New Orleans, Wm. B. Allen Co.	504-525-8222
MI	Augusta, Great Lakes	616-731-4156
MI	Grand Rapids, Stotts Freidman	616-459-0216
MN	Minneapolis, Acme Elctrns.	612-338-4755
MS	Jackson, Ellington Elctrns.	601-355-0561
MO	St. Louis, Olive Elctrns.	314-426-4500
MT	Missoula, Northwest Distrs.	406-543-5181
NE	Lincoln, Scott Elctrns.	402-466-8221
NJ	Edison, Willian Elctrns.	201-985-3700
NJ	Marlton, Resco Elctrns.	609-983-6552
NJ	Raritan, Masters Supp.	201-725-3533
NM	Carslbad, Indl. Elctrns.	505-887-1121
NY	Hempstead, Elctrn. Equip.	516-538-5510
NY	Jamaica, All State Elctrns.	212-739-3916
NY	Levittown, Eddie Elctrns.	
NY	NYC, B&B Elctrns.	212-446-5120
NY	NYC, Barry Elctrns.	212-925-7000
NY	Plainview, Atlas West	516-576-9100
NC	Charlotte, United Elctrns. Supp.	704-372-2650
ND	Fargo, S&S Elctrns.	701-237-5003
OH	Columbus, Whitehead Radio	614-224-1186
OH	Columbus, Comps. Unltd.	614-252-0728
OH	Freemont, J&B Elctrns.	419-332-9334
OR	Beaverton, Norvac Elctrns.	503-644-1025
PA	Philadelphia, Almo Elctrns.	215-698-4000
PA	Pittsburgh, CRS Elctrns.	412-431-7700
TX	Dallas, Wholesale Radio	214-824-3001
TX	Ft. Worth, Indl. Elctrns.	817-731-7321
TX	Houston, Lenert Co.	713-225-1465
WA	Seattle, Westlake Distrs.	206-282-3660
WV	Arlington, Arlington Elctrns.	703-524-2412
WV	Fairmont, State Elctrns.	304-366-4520
WI	Madison, Superior Elctrns.	608-257-1477
WI	Madison, Satterfield Elctrns.	608-257-4801
WI	Oskosh, Elctrn. Inds.	414-235-8930

MURATA ERIE NORTH AMERICA, INC., 1148 Franklin Rd., S.E., Marietta, GA 30067, Tel: 404-952-9777, Telex: 54-2329, TWX: 810-766-1531; Empl.: 1800; *Sls. Mgr.:* Jack Driscoll; *Dist. Mgr.:* C. Augello ....**1A**•1148-1151, 1394, 1395, 1576, 1604, 1605, 1903-1905, 2016, 2048, 2049, 2107, 2209; **3**•1042, 1659

Local Sales Offices & Reps

AL	Huntsville, Jack W. Harvey & Assocs.	205-536-4414
AZ	Scottsdale, Murata Erie N. America	602-941-2667
CA	Los Altos, Recht. Assocs.	415-964-6321
CA	Palo Alto, Murata Erie North America	415-327-1520
CA	Santa Ana, Murata Erie North America	714-835-4822
FL	Maitland, Murata Erie North America	305-644-0954
FL	Plantation, Innovative Mktg., Inc.	305-583-8895
GA	Marietta, Murata Erie N. America	404-952-9777
IL	Des Plaines, Murata Erie North America	312-297-5560
IN	Ft. Wayne, Murata Erie North America	219-484-1528
IN	Indianapolis, Jack Harvey & Assocs.	317-872-1031
IN	Kokomo, Jack Harvey & Assocs.	317-453-4260
MD	Columbia, Murata Erie North America	301-992-6612
MA	Wakefield, Murata Erie North America	617-245-7880
MN	Plymouth, Murata Erie North America	612-553-1594
NJ	Springfield, Radix	201-467-4970
NC	Greensboro, Murata Erie North America	919-299-1905
OK	Tulsa, Murata Erie N. America	918-663-2882
OR	Beaverton, Caruso & Northcutt, Inc.	503-646-4973
TN	Johnson City, Jack Harvey & Assocs.	615-928-7588
TX	Richardson, Murata Erie North America	214-238-8211
WA	Bellevue, Caruso & Northcutt, Inc.	206-454-9699

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Phoenix, R.V. Weatherford	602-272-7144
AZ	Tempe, Arrow Elctrns.	602-968-4800
AZ	Tempe, Powell Elctrns.	602-967-7538
AZ	Tempe, Time Elctrns.	602-967-2000
CA	Anaheim, Time Elctrns.	714-937-0911
CA	Anaheim, R.V. Weatherford Co.	714-547-0981
CA	Belmont, Varitech Elctrns.	415-593-3300
CA	Chatsworth, Shelley Elctrns.	213-998-3333
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Costa Mesa, Powell Elctrns.	714-754-1717
CA	Garden Grove, Inductive Prods. Inc.	714-892-7749
CA	Garden Grove, Natl. Capacitor Supp.	213-598-9611
CA	Glendale, R.V. Weatherford Co.	213-849-3451
CA	Inglewood, Newark Elctrns.	213-678-0441
CA	Mountain View, Shelly Elctrns.	415-969-1820
CA	Newport Beach, Arrow Elctrns.	714-851-8961
CA	Pomona, R.V. Weatherford Co.	714-623-1261
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Diego, R.V. Weatherford Co.	714-695-1700
CA	San Diego, Arrow Elctrns.	714-565-4800
CA	Santa Clara, Pyramid Elctrns. Supp.	408-727-9810
CA	Santa Clara, Intl. Standard Comps.	408-496-0411
CA	Sunnyvale, Acacia Sls.	408-745-7200
CA	Sunnyvale, R.V. Weatherford Co.	408-738-8694
CA	Sunnyvale, Capsco	408-734-3020
CA	Sunnyvale, Powell Elctrns.	408-739-4321
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Sunnyvale, Time Elctrns.	408-734-9888
CA	Torrance, Time Elctrns.	213-320-0880
CO	Aurora, Arrow Elctrns.	303-696-1111
CO	Boulder, Shelley Elctrns.	303-442-2718
CO	Denver, Newark Elctrns.	303-423-7941
CO	Denver, R.V. Weatherford Co.	303-428-6900
CO	Englewood, Time Electrns.	303-850-7701
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Orange, Milgray Elctrns.	263-795-0711
CT	Wallingford, Cronin Elctrns.	203-265-3134
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Ft. Lauderdale, Time Elctrns.	305-974-4800
FL	Ft. Lauderdale, Newark Elctrns.	305-587-2372
FL	Ft. Lauderdale, Powell Elctrns.	305-979-5000
FL	Palm Bay, Arrow Elctrns.	305-725-1480
FL	Winter Park, Milgray Elctrns.	305-647-5747
GA	Atlanta, Milgray Elctrns.	404-393-9666
GA	Norcross, Newark Elctrns.	404-448-1300
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Inds.	312-982-9210
IL	Rosemont, Advent Elctrns.	312-297-6200
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Advent Elctrns.	317-872-4910
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IA	Cedar Rapids, Advent Elctrns. Inc.	319-363-0221
KS	Overland Park, Milgray Elctrns.	913-236-8800
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Baltimore, Resco	301-823-0070
MD	Beltsville, Resco	301-937-9100
MD	Columbia, Time Elctrns.	301-964-3090
MD	Columbia, Powell Elctrns.	301-621-4070
MD	Rockville, Milgray Elctrns.	301-468-6400
MA	Burlington, Milgray Elctrns.	617-272-6800
MA	Needham, Cronin Elctrns.	617-449-5000
MA	Westboro, Powell Elctrns.	617-366-6100
MA	Woburn, Time Elctrns.	617-935-8080
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-7220
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Grand Rapids, Arrow Elctrns.	616-243-0912
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minneapolis, The Joel Co.	612-545-5669
MN	Minneapolis, Newark Elctrns.	612-331-6350
MO	St. Louis, Time Elctrns.	314-391-6444
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Englewood, Powell Elctrns.	201-894-0800
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Marlton, Arrow Elctrns.	609-596-8000
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NJ	Whippany, Tonar Inds.	201-884-1400
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Buffalo, Newark Elctrns.	716-892-4321
NY	Farmingdale, Arrow Elctrns.	516-293-6363
NY	Farmingdale, Arrow Elctrns.	516-694-6800
NY	Farmingdale, Milgray Elctrns.	516-420-9800
NY	Hauppauge, Time Elctrns.	516-273-0100
NY	Hauppauge, Fairmont Elctrns.	516-231-3313
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Lynbrook, Varitech Elctrns.	516-593-9300
NY	Melville, Arrow Elctrns.	516-391-1485
NY	Pittsford, Milgray Elctrns.	711-385-9330
NY	Rochester, Arrow Elctrns.	716-275-0300
NC	Cary, Powell Elctrns.	919-467-1212
NC	Charlotte, Elctrn. Mktg. Corp.	704-394-6195
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Raleigh, Resco/Raleigh	919-781-5700
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Cleveland, Milgray Elctrns.	216-447-1520
OH	Cleveland, Newark Elctrns.	216-361-4700
OH	Columbus, Elctrn. Mktg. Corp.	614-299-4161
OH	Columbus, Newark Elctrns.	614-451-0002
OH	Dayton, Elctrn. Mktg. Corp.	513-439-3441
OH	Highland Hts., Elctrn. Mktg. Corp.	216-442-3441
OH	Solon, Arrow Elctrns.	216-248-3990
OK	Tulsa, Arrow Elctrns.	918-665-7700
OR	Lake Oswego, Moore Elctrns.	503-684-3100
OR	Portland, Newark Elctrns.	503-257-0741
OR	Tigard, Arrow Elctrns.	503-684-1690
PA	Broomall, Time Elctrns.	215-359-1200
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Versailles, Newark Elctrns.	412-834-8504
TX	Addison, R.V. Weatherford Co.	214-931-7333
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Dallas, Powell Elctrns.	214-350-4186
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Garland, Newark Elctrns.	214-494-5911
TX	Houston, Arrow Elctrns.	713-530-4700
TX	Houston, R.V. Weatherford Co.	713-688-7406

UT	Salt Lake City, Arrow Elctrns.	801-539-1135
VA	Richmond, Arrow Elctrns.	804-282-0413
WA	Bellevue, Arrow Elctrns.	206-634-4800
WA	Seattle, R.V. Weatherford Co.	206-575-1340
WI	Oak Creek, Arrow Elctrns.	414-764-6600
WI	Waukesha, Bell Inds.	414-784-0235

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Local Sales Offices & Reps

CA	Los Angeles, Yarbrough Sls.	213-254-5101
CA	San Anselmo, Technology Sys.	415-459-2774
CO	Littleton, The McCarthy Co.	303-773-0643
GA	Atlanta, Biondo Assoc.	404-394-9640
MA	Newtonville, Shain Assocs.	617-965-3060
MN	Edina, Wendell Lee & Assoc.	612-831-5056
OH	Akron, Augnat Assoc.	216-273-1211
PA	Orwigsburg, Jase Assoc.	717-366-1109
TX	Cypress, Wessco	713-469-7814

MVP ELCTRNS., 1161 N. Tustin, Orange, CA 92667, Tel: 714-639-9246, Telex: 678401; Empl.: 4; *Sls. Mgr.:* M. Vander Plaats

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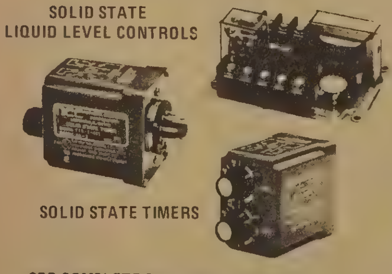

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NANMAC CORP., 9 Mayhew St., Framingham, MA 01701, Tel: 617-872-4811; Empl.: 32; *Sls. Mgr.:* G. Nanigian; *Dist. Mgr.:* J. Manigian

NARDA MICROWAVE CORP., 435 Moreland Rd., Hauppauge, NY 11788, Tel: 516-231-1700, TWX: 510-221-1867; *Sls. Mgr.:* John Coppola

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Local Sales Offices & Reps

CA	Hayward	415-493-1100
CO	Englewood	303-797-8448
IL	Elk Grove Village	312-593-8100
OR	Portland	503-620-9400
TX	Houston	713-464-8555

NATIONAL ELCTRN. DISTRS. ASSN., 1420 Renaissance Dr., Ste. 211, Park Ridge, IL 60068, Tel: 312-298-9747

NATIONAL INSTRUMENTS, 12109 Technology Blvd., Austin, TX 78759, Tel: 512-250-9119, Telex: 756737 NAT INST AUS; *Sls. Mgr.:* Don Nadon .... **3**•1266

Local Sales Offices & Reps

AZ	Phoenix, Odyssey 1	602-246-8846
CA	Mountain View, Thorson West	415-964-9300
CO	Castle Rock, Odyssey 1	303-688-3555
IL	Elmhurst, Sector Engrg. Sls.	312-530-7850
IN	Indianapolis, Sector Engrg. Sls.	317-842-1120
MD	Linthicum, KD Assocs.	301-859-5151
MA	Reading, Scheinfein Assocs.	617-944-2304
MN	Bloomington, Sector Engrg. Sls.	612-888-6920
NM	Albuquerque, Odyssey	505-265-6645
OH	Chesterland, EQS Systems	216-729-2222
WI	Milwaukee, Sector Engrg. Sls.	414-352-8280

Local Distributors

AZ	Phoenix, Odyssey 1	602-246-8846
CA	Mountain View, Thorson West	415-964-9300
CO	Castle Rock, Odyssey 1	303-688-3555
IL	Elmhurst, Sector Engrg. Sls.	312-530-7850
IN	Indianapolis, Sector Engrg. Sls.	317-842-1120
MD	Linthicum, KD Assocs.	301-859-5151
MA	Reading, Scheinfein Assoc.	617-944-2304
MN	Bloomington, Sector Engrg. Sls.	612-888-6920
NM	Albuquerque, Odyssey 1	505-265-6645
OH	Chesterland, EQS	216-729-2222
WI	Milwaukee, Sector Engrg. Sls.	414-352-8280

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NATIONAL POWER TECHNLG., Natl. Technlg., 2111 Howell Ave., Anaheim, CA 92806, Tel: 714-937-1301; Empl.: 85; *Sls. Mgr.:* Harold Myers .... **3**•1660

Local Sales Offices & Reps

CA	Canoga Park, Cummings & Assocs.	818-340-6035
CA	Palo Alto, Abbott Engrg. Co., Inc.	415-968-2265
CA	San Diego, Mesa Engrg.	619-278-8021
CO	Denver, Cummings & Assocs.	303-455-6860
FL	Orlando, Gillum Sls., Inc.	305-857-2110
KY	Ft. Mitchell, G. W. Thelen	606-341-8181
MD	Randallstown, Beacon North	301-655-2265
MA	Chelmsford, Encotronics	617-256-4207
NY	Wantagh, Bytec	516-781-7400; 201-531-7792
OH	Medina, G. W. Thelen	216-727-1293
TX	Irving, Kite Elctrn. Sls. Co., Inc.	214-438-9336
UT	Salt Lake City, Cummings & Assocs.	801-263-8131
VA	Fairfax, Beacon North	703-591-1300
VA	Forest, Beacon North	804-239-8486
WA	Bellevue, Underwood-Hanify	206-451-8223
WA	Vancouver, Underwood-Hanify	206-695-2311
WI	Greenfield, Olympic	414-281-9294

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NATIONAL SOLID STATE DEVELOPMENT, INC., See NSD

NATIONAL SONICS/XERTEX CORP., 250 Marcus Blvd., Hauppauge, NY 11787, Tel: 516-273-6600, Telex: 14-4545; Empl.: 140; *Sls. Mgr.:* John Kristoffersen

NATIONAL-STANDARD CO., 601 N. 8th, Niles, MI 49120, Tel: 616-683-8100, Telex: 25-8453, TWX: 810-270-3153; Empl.: 1000; *Sls. Mgr.:* J. L. Dayton; *Dist. Mgr.:* J. L. Dayton

NATIONAL TELEPHONE & ELCTRNS. INC., 7561 N.W. 77th Terr., Miami, FL 33166, Tel: 305-885-9423; Empl.: 30

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NATIONAL TEL-TRONICS, State Road Hill, Meadville, PA 16335, Tel: 814-724-6440, Telex: NATL TELMEAD 91-4405; Empl.: 250; *Sls. Mgr.:* Marion K. Manzi; *Dist. Mgr.:* Marion K. Manzi .... **2**•1530, 1531

Local Sales Offices & Reps

AL	Birmingham, Southeastern First Rep	205-967-7082
AZ	Phoenix, Finn-Pat Co.	602-954-0301
CA	Garden Grove, West Elctrn. Sls. Co.	714-898-0120
CA	San Diego, CK Associates	619-279-0420
CA	Santa Ana, Electrotechnical Sales	714-546-9305
CA	Sunnyvale, Ward Elctrn. Packaging Sls.	408-730-0993
CO	Denver, Donohue Sls. Co.	303-455-1719
CT	Wallingford, Marathon Sls. Ltd.	
FL	Kissimmee, Southeastern First Rep	305-846-1306
FL	Melbourne, Southeastern First Rep	305-784-4723

FL	North Palm Beach, Southeastern First Rep	305-844-3758
GA	Atlanta, Southeastern First Rep	404-393-2073
IL	Chicago, Electro-Mech Sls. Co.	312-777-0554
IN	Columbus, Tech. Reps.	812-376-9226
IA	Des Moines, Beams Co.	515-255-1148
KS	Shawnee Mission, Beams Co.	913-631-0300
MA	Hopkinton, Marathon Sls. Ltd.	617-435-6984
MI	Union Lake, Randall Sales Inc.	313-363-7129
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
MO	St. Louis, Beams Co.	314-569-1069
NJ	Cherry Hill, Ned Krouse Assocs.	609-424-3543
NJ	Nutley, Falk-Baker Assocs.	201-661-2430
NY	E. Syracuse, Nycom	315-437-8343
NC	Raleigh, RepCo Mktg.	919-787-7887
OH	Akron, Imtech	216-666-1185
OH	Dayton, Imtech	513-278-6507
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Pittsburgh, Imtech	412-344-0844
TN	Greeneville, Dimark	615-639-0113
TX	Dallas, Allied Comps.	214-238-0408
TX	Houston, Allied Comps.	713-988-1600
TX	Hurst, Allied Comps.	817-589-0456
TX	Round Rock, Allied Comps.	512-244-1166
UT	Salt Lake City, Meridian Mktg.	801-968-4177
WA	Bellevue, Panoco	206-454-2503

Local Distributors

AZ	Phoenix, Tri-Tek, Inc.	602-995-9352
CA	Anaheim, Besco Industries	714-635-0380
CA	Haywood, Allied Elctrns.	415-487-5250
CA	Industry, Ital Electronics	818-968-8515
CA	Redondo Beach, Mark Elctrns.	213-772-2141
CA	San Jose, Besco Industries	408-946-8980
CA	Santa Ana, Compu Serv	714-546-5140
CA	Santa Ana, CR Elctrns.	714-556-2040
CO	Arvada, Denver Wintronics	303-431-7161
CO	Denver, CSID	303-292-9594
CT	Bethel, Heilind Elctrns.	203-797-8600
FL	Pompano Beach, Components South	305-971-0350
IL	Elgin, Allied Elctrns.	312-697-8200
IL	Franklin Park, Besco Industries	312-451-1230
IN	Fort Wayne, Graham Elctrn.	219-423-3422
IN	Indianapolis, Graham Elctrn.	317-634-8202
MA	Burlington, Heilind Elctrns.	617-272-5610
MA	Lynn, Land Elctrns.	617-592-2220
MN	Fridley, Voyager Elctrns. Corp.	612-571-7766
NH	Dover, American Radio	603-742-6800
NH	Hudson, Heilind Elctrns.	603-883-9536
NJ	Clifton, Meltronics, Inc.	201-340-3200
NY	Buffalo, Summit Distributors	716-884-3450
NY	Port Washington, Connector Concepts	516-883-3800
NY	Rochester, Summit Distributors	716-334-8110
NC	Winston-Salem, Kirkman Elctrns. Inc.	919-722-9131
OH	Centerville, Charles V. Clark	513-435-3000
OR	Portland, United Radio Supp.	503-233-7151
PA	Huntingdon Valley, Shap Elctrns.	215-322-7150
TX	Dallas, Heilind Elctrns.	214-351-2058
TX	Ft. Worth, Allied Elctrns.	817-336-5401
WA	Seattle, Pacific Elctrns.	206-575-1050

NATIONAL WIRE & CABLE CORP., 136 San Fernando Rd., Los Angeles, CA 90031-1780, Tel: 213-225-5611, Telex: 181409, TWX: 910-321-4155; FSC No.: 04569; Empl.: 225 .... 2•2116-2132

Local Sales Offices & Reps

AZ	Phoenix, Coker Assoc.	602-277-7148
AR	Fort Smith, Electro-Related Prod.	501-452-4130
CA	Redwood City, National Wire & Cable	415-365-1952
CA	San Diego, McKinley Elctrn. Sls.	619-271-7221
CA	Santa Clara, Ross Mktg.	408-988-8111
CO	Arvada, Arrowhead Sls.	303-423-5556
FL	Altamonte Springs, Gugel-Tuttle Assocs.	305-788-0845
FL	Orlando, National Wire & Cable	305-898-3801
GA	Lawrenceville, Tek-Rep Mktg.	404-963-1600
HI	Hilo, Kirco Corp.	808-959-3888
IL	Northfield, H. S. Tollaksen	312-441-6644
KS	Baxter Springs, P.M.I. Sls.	316-856-2133
MD	Glen Burnie, Faion Lott	301-744-4611
MA	Needham, Mullin Tech. Sls.	617-444-4740
MI	Livonia, Luebbe Sls.	313-477-3131
MN	Edina, Electro Sls. Inc.	612-941-2143
NJ	Wayne, GT Assoc.	201-694-6040
NY	Farmingdale, National Wire & Cable	516-752-8038
NY	Sodus, Kehoe Comp. Sls.	315-483-9122
OH	Cincinnati, Luebbe Sls.	513-891-5770
OH	Cleveland, Luebbe Sls.	216-333-0425
OH	Dayton, Luebbe Sls.	513-294-0426
PA	Hatboro, Jacobsen Assocs.	215-674-2937
TX	Fort Worth, J. H. Gibbs Assocs.	817-430-1861
WA	Olympia, Bergford Assocs.	206-866-2001

NATIONWIDE ELECTRONIC SYSTEMS, See NES, Inc.

NAUGLER ENGRG., Off Dunham Rd., Beverly, MA 01915, Tel: 617-922-5634; FSC No.: 05222; Empl.: 10; *Sls. Mgr.:* Charles A. Osborn

NAZ-DAR INTL., 1087 N. Branch St., Chicago, IL 60622, Tel: 312-943-8338, Telex: 25-3303; Empl.: 53; *Sls. Mgr.:* Don Finwall; *Dist. Mgr.:* Don Finwall

N.C.E., Mail Station 331, 9925 Lyndale Ave. S., Bloomington, MN 55420, Tel: 612-890-1360; *Sls. Mgr.:* Hortense M. Rowe .... 3•1420, 1421

NCR COMTEN, INC., NCR Corp., 2700 Snelling Avenue N., St. Paul, MN 55113, Tel: 612-638-7777, Telex: 6879018 COMTEN, TWX: 910-563-3661; FSC No.: 7025-0010; *Sls. Mgr.:* Lewis M. Meador

NCR MICROELECTRONICS DIV., NCR Corp., 8181 Byers Rd., Miamisburg, OH 45342, Tel: 800-543-5618, 513-866-7471, Telex: 241669 NCR NVEM MSBG; FSC No.: 60924; *Sls. Mgr.:* W. David Major

NCR CORP., Terminal Sys Div., Babcock Hall, Terrace Hill, Ithaca, NY 14850, Tel: 607-273-5310

NEC ELCTRNS. USA INC., NEC Electron Div., 252 Humboldt Ct., Sunnyvale, CA 94086, Tel: 408-745-6520, Telex: 35-7475, TWX: 910-339-9539; *Sls. Mgr.:* Robert Buchanan; *Dist. Mgr.:* Jason Stewart

NEC INFOR. SYS., 5 Militia Dr., Lexington, MA 02173, Tel: 617-862-3120, Telex: 92-3434; Empl.: 250; *Sls. Mgr.:* Harry Segal

NEDA, See National Elctrn. Distrs. Assn.

NEFF INSTR., 700 S. Myrtle Ave., Monrovia, CA 91016, Tel: 818-357-2281, TWX: 910-585-1833; Empl.: 125; *Sls. Mgr.:* James T. Barber

NELSON STUD WELDING TRW INC., 28th & Toledo Ave., Lorain, OH 44055, Tel: 216-245-6931, Telex: 980466; Empl.: 350; *Sls. Mgr.:* B. Robinson

NEPENTHE/YAMAICHI, 2471 E. Bayshore, #520, Palo Alto, CA 94303, Tel: 415-856-9332, TWX: 910-373-2060; FSC No.: 415.856 8650; *Sls. Mgr.:* G. Hall

NESHAMINY TRANSFORMER, Neshaminy Electronics Corp., Edison-Furlong Road, Furlong, PA 18925, Tel: 215-794-7411; *Sls. Mgr.:* Philip Klein

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Local Sales Offices & Reps

CA	Palo Alto, Priz Co.	415-326-9333
IL	Moline, Jim Otis & Assocs.	309-762-9311
IN	Indianapolis, Electro Dev. & Engrg. Co.	317-547-5274
LA	Baton Rouge, Control Sys. Consultants	504-292-1462
MD	Baltimore, Wistex, Inc.	301-366-6303
NE	Lincoln, Jim Otis & Assocs.	402-474-2390
NY	Albany, L-Tron Assocs. Corp.	518-482-1987
NY	Rochester, L-Tron Assocs. Corp.	716-436-4410
OH	Cincinnati, Anderson-Bolds	513-528-5680
OH	Cleveland, Anderson-Bolds	216-229-4700
PA	Wayne, Wistex, Inc.	215-687-5930
UT	Sandy, Priz Co.	801-571-7311
WI	Brookfield, BII, Inc.	414-783-5252

Local Distributors

IL	Bridgeview (Chicago), Norman Equip. Co.	312-430-4000
KY	Louisville, Main Elec.	502-587-6511
MN	St. Paul, Century Controls	612-222-7355
NC	Charlotte, General Elctrn. of Charlotte	704-568-6793
SC	Charleston, Flow Control	803-722-0176
TX	Houston, Quality Instr. Lab	713-524-0528

NETCOM, 3002 Commercial Ave., Northbrook, IL 60062, Tel: 312-564-5100, TWX: 910-686-5478; FSC No.: 57193; Empl.: 85; *Sls. Mgr.:* Wayne Roeder

NEUTRIK PRODUCTS, 77 Selleck St., Stamford, CT 06902, Tel: 203-348-2121; Empl.: 40; *Sls. Mgr.:* Peter Wellikoff

Local Sales Offices & Reps

CA	North Hollywood, MCS Mktg.	818-980-1188
CA	Santa Clara, Warren Assocs.	408-988-7762
CO	Wheatridge, Brake & Assocs.	303-431-5791
FL	Miami, World Wide Products	305-754-5475
GA	Atlanta, Millar Elctrns.	404-261-6160
IL	Northbrook, Steffey Mktg.	312-480-3575
IN	Fort Wayne, N. Browning & Co.	219-432-9738
KS	Kansas City, BC Elctrn. Sls.	913-342-1211
KS	Wichita, BC Elctrn. Sls.	316-942-9840
KY	Louisville, N. Browning & Co.	502-955-6473
MD	Wheaton, Taub Sls.	301-942-3100
MA	Braintree, Anderson Sls.	617-848-9194
MI	Ann Arbor, Audio Mktg. Concepts	313-663-9733
MN	Golden Valley, Ambassador Indl. Mktg.	612-542-8437
MO	Bridgeton, BC Elctrn. Sls.	314-291-1101
NJ	Englewood, Baum & Epstein Assocs.	212-564-4105
NY	Baldwinsville, Darmstedter Assocs.	315-638-1261
NC	Raleigh, Millar Elctrns.	919-787-9564
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Erie, N. Browning & Co.	814-456-6435
TX	Dallas, Dimenson Mktg.	214-348-9657
WA	Seattle, Earl & Brown Co.	206-284-1121

NEW ENGLAND INSTR., 14 Kendal Lane, Natick, MA 01760, Tel: 617-875-9711, TWX: 710-346-0398; Empl.: 600

NEW ENGLAND SMELTING WORKS, INC., 502 Union St., W. Springfield, MA 01090, Tel: 413-734-6491; FSC No.: 3439; Empl.: 35; *Sls. Mgr.:* David R. Saffer

Local Sales Offices & Reps

MI	Southfield, New England Smelting Wks. Sls.	313-355-0393; 800-521-0352

NEW HAMPSHIRE BALL BEARINGS, INC., Rte. 202, Peterborough, NH 03458, Tel: 603-924-3311, TWX: 710-364-1805; Empl.: 1000

NEW HAVEN WIRE & CABLE, P.O. Box 266, New Haven, IN 46774, Tel: 219-493-4489, Telex: 232414; Empl.: 52

NEWMAN, M. M., CORP., Heli-Tube Div., P.O. Box 615, Marblehead, MA 01945, Tel: 617-631-7100; FSC No.: 09106; *Sls. Mgr.:* C. Loutrel; *Dist. Mgr.:* C. Loutrel .... 2•2133

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Milwaukee .... (414) 643-0554
ALL OTHER STATES .... (800) 962-8128

NEWPORT ELECTRONICS, 630 E. Young St., Santa Ana, CA 92705, Tel: 714-540-4914, TWX: 910-595-1787; Empl.: 150 .... **3**•1342, 1343

Local Sales Offices & Reps

AZ	Phoenix, PLS Assocs.	602-246-6614
CA	Campbell, Luscombe Engrg. Co.	408-370-2020
CA	Pasadena, Luscombe Engrg. Co.	213-684-2000
CO	Englewood, PLS Assocs.	303-773-1218
FL	Orlando, Gra-Mar	305-894-3351
IL	Arlington Hgts., Brainard-Wilson	312-437-2700
IN	Carmel, Brainard-Wilson	317-844-2800
KS	De Soto, Midtec Assocs.	913-441-6565
LA	Baton Rouge, Alpha Engrg.	504-769-3740
MD	Perry Hall, Electra-Tech	301-256-2723
MA	Bedford, Eastronix, Inc.	617-275-5775
MI	Farmington, Amtech Reps.	313-474-8300
MN	Eden Prairie, Rockmore Sls. Corp.	612-941-1390
MO	Florissant, Midtec Assocs.	314-837-5200
NJ	Parlin, JMR Sls.	201-727-5335
NM	Albuquerque, PLS Assocs.	505-345-5501
NY	East Setauket, JMR Sls., Inc.	516-689-8871
NY	Skaneateles, ADN Entprs.	315-685-8991
OH	Centerville, Dolfuss-Root & Co.	513-433-6776
OH	Strongsville, Dolfuss-Root & Co.	216-238-0300
PA	Bridgeville, Dolfuss-Root & Co.	412-221-4420
PA	King of Prussia, J. E. Cuesta & Co., Inc.	215-265-5800
TX	Addison, Associated Dynamics, Inc.	214-387-3800
TX	Sugarland, Alpha Engrg.	713-491-4505
UT	Midvale, PLS Assocs.	801-566-0671
VA	Dumfries, Electra-Tech	703-670-6962
WI	Menomonee Falls, Brainard-Wilson	414-255-3400

Local Distributors

AL	Birmingham, Brownell-Electro, Inc.	205-322-3374
AL	Muscle Schoals, Jones Elctrns.	205-383-1241
AZ	Phoenix, Metermaster	602-437-1425
AZ	Scottsdale, Beta Distrs.	602-947-7841
CA	Costa Mesa, FLW, Inc	714-751-7512
CA	Hayward, FLW, Inc.	415-487-2222
CA	Los Angeles, EIL Instrs., Inc.	213-685-7020
CA	Los Angeles, Metermaster	213-685-4340
CA	Van Nuys, FLW, Inc.	818-989-5238
CO	Englewood, Beta Distrs.	303-779-4494
CT	Middletown, EIL Instrs., Inc.	203-346-6646
FL	Miami, Brownell Electro, Inc.	305-591-3215
GA	Atlanta (Hapeville), Brownell Electro	404-762-5181
GA	Marietta, FLW, S.E.	404-424-1731
IL	Chicago, Data Elctrns. Co.	312-283-0300
IL	Elk Grove Village, Metermaster	312-593-8650
IN	Indianapolis, Data Elctrns.	317-359-5368
IA	Davenport, Universal Precision Instr.	319-326-5757
KS	Kansas City, Kornfeld Thorp	913-321-7070
KY	Louisville, EIL Instrs.	502-454-3420
LA	Baton Rouge, Beta Distrs.	504-924-6826
MD	Gaithersburg, Pioneer Instrs.	301-921-0660
MD	Sparks, EIL Instr.	301-771-4800
MA	Waltham, Calibron Instrs.	617-894-6440
MI	Livonia, Pioneer Instr.	313-525-1800
MI	Madison Heights, NIDI	313-588-2300
MN	Plymouth, Data Elctrns.	612-559-1434
MO	St. Louis, Universal Precision Inst.	314-394-4693
NJ	North Caldwell, Hosica Labs.	201-256-7724
NM	Albuquerque, Beta Distrs.	505-299-7658
NY	Buffalo, Robert F. Lamb Co.	716-874-4900
NY	Clarence, Trott Elctrns.	716-634-8500
NY	Hauppauge, EIL Instrs., Inc.	516-231-6333
NY	NYC, Brownell Electro	212-691-1171
NY	Rochester, Robert F. Lamb Co.	716-323-1250
NC	Concord, FLW Southeast	704-782-6615
NC	Raleigh, Brownell Electro	919-876-6524
OH	Cleveland, Weschler Elec.	216-238-2550
OH	Cleveland, Metermaster	216-651-4100
OH	Cleveland, Pioneer Instr.	216-587-3600
OH	Dayton, EIL Instrs., Inc.	513-435-2134
OH	Dayton, Pioneer Instr.	513-236-9900
OH	Dayton, NIDI	513-434-7500
OK	Tulsa, Inotek	918-622-8570
OR	Portland, Westcon	503-283-0132
PA	Pittsburgh, Pioneer Instr.	412-782-2300
TN	Memphis, FLW Southeast	901-345-3563
TN	Nashville, Brownell Electro, Inc.	615-889-8230
TX	Austin, Beta Distrs.	512-452-0199
TX	Dallas, Dallas Meter Tek	214-349-6044
TX	Dallas, Inotek	214-243-7000
TX	Ft. Worth, Inotek	817-831-2126
TX	Garland, Metermaster	214-271-5671
TX	Houston, American Analog	713-941-7265
TX	Houston, Inotek	713-688-7000
TX	Houston, Beta Distrs.	713-688-9971
TX	Richardson, Beta Distrs.	214-231-2573
UT	Murray, Beta Distrs.	801-262-3000
VA	Richmond, Metermetrics	804-275-1431
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N.Y. TESTING LABS., INC., 81 Urban Ave., Westbury, NY 11590, Tel: 516-334-7770, TWX: 212-297-1449; Empl.: 50

NIC COMPONENTS CORP., 238 Rte. 109, Farmingdale, NY 11735, Tel: 516-694-0060, 800-645-9333, Telex: 221-228; Empl.: 50; *Sls. Mgr.:* Ronald J. Travis; *Dist. Mgr.:* Nancy Lamendola .... **1A**•1152, 1153, 1906

Local Sales Offices & Reps

AL	Huntsville, Novus Group	205-881-2207
AZ	Phoenix, Sterling Elctrns.	602-258-4531
AZ	Phoenix, Tech Sls.	602-246-1614
AR	Little Rock, Carlton Bates	501-562-9100
CA	Fullerton, Pyramid Elctrns.	714-773-0781
CA	Mission Viejo, Par Mktg.	714-768-6021
CA	Redwood City, James S. Heaton Co.	415-367-9000
CA	San Diego, Ryno	619-292-6022
CA	San Diego, Bestronic South	619-452-5500
CA	Santa Ana, Projections Unlimited	714-641-1472
CA	Sun Valley, QC Comps.	213-768-6111
CT	Bloomfield, SLR Assocs.	203-243-9343
CT	Danbury, Pilgrim Elctrns.	203-792-7274
FL	Clearwater, Perrott Assocs.	813-443-5214
FL	Largo, Graham Elctrns.	813-541-4434
IL	Champaign, Klaus Radio	217-356-1896
IL	Lisle, W. G. Controls	312-963-5954
IL	Melrose Park, Belford Elctrns,	312-865-2400
IN	Fort Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Elctrn. Rep. Inc.	317-894-1414
IA	Cedar Rapids, Deeco	319-365-7551
KS	Shawnee Mission, K&M Sls.	913-262-1444
KY	Louisville, Peerless	502-637-7674
LA	Harvey, AFG	504-368-9696
MD	Baltimore, Burgin-Kreh Assocs.	301-265-8500
MD	Rockville, MS Elctrns.	301-340-6400
MA	Bedford, SLR Assocs.	617-275-5550
MA	Burlington, TLC	617-273-0140
MI	Detroit, Burcaw Co.	313-533-7700
MI	Grand Rapids, SF Elctrns.	616-459-0216
MI	Livonia, Reptron	313-525-2700
MN	Bloomington, NWR	612-854-7329
MN	Golden Valley, Ambassador Ino Mktg.	612-542-8437
NH	Londonderry, S Squared	603-434-2033
NJ	Perth Amboy, Sterling	201-442-8000
NJ	Union, Cougar	201-687-7722
NY	Hauppauge, Belmont Elctrns.	516-273-1333
NY	Jericho, J-Square Mktg. Inc.	516-935-3200
NY	Suffern, M&M Assoc.	914-368-0583
NC	Greensboro, United Sls.	919-674-9849
OH	Cincinnati, Stegman Blaine Mktg. Inc.	513-729-1969
OH	Cincinnati, Graham Elctrns.	513-772-1661
OH	Dayton, Dulian	513-445-0424
OH	Vandalia, Stegman Blaine Mktg. Inc.	513-890-7975
OR	Beaverton, ACACIA	503-646-3377
PA	Philadelphia, Paragon Sls.	215-563-7060
TN	Nashville, Graham	615-242-2682
TX	Dallas, Heiland Elctrns.	214-351-2050
TX	Dallas, Design Mktg.	214-680-9767
TX	Hurst, Design Mktg.	817-268-2004
UT	S. Jordan, Mac III	801-566-3781
EXP	New York Farmingdale, NIC Comps. Corp.	516-694-0060

NICHICON (AMERICA) CORP., 927 E. State Pkwy., Schaumburg, IL 60195, Tel: 312-843-7500, Telex: 20-6577; FSC No.: 312-843-2798; *Sls. Mgr.:* Russ Edwards; *Dist. Mgr.:* Robert Poteracki .... **1A**•1154-1159

Local Sales Offices & Reps

AL	Huntsville, Intrep Assocs.	205-533-1730
AZ	Phoenix, Compass Mktg.	602-266-5400
CA	Huntington Bch., J. J. Riley & Assoc.	714-841-1411
CA	Santa Clara, I2 Inc.	408-988-3400
CO	Denver, West Inc.	303-692-0131
CT	Stratford, Gerald Rosen Co.	203-375-5456
FL	Clearwater, Delmac Sls.	813-447-5192
FL	Miami, Delmac Sls.	305-726-1330
FL	Orlando, Delmac Sls.	305-898-4688
GA	Norcross, Intrep Assocs.	404-449-8680
IL	Chicago, IRI	312-647-7755
IN	Indianapolis, Jack Harvey Assoc.	317-453-4260
MA	Framingham, Gerald Rosen Co.	617-879-5505
MI	Gross Pointe, Greiner Assoc.	313-499-0188
MN	Minneapolis, R. W. Marshall	612-929-0457
MO	Earth City, Centech	314-291-4230
MO	Raytown, Centech	816-358-8100
NJ	Springfield, Radix Inc.	201-467-4970
NM	Albuquerque, Compass Mktg.	505-292-7377
NY	Syracuse, T-Squared Elctrns.	315-463-8592
NY	Victor, T-Squared Elctrns.	716-924-9101
NC	Raleigh, Zucker Assoc.	919-782-8433
OH	Columbus, KW Elctrn. Sls.	614-888-0483
OH	Dayton, KW Elctrn. Sls.	513-890-2150
OH	Shaker Hgts., KW Elctrn. Sls.	216-491-9177
PA	Allison Park, KW Elctrn. Sls.	412-287-4300
PA	Huntingdon Valley, Omega Elctrns.	215-947-4135
TX	Austin, Southern States Mktg.	512-452-9459
TX	Dallas, Southern States Mktg.	214-238-7500
TX	Houston, Southern States Mktg.	713-558-4900
WA	Bellevue, Venture Elctrns.	206-454-4594
WI	Milwaukee, IRI	414-259-0965

Local Distributors

AL	Huntsville, Hall Mark Elctrns.	205-837-8700
AZ	Phoenix, TTI	602-966-1616
AZ	Phoenix, Hall-Mark	602-437-1200
AZ	Tempe, Bell Inds.	602-966-7800
AZ	Tempe, Shelley Elctrns.	602-894-2058
CA	Chatsworth, Shelley Elctrns.	213-998-3333
CA	Chatsworth, Integrated Elctrns.	213-998-2200
CA	Fullerton, Pyramid Elctrns.	714-773-0781
CA	Irvine, Ryno Elctrns.	714-261-2500
CA	Irvine, Integrated Elctrns.	714-660-1055
CA	Irvine, Kelex Elctrns.	714-863-1230
CA	Sacramento, Integrated Elctrns.	916-424-4297
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Diego, Hall-Mark	619-268-1201
CA	San Diego, Ryno Elctrns.	619-252-6022
CA	San Jose, Shelley Elctrns.	408-942-9111
CA	San Jose, Eric Electronics	408-262-1111
CA	San Jose, Integrated Electronics	408-287-6488
CA	Sunnyvale, Hall-Mark	408-773-9990
CO	Boulder, Shelley Elctrns.	303-442-2718
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Denver, Hall-Mark	303-694-1662
CT	Hamden, Almo	203-288-6556
CT	Wallingford, Cronin Elctrns.	203-265-3134
CT	Wallingford, Sager Elctrns.	203-265-4600
FL	Clearwater, Hall-Mark	813-530-4543

FL	Ft. Lauderdale, Hall-Mark	305-971-9280
FL	Orlando, Hall Mark Elctrns.	305-855-4020
FL	Orlando, T.T.I 2	305-859-1000
FL	Tampa, Reptron	813-855-4656
GA	Norcross, Hall-Mark	404-447-8000
GA	Norcross, Spectrum	404-448-1516
IL	Arlington Hts., Reptron	312-593-7070
IL	Bensenville, Hall Mark Elctrns.	312-860-3800
IL	Chicago, Century Elctrns.	312-777-9700
IL	Elkgrove, GBL/Goold	312-593-3220
IL	Hoffman, Estates Intercomp	312-843-2040
IN	Ft. Wayne, Graham Elctrns.	619-423-3422
IN	Indianapolis, Advent Elctrn.	317-872-4910
IA	Cedar Rapids, Deeco	319-365-7551
KS	Lenexa, Hall Mark Elctrns.	913-888-4747
MD	Baltimore, Hall Mark Elctrns.	301-796-9300
MD	Rockville, Almo Elctrn.	301-251-1161
MA	Canton, Almo	617-821-1450
MA	Hingham, Saager Elctrn.	617-749-6700
MA	Needham, Cronin Elctrn.	617-449-5000
MA	Woburn, T.T.I.	617-938-8800
MA	Woburn, Hall-Mark Electr.	617-935-9777
MI	Livonia, Reptron	313-525-2700
MN	Bloomington, Hall Mark Elctrns.	612-854-3223
MN	Minneapolis, Joel	612-545-5669
MO	Earth City, Hall Mark Elctrns.	314-291-5350
NJ	Cherry Hill, Hall Mark Elctrns.	609-424-7300
NJ	Fairfield, Hall-Mark	201-575-4415
NJ	Perth Amboy, Sterling Elctrns.	201-442-8000
NY	Buffalo, Summit	716-887-2800
NY	Hauppauge, Fairmont	516-231-3313
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Rochester, Masline	716-546-5373
NY	Rome, Rome Elctrns.	800-962-2153
NY	Ronkonkoma, Hall-Mark	516-737-0600
NC	Charlotte, Dixie	704-377-5413
NC	Raleigh, Hall Mark Elctrns.	919-872-0712
NC	Raleigh, Resco/Raleigh	919-781-5700
NC	Winston-Salem, Dixie	919-724-5961
OH	Cincinnati, Hall-Mark	513-563-5980
OH	Dayton, Pioneer	513-236-9900
OH	Englewood, Argent Inds.	513-836-8633
OH	Solon, Hall-Mark	216-349-4632
OH	Solon, Repco	216-248-8900
OH	Westerville, Hall Mark Elctrns.	614-891-4555
OK	Tulsa, Hall Mark Elctrns.	918-665-3200
OR	Lake Oswego, Bell Inds.	503-241-4115
PA	Harrisburg, Cumberland	717-232-5999
PA	Harrisburg, Advacom	717-545-5674
PA	McKean, Advacom	814-476-7774
PA	Philadelphia, Almo	215-698-4000
SC	Columbia, Dixie	803-779-5332
TN	Knoxville, Dixie	615-938-4131
TX	Austin, Hall-Mark	512-258-8848
TX	Dallas, Captronics	214-340-3592
TX	Dallas, Hall Mark Elctrns.	214-341-1147
TX	Ft. Worth, T.T.I 2	817-831-0441
TX	Houston, Hall-Mark	713-781-6100
WA	Bellevue, Integrated Electr.	206-455-2727
WA	Bellevue, Bell Inds.	206-747-1515
WI	Oak Creek, Hall Mark Elctrns.	414-761-3000

NICHIFU AMERICA, INC., 1494 N. Charlotte St., Pottstown, PA 19464, Tel: 215-323-7120; *Sls. Mgr.:* Roy Allen

NICOLET COMPUTER GRAPHICS DIV., P.O. Box 3020, 777 Arnold Dr., Martinez, CA 94553, Tel: 415-372-7568, TWX: 910-481-5951 ZETAPLOTS MART; FSC No.: 52893; *Sls. Mgr.:* Bill Manos

NICOLET INSTR. CORP., Oscilloscope Div., 5225 Verona Rd., Madison, WI 53711, Tel: 608-271-3333, TWX: 910-286-2737; Empl.: 525; *Sls. Mgr.:* Dean Dawson

Local Sales Offices & Reps

AZ	Phoenix, Axtec Entprs.	602-944-9185
CA	Los Angeles, Nicolet Instr.	714-549-7611
CA	San Diego, Nicolet Instr.	619-454-6274
CA	San Jose, Nicolet Instr.	408-946-3310
CO	Littleton, Aztec Entprs.	303-795-0250
FL	Valrico, Nicolet Instr.	813-685-0444
GA	Tucker, Nicolet Instr.	404-491-0127
IL	Chicago, Nicolet Instr.	312-843-2905
MD	Lanham, Nicolet Instr.	301-459-2940
MA	Burlington, Nicolet Instr.	617-273-4404
MI	Brighton, Nicolet Instrument	313-229-4655
MN	Minneapolis, Nicolet Instr.	612-933-0048
MO	St. Louis, Nicolet Instr.	314-821-2868
NJ	Cherry Hill, Nicolet Instr.	609-665-5100
NJ	Cranford, Nicolet Instr.	201-276-6677
NM	Albuquerque, Aztec Entprs.	505-262-1688
NY	Schenectady, Nicolet Instr.	518-346-2503
NC	Charlotte, Nicolet Instr. Corp.	704-364-0240
OH	Chardon, Nicolet Instr.	216-951-8249
OH	Hamilton, NIC Inst.	513-868-3611
PA	Beaver Falls, Nicolet Instrument	412-847-0100
TX	Plano, Nicolet Instr.	214-422-4014
UT	Salt Lake City, Aztec Entprs.	801-621-1655
WA	Edmonds, Nicolet Instr. Corp.	206-771-2400
WI	Madison, Nicolet Instr.	608-273-5008

NICOLET PARATRONICS, 201 Fourier Ave., Fremont, CA 94539, Tel: 415-490-8300, TWX: 910-381-7030; FSC No.: 6625; Empl.: 95; *Sls. Mgr.:* Ernie Marsh

Local Sales Offices & Reps

AL	Huntsville, Magaro & Assocs.	205-882-0827
AZ	Phoenix, Zeus	602-263-6022
CA	Carson, Amasco	213-516-8561
CA	Sunnyvale, Amasco	408-733-8690
CO	Denver, Zeus	303-321-4246
CT	Danbury, Martindale Assoc.	203-748-2253
FL	Orlando, Datarep, Inc.	305-843-5224
FL	Tampa, Datarep, Inc.	813-962-7555
GA	Atlanta, Magaro & Assocs.	404-451-8862
IL	Downers Grove, Charles Menshek	312-964-8700
IN	Carmel, Carter, McCormic, & Peirce, Inc.	317-844-4175
MD	Burtonsville, Eastern Instr.	301-384-8500
MA	North Reading, Martindale Assoc.	617-942-0514
MI	Farmington, Carter, McCormic, & Peirce, Inc.	313-477-7700
MO	Kansas City, Eir Company	816-452-7030
MO	Leasburg, Eir Company	314-895-4100
NJ	Ridgefield, Rical Assocs.	201-945-5250
NM	Albuquerque, Zeus Elctrns.	505-256-9831
NY	Earlton, Martindale-Paul, Inc.	518-634-7617
NY	Rochester, Martindale-Paul, Inc.	716-288-8611
NY	Syracuse, Martindale-Paul, Inc.	315-432-1141
NC	Greensboro, Magaro & Assocs.	919-294-4783
OH	Englewood, Carter, McCormic & Peirce, Inc.	513-836-0951
OH	Fairview Park, Carter, McCormic, & Peirce, Inc.	216-779-1700
PA	Jenkintown, Monument Techn. Assoc.	215-884-3737
PA	Monroeville, Carter, McCormic & Peirce, Inc.	412-372-4415
TX	Austin, Testech	512-327-7033
TX	Houston, Testech	713-956-0837
TX	Richardson, Testech	214-644-5010
UT	Salt Lake City, Zeus Elctrns.	801-534-0500
VT	Jericho, Martindale Assocs.	802-899-2329
WA	Edmond, Nicolet Instrument Corp.	206-771-2400

NISSEI SANGYO AMERICA, LTD., 1701 Golf Rd., Ste. 401, Rolling Meadows, IL 60008, Tel: 312-981-8989, Telex: 28-0547, TWX: 910-233-5865; *Sls. Mgr.:* Y. Hamada

NITRON, 10420 Bubb Rd., Cupertino, CA 95014, Tel: 408-255-7550, TWX: 910-338-0222; Empl.: 150; *Sls. Mgr.:* R. Gardner

NITTO DENKO AMERICA, INC., 27 Seaview Blvd., Port Washington, NY 11050, Tel: 516-484-9700, Telex: 96-1386; *Sls. Mgr.:* Steven E. Schoenstadt

NJE CORPORATION, Box 50, Culver Rd., Dayton, NJ 08810, Tel: 201-329-4611, TWX: 710-480-5674; FSC No.: 98380; Empl.: 125; *Sls. Mgr.:* John M. Slavik ..... 3•1661

Local Sales Offices & Reps

AZ	Phoenix, Sigma Engrg. Sls.	602-241-1334
CA	Garden Grove, Elsco Elctrns.	714-891-4621
CO	Englewood, F. G. Mktg.	303-795-9176
CT	Ansonia, R. H. Sturdy Co.	203-734-2186
ID	Boise, Underwood Hanify Co.	208-343-0964
IA	Davenport, Ensco Rep	319-386-6600
KS	Overland Park, Ensco Rep	913-381-7557
KS	Wichita, Ensco Rep	316-683-1070
MA	Salisbury, R. H. Sturdy Co.	617-465-1505
MA	Wellesley Hills, R. H. Sturdy Co.	617-235-2330
MI	Brighton, A. P. Assocs.	313-229-6550
MN	Edina, Grayden & Flemmer	612-941-1120
MO	Maryland Heights, Ensco Rep	314-423-3935
NY	Clark Mills, KLM Garner	315-853-6126
NY	N. Syracuse, KLM Garner	315-458-6214
NY	Pittsford, KLM Garner	716-381-8350
OH	Englewood, Allen Nace Co.	513-836-0931
OH	Richfield, Allen Nace Co.	216-659-7178
PA	Glenshaw, Allen Nace Co.	412-487-1217
WA	Bellevue, Underwood Hanify Co.	206-451-8223
WA	Vancouver, Underwood Hanify Co.	503-641-4463
EXP	NJ, Dayton, NJE Corp.	201-329-4611

nkk switches OF AMERICA INC.

NKK SWITCHES OF AMERICA, INC., 14415 N. Scottsdale Rd., Ste. 600, Scottsdale, AZ 85260, Tel: 602-991-0942, TWX: 910-950-1167; FSC No.: FSCN 63426; *Sls. Mgr.:* Samuel L. Porcelli; *Dist. Mgr.:* Samuel L. Porcelli ..... 1B•1723-1731

Local Sales Offices & Reps

AL	Huntsville, Over & Over	205-837-7105
AZ	Scottsdale, Mahaffey & Assocs.	602-991-9790
CA	Granada Hills, C & W Component Sls.	213-368-4032
CA	Mountain View, Caltron Components Corp.	415-964-3244
CA	San Diego, McKinley Elctrn. Sls.	619-271-7221
CO	Parker, TMA of Colorado	303-841-3435
FL	Orlando, Over & Over, Florida, Inc.	305-857-4057
GA	Norcross, Over & Over	404-449-6205
IL	Rolling Meadows, KMA Sales	312-398-5300
IN	Fort Wayne, Frank E. Kahsar Sls.	219-422-0311
IN	Indianapolis, Frank E. Kahsar Sls.	317-888-8396
KS	Merriam, Midwest Tech. Sls.	913-236-8557
MA	Needham Hgts., Newscott Co.	617-444-1923
MN	Minnetonka, SAI Mktg. Corp.	612-935-0777
MS	Jackson, Welch & Doby, Inc.	601-932-5534
NY	De Ruyter, NET Sales Co.	315-662-7996
NY	Fairport, NET Sales Co.	716-467-4538
NY	Oceanside, Bittan	516-678-6222
NY	Troy, NET Sales Co.	716-467-4538
NY	Webster, NET Sales Co.	716-467-4538
NC	Charlotte, Over & Over	704-527-3070
NC	Raleigh, Over & Over	919-872-2262
OH	Cincinnati, Frank E. Kahsar Sls.	513-922-3133
OH	Hudson, Frank E. Kahsar Sls.	216-650-1089
OR	Portland, James J. Backer, Inc.	503-297-8744
OR	Salem, James J. Backer, Inc.	503-362-0717
PA	West Conshohocken, Eastern Comps. Sls.	215-825-8610
RI	Stewartstown, Eastern Comps. Sls.	301-323-7104
TX	Dallas, Rem Air Components Corp.	214-234-1069
UT	Salt Lake City, TMA of Colorado	801-483-1009
VA	Manassas, Eastern Comps. Sls.	703-471-1025
WA	Seattle, James J. Backer, Inc.	206-285-1300
WI	Milwaukee, KMA Sales	414-259-1771

Local Distributors

AZ	Phoenix, Dalis Elctrn. Supply	602-275-2885
AZ	Tempe, Powell Elctrns.	602-438-1505
CA	Burlingame, Rose Electronic Dist. Co.	415-348-2740
CA	San Diego, Shanks & Wright	619-239-0176
CA	San Dimas, Mrs. Switch, Inc.	714-599-6639
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Torrance, Cypress Elctrns.	213-533-6005
CA	Tustin, Western Switches & Controls	714-731-4333
CO	Arvada, Denver Wintronics	303-431-7161
CO	Aurora, Jet Elctrns. Supp. Co.	303-364-1000
CT	Danbury, Pilgrim Elctrns.	203-792-7274
CT	Stamford, Bond Elctrns.	203-348-2663
FL	Miami, Elctrn. Equip. Co.	305-871-3500
FL	West Palm Beach, Nurmi Elctrn. Supply	305-686-8553
IL	Wheeling, Hawk Elctrns.	312-459-4030
IN	Fort Wayne, Graham Elctrns. Supply	219-423-3422
IN	Indianapolis, Graham Elctrns. Supply	317-634-8202
IN	Indianapolis, MAR Elctrn.	317-875-4510
KS	Wichita, Radio, Inc.	316-264-2798
KS	Wichita, Air Technics	316-267-2849
MD	Kensington, Marine Air Supply Co.	301-949-9560
MA	Boston, Controller Svc. & Sls.	617-269-1300
MA	Woburn, EPC, Inc.	617-935-0400
MI	St. Clair Shores, Spemco Switches	313-771-2700
MN	Minneapolis, The Joel Co.	612-545-5669
MO	St. Louis, Franklin Elctrns.	314-993-5333
NJ	Englewood, Powell	201-894-0800
NY	Hempstead, Elctrn. Equip. Co.	516-538-5510
NY	Mt. Vernon, Kin-Tronics	914-668-9882
NY	Oceanside, Tritech Elctrn. Distr.	516-678-6222
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rome, Rome Elctrns.	315-337-5400
NY	Troy, Trojan Elctrn. Supp. Co.	518-274-4481
NC	Cary, Powell Elctrns.	919-467-1212
OH	Cincinnati, Schuster Elec. Co.	513-489-1400
OH	Twinsburg, Schuster Elec. Co.	216-425-8134
OK	Oklahoma City, Radio, Inc.	405-789-0741
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Lake Oswego, Rose Elctrn. Distr. Co.	503-635-8823
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Wayne, Peak Elctrns. Corp.	215-293-9000

TN	Chattanooga, Techni-Tronics	615-875-5449
TX	Austin, Southwest Elctrns.	512-837-8971
TX	Dallas, Wallace Elctrns. Co.	214-340-0400
TX	Fort Worth, Allied Elctrns.	817-336-5401
TX	Houston, Powerline Prods.	713-578-3222
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Stafford, Southwest Elctrns.	713-491-4900
WA	Seattle, Priebe Elctrns.	206-682-8242
WI	Hartland, GW Elctrns.	414-367-6003

NKR PRECISION MFG., Rte. 17M, Box 333, Harriman, NY 10926, Tel: 914-782-8562; Empl.: 17

NL BEARINGS/NL INDUSTRIES INC., PO Box 934, Toledo, OH 43694, Tel: 419-381-3100; Empl.: 1000; *Sls. Mgr.:* James Doherty; *Dist. Mgr.:* B. Sexauer

NMB CORP., MOTOR DIV., 9730 Independence Ave., Chatsworth, CA 91311, Tel: 213-709-1555

NOBEX DIV., Griffith Plastics Corp., 1027 California Dr., Box 4365, Burlingame, CA 94010, Tel: 415-342-8170, TWX: 910-374-2840; FSC No.: 32767; Empl.: 35

NOBLE U.S.A., INC., 151 Stanley St., Elk Grove Vllg., IL 60007, Tel: 312-364-6038, Telex: 206745; FSC No.: 1-3123646045; *Sls. Mgr.:* Vyto Omilijonas; *Dist. Mgr.:* Vyto Omilijonas

NOLATRON, P.O. Box 4042, Harrisburg, PA 17111, Tel: 717-564-3398; Empl.: 10

NOLL, J. A., CO., P.O. Box 447, Cumberland, MD 21502, Tel: 301-777-7887; *Sls. Mgr.:* P. Carson; *Dist. Mgr.:* P. Carson

NON-LINEAR SYSTEMS/DIV. OF KAYPRO CORP., 533 Stevens Ave., Solana Bch., CA 92075, Tel: 619-481-3900, TWX: 910-322-1132; Empl.: 55; *Sls. Mgr.:* Ben W. Fisher; *Dist. Mgr.:* Jeanne Simmons

Local Sales Offices & Reps

GA	Norcross, Hollingsworth & Still	404-447-1700
MA	N. Scituate, W. A. Hendrickson Co.	617-545-0652
OH	Dayton, Shamrock Elctrn. Sls.	513-258-1227
PA	Abington, Mid-Atlantic Sls.	215-657-2815
TX	Dallas, Berthold Sls.	214-328-0067

Local Distributors

AZ	Phoenix, Metermaster	602-273-7331
CA	Costa Mesa, Marvac Elctrns.	714-540-3280
CA	Garden Grove, Allied Electronics	714-554-0731
CA	Hayward, Allied Electronics	415-487-5250
CA	Irvine, Meter Craft	714-979-1420
CA	Los Angeles, E.I.L. Instrs.	213-685-7020
CA	Los Angeles, Metermaster	213-685-4340
CA	Oakland, Western Electro. Mech.	415-452-1936
CA	Palo Alto, Metermaster	415-968-0313
CA	San Diego, Metermaster	619-560-4841
CA	San Jose, Allied Electronics	408-727-1690
CA	Santa Clara, Eil Instruments	408-272-0396
FL	Ft. Lauderdale, Allied Electronics	305-486-0550
FL	Miami, Brownell Electro	305-591-3215
FL	Orlando, Brownell Electro	305-843-6770
FL	Palm City, Eil Instruments	305-725-8300
GA	Atlanta, Allied Electronics	404-237-3366
GA	Atlanta, Metermaster	404-446-0166
GA	Atlanta, Brownell Electro	404-762-5181
IL	Bridgeview, Eil Instruments	312-430-2292
IL	Elgin, Allied Elctrns.	312-697-8200
IL	Elk Grove, Metermaster	312-593-8650
IL	Niles, Joseph Elctrns.	312-297-4200
IL	Peoria, Klaus Radio	309-691-4840
IN	Indianapolis, Eil Instruments	317-545-1373
KY	Louisville, Eil Instruments	502-637-7677
LA	Harahan, Indus. Instru. Works	504-733-8355
LA	Shreveport, Indl. Elctrns. Supp.	318-222-9459
MD	Elkridge, Sunshine Sci. Instrs.	301-796-5600
MD	Marlow Heights, Allied Electronics	301-423-0161
MD	Rockville, Capitol Radio Whlsrs.	301-881-2270
MD	Sparks, E. I. L. Instrs	301-252-1260
MA	Boston, Allied Electronics	617-942-0150
MA	Burlington, E.I.L. Instrs.	617-272-9450
MA	Hingham, Sager Electrical Supply	617-542-2281
MI	Ferndale, Ram Meter	313-547-1000
MN	Minneapolis, Instrumentation Serv.	612-544-8916
MO	Kansas City, Electronic Supply	816-931-0250
MO	St. Louis, Eil Instruments	317-545-1373
NV	Las Vegas, Hurley Electronics	702-384-5666
NJ	N. Caldwell, Hosica Labs	201-256-7724
NJ	So. Plainfield, Brownell Electro	201-753-4600
NM	Albuquerque, Electronic Parks	505-293-6161
NY	Albany, Edwin E. Taylor	518-438-7811
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Hauppauge, Eil Instruments	516-231-6333
NY	Mineola, Allied Electronics	516-248-2360
NY	New York, Advance Electronics	212-687-2224
NY	Port Chester, Wise Electronics	914-939-3940
NY	Rochester, Eil Instruments	716-424-5750
NY	Rochester, Simcona Elctrns.	716-328-3230
NC	Charlotte, Brownell Electro	704-597-1270
NC	Raleigh, Brownell Electro	919-876-6524
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cleveland, Metermaster	216-651-4100
OH	Columbus, Hughes Peters	614-294-5351
OH	Dayton, Eil Instruments	513-435-2134
OH	Wickliffe, Gateway-Megatech	216-944-8565
OH	Willoughby, Allied Electronics	216-951-0908
OK	Oklahoma City, Trice	405-524-4411
OK	Tulsa, Trice	918-585-5718
OK	Tulsa, Radio Inc.	918-587-9123
OR	Portland, United Radio Supply	503-434-2171
PA	Bala Cynwyd, Allied Electronics	215-667-6940
PA	Philadelphia, Sunshine Sci. Instrs.	215-673-5600
PA	Pittsburgh, CAM/RPC	412-782-3770
PA	Pittsburgh, Eil Instruments	412-731-5230
PA	Reading, Barbey	215-376-7451
PA	York, Cumberland	717-845-8791
SC	Columbia, Dixie Electronics	803-779-5332
TN	Chattanooga, Curle Elctrns.	615-266-4728
TN	Knoxville, Brownell Electro	615-966-3441
TN	Memphis, Brownell Electro	901-795-8487
TN	Nashville, Brownell Electro	615-889-8230
TX	Austin, Electrotex	512-454-0318
TX	Dallas, Eil Instruments	214-931-1236
TX	Dallas, Metermaster	214-271-5671
TX	Dallas, Dallas Meter Tek	214-349-6044
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Houston, Allied Electronics	713-681-2983
TX	Houston, Electrotex	713-526-3456
TX	Houston, Eil Instruments	713-271-3100
TX	San Antonio, Sherman Elctrns.	512-224-1001
VA	Alexandria, Eil Instruments	703-354-4330
VA	Virginia Beach, Eil Instruments	804-499-3746
WA	Seattle, Allied Electronics	206-547-2827
WA	Seattle, Eil Instruments	206-762-0880
WA	Seattle, Eicher-Richards Co.	206-523-7888
WI	Milwaukee, Allied Electronics	414-355-8866

NORELCOM INDS., 63 Marine St., Farmingdale, NY 11735, Tel: 516-249-7245; Empl.: 55; *Sls. Mgr.:* Richard E. Thaw; *Dist. Mgr.:* Regina Vena

NORITAKE ELCTRNS., INC., Noritake Co., Ltd. (Japan), 22410 Hawthorne Blvd., #6, Torrance, CA 90505, Tel: 213-373-6704, Telex: 67-4910; *Sls. Mgr.:* T. Ohki

NORLAND, Norland Dr., Ft. Atkinson, WI 53538, Tel: 414-563-8456, Telex: 26-5448; Empl.: 275; *Sls. Mgr.:* Robert J. Millar

Local Sales Offices & Reps

CA	San Jose, Norland	408-972-2248
FL	Orlando, Micro Spec	305-299-6508
MD	Silver Spring, Seltronics	301-589-3391
MI	Coloma, Norland	800-558-0158
MI	Farmington Hills, Anderson Elctrns.	313-553-7600
NM	Las Cruces, Sota-Com	505-523-4480
NY	Rensselaer, Norland	518-477-2329
SC	Rock Hill, Micro Spec	803-366-3015
TX	Arlington, Norland	817-261-5284
WA	Bellevue, Showalter Instrs.	206-746-7970

NORPLEX DIV., 10 V.O.P. Plaza, Des Plaines, IL 60016, Tel: 312-391-2000

NORSAL INDS., 85 D Hoffman Lane So., Central Islip, NY 11722, Tel: 516-234-1200, TWX: 510-227-1045; *Sls. Mgr.:* Lauren Kent

Local Sales Offices & Reps

CA	El Segundo, Fetty/Schoenduve, Inc.	213-322-4991
CA	Santa Clara, Donahue Assocs.	408-727-6694
GA	Kennesaw, BWS Mktg.	800-824-7888
MD	Pasadena, Spectro-Lambda Inc.	301-279-2010
MA	Lexington, Eugene Delfino Inc.	617-862-1118
MN	Minneapolis, Deming & Assocs.	612-888-5000
OH	Dayton, Frederick Ohmer Assoc.	513-434-1454
OH	Dayton, Ohmer Assocs.	513-434-1454
PA	Elkins Park, Snow Assocs.	215-379-4700
TX	Dallas, Texas Microwave	214-351-4773
WA	Seattle, Datacom	206-285-2525
EXP	NY, Central Islip, Norsal Export, Ltd.	516-234-1200

Local Distributors

CA	El Segundo, Fetty/Schoenduve, Inc.	213-322-4991
CA	Santa Clara, Donahue Assocs.	408-727-6694
GA	Kennesaw, BWS Mktg.	800-824-7888
MD	Pasadena, Spectro-Lambda, Inc.	301-279-2010
MA	Lexington, Eugene Delfino, Inc.	617-862-1118
MN	Minneapolis, Deming & Assocs.	612-999-5000
OH	Dayton, Frederick Ohmer Assocs.	513-434-4454
PA	Elkins Park, Snow Assocs.	215-379-4700
TX	Dallas, Texas Microwave	214-351-4773
WA	Seattle, Datacom	206-285-2525

NORTH AMERICAN PHILIPS CONTROLS CORP., See Airpax Corporation, Cheshire Div.

NORTH AMERICAN PHILIPS LIGHTING, Bank St., Hightstown, NJ 08520, Tel: 609-448-4000, TWX: 510-685-5651; Empl.: 600; *Sls. Mgr.:* C. J. Lehmann

NORTH AMERICAN PRINTED CIRCUIT DIV., Tyco Labs., Inc., Box 145, Stafford, CT 06075, Tel: 203-684-2703; Empl.: 230

NORTH AMERICAN SOAR CORP., 11126 Cornell Ave., Cherry Hill, NJ 08002, Tel: 609-488-1060; Empl.: 7; *Sls. Mgr.:* Robert Liska ....**3•**1267-1275, 1360, 1372-1374

NORTH ATLANTIC INDS., Instrument Div., 60 Plant Ave., Hauppauge, NY 11788, Tel: 516-582-6500, TWX: 510-227-9660; FSC No.: 07342; Empl.: 320; *Sls. Mgr.:* K. Salz ....**3•**1277, 1345

Local Sales Offices & Reps

AZ	Phoenix, Aztec Entprs.	602-944-9185
CA	Cupertino, T. Louis Snitzer Co.	408-257-8333
CA	Delmar, T. Louis Snitzer Co.	714-226-0305
CA	Los Angeles, T. Louis Snitzer Co.	213-836-6170
CO	Littleton, Aztec Entprs.	303-795-0250
CT	Enfield, Meco	800-225-3409
FL	Cocoa Beach, TeqSpec	305-783-3444
FL	Palm Harbor, Teqspec	813-785-2296
GA	Atlanta, Teqspec II	404-399-6780
IL	Chicago, Pat Lind Elctrns.	312-726-3513
IN	Indianapolis, Pat Lind Elctrns.	317-632-7444
MD	Wheaton, Brimberg Sls. Co.	301-946-2670
MA	Reading, Meco	617-944-6660
MI	Madison Hgts., WKM Assoc.	313-588-2300
MN	Circle Pines, P. Lind	612-786-5770
NM	Albuquerque, Aztec Entprs.	505-262-1688
NC	Winston-Salem, Teqspec III	919-723-8102
OH	Cleveland, WKM Assoc.	216-524-5930
OH	Dayton, WKM Assoc.	513-434-7500
OR	Beaverton, Northwest Test & Meas.	503-646-9966
PA	Philadelphia, Tech. Instr. Sls.	215-836-2222
PA	Pittsburgh, WKM Assoc.	412-892-2953
TN	Morristown, Teqspec	615-587-0980
TX	Houston, Scientific Sls.	713-460-9170
TX	Richardson, Sci. Sls.	214-231-6541
UT	Ogden, Aztec Entprs.	801-621-1655
WA	Redmond, Northwest Test & Meas.	206-881-8857
WI	Milwaukee, Pat Lind Elctrns.	414-224-0146

NORTHEAST SCIENTIFIC CORP., 30 Wetherbee St., Acton, MA 01720, Tel: 617-263-2711; Empl.: 10; *Sls. Mgr.:* C. Moritz

NORTHERN ENGRG. LABS., See Midland-Ross Corp., NEL Unit

NORTHERN PRECISION LABS., 11 Madison Rd., Fairfield, NJ 07006, Tel: 201-227-4800, TWX: 710-734-4301; Empl.: 95; *Sls. Mgr.:* M.P. Nigro

NORTH HILLS ELCTRNS., Alexander Pl., Glen Cove, NY 11542, Tel: 516-671-5700, Telex: 64-0476; FSC No.: 98821; Empl.: 85; *Sls. Mgr.:* H. H. Marx ....**1A•**1247, 1774, 2210; **3•**1393, 1662

Local Sales Offices & Reps

MA	Burlington, Microwave Comps. Mktg.	617-273-3106
MN	Minneapolis, Hei-Lite Sls.	612-861-6051

NORTHLAKE ENGRG., 999 Anita Ave., Antioch, IL 60002, Tel: 312-395-5710; FSC No.: 50638; Empl.: 100; *Sls. Mgr.:* M. R. Whitman

NORTHWEST MICROCIRCUITS, 2115 N. College, Newburg, OR 97132, Tel: 503-538-7081; Empl.: 5; *Sls. Mgr.:* Wm. H. Ferwalt

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NORTHWEST MICRO produces custom Hybrid Circuits from customer schematics, layouts, or film positives. Turn around time for prototypes runs 4 to 6 weeks with engineering costs usually ranging from $500 to $900. NWμ also does complete circuit design to customer performance specifications. Hybrid ckt experience includes voltage regulators, R & RC networks, digital & analog timing, and medical products. Services include solder sealing of flat packs and chip carriers for hermeticity.

NORTON, One New Bond St., Worcester, MA 01606, Tel: 617-853-1000, Telex: 920428, TWX: 710-340-1126; Empl.: 19000

NORTON ASSOCS., 10 Di Tomas Ct., Copiague, NY 11726, Tel: 516-842-4666; FSC No.: 08739

NORTON CHEMPLAST, 31-150 Dey Rd., Wayne, NJ 07470, Tel: 201-696-4700, TWX: 710-988-5834; Empl.: 300; *Dist. Mgr.:* Wes Wheeler

NORTRAN, Power Elctrns. Corp., 96 Milton Rd., Rochester, NH 03867, Tel: 603-332-3334, TWX: 510-297-4462; *Sls. Mgr.:* Robert S. Karstedt

NOTHELFER WINDING LABS, See NWL Transformers

NOUMENON CORP., 512 Westline Dr., Alamdea, CA 94501, Tel: 415-521-2145, Telex: 176340; *Sls. Mgr.:* Michael C. Mead

TAURUS™ by Nova

NOVA ELEC., 263 Hillside Ave., Nutley, NJ 07110, Tel: 201-661-3434, Telex: 219077; FSC No.: 29019; Empl.: 50; *Sls. Mgr.:* Carlton C. Applegate ....3•1895

Local Sales Offices & Reps

AL	Huntsville, Kemp Instrs.	205-837-4304
AZ	Phoenix, Adtek	602-931-9289
CA	Los Alamitos, Sci. Devices	213-598-7678
CA	San Diego, Sci. Devices	619-279-6642
CA	San Jose, Sci. Devices	408-554-0455
CO	Boulder, Sci. Devices	303-449-9466
CO	Denver, Sci. Devices	303-449-9466
FL	Orlando, Data Rep	305-843-5224
IL	Chicago, Ampol Svcs. & Engrg.	312-685-1350
IN	Carmel, CMP	317-844-4175
KS	Shawnee Mission, W. Hickman	913-362-4300
LA	Abbeville, Data Mktg. Assoc.	318-989-1265
MD	Silver Spring, Spectro Sls.	301-949-8261
MA	Wakefield, Bordewieck Engrg.	617-659-4915
MI	Farmington Hills, Carter, McCormic & Peirce	313-477-7700
MN	Eden Prairie, Compusite	612-944-8552
MO	St. Louis, F. Gilliam	314-961-5555
NJ	Northvale, Comp-Tran	201-768-2060
NY	Binghamton, Tae-Rep	607-772-6952
NY	Fishkill, Tae-Rep	716-586-8710
NY	Rochester, Tae-Rep	716-586-8710
NC	Charlotte, J. Rudisill Assoc.	704-377-6901
OH	Cleveland, CMP	216-779-5100
OH	Englewood, CMP	513-836-0951
OK	Oklahoma City, Data Mktg. Assoc.	918-496-1497
PA	Bala Cynwyd, Electrical Distribution	215-665-5654
PA	Monroeville, CMP	412-372-4415
TX	Austin, Data Mktg. Assoc.	512-451-5174
TX	Dallas, Data Mktg. Assoc.	214-661-0300
TX	Houston, Data Mktg. Assoc.	713-780-2511
TX	San Antonio, Data Mktg. Assoc.	512-342-3031
VA	Richmond, J. Rudisill Assoc.	704-377-6901
WA	Seattle, Al Smith Co.	206-746-6770

NOVA TRAN, 100 Deposition Dr., Clear Lake, WI 54005, Tel: 715-263-2333; FSC No.: 56643; Empl.: 45; *Sls. Mgr.:* R. Schley

NOVATRONICS, Box 878, Pompano Beach, FL 33061, Tel: 305-942-5200, TWX: 510-956-9878; Empl.: 225; *Sls. Mgr.:* W. G. Peters

NRD, Mark IV Inds., 2937 Alt Blvd. N., Grand Island, NY 14072, Tel: 716-773-7634, Telex: 91578 NRD GRDI; *Sls. Mgr.:* James R. Curtis; *Dist. Mgr.:* Larry Keating

NSD, 10936 Portal Dr., Los Alamitos, CA 90720, Tel: 714-527-4896; *Sls. Mgr.:* Paul Pomerantz; *Dist. Mgr.:* Paul Pomerantz

NTK TECHNICAL CERAMICS, NGK Spark Plugs (U.S.A.), Inc., 1701 N. Greenville Ave. #205, Richardson, TX 75081, Tel: 214-235-8332; FSC No.: 95-246-1286; *Sls. Mgr.:* K. C. Ogawa; *Dist. Mgr.:* Mark Ota ....**1A**•1396, 1397; **1B**•1853; **3**•1043

Local Sales Offices & Reps

AL	Huntsville, L&D, Inc.	919-292-3201
CA	Culver City, DeAngelo Rothman and Co. Inc.	213-827-2202
CA	San Jose, Frequency Control Assocs.	408-446-0200
CT	Bloomfield, Zaslow Sales Co.	203-242-7781
FL	Maitland, D.J. Ellis & Assocs. Inc.	305-645-1101
GA	Atlanta, L&D Inc.	404-455-3483
IN	Indianapolis, Intl. Elctrns. Corp. of Indiana	317-257-8115
IN	Scottsburg, Intl. Elctrns. Corp. of Indiana	812-752-4611
IA	Chanhassen, Barnes Sls. Assocs.	612-934-2907
KS	Overland Park, Barnes Midwest Sls.	913-341-9317
MD	Baltimore, Espy Sls. Co.	301-441-6982
MI	Ann Arbor, Elliott Sls. Co.	313-662-4087
MN	Chanhassen, Barnes Sales Assocs.	612-934-2907
NJ	Boonton, Pafi Assocs.	201-335-0680
NY	Smithtown, Pafi Assocs.	516-360-0940
NC	Raleigh, L&D Inc.	919-876-5301
PA	Rydal, Espy Sls. Assocs.	215-576-0780
TN	Seymour, Espy Sls. Assocs.	315-573-6511
VA	Richmond, Espy Sls. Assocs.	804-359-0125
WA	Seattle, Northmar Inc.	206-524-5170

NUCLEAR RESCH. CORP., 125 Titus Ave., Warrington, PA 18976, Tel: 215-343-5900, Telex: 510-665-8525 NRC WNTN; FSC No.: 96696; Empl.: 85; *Sls. Mgr.:* D.T. McIntyre, V.P.

NUCLEONIC PRODS., See Thomson-CSF Comps. Corp., Passive Comps. Div.

NU-CONCEPT COMPUTER SYS., Rte. 309 & Advance La., Colmar, PA 18915, Tel: 215-822-8400; Empl.: 17; *Sls. Mgr.:* Thomas Dvorak

NU DATA, 32 Fairview Ave., Little Silver, NJ 07739, Tel: 201-842-5757, Telex: 132405, TWX: 710-722-5754; Empl.: 20; *Sls. Mgr.:* S. L. Houcke

NUMARK ELCTRNS. CORP., 503 Raritan Ctr., Edison, NJ 08817

NUMERIX CORP., 320 Needham St., Newton, MA 02161, Tel: 617-964-2500, Telex: 948032; *Sls. Mgr.:* Harold Messias

NU-METRICS, P.O. Box 800, Connellsville, PA 15425, Tel: 412-628-0400; Empl.: 12; *Sls. Mgr.:* Waide Miller

NURAD, INC., 2165 Druid Pk. Dr., Baltimore, MD 21211, Tel: 301-462-1700, TWX: 710-234-1071; Empl.: 80

NWL TRANSFORMERS, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, Tel: 609-298-7300, TWX: 510-685-3645; Empl.: 230; *Sls. Mgr.:* C. W. Harrison ....**1A**•2211; **3**•1663

NWL TRANSFORMERS, Megatran Electronic Power, Rising Sun Rd., P.O. Box 358, Bordentown, NJ 08505, Tel: 609-298-7300, TWX: 510-685-3645; Empl.: 195; *Sls. Mgr.:* C. W. Harrison ....**3**•1663

NYE, WILLIAM F., INC., P.O. Box G-927, New Bedford, MA 02742-0927, Tel: 617-996-6721, Telex: 940807; Empl.: 15

NYLTITE, 3451 S. Clinton Ave., S. Plainfield, NJ 07080, Tel: 201-561-1300; *Sls. Mgr.:* Frances Gould

NYTRONICS COMPS. GROUP INC., Orange St., Darlington, SC 29532, Tel: 803-393-5421, TWX: 810-665-2182; FSC No.: 83125; Empl.: 450 ....**1A**•1160-1172, 1218, 1248-1267, 1554-1557, 1907-1909

Local Sales Offices & Reps

AL	Huntsville, B.C.I.	205-539-4411
AZ	Tucson, Clemick Neenan & Assoc.	802-749-4003
CA	San Diego, Clemick Neenan & Assocs.	619-268-8540
CA	Sherman Oaks, Clemick Neenan & Assocs.	213-990-3150
CA	Sunnyvale, W.W. Posey	408-746-0771
CO	Denver, Component Sls.	303-759-1666
GA	Chamblee, B.C.I.	404-455-0405
IL	Rolling Meadows, Sumer Inc.	312-991-8500
IN	Indianapolis, Southern Sls.	317-875-8750
KS	De Soto, Mid-Tec Assoc.	913-441-6565
MA	Bedford, F.R. Lesser	617-275-7558
MI	Rockford, H.C. Heym Assoc.	616-874-7443
MN	Minneapolis, Dunlop Consits.	612-529-7626
MO	Florissant, Mid-Tec Assoc.	314-837-5200
NJ	West Orange, National Atlantic	201-731-0703
NY	Pittsford, W.A. Franklin Sls.	716-248-8251
NY	Valley Cottage, LRC Assocs.	914-268-4435
NC	Charlotte, B.C.I. Inc.	704-567-0473
NC	Raleigh, B.C.I.	919-781-9426
OH	Akron, Imtech	216-666-1185
OH	Dayton, Imtech	513-278-6507
OK	Tulsa, Design Mktg.	918-742-2589
PA	Narberth, Bresson Assocs.	215-664-6460
TX	Dallas, Design Mktg.	214-680-9767
TX	Round Rock, Design Mktg.	512-255-9896
UT	Salt Lake City, Component Sls.	801-466-8623
VA	Lynchburg, Bresson Assocs.	703-237-1304
WA	Bellevue, Eltec	206-643-4330
WI	Brookfield, Sumer, Inc.	414-784-6641

Local Distributors

CA	Garden Grove, Hi Rel	213-594-9571
CA	Gardena, Bell Inds.	213-515-1800
CA	San Diego, Mock III	619-560-0515
CA	Sunnyvale, Bell Inds.	408-734-8570
CO	Denver, Newark Elec.	303-757-3351
CO	Wheatridge, Bell Inds.	303-424-1985
FL	Ft. Lauderdale, Newark Elect.	305-587-2372
IL	Chicago, Newark Elect.	312-638-4411
IL	Chicago, Bell Inds.	312-982-9210
IN	Indianapolis, Graham Elect.	317-634-8202
IA	Cedar Rapids, Newark Elect.	312-362-1171
MD	Baltimore, Radio Elect.	301-823-0070
MD	Beltsville, Newark Elec.	301-937-5085
MA	Needham, Cronin Elctrns.	617-449-0500
MA	Waltham, Sterling Elec.	617-894-6200
MN	Minneapolis, Newark Elect.	216-361-4700
MN	Minneapolis, Joel Co.	612-545-5669
NJ	Kenilworth, Newark Elect.	201-272-8410
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Hauppauge, Fairmont Elctrns.	516-231-3313
NY	Hauppauge, Jaco Elect.	516-273-5500
NY	Plainview, ACI Elect.	516-293-6630
NY	Rome, Rome Elect.	315-337-5400
NC	Raleigh, Radio Elec. Svc.	919-781-5700
OH	Centerville, C.V. Clark	513-435-3000
OH	Cleveland, Newark Elect.	216-361-4700
OR	Lake Oswego, Bell Inds.	503-241-4115
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Philadelphia, Herback Rademan	215-426-1700
TX	Dallas, Wholesale Elect.	214-824-3001
UT	Salt Lake City, Newark Elect.	801-486-1048
WA	Bellevue, Bell Inds.	206-747-1515
WI	Brookfield, Newark Elect.	414-781-2450

OAK MATERIALS GROUP INC., Laminates Div., 174 N. Main St., Franklin, NH 03235, Tel: 603-934-5736, TWX: 510-298-1170; FSC No.: 53240

OAK Switch Systems Inc.

OAK SWITCH SYS., 100 S. Main St., Crystal Lake, IL 60014, Tel: 815-459-5000, Telex: 72-2447, TWX: 910-634-3353; FSC No.: 76854; Empl.: 1200 ....1B•1092, 1732, 1733, 1789

Local Sales Offices & Reps

AZ	Phoenix, Shefler/Kahn	602-257-9015
AR	Little Rock, Erickson Sls., Inc.	501-562-2159
CA	Huntington Bch., Oak Switch Sys.	714-963-0577
CA	Irvine, Oak Switch Sys. Inc.	714-786-8028
CA	Palo Alto, Oak Switch Sys. Inc.	415-493-0960
CA	San Jose, Oak Switch Sys. Inc.	408-729-1200
CA	Saratoga, Oak Switch Sys. Inc.	408-741-0372
CO	Denver, I.W. Strong Assoc.	303-292-6900
FL	Altamonte Springs, Oak Switch Sys.	305-831-5411
GA	Marietta, Oak Switch Sys. Inc.	404-953-9279
IL	Crystal Lake, Oak Switch Sys. Inc.	815-459-5000
IN	Speedway, Oak Switch Sys. Inc.	317-241-4424
LA	Chalmette, Erickson Sls., Inc.	504-271-1976
MA	Framingham, Oak Switch Sys. Inc.	617-256-1414
MA	Hudson, Oak Switch Sys. Inc.	617-562-3328
MI	Southfield, R.E.P. Assocs.	313-352-0110
MI	St. Joseph, R.E.P. Assocs.	616-983-7702
MN	Minnetonka, Gibb Elctrns. Sls.	612-935-4600
MO	Florissant, Oak Switch Sys.	314-355-8732
NJ	Haddonfield, Gray Assoc.	609-429-5300
NJ	Mountainside, Henry G. Richter	201-233-4615
NM	Albuquerque, Shefler/Kahn	505-296-0749
NY	Fayetteville, Henry G. Richter	315-637-6713
NC	Raleigh, Oak Switch Sys.	919-876-7591
OH	Eastlake, Oak Switch Sys. Inc.	216-946-0970
OK	Oklahoma City, Erickson Sls., Inc.	405-682-2947
OR	Beaverton, Oak Switch Sys.	503-642-4675
TX	Austin, Erickson Sls., Inc.	512-244-3068
TX	Dallas, Erickson Sls., Inc.	214-739-5833
TX	Houston, Erickson Sls., Inc.	713-980-9606
UT	Salt Lake City, I.W. Strong Assoc.	801-363-1014

Local Distributors

AL	Huntsville, Marshall Elctrns.	205-881-9235
AZ	Tempe, Marshall Elctrns.	602-968-6181
AZ	Tempe, Fisher-Brownell	602-967-1464
CA	Alhambra, Fisher-Brownell	213-289-0255
CA	Canoga Park, Marshall Elctrns.	213-999-5001
CA	Inglewood, Newark Elctrns.	213-671-7066
CA	Irvine, Marshall Elctrns.	714-556-6400
CA	Mountain View, I/O Sls. Inc.	415-968-1080
CA	San Diego, Marshall Elctrns.	619-578-9600
CA	San Diego, Fisher-Brownell	619-560-8545
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	Santa Clara, Fisher-Brownell	408-988-6041
CA	Sunnyvale, Marshall Elctrns.	408-732-1100
CO	Denver, CSID	303-292-9594
CO	Denver, Newark Elctrns.	303-757-3351
CO	Denver, Marshall Elctrns.	303-427-1818
CT	Hamden, Impact Elctrns.	203-281-1331
CT	Wallingford, Marshall Elctrns.	203-265-7338
FL	Ft. Lauderdale, Component Distr.	305-971-4950
FL	Orlando, Marshall Elctrns.	305-841-1878
GA	Norcross, Marshall Elctrns.	404-923-5750
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Crystal Lake, Sub-Sem, Inc.	815-459-4139
IL	Palatine, Ohm/Elctrns.	312-359-5500
IL	Rosemont, Advent Elctrns.	312-297-6200
IL	Schaumburg, Marshall Elctrns.	312-490-0155
IN	Indianapolis, Graham Elctrns.	317-634-8202
MD	Baltimore, C.E.I. Distr.	301-744-7711
MD	Beltsville, Newark Elctrns.	301-937-5085
MD	Gaithersburg, Marshall Elctrns.	301-840-9450
MA	Burlington, Marshall Elctrns.	617-272-8200
MA	Canton, Impact Sls.	617-821-1500
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Livonia, Marshall Elctrns.	313-525-5850
MI	Oak Park, Newark Elctrns.	313-967-0600
MN	Minneapolis, Newark Elctrns.	612-331-6350
MN	Minneapolis, Northern Elec. Supp.	612-944-1167
MN	Plymouth, Marshall Elctrns.	612-559-2211
MO	St. Louis, Olive Elctrns.	314-426-4500
NJ	Fairfield, Marshall Elctrns.	201-882-0320
NJ	Mt. Laurel, Marshall Elctrns.	609-234-9100
NJ	Springfield, Newark Elctrns.	201-376-9500
NJ	Springfield, Route Elctrns.	201-379-7710
NM	Albuquerque, Walker Radio	505-247-2288
NY	Endwell, Marshall Elctrns.	607-754-1570
NY	Hauppauge, Marshall Elctrns.	516-273-2424
NY	Hauppauge, Fairmont Elec.	516-231-3313
NY	Jamaica, Calson Co.	212-525-5900
NY	Rochester, Marshall Elctrns.	716-235-7620
NY	Rochester, Modutex Corp.	716-647-9700
NC	Raleigh, Southeastern Radio	919-828-2311
OH	Centerville, IPD	513-435-2086
OH	Dayton, Marshall Elctrns.	513-236-8088
OH	Solon, Marshall Elctrns.	216-248-1788
OH	Wickliffe, Gateway Megatech	216-944-8565
OR	Portland, Radar Elec.	503-232-3404
PA	Pittsburgh, Newark Elctrns.	412-787-7740
TX	Austin, Marshall Elctrns.	512-458-5654
TX	Dallas, Marshall Elctrns.	214-233-5200
TX	El Paso, Ideal Indl. Elect.	915-779-6647
TX	Houston, Marshall Elctrns.	713-789-6600
TX	Richardson, Fisher-Brownell	214-235-3177
UT	Salt Lake City, Newark Elctrns.	801-484-8611
WA	Bellevue, Marshall Elctrns.	206-747-9100
WA	Seattle, Radar Elec.	206-282-2511
WA	Spokane, Radar Elec.	509-747-3053

OAKTRON INDS., 1000 30th St., Monroe, WI 53566, Tel: 608-328-5560; Empl.: 250 ....3•1045

Local Sales Offices & Reps

AZ	Phoenix, S. Fisher Assoc.	602-247-7865
CA	Mill Valley, Roy Colen Sls., Inc.	415-383-8700
CA	Newhall, Lessing Assoc.	213-348-6662
CO	Arvada, C B Elctrn. Mktg.	303-422-0561
FL	Tampa, SRT Marketing	813-884-4805
GA	Atlanta, Millar Elect.	404-261-6160
IL	Elmhurst, E.S.I.	312-941-0710
IN	Mulberry, Maish Sls.	317-296-2322
MA	Lexington, Six States Sls.	617-376-2044
MN	Minneapolis, Kodo Assoc.	612-881-1255
MO	Kansas City, Nevco	816-421-1751
MO	St. Louis, Nevco	314-843-7406
NY	Rochester, J. Brown Elect. Sls.	716-266-2728
NY	Whitestone, J. Brown Elect. Sls.	212-767-1977
NC	Raleigh, Millar Elect.	919-787-9564
OH	Akron, Shamrock Elect.	216-645-0363
OH	Dayton, Shamrock Elect.	513-298-1227
TX	Richardson, Campion Sls.	214-238-8145
VA	Great Falls, Kendall & Assoc.	703-759-3128
WA	Seattle, Vector/RMC	206-322-4343
EXP	IL, Chicago, Magnus Elect.	312-679-6070

OAL ASSOCS., P.O. Box J, Escondido, CA 92025, Tel: 619-743-7143; Empl.: 10; *Sls. Mgr.:* Mark Lohkemper

Local Sales Offices & Reps

CA	Costa Mesa, Pat Dooley Co.	714-548-2232
IL	Palatine, Jos. Clark Co.	312-358-5095
NY	Great Neck, W&A Holland	516-487-8877

OAR CORP., A CompuDyne Co., 10447 Roselle St., San Diego, CA 92121, Tel: 619-453-4013, Telex: 697852; *Sls. Mgr.:* Michael A. Duke

OAS INC., See Optimum Applied Systems

OCEAN RESCH. EQUIP., INC., Box 709, Falmouth, MA 02541, Tel: 617-548-5800, Telex: 94-0859; Empl.: 125; *Sls. Mgr.:* J. Angell

OCLI PHOTOELCTRNS. DIV., See Applied Solar Energy

ODELL, M. P., CO., 1620 Chesapeake Dr., Hoffman Estates, IL 60195, Tel: 312-991-2828, 800-633-5526; *Sls. Mgr.:* Maria McClurkin ....3•1927

OECO CORP., 712 S.E. Hawthorne Blvd., Portland, OR 97214, Tel: 503-238-2440, Telex: 36-0350; FSC No.: 95266; Empl.: 575; *Sls. Mgr.:* Bob Bunker

OGALLALA ELCTRNS., Div. Arnold Engrg. Co., Box 59, Ogallala, NE 69153, Tel: 308-284-4093; Empl.: 37; *Sls. Mgr.:* H. L. Harrington

OHIO SEMITRONICS, INC., 1205 Chesapeake Ave., Columbus, OH 43212, Tel: 614-486-9561, TWX: 810-482-1630; FSC No.: 12066; Empl.: 46; *Sls. Mgr.:* G. Clagett ....1B•1854-1867; 3•1278-1283

Local Sales Offices & Reps

AL	Huntsville, Guest Assocs.	205-534-2487
CA	Arcadia, Van Gott & Assocs.	818-445-9728
CA	Hayward, FLW, Inc.	415-467-2222
CO	Boulder, Meas. Conslts.	303-449-7506
CT	North Haven, Pat Jenks Assocs.	203-239-6201
FL	Orlando, Datarep	305-843-5224
GA	Stone Mountain, Zelco Assocs.	404-498-2181
IL	Columbia, R. L. Weisheimer & Assocs.	618-281-4148
IL	Park Ridge, Elctrn. Instr. Assocs.	312-298-2290
MA	Woburn, Pat Jenks Assocs.	617-938-0488
MN	Minneapolis, Mark Co.	612-920-6280
NJ	Springfield, E. R. Mertz, Inc.	201-232-4643
NY	Latham, L-Tron Corp.	518-785-5032
NC	Charlotte, Zelco Assocs.	704-523-2961
OH	Dayton, Mohawk Intronics	513-434-8873
PA	Carnegie, Flow Media	412-923-1619
PA	King of Prussia, FLW, PA, Inc.	215-337-4343
TX	Houston, Scientific Sls. Co.	713-460-9170
TX	Richardson, Scientific Sls. Co.	214-231-6541
UT	Salt Lake City, Meas. Conslts.	801-364-3174
WA	Bellevue, Topp Engrg. Sls. Corp.	206-747-5400

Distributor

OHIOSWITCH, INC., 6534 Singletree Dr., Columbus, OH 43229, Tel: 614-885-0319 ....1B•1742

OHMITE MFG. CO., 3601 W. Howard St., Skokie, IL 60076, Tel: 312-675-2600, Telex: 72-4433, TWX: 910-223-0805 ....1A•1910-1917, 2050, 2051

Local Sales Offices & Reps

AL	Huntsville, Cartwright & Bean	205-830-1540
AK	Anchorage, H. J. Lang Assoc.	907-279-5741
AZ	Phoenix, Stitzer-Dodd Inc.	602-944-2237
CA	Los Angeles, Wiley Co.	213-666-1611
CA	Palo Alto, Ohmite Mfg. Co.	415-494-6954
CA	San Diego, Wiley Co.	619-571-2881
CO	Denver, Lindberg Co.	303-758-9033
CT	North Haven, Coakley, Boyd & Abbett	203-239-6217
FL	Ft. Lauderdale, Cartwright & Bean	305-735-4900
FL	Orlando, Cartwright & Bean	305-422-4531
GA	Atlanta, Cartwright & Bean	404-233-2939
LA	Kenner, Cartwright & Bean	504-466-0020
MA	Needham Hgts., Coakley, Boyd & Abbett	617-444-5470
MI	Grosse Pointe Park, Greiner Assoc.	313-499-0188
MN	Bloomington, PWC Inc.	612-831-5999
MS	Jackson, Cartwright & Bean	601-981-1170
MO	Gladstone, Delltron Co.	816-436-6445
MO	St. Louis, Delltron Co.	314-869-4779
NH	Plaistow, Coakley, Boyd & Abbett	617-444-5470
NJ	River Edge, Ohmite Mfg. Co.	201-488-3690
NJ	Willingboro, Ohmite Mfg. Co.	609-871-1691
NY	Rochester, Electra Sls. Corp.	716-461-5252
NY	Syracuse, Electra Sls. Corp.	315-463-1248
NC	Charlotte, Polytech Svcs.	704-372-4161
OH	Chardon, Ohmite Mfg. Co.	216-286-7454
OH	Dayton, Ohmite Mfg. Co.	513-277-6543
OK	Oklahoma City, Erickson Sls.	405-682-2947
OR	Tigaird, Electronic Comp Sales	503-245-2342
PA	Monroeville, Ohmite Mfg. Co.	412-373-2695
TN	Knoxville, Cartwright & Bean	615-693-7450
TN	Memphis, Cartwright & Bean	901-276-4442
TX	Austin, Erickson Sls.	512-445-2952
TX	Dallas, Erickson Sls.	214-739-5833
TX	Houston, Erickson Sls.	713-980-9606
UT	Salt Lake City, Lindberg Co.	801-467-1794
WA	Mercer Island, Electronic Comp Sales	206-232-9301

Local Distributors

AZ	Phoenix, Dalis Elctrn. Supp.	602-258-8151
CA	El Monte, Kimball & Stark	213-444-2594
CA	Hollywood, Yale Radio Elec.	213-465-3186
CA	Mountain View, Abacus Elctrns. Co.	415-961-1500
FL	Tampa, Leader Elctrn. Distr.	813-870-3315
FL	West Palm Beach, Nurmi Elec. Supp.	305-684-0320
GA	Atlanta, Specialty Distr. Co.	404-873-2521
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Peoria, Klaus Radio	309-691-4840
IN	East Chicago, Acro Elctrns. Corp.	219-397-8681
KS	Wichita, Radio Supp. Co.	316-267-5213
MA	Hingham, Sager Electrical Supp.	617-749-6700
MI	Grand Rapids, S-F Elctrn. Supp.	616-459-0216
MO	Kansas City, Walters Radio Supp.	816-531-7015
NJ	Camden, General Radio Supp.	609-964-8560
NY	Hempstead, Electronic Equip.	516-538-5510
NY	Richmond Hill, Anchor Elctrn. Distr.	212-846-2420
NY	Rochester, Simcona Elctrns.	716-328-3230
NY	Rome, Rome Elctrns.	315-337-5400
OH	Cleveland, Specialized Comp. Sls.	216-464-0405
OH	Dayton, Stotts-Friedman Co.	513-224-1111
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VA	Charlottesville, Virginia Radio Supp.	804-296-4186
WI	Milwaukee, Marsh Elctrns.	414-475-6000

OHMTEK, INC., 2160 Liberty Dr., Niagara Falls, NY 14304, Tel: 716-283-4025, TWX: 710-524-1653; FSC No.: 57489; Empl.: 115; *Sls. Mgr.:* John Burger .... **1A**•1919-1921

Local Sales Offices & Reps

CA	Santa Clara, I² Inc.	408-988-3400
CA	Woodland Hills, Interstate Mktg. Assoc.	213-883-7606
CO	Aurora, High Tech. Assocs.	303-695-1990
FL	Hollywood, Askland Elctrn. Comps.	305-987-1074
KS	Overland Pk., Advanced Techn. Sls.	913-642-6675
MA	Shrewsbury, Compatible Comps.	617-842-2022
MN	Mendota Hgts., G-II Sales	612-454-3086
NJ	Englewood, Harold Gray Assocs.	201-894-0894
NM	Albuquerque, Power Entprs.	505-298-1918
NY	Rochester, Fritz Dasson	716-338-1699
OH	Cincinnati, John F. Kilfoil Co.	513-791-6150
PA	Wynnewood, Metz-Benham Assocs.	215-896-7300
TX	Lewisville, Jim Hughes Co.	214-221-1536

OK INDUSTRIES, INC., 3455 Conner St., Bronx, NY 10475, Tel: 212-994-6600, Telex: 12-5091; Empl.: 100; *Sls. Mgr.:* David Leventhal

OKONITE, Box 340, Ramsey, NJ 07446, Tel: 201-825-0300, TWX: 710-988-1017; Empl.: 1900; *Sls. Mgr.:* A. C. Coppola

OLIVER ADVANCED ENGRG., 676 W. Wilson Ave., Glendale, CA 91203, Tel: 818-240-0080, Telex: 194773; Empl.: 28; *Sls. Mgr.:* Dane Hutchins; *Dist. Mgr.:* Dane Hutchins

OLYMPIC WIRE & CABLE, 1 Madison Rd., Fairfield, NJ 07006, Tel: 201-227-7996, Telex: 75-2217; Empl.: 18; *Sls. Mgr.:* Robert T. Mello; *Dist. Mgr.:* Robert T. Mello

OMEGA ENGRG., Box 4047, Stamford, CT 06907, Tel: 203-359-1660, Telex: 99-6404; Empl.: 400; *Sls. Mgr.:* George Vermilyea ..... **1B**•1735, 1818, 1819, 1868, 1869; **2**•2135; **3**•1013, 1089, 1137, 1168, 1284, 1346, 1347, 1386

OMNETICS, P.O. Box 2577, Syracuse, NY 13220, Tel: 315-699-5262, TWX: 710-545-0235; FSC No.: 52516; Empl.: 85; *Sls. Mgr.:* Dennis G. Conard; *Dist. Mgr.:* Dennis G. Conard

OMNIBYTE CORP., 245 W. Roosevelt Rd., Bldg. 1-5, W. Chicago, IL 60185, Tel: 312-231-6880; Empl.: 30; *Sls. Mgr.:* Susan Cochran

Local Sales Offices & Reps

AZ	Scottsdale, Frontier Technology	602-998-4438
CA	Santa Clara, Applied Micro Tech.	408-730-1289
CA	Woodland Hills, Applied Micro Tech.	213-888-2027
FL	Melbourne, Reynolds & Assoc.	305-259-7000
IL	Park Ridge, Ad Tech Inc.	312-692-7320
MA	Belmont, E.S.M.	617-489-4414
MI	Southfield, Infinity, Inc.	313-557-7230
MN	Minneapolis, Jen-Ray Systems	612-831-5060
NJ	Boonton, Winter Assoc.	201-334-3434
NY	Caledonia, E. F. Sls.	716-538-4754
PA	Philadelphia, Systems Plus	215-677-2985
TX	Houston, Dyna Marketing	713-460-0314
EXP	IL, Chicago, Computer Overseas Corp.	312-332-3272

OMNI SPECTRA, 21 Continental Blvd., Merrimack, NH 03054, Tel: 603-424-4111, Telex: 953053, TWX: 710-366-0674; FSC No.: QUIP; Empl.: 750; *Sls. Mgr.:* Ernest J. Devita; *Dist. Mgr.:* Terri Hastings

OMNI SPECTRA, INC., Microwave Connector Div., 140 Fourth Ave., Waltham, MA 02154, Tel: 617-890-4750

OMNI SPECTRA, INC., Microwave Subsystems Div., 2626 So. Hardy Dr., Tempe, AZ 85282, Tel: 602-966-1471, TWX: 910-950-1296; *Sls. Mgr.:* Carl Seburn; *Dist. Mgr.:* Carl Seburn

OMNITEC DATA INC., 2405 S. 20th St., Phoenix, AZ 85034, Tel: 602-258-8244, 800-528-8423, TWX: 910-951-4247; *Sls. Mgr.:* Dan J. Mitchell; *Dist. Mgr.:* Dan J. Mitchell

OMNITEK, INC., P.O. Box 102, 820 Pennsylvania Blvd., Feasterville, PA 19047, Tel: 215-355-4443, TWX: 510-667-1730; FSC No.: 54316; *Sls. Mgr.:* Frank Shandelman

OMNI-WAVE ELECTRONICS CORP., P.O. Box 660, Gloucester, MA 01930, Tel: 617-281-2800

OMRON ELCTRNS., INC., Control Comps. Div., One E. Commerce Dr., Schaumburg, IL 60195, Tel: 312-843-7900, TWX: 910-291-2494; Empl.: 209; *Sls. Mgr.:* D. Nelson

ONSET COMPUTER CORP., 199 Main St., P.O. Box 1016, N. Falmouth, MA 02556, Tel: 617-563-2267, Telex: 469915; Empl.: 6; *Sls. Mgr.:* Elaine Boyd

ONTEL CORP., 250 Crossways Park Dr., Woodbury, NY 11797, Tel: 516-364-2121, Telex: 961-382; Empl.: 430; *Sls. Mgr.:* Ed Heinze

OPAMP LABS, INC., 1033 N. Sycamore Ave., Los Angeles, CA 90038, Tel: 213-934-3566; FSC No.: 24699; Empl.: 18 .... **3**•1046

OPTEK, Crown Semi, 345 Industrial Blvd., McKinney, TX 75069, Tel: 214-542-9461, TWX: 910-860-5625; Empl.: 320; *Sls. Mgr.:* James Trautwein; *Dist. Mgr.:* Dave Kimbrough .... **1B**•1232

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Verein Corp.	602-861-1141
CA	Escondido, Uni Rep	714-746-5131
CA	Santa Clara, Criterion	408-988-6300
CA	Thousand Oaks, Sc Cubed	805-496-7307
CA	Tustin, Sc Cubed	714-731-9206
CO	Wheatridge, Waugaman Assocs.	303-423-1020
CT	Madison, Conti-Younger Assocs.	203-245-1136
FL	Ft. Lauderdale, APM Assocs.	305-565-0056
FL	Longhorn, APM Assocs.	305-869-6831
FL	Tampa, APM Assocs.	813-886-2457
GA	Norcross, Montgomery Mktg.	404-447-6124
ID	Rathdrum, Vantage Corp.	208-772-7235
IL	Rolling Meadows, KMA Sales	312-398-5300
IN	Indianapolis, J & W Sales	317-842-3740
MA	Burlington, Conti-Younger Assocs.	617-273-1582
MI	Grosse Pointe Pk., Greiner Assocs.	313-499-0188
MN	Eden Praire, Elctrn. Innovators	612-941-0830
NH	Melvin Village, Conti-Younger Assocs.	603-544-7278
NY	Clark Mills, KLM/Garner	315-853-6126
NY	Manhasset, Win-Cor Elec.	516-627-9474
NY	Pittsford, KLM/Garner	716-381-8350
NY	Syracuse, KLM/Garner	315-458-6214
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Cincinnati, Makin & Assocs.	513-871-2424
OH	Columbus, Makin & Assocs.	614-459-2423
OH	Ravenna, Makin & Assocs.	216-297-9748
OR	Silverton, Vantage Corp.	206-455-3460
TX	Austin, Kruvand Assocs.	512-458-9204
TX	Dallas, Kruvand Assocs.	214-691-4592
TX	Houston, Kruvand Assocs.	713-780-9710
UT	Salt Lake City, Waugaman Assocs.	801-254-0570
WA	Bellevue, Vantage Corp.	206-455-3460
WI	Milwaukee, KMA	414-259-1771

OPTELECOM, 15940 Lauanne Dr., Gaithersburg, MD 20760, Tel: 301-948-4232; FSC No.: 59338; Empl.: 50; *Sls. Mgr.:* F. C. Eggleston

OPTICAL & CONDUCTIVE COATINGS, Meridian Inds., Inc., 428 N. Buchanan Cir., #8, Pacheco, CA 94553, Tel: 415-798-6066, Telex: 171309 HQ WNCK; FSC No.: 9U775; Empl.: 8; *Sls. Mgr.:* Glenn G. Grupe

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Local Sales Offices & Reps

CA	San Diego, California Elctrn. Mktg.	619-692-3551
CA	Santa Ana, California Elctrn. Mktg.	714-835-2702
CA	Santa Clara, Comtronics	408-773-9800
MA	Burlington, Tritek Inc.	617-272-4550
NJ	Paramus, Design Elctrns.	201-845-6224
TX	Hurst, El-Tec Sls.	817-268-2896

OPTICAL FIBER TECHNOLOGIES, INC., P.O. Box 148, Nutting Lake, MA 01865, Tel: 617-663-6629, Telex: 948-288; *Sls. Mgr.:* Patricia Whalen

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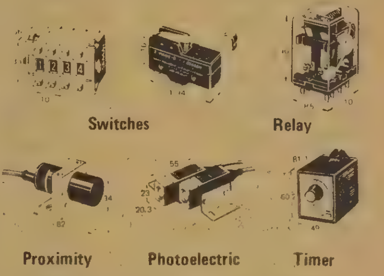

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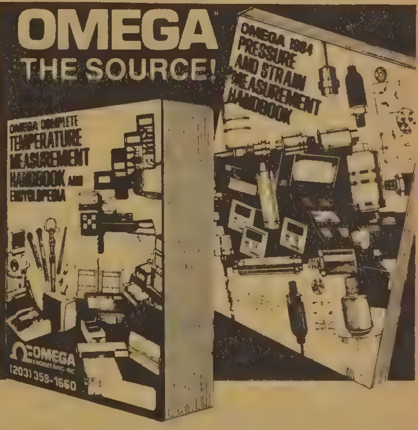
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OPTICS INTERNATIONAL, Box 101, Tenafly, NJ 07670, Tel: 201-567-4799; Empl.: 10

OPTIMA ENCLOSURES, 2166 Mountain Indl. Blvd., Tucker, GA 30084, Tel: 404-939-6340, TWX: 810-766-3967; FSC No.: 10110; Empl.: 250; *Sls. Mgr.:* Al Waters .... **2**•1047-1052

Local Sales Offices & Reps

AZ	Scottsdale, Arcom Sls.	602-947-5745
CA	Santa Clara, Optima Div.	408-496-1040
CA	Santa Fe Springs, Optima Div.	213-949-9302
CO	Denver, Quorum 3	303-696-8480
FL	Orlando, OEM Mktg.	305-299-1000
GA	Atlanta, Optima Div.	404-449-2530
IL	Arlington Heights, Diethert/Angel	312-593-7600
KS	Kansas City, BC Elctrn. Sls.	913-342-1211
KS	Wichita, BC Elctrn. Sls.	316-942-9840
MD	Gaithersburg, Beacon North	301-869-3289
MD	Randallstown, Beacon North	703-591-1300
MI	Southfield, L. H. Dickelman Co.	313-353-8210
MN	Golden Valley, Diethert/Angel	612-546-6099
MO	Bridgeton, BCElctrn. Sls.	314-291-1101
NJ	Fair Lawn, Optima Div.	201-794-3100
NY	Rochester, Apex Assoc.	716-254-6050
OH	Cleveland, C. A. Robinson Co.	216-381-9049
OH	Dayton, C. A. Robinson Co.	513-278-7969
OR	Beaverton, Caruso & Northcutt, Inc.	503-646-4973
TX	Richardson, Optima Div.	214-238-1116
UT	Sandy, Quorum 3	801-943-9227
VA	Fairfax, Beacon North	703-591-1300
VA	Forest, Beacon North	804-239-8486
WA	Bellevue, Caruso & Northcutt, Inc.	206-454-9699
WI	Waukesha, Diethert/Angel	414-547-6575

OPTIMATION, See Julie Research Labs

OPTIMIZED DEVICES, INC., 220 Marble Ave., Pleasantville, NY 10570, Tel: 914-769-6100; Empl.: 30

OPTIMUM APPLIED SYSTEMS, 145 Palisade St., Dobbs Ferry, NY 10522-1696, Tel: 914-693-9001, Telex: 646689 PANGIA-YONKERS; Empl.: 30; *Sls. Mgr.:* H. Joseph Brakl

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Local Sales Offices & Reps

CA	Palo Alto, Sheehan McCristall Assocs.	415-494-8244
FL	Lauderhill, Innovative Mktg.	305-485-6869
FL	Melbourne, EMS, Inc.	305-724-1027
IL	Chicago, LGS Elctrns. Co.	312-456-9616
IN	Ft. Wayne, Corrao Marsh, Inc.	219-637-5548
IA	Cedar Rapids, Cahill, Schmitz & Cahill	319-377-8219
MI	Ann Arbor, Technical Sls. Assocs.	313-995-4082
MI	Union Lake, Technical Sls. Assocs.	313-363-1427
MN	Minneapolis, White Sls. Co.	612-755-0855/3511
NJ	Freehold, Sal Giaconne	201-462-7410
NJ	Palisades Park, Janco Technlg.	201-941-4008
NY	Pittsford, Franklin Sls. Corp.	716-248-8251; 315-737-7121
OH	Dayton, Technical Sls. Assocs.	513-222-1892
OH	Dayton, Patrick Montplaisir	513-434-4316
OH	Lyndhurst, Technical Sls. Assocs.	216-461-0826
TX	Plano, Zeus Engrg. Co.	214-423-2027

OPTOELECTRONICS, INC., 1309 Dynamic St., Petaluma, CA 94952, Tel: 707-763-4181, Telex: 34-0186; Empl.: 40; *Sls. Mgr.:* Victor Yen

OPTOELECTRONICS, INC., 5821 N.E. 14th Ave., Ft. Lauderdale, FL 33334, Tel: 305-771-2050, Telex: 514849; Empl.: 25; *Sls. Mgr.:* L. R. Hufft; *Dist. Mgr.:* L. R. Hufft

OPTOMICRONIX, 10080 N. Wolfe Rd., SW 3-360, Cupertino, CA 95014, Tel: 408-725-1220; *Sls. Mgr.:* W. M. Otsuka

OPTO TECHNLG., 1674 S. Wolf Rd., Wheeling, IL 60090, Tel: 312-537-4277, TWX: 910-687-1490; Empl.: 25; *Sls. Mgr.:* William E. Hegberg; *Dist. Mgr.:* Richard Hegberg

opto 22

OPTO 22, 15461 Springdale St., Huntington Bch., CA 92649, Tel: 714-891-5861, Telex: 692-386; Empl.: 120; *Sls. Mgr.:* Jim Pancake ....**1B**•1470, 1471

Local Distributors

AL	Birmingham, Industrial Elec. Supply	205-956-8504
AL	Huntsville, Hamilton Avnet Elctrns.	205-837-7210
AZ	Tempe, Hamilton Avnet Elctrns.	602-231-5100
AR	Little Rock, Carlton Bates	501-562-9100
CA	Costa Mesa, Avnet Elctrns.	714-754-6111
CA	Costa Mesa, Hamilton Electro Sls. Orange County	714-641-4100
CA	Culver City, Hamilton Electro Sls.	213-558-2121
CA	Huntington Beach, Opto 22 Distibutor Sls.	714-891-5861
CA	Laguna Hills, Automated Dynamics	714-855-8235
CA	Milpitas, Automated Dynamics	408-946-0222
CA	Sacramento, Hamilton Avnet Electronics	916-925-2216
CA	San Diego, Hamilton Avnet Elctrns.	619-571-7510
CA	Sunnyvale, Hamilton Avnet Elctrns.	408-743-3355
CO	Arvada, Automated Dynamics	303-425-5242
CO	Denver, Hamilton Avnet Elctrns.	303-740-1000
CT	Danbury, Hamilton Avnet Elctrns.	203-797-2800
FL	Fort Lauderdale, Hamilton Avnet Elctrns.	305-971-2900
FL	Orlando, Hamilton Avnet Elctrns.	305-628-3888
FL	St. Petersburg, Hamilton Avnet Elctrns.	813-576-3930
GA	Norcross, Professional Control Corp.	404-449-4577
GA	Norcross, Hamilton Avnet	404-447-7507
IL	Bensenville, Hamilton Avnet Elctrns.	312-860-7700
IL	Berkeley, Tara	312-449-6434
IL	Elk Grove Village, GBL Goold Elctrns.	312-593-3220
IL	Moline, Jim Otis	309-762-9311
IN	Carmel, Hamilton Avnet Elctrns.	317-844-9333
IN	Indianapolis, Process Automation Devices	317-849-3682
KS	Overland Park, Hamilton Avnet Elctrns.	913-888-8900
MD	Baltimore, Automation Indl. Control	301-944-8400
MD	Columbia, Hamilton Avnet Elctrns.	301-995-3500
MD	Mount Airy, Thermal Devices	301-442-1007
MA	N. Redding, Martindale Assocs.	617-942-0514
MA	Woburn, Hamilton Avnet Elctrns.	617-273-7500
MI	Grand Rapids, Hamilton Avnet Elctrns.	616-243-8805
MI	Livonia, Hamilton Avnet Elctrns.	313-522-4700
MI	Madison Heights, McNaughton-McKay Elect.	313-399-7500
MN	Minneapolis, Cassidy Elctrns.	612-944-0100
MN	Minnetonka, Hamilton Avnet Elctrns.	612-932-0600
MN	St. Paul, Kim Controls	612-780-2991
MO	Earth City, Hamilton Avnet Elctrns.	314-344-1200
NJ	Cherry Hill, Hamilton Avnet Elctrns.	609-424-0100
NJ	Fairfield, Hamilton Avnet Elctrns.	201-575-3390
NM	Albuquerque, Hamilton Avnet Elctrns.	505-765-1500
NY	East Syracuse, Hamilton Avnet Elctrns.	315-437-2641
NY	Glen Head, Livera-Polk Assocs.	516-759-9300
NY	Melville, Hamilton Avnet Elctrns.	516-454-6060
NY	Rochester, Hamilton Avnet Elctrns.	716-475-9130
NC	Charlotte, Regan Controls	704-523-9137
NC	Raleigh, Hamilton Avnet Elctrns.	919-878-0810
OH	Centerville, I. P. D.	513-435-2086
OH	Cincinnati, Richard Equip.	513-271-8666
OH	Cleveland, Hamilton Avnet Elctrns.	216-831-3500
OH	Columbus, Great Lakes Controls Corp.	614-451-7872
OH	Dayton, Hamilton Avnet Elctrns.	513-433-0610
OH	North Royalton, Great Lakes Controls Corp.	216-582-0020
OK	Tulsa, Quality Comps.	918-664-8812
OR	Lake Oswego, Hamilton Avnet Elctrns.	503-635-8831
OR	Portland, Pacific Control Supply	503-249-2033
PA	King of Prussia, Applied Controls	215-265-3832
PA	Pittsburgh, Great Lakes Controls Corp.	412-341-6084
PA	Pittsburgh, Customized Control Sys.	412-921-3196
TX	Addison, Quality Comps.	214-387-4949
TX	Austin, Quality Comps.	512-835-0220
TX	Austin, Hamilton Avnet Elctrns.	512-837-8911
TX	Houston, Hamilton Avnet Elctrns.	713-780-1771
TX	Houston, Quality Comps.	713-491-2255
TX	Irving, Hamilton Avnet Elctrns.	214-659-4111
UT	Salt Lake City, Hamilton Avnet Elctrns.	801-972-2800
WA	Bellevue, Hamilton Avnet Elctrns.	206-643-3950
WA	Kent, Shannon, Ltd.	206-763-0545
WA	Redmond, Cascade Controls	206-881-8843
WI	Milwaukee, Taylor Elctrns.	414-241-4321
WI	Milwaukee, Hamilton Avnet Elctrns.	414-784-4510
WI	Sussex, Professional Control Corp.	414-246-3220

OPTRON, INC., See TRW Optron

ORAM ELCTRNS., Rte. 22, Brewster, NY 10509, Tel: 914-279-2966; Empl.: 25; *Sls. Mgr.:* Vincent A. Gianguzzi

ORBIT INDS., 2670 Lockheed Way, Carson City, NV 89701, Tel: 702-882-6123; Empl.: 10

ORBIT INSTRUMENT CORP

ORBIT INSTRUMENT CORP., 80 Cabot Ct., Hauppauge, NY 11788, Tel: 516-435-8300, TWX: 510-221-2122; FSC No.: 11263; *Sls. Mgr.:* Bruce Reissman, Dennis Sunshine ...**1B**•1790, 1791; **3**•1138

Local Sales Offices & Reps

CA	San Diego, Orbit Instr. Corp.	619-566-3437

ORBIT INSTRUMENT OF CAL., 6431 Global Dr., Cypress, CA 90630, Tel: 714-527-0561, TWX: 510-221-2122; FSC No.: 11263; *Sls. Mgr.:* Bruce Reissman

ORIEL CORP., 250 Long Beach Blvd., Stratford, CT 06497-0872, Tel: 203-377-8282, TWX: 710-453-8719

ORIONICS, INC., 34368E Frontage Rd., Bozeman, MT 59715, Tel: 406-586-8256, TWX: 910-963-2063

ORTEL CORP., 2015 W. Chestnut St., Alhambra, CA 91803, Tel: 213-281-3636; *Sls. Mgr.:* Andrew Hilbert

OSBORNE TRANSFORMER, 19636 Derby St., Detroit, MI 48203, Tel: 313-368-4136; Empl.: 30; *Sls. Mgr.:* J. R. Osborne

OSCILLATEK CORP., 620 North Lindenwood Dr., Olathe, KS 66062, Tel: 913-829-1777, Telex: 437045; Empl.: 20; *Sls. Mgr.:* A. Ghafoor ....**1A**•1399

OSHINO ELECTRIC LAMP WORKS, LTD., 5-2, Mianami-Shinagawa 2-chome, Shinagawa-Ku, Tokyo, Japan, Tel: 03-471-8548, Telex: 0242-2117; Empl.: 300; *Sls. Mgr.:* T. Koyama ....**1B**•1093

Local Sales Offices & Reps

CA	Fountain Valley, WAMCO Inc.	714-545-5560

OSLO CONTROLS, 328 Industrial Ave, Cheshire, CT 06410, Tel: 203-272-2794, TWX: 710-455-3774; *Sls. Mgr.:* J. J. Martinez ....**1B**•1736, 1737

Local Sales Offices & Reps

AZ	Scottsdale, Semi-Systems	602-991-1151
CA	Brea, Masco	714-529-0866
CA	Mountain View, Westech Sls.	415-961-1422
CO	Englewood, Computech Mkt.	303-773-3981
CT	Bloomfield, Zaslow Sls.	203-242-7781
FL	Tampa, J-R Controls	813-961-9478
IL	Lisle, W-G Controls	312-963-5954
MD	Silver Spring, L. G. White & Co.	301-434-1555
MI	Grosse Pointe Park, Greiner Assoc.	313-499-0188
MN	Minneapolis, JOS-CO/Melius	612-861-3343
MO	St. Louis, Hill & Co.	314-432-1136
NJ	Caldwell, Grimm Siegel Assoc.	201-575-9300
NY	Syracuse, Canavan-Scanlon Assoc.	315-437-1271
OH	Cincinnati, O. H. Bromberg & Assoc.	513-771-9333
OH	Mentor, KT/DEPCO	216-729-3588
PA	Broomall, White-Whiddett	215-353-6347
TX	Dallas, Glidden Electro Equip.	214-341-0610
WA	Mercer Island, J. H. Andersen & Assocs.	206-232-0484

Local Distributors

CA	Gardena, California Switch & Signal	213-770-2330; 213-538-9830
CA	Los Angeles, Master Distrs.	213-829-4656
CA	Los Angeles, Minarik Elect.	213-485-1291
CA	Riverside, Elctrn. Supply	714-683-7300
CA	San Diego, Deco Elctrns.	619-693-1595
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Tustin, Western Switches	714-731-4333
CA	Van Nuys, Pacific Switch Controls	213-873-4802
CT	Shelton, Century Elec. Supply	203-736-2684
CT	West Hartford, Atlantic Switch Controls	203-527-7705

FL	Lakeland, A A Elec.	800-237-8274
FL	Lakeland, Switch Controls	813-644-7564
IL	Lombard, R. M. Elctrns.	312-932-5150
IL	Wheaton, Conectrix	312-653-1460
MA	Canton, Impact Elctrns.	617-821-1500
MI	St. Clair Shores, Spemco	313-771-2700
MN	Minneapolis, Elctrn. Center	612-338-5881
NJ	Fair Lawn, Relay Specialties	201-797-3313
NJ	Mt. Laurel, Jersey Switch	609-778-8190
NY	Woodside, Switches Unltd.	212-478-5000
OH	Cincinnati, Cartessa Mfg.	513-522-3100
OH	Columbus, Ohio Switch	614-885-0319
TX	Dallas, Glidden Electro Equip. Co.	214-341-0610
TX	Dallas, Texaswitch	214-357-1768
WI	Mequon, Taylor Elec.	414-241-4321
PR	Ponce, Distributronics	809-843-3321

OSTBY & BARTON, 487 Jefferson Blvd., Warwick, RI 02886, Tel: 401-739-7310, Telex: 927573; *Sls. Mgr.:* Jos. E. Burns

OTTO
CONTROLS

OTTO ENGRG., 2 E. Main St., Carpentersville, IL 60110, Tel: 312-428-7171, Telex: 722426; FSC No.: 21649; Empl.: 120; *Sls. Mgr.:* R. E. Sparks .... **1B**•1738, 1739

Local Sales Offices & Reps

AL	Decatur, El Tech	205-353-7899
AZ	Mesa, Temp Assoc.	602-829-1901
CA	Costa Mesa, Gabriel Assocs.	714-957-1981
CA	San Jose, Mollard Mktg.	415-961-0456
FL	Ft. Lauderdale, Newell-Hynes Assocs.	305-761-1113
IL	Glen Ellyn, Rockford Controls Co.	312-469-6016
MA	Needhan Heights, Newscott	617-444-1923
MO	Kansas City, Harris-Hanson Co.	816-444-9494
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NJ	Medford, Jack McCoy Inc.	609-953-0770
NY	Great Neck, F. Tylinski Co.	516-466-9070
OH	Cleveland, Electro-Com	216-676-8154
OH	Dayton, Electro-Com	513-898-5140
SC	Irmo, Heritage Sls. Assoc.	803-781-8259
TX	Dallas, Control Comps. Corp.	214-458-8877
WA	Bellevue, James Findlay Co.	206-455-9597

Local Distributors

CA	Los Angeles, Electric Switches, Inc.	213-664-2125
CA	N. Hollywood, Flame Enterprises	213-769-2442
CA	Sunnyvale, Pyramid Elctrns.	408-744-1900
MD	Kensington, Marine Air Supp.	301-949-1353
MA	Hingham, Sager Elec. Supp.	617-749-6700
NY	Farmingdale, Harrison Radio Corp.	516-293-7990
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Woodside, Durham Aircraft Srvc.	212-274-9000
TX	Dallas, Associated Aircraft Supp.	214-331-4381

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OVENAIRE, 706 Forrest St., Charlottesville, VA 22901, Tel: 804-977-8050, TWX: 510-587-5461; FSC No.: 12020; Empl.: 150; *Sls. Mgr.:* Andy Bell .... **1A**•1400-1403

Local Sales Offices & Reps

AL	Huntsville, L & D, Inc.	205-837-1469
CA	San Mateo, Melvin Sls.	415-349-7445
CA	Van Nuys, R.L. Assocs.	213-782-7826
CO	Loveland, Morbak Mktg.	303-669-8900
FL	Maitland, Ellis & Assocs.	305-645-1101
GA	Atlanta, L & D Inc.	404-455-3483
IL	Des Plaines, Janus Inc.	312-298-9330
IN	Fort Wayne, TX Sls., Inc.	219-489-4447
MD	Towson, Dickison Sls. Co.	301-823-0923
MA	Milton, Naton Assocs.	617-698-0670
MN	St. Paul, Countryman	612-645-9151
MO	Blue Springs, Chesco	816-229-1404
MO	St. Charles, Chesco	314-946-6677
NJ	Cherry Hill, H. J. White Co.	609-428-4544
NJ	Paramus, Eltech Sls.	201-967-1309
NY	Buffalo, Quality Comps.	716-837-5430
NC	Greensboro, L & D, Inc.	919-292-3201
NC	Raleigh, L&D Inc.	919-876-5301
TN	Seymour, L&D Inc.	615-577-1549
TX	Arlington, W. Pat Fralia Co.	817-640-9101
VA	Richmond, L & D, Inc.	804-359-1025
WA	Seattle, Carlyle Tech. Sls.	206-575-6750
WI	Milwaukee, Janus Inc.	414-476-9104

OVEN INDS., 191 Hempt Rd., P.O. Box 290, Mechanicsburg, PA 17055, Tel: 717-766-0721; FSC No.: 21302; Empl.: 50; *Sls. Mgr.:* T. M. Nolan

OXLEY INC., 6290 Sunset Blvd., Ste. 1126, Los Angeles, CA 90028, Tel: 213-463-5120, TWX: 910-321-2903; *Sls. Mgr.:* Norman R. Sutherland

PACCOM, 3928 148th NE, Redmond, WA 98052, Tel: 206-883-9200, 800-426-6254, TWX: 910-449-2592; Empl.: 15; *Sls. Mgr.:* D. Tully; *Dist. Mgr.:* C. Beaudette

PACE INC., 9893 Brewers Ct., Laurel, MD 20707, Tel: 301-490-9860, Telex: 87446; Empl.: 75; *Sls. Mgr.:* James K. Bausell

PACER INDUSTRIES, INC., 1450 First Ave., Chippewa Falls, WI 54729, Tel: 715-723-1141, Telex: 260391; FSC No.: 60162; *Sls. Mgr.:* Steven Prince; *Dist. Mgr.:* Steven Prince

PACIFIC ATLANTIC ELCTRNS., Box 754, El Cerrito, CA 94530, Tel: 415-237-5837, TWX: 910-366-7296; Empl.: 4; *Sls. Mgr.:* P. Yen; *Dist. Mgr.:* P. Yen

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Local Sales Offices & Reps

CA	El Cerrito, Patronix	415-237-5837

PACIFIC CYBER/METRIX INC., 6800 Sierra Ct., Dublin, CA 94568, Tel: 415-829-8700, TWX: 910-389-6890; *Sls. Mgr.:* R. Nelson

PACIFIC COMMUNICATIONS, 2041-A S. Grand Ave., Santa Ana, CA 92705, Tel: 714-546-0147; Empl.: 35

PACIFIC ELECTRICORD, 747 W. Redondo Bch. Blvd., Gardena, CA 90247, Tel: 213-532-6600, TWX: 910-346-7619; Empl.: 600; *Sls. Mgr.:* W. A. Fiechtner; *Dist. Mgr.:* Gary M. Payne

PACIFIC ELECTRO DYNAMICS, INC., 11465 Willows Rd. N.E., Redmond, WA 98052, Tel: 206-881-1700, TWX: 910-449-2977

PACIFIC INSTRS. INC., 2355 Whitman Rd., Concord, CA 94518, Tel: 415-827-9010, TWX: 910-481-9977; Empl.: 45 .... **3**•1015

Local Sales Offices & Reps

AL	Huntsville, Lee Assocs.-Mid South, Inc.	205-533-5896
AZ	Phoenix, Vic Myers Assocs.	602-241-9324
AZ	Phoenix, Trembly Assocs.	602-967-2058
CA	Alhambra, Dale-Dahl Assocs.	213-682-3417
CA	Walnut Creek, Dale-Dahl Assocs.	415-933-9595
CO	Denver, Vic Myers Assocs.	303-629-9676
CO	Denver, Trembly Assocs.	303-759-1195
CT	Hamden, Applied Measurements	203-288-5288
FL	Maitland, Wade H. Boggs, Inc.	305-647-2226
IL	Park Ridge, EIA, Inc.	312-298-2290
IN	Indianapolis, EIA, Inc.	317-257-7231
ME	Freeport, Applied Measurements	207-773-4580
MA	Acton, Applied Measurements	617-263-2766
MI	Farmington Hill, Anderson Elctrns., Inc.	313-553-7608
NJ	Marlboro, Cook & Weil	201-536-3964
NM	Albuquerque, Vic Myers Assocs.	505-884-6878
NM	Albuquerque, Trembly Assocs.	505-266-8616
NY	Latham, L-Tron Corp.	518-785-5032
NY	New York, Cook & Weil	212-246-6599
PA	Radnor, Roberts Engrg.	215-688-6525
TN	Nashville, Lee Assocs.-Mid South, Inc.	205-533-5896
TX	Arlington, John T. Houston Assocs., Inc.	817-265-2931
UT	Salt Lake City, Trembly Assocs.	801-486-5292
UT	Salt Lake City, Vic Myers Assocs.	801-581-1760
VT	Bennington, Applied Measurements	802-442-2222
VA	Arlington, Gans & Pugh Assocs.	703-527-3262

PACIFIC MAGNETICS CORP., 2602 Transportation Ave., Ste. F, National City, CA 92050, Tel: 619-474-8216; *Sls. Mgr.:* Mary Hill

PACIFIC MEAS., INC., 488 Tasman Drive, Sunnyvale, CA 94086, Tel: 408-734-5780, TWX: 910-339-9273; Empl.: 100; *Sls. Mgr.:* Ed Mendel

PACIFIC MICROCOMPUTERS, INC., 119 Aberdeen, Cardiff, CA 92007, Tel: 619-436-8649; Empl.: 27; *Sls. Mgr.:* Sherrell Harper

PACIFIC MICRO SYS., INC., 160 Gate 5 Rd., Sausalito, CA 94965, Tel: 415-331-2525; Empl.: 12; *Sls. Mgr.:* Donald Shipley; *Dist. Mgr.:* Donald Shipley

PACIFIC
POWER SOURCE CORP.

PACIFIC POWER SOURCE CORP., 15122 Bolsa Chica St., Huntington Bch., CA 92649, Tel: 714-898-2691, 800-854-2433; Empl.: 49; *Sls. Mgr.:* A. F. Hatlestad .... **3**•1897-1901

Local Sales Offices & Reps

KS	Overland Park, Ramsey Assocs.	913-649-6996
MA	Burlington, Intersell, Inc.	617-273-3844
MN	Minneapolis, Loren Green Assocs.	612-571-6666
MO	Maryland Heights, Ramsey Assocs.	314-878-5042
NY	Dewitt, D. B. Assocs. Inc.	315-446-0220
NY	Wantagh, Bytec Reps.	516-781-7400
VA	Springfield, Tech Reps. Inc.	703-569-6868
WA	Bellevue, Al Smith	206-746-6770
WA	Vancouver, Al Smith	206-892-9912

Local Distributors

EXP	Los Angeles, CA, Trans World Trade	213-476-8406

PACIFIC RESISTOR CO., 18300 Oxnard St., Tarzana, CA 91356, Tel: 213-345-7811 .... **1A**•1922, 1923

Local Sales Offices & Reps

CA	San Jose, Silcon Valley	408-286-7510
MN	St. Paul	612-642-2828

PACIFIC SCIENTIFIC CO., 4301 Kishwaukee, Rockford, IL 61105, Tel: 815-966-3600, Telex: 257-315; Empl.: 400

Distributor

PACIFIC SWITCH CONTROLS, INC., 16116 Leadwell St., Van Nuys, CA 91406, Tel: 213-873-4802 .... **1B**•1742

PACIFIC TIMER INC., 21739 N.E. 18th Way, Redmond, WA 98052, Tel: 206-881-1785; *Sls. Mgr.:* Karen A. Pettyjohn

PACIFIC TRANSDUCER, 2301 Federal, Los Angeles, CA 90064, Tel: 213-478-1134; Empl.: 23

PACTEC DIV., LaFrance Corp., Enterprise & Executive Avenues, Philadelphia, PA 19153, Tel: 215-365- 8400, Telex: 83- 1732; *Dist. Mgr.:* Edward Fitzpatrick .... **2**•1002, 1042, 1043

Local Sales Offices & Reps

AL	Huntsville, Hollingsworth & Still	800-241-5712
AZ	Phoenix, Gramer & Co.	602-995-9455
CA	Fallbrook, Martronix	619-728-7678
CA	Santa Clara, Warren Assoc.	408-988-7762
CO	Denver, High Plains Mktg.	303-751-7150
CT	Middletown, Gerber Sls.	203-347-3000
FL	Ft. Lauderdale, Hollingsworth & Still	305-748-8964
GA	Norcross, Hollingsworth & Still	404-447-1700
IL	Arlington, Brainard-Wilson Mktg.	312-437-2700
IN	Carmel, Brainard-Wilson Mktg.	317-844-2800
MA	Newton, Gerber Sls.	617-969-2620
MI	Detroit, Burcaw Co.	313-533-7700
MN	St. Louis Park, Lestronix	612-926-8466
MO	Grandview, Harris Hanson Co.	816-763-6200
MO	St. Louis, Harris Hanson Co.	314-432-3611
NJ	Broomall, L. D. Lowery, Inc.	215-528-5170
NJ	Woodcliff Lake, Joe Freid & Assoc.	201-391-8091
NY	Great Neck, F & F Metro	516-482-4080
NY	Mendon, Tech-Mark	716-624-3840
OH	Richfield, Bear Mktg.	216-659-3131
OR	Portland, James J. Backer Co.	503-297-8744
PA	Broomall, L.D. Lowery, Inc.	215-528-5170
TX	Dallas, MGR Elctrn.	214-238-5246
UT	Salt Lake City, High Plains Mktg.	801-968-9456
WA	Seattle, James J. Backer Co.	206-285-1300
WI	Colgate, Rep 1 & Assocs.	414-628-4016

Local Distributors

AL	Decatur, Forbes Distrs.	205-353-4762
AZ	Phoenix, R. V. Weatherford	602-272-7144

AZ	Phoenix, Tri-Tek	602-995-9352
AZ	Phoenix, Lion Elctrns.	602-869-9611
AZ	Tucson, Elliot Elctrns.	602-884-7394
CA	Anaheim, R. V. Weatherford	714-634-9600
CA	Burlingame, Rose Elctrns.	415-348-2740
CA	Cucamonga, Abletronics	714-987-7606
CA	Gardena, California Switch & Signal	714-522-8600
CA	Glendale, R. V. Weatherford	213-849-3451
CA	Glendale, R. V. Weatherford	213-849-3451
CA	Monterey, Zackit (Monterey)	408-375-3144
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Palo Alto, R. V. Weatherford	415-493-5373
CA	Pomona, R. V. Weatherford	714-623-1261
CA	Sacramento, Zackit/Sacramento	916-446-3131
CA	San Diego, R. V. Weatherford	619-278-7400
CA	San Jose, Quement Elctrns.	408-998-5900
CA	San Rafael, Electronics Plus	415-457-0456
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CA	Valleyo, Zackit (Valleyo)	707-644-6676
CO	Denver, Intergrated Elctrns.	303-292-6121
CO	Denver, Gateway Elctrns.	303-458-5444
CO	Denver, R. V. Weatherford	303-428-6900
CO	Greeley, Greely Walker	303-353-3241
CT	Middletown, Midstate Elctrns.	203-347-5638
CT	New Haven, Hatry Elctrns.	203-787-5921
CT	New London, Jan Elctrns.	203-442-4386
CT	Stratford, Utronics	203-378-4201
DE	Wilmington, Wholesale Elctrns.	302-656-9988
FL	Longwood, MRP Micro Elctrns.	305-331-8787
FL	Miami, Electronic Equip. Co.	305-871-3500
FL	Orlando, EMSCO	305-849-6362
FL	West Palm Beach, Nurmi Elctrns.	305-686-8553
GA	Atlanta, Ack Radio	404-351-6340
IL	Arlington Hgts., Martec Assocs.	312-437-2700
IL	Berwyn, BB & W Inc.	312-242-1533
IL	Champagne, Klaus Radio	217-356-1896
IL	Chicago, R. W. Elctrns.	312-248-2480
IL	Chicago, Electronic Distrs.	312-283-4800
IL	Elk Grove, Martec Assocs.	312-956-8090
IL	Mt. Prospect, Tri State Elctrns.	312-255-0600
IL	Niles, Joseph Elctrns.	312-297-4200
IL	Rosemont, Advent Elctrns.	312-297-6200
IN	Bloomington, Stansifer Radio Co.	812-336-6339
IN	Gary, Calumet Elctrns.	317-887-4961
IN	Indianapolis, Electronic Service Parts	317-632-8586
IN	Jasper, Elex Mart	812-882-3615
IA	Cedar Rapids, Iowa Radio Supply	319-393-5410
KS	Salina, Electronics, Inc.	913-827-7377
KY	Bowling Green, Randolph, Hale & Meredith	502-781-1460
KY	Louisville, Peerless Elctrns.	502-637-7674
MD	Aberdeen, Harco Elctrns.	301-838-7990
MD	Baltimore, Almo Elctrns.	301-247-5955
MD	Beltsville, P.S.I.	301-937-4960
MD	Hyattsville, Mark Elctrns.	301-559-7700
MD	Rockville, Capitol Radio	301-881-2270
MD	Rockville, Heath Kit Elctrns.	301-881-5420
MD	Towson, Baynesville Elctrns.	301-823-0082
MA	Hingham, Sager Elec. Supp.	617-749-6700
MI	Augusta, Great Lakes Elctrns.	616-731-4156
MI	Berrien Springs, Data Comms.	616-471-2119
MI	Detroit, Radio Supp. & Engrg.	313-TE1-3174
MI	Grand Rapids, S. F. Elctrns.	616-459-0216
MI	Lansing, Fulton Radio	517-394-5020
MI	Livonia, RS Elctrns.	313-525-1155
MN	Edina, Northern Elctrns.	612-944-1167
MO	Kansas City, Burstein & Assocs.	816-BA1-4100
MO	St. Louis, Gateway Elctrns.	314-427-6116
NE	Lincoln, Scott Elctrns.	402-466-8221
NJ	Milford, Sintec/Aries	201-996-4093
NJ	Pine Brook, Parts Masters	201-227-7797
NM	Albuquerque, Walker Radio Co.	505-247-2288
NY	Buffalo, Summit Distr.	716-887-2800
NY	Freeport, KRP Elctrns.	516-623-3346
NY	New York, Advance Elctrns.	212-687-2224
NY	Rochester, Summit Distr.	716-334-8110
NY	Rochester, Rochester Radio Supp.	716-454-7800
NY	Rockville Centre, Midway Indl. Elctrns.	212-895-2443
NY	Rockville Centre, Midway Indl.	516-764-2400
NY	Troy, Trojan Elctrn. Supp.	518-274-4481
NC	Burlington, Womack Elctrns.	919-227-7486
NC	Charlotte, Dixie Elctrns.	704-377-5413
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Columbus, Hughes-Peters	614-294-5351
OH	Solon, Hart Elctrns.	216-248-8855
OK	Oklahoma City, Electronic Supp.	405-232-5215
OK	Tulsa, Radio Inc.	918-587-9123
OR	Beaverton, Norvac Elctrns.	503-644-1025
OR	Portland, Radar Elec.	206-233-3691
PA	Allentown, A.A. Peter, Inc.	215-434-5237
PA	Coatesville, County Supply	215-384-4585
PA	Enola, Almo Elctrns.	717-732-3681
PA	Marcus Hook, Linwood Wholesalers	215-485-0777
PA	Philadelphia, Almo Elctrns.	215-698-4000
PA	Willow Grove, Resco Elctrns.	215-659-4575
PA	York, Rosen Elctrns.	717-843-3875
RI	Pawtucket, Jabbour Elctrns.	401-728-4600
SC	Columbia, Dixie Elctrns.	803-779-5332
TN	Chattanooga, Techni-Tronics	615-875-5449
TN	Clarksville, Randolph, Hale & Matthews	615-647-2325
TN	Columbus, Randolph & Williams	615-388-7566
TN	Gray, Dixie Elctrns.	615-477-3838
TN	Memphis, Bluff City	901-345-9500
TN	Nashville, Randolph & Rice	615-255-5602
TN	Tullahoma, Randolph, Rice & Williams	615-455-4531
TX	Austin, Galtronics	512-452-9311
TX	Dallas, R. V. Weatherford	214-243-1571
TX	Dallas, Solid State Elctrns.	214-438-5700
TX	Houston, Ace Elctrns.	713-688-8114
TX	Houston, R. V. Weatherford	713-688-7406
TX	Houston, Gateway Elctrns.	713-978-6575
TX	San Antonio, Altex Elctrns.	512-828-0503
UT	Salt Lake City, Standard Supp.	801-486-3371
VA	Arlington, Arlington Elctrns.	703-524-2415
VA	Charlottesville, Virginia Radio	804-296-4184
VA	Falls Church, Crossroads Elctrns.	703-931-0600
VA	Richmond, ITR (Instr. Tech. Reps.)	804-275-1431
WA	Seattle, Zephyr Elctrn. Sls.	206-241-1980
WA	Seattle, Radar Elec.	206-282-2511
WA	Seattle, R. V. Weatherford	206-575-0922
WI	Madison, Satterfield Elctrns.	608-257-4801
WI	Milwaukee, E-M Instruments	414-272-7799
WI	Milwaukee, Marsh Elctrns.	414-475-6000

PAINE INSTRS., 2401 S. Bayview St., Seattle, WA 98144, Tel: 800-426-0366, TWX: 910-444-2164; FSC No.: 13624; Empl.: 69; *Sls. Mgr.:* R. E. Helmick 1B•1870

PAK-TRONIC, See Tracor Paktronics

PALADIN, 3543 Old Conejo Rd., Newbury Park, CA 91320, Tel: 805-499-0318, Telex: 910-494-2799; Empl.: 9; *Sls. Mgr.:* Ronald Vogel

PALL TRINITY MICRO, Rte. 281, Cortland, NY 13045, Tel: 607-753-6041, Telex: 93-7295, TWX: 510-252-0791; Empl.: 500; *Sls. Mgr.:* R. H. Simkins; *Dist. Mgr.:* R. H. Hauslein

PALL ULTRAFINE FILTRATION CORP., 30 Sea Cliff Ave., Glen Cove, NY 11542, Tel: 516-759-1900, Telex: 64-9491, TWX: 510-223-0606; Empl.: 3500

Local Distributors

CA	Fremont, Mensco	408-739-8690
CO	Englewood, Ross Equip.	303-740-9400
CT	Hamden, Pont Tech. Sls.	203-281-0005
FL	Cocoa Beach, Sys. Comps. Corp.	305-783-1002
MI	Kalamazoo, Flowtech Corp.	616-375-1290
MI	Livonia, Flowtech Corp.	313-471-5660
MO	Maryland Heights, Process & Chemical Equip.	314-878-6161
NY	Cortland, Prosco Prods., Inc.	607-753-8231
RI	Cranston, Chisholm	800-556-6436
TX	Houston, AWC Texas, Inc.	713-486-5800
TX	Odessa, Engineered Equip.	915-367-1821

PALOMAR ENGRS., Box 455, Escondido, CA 92025, Tel: 619-747-3343; Empl.: 9

PAMOTOR

ONE OF THE PURDY GROUP OF COMPANIES

PAMOTOR, 770 Airport Blvd., Burlingame, CA 94010, Tel: 415-347-1203, TWX: 910-374-2353; Empl.: 35; *Sls. Mgr.:* F. L. Nelson; *Dist. Mgr.:* F. L. Nelson 2•1840-1850

Local Sales Offices & Reps

AL	Huntsville, Conley & Assocs.	205-882-0316
AZ	Tempe, Foley, Tallent & Lee	602-438-1564
AR	Little Rock, J.Y. Schoonmaker	501-375-2168
CA	Burlingame, W. J. Purdy	415-347-7701
CA	Costa Mesa, Berman-Gravley	714-549-2122
CO	Denver, W. J. Purdy	303-777-1411
CT	Hartford, Sturgeon	203-249-7800
FL	Boca Raton, Conley & Assocs.	305-395-6108
FL	Oviedo, Conley & Assocs.	305-365-3283
FL	Tampa, Conley & Assocs.	813-885-7658
GA	Atlanta, Conley & Assocs.	404-447-6992
IL	Elmhurst, Hill-Gray	312-832-4101
IN	Indianapolis, Sukup & Cox	317-253-5501
IA	Marion, MSB Assocs.	319-377-6261
KS	Shawnee Mission, MSB Assocs.	913-432-2131
MD	Lisbon, S. K. MacDonald	301-924-5880
MA	Needam, Sturgeon	617-444-6603
MI	Ferndale, Hilltronics	313-398-5556
MN	Edina, Mel Foster Tech. Sls.	612-941-9790
MO	St. Charles, MSB Assocs.	314-946-5577
NJ	Englewood, Harold Gray	201-894-0894
NM	Albuquerque, W. J. Purdy	505-266-7959
NY	Syracuse, Paston-Hunter	315-437-2843
NC	Raleigh, Conley & Assocs.	919-876-9862
OH	Beachwood, Electronic Salesmasters	216-831-9555
OK	Tulsa, J.Y. Schoonmaker	918-446-0373
OR	Beaverton, William J. Purdy	503-641-9373
PA	Philadelphia, S. K. MacDonald	215-545-1205
TX	Austin, J. Y. Schoonmaker	512-480-9257
TX	Dallas, J. Y. Schoonmaker	214-349-1650
TX	Houston, J.Y. Schoonmaker	713-738-2427
UT	Salt Lake City, W. J. Purdy	801-486-8557
WA	Redmond, William J. Purdy	206-882-3144

Local Distributors

AL	Birmingham, Forbes Distributing	205-251-4104
AL	Birmingham, JLS Indl. Elctrns.	205-322-2486
AL	Huntsville, Pioneer/Huntsville	205-837-9300
AZ	Phoenix, Electronic Parts	602-277-7281
AZ	Phoenix, Wyle/Distribution	602-249-2232
AZ	Tempe, Waltronic Sls.	602-967-1020
AZ	Tucson, Inland Elctrn. Supp.	602-294-2628
AR	Little Rock, Carlton-Bates Co.	501-562-9100
CA	Buena Park, RPS Elctrns.	213-744-0355
CA	El Segundo, Wyle/Distribution	213-322-8100
CA	Fresno, J. C. Arbuckle	209-264-6554
CA	Hayward, Allied Elctrns.	415-487-5250
CA	Inglewood, Newark	213-678-0441
CA	Irvine, Ratel Elctrns.	714-549-8611
CA	Irvine, Wyle/Distribution	714-641-1600
CA	Mountain View, Abacus Elctrns.	415-961-1500
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Sacramento, Sacramento Elctrns.	916-441-4821
CA	Sacramento, Dunlap Elctrns.	916-444-8070
CA	San Diego, Wyle/Distribution	619-565-9171
CA	San Jose, Quement Elctrns.	408-998-5900
CA	San Jose, Ratel Elctrns.	408-946-4300
CA	Santa Clara, Waltronic Sls.	408-727-1200
CA	Santa Clara, Wyle/Distribution Grp.	408-727-2500
CA	Van Nuys, Nesco	213-781-0505
CO	Colorado Springs, Centennial Elctrns.	303-633-4666
CO	Denver, Ragon Elctrns.	303-744-3601
CO	Denver, Fistell Elctrns. Supp.	303-244-4691
CO	Denver, CW Elctrn. Sls. Co.	303-832-1111
CO	Denver, Newark	303-757-3351
CO	Lakewood, Acacia Sls.	303-232-2882
CO	Thornton, Wyle/Distribution	303-457-9953
CT	New Haven, Hatry Elctrns.	203-787-5921
CT	Norwalk, Bond Radio Elctrns.	203-348-2663
CT	Wallingford, Sager Elect. Supp. Co.	203-265-4600
FL	Altamonte, Pioneer/Orlando	305-834-9090
FL	Jacksonville, Southeast Elctrns.	904-356-3007
FL	Miami, ESL Elctrn. Distrs.	305-633-6973
FL	Miami, Electronic Equip.	305-871-3500
FL	Tampa, Leader Elctrn. Distrs.	813-870-3315
FL	West Palm Beach, Dolphin Elctrn. Supp.	305-659-7166
HI	Honolulu, Honolulu Elctrns.	808-949-5564
IL	Addison, L Comp/Chicago	312-628-1400
IL	Champaign, Klaus Radio	217-356-1896
IL	Chicago, Newark/Chicago	312-638-4411
IL	Elgin, Allied Elctrns.	312-697-8200
IL	Rockford, Midwest Assocs.	815-962-8036
IN	E. Chicago, Acro Distrs.	219-397-8681
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Genesis Elctrns.	317-637-5571
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Michigan City, Tri-State Elec. Supp.	219-872-5551
IA	Cedar Rapids, Iowa Radio Supp.	319-393-4510
KY	Lexington, Radio Elctrn. Equip.	606-255-6661
KY	Louisville, Peerless Elctrn. Equip.	502-637-7674
LA	Lafayette, Ralph's Elctrns.	318-234-4507
LA	New Orleans, Southern Radio Supp.	504-524-2343
LA	New Orleans, William B. Allen Co.	504-525-8222
LA	Shreveport, Industral Elctrn. Supp.	318-222-9459
MD	Baltimore, Resco/Baltimore	301-823-0070
MD	Gaithersburg, Pioneer/Wash.	301-948-0710
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	Lynn, Land Elctrn. Supp.	617-592-2220
MA	Needham, Cronin Electrns.	617-449-5000
MA	No. Wilbraham, Industrial Comps.	413-596-3854
MA	Waltham, Sterling Elctrns.	617-894-6200
MI	Ann Arbor, Wedemeyer Elctrn. Supp.	313-665-8611
MI	Battle Creek, Great Lakes Elctrns.	616-731-4156
MI	Flint, Shand Elctrns.	313-743-8940
MI	Livonia, RS Elctrns.	313-525-1155
MI	Oak Park, Newark	313-967-0600
MN	Minneapolis, Electrn Center	612-371-5200
MN	Minneapolis, Newark	612-331-6350
MN	St. Paul, Gopher Elctrns. Co.	612-483-3322

MS	Jackson, Ellington Elctrns. Supp.	601-355-0561
MO	Kansas City, L Comp/Kansas City	816-221-2400
MO	Maryland Hgts., L Comp/St. Louis	314-291-6200
MO	St. Louis, Olive Indl. Elctrns.	314-426-4500
MO	St. Louis, Van-Sickle Radio Elctrns.	314-621-5000
NE	Lincoln, Scott Elctrn. Supp.	402-466-8221
NJ	Clifton, J-Mar	201-772-6400
NJ	Cranford, Garden State Indl. Elect.	201-272-6400
NJ	Springfield, Newark	201-376-9500
NM	Albuquerque, Elctrn. Parts Co.	505-293-6161
NM	Albuquerque, Walker Radio	505-247-2288
NY	Albany, E. E. Taylor	518-438-7811
NY	Buffalo, Genessee Radio & Parts	716-873-9661
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Hauppauge, Fairmont Elctrn. Sls.	516-231-3313
NY	Millbrook, Villarreal Elctrns.	914-677-3447
NY	Rochester, Summit Distrs.	716-334-8110
NC	Raleigh, Southeastern Elctrns.	919-828-2311
OH	Akron, Sun Radio Co.	216-434-2171
OH	Akron, Akron Elctrn. Supp.	216-762-8818
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Columbus, Hughes-Peters	614-294-5351
OH	Solon, Repco	216-248-8900
OK	Oklahoma City, Elctrn. Supp.	405-232-5215
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Hillsboro, Wyle/Distribution	503-640-6000
OR	Portland, United Radio Supp.	503-233-7151
OR	Portland, Radar Elec. Co.	503-232-3404
PA	Altoona, Allegheny Elctrns.	814-946-0871
PA	Erie, Rem Elctrns.	814-453-5626
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Philadelphia, Almo Elctrns.	215-698-4000
PA	Pittsburgh, CAM/RPC Ind'l Elctrns.	412-782-3770
RI	Pawtucket, Major/Edwards Elctrns.	401-725-7400
SC	Charleston, Wholesale Ind'l. Elctrns.	803-722-2634
SC	Columbia, Dixie Elctrns.	803-779-5332
TN	Kingsport, Radio Elec. Supp.	615-247-8111
TN	Knoxville, Indl. Elctrns.	615-573-7135
TN	Memphis, Bluff City Dist.	901-345-9500
TN	Nashville, Randolph & Rice	615-255-5601
TX	Austin, Wholesale Elctrns. Supp.	512-478-9568
TX	Austin, Harrison Equip.	512-458-3555
TX	Corpus Christi, Douglas Elctrns.	512-883-5103
TX	Corpus Christi, Wicks Radio Equip.	512-883-4481
TX	Dallas, Wholesale Elctrns. Supp.	214-824-3001
TX	El Paso, Midland Specialty Co.	915-533-9555
TX	El Paso, Ideal Ind'l Elctrn. Supp.	915-779-6647
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Houston, Altair Co.	713-462-3029
TX	San Antonio, Sherman Elctrns.	512-224-1001
TX	Stafford, Harrison Equip.	713-879-2600
UT	Salt Lake City, Newark	801-486-1048
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
VA	Norfolk, Avec Elctrns.	804-627-3502
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Bellevue, Wyle/Distribution	206-453-8300
WA	Seattle, Radar Elec.	206-282-2511
WV	Beckley, Halley Elctrns.	304-253-2561
WV	Charleston, McJunkin Corp.	304-348-4906
WI	Mequon, Taylor Elec.	414-241-4321
WI	Milwaukee, Indl. Elctrn. Corp. of WI	414-276-1212
PR	San Turce, Elctrn. Centre	809-724-3823

PAMRAN, 1101 Cedar Creek, Racine, WI 53402, Tel: 414-639-9076; Empl.: 28; *Sls. Mgr.:* R. C. Pfeil

PANAMETRICS, 221 Cresent St., Waltham, MA 02254, Tel: 617-899-2740, Telex: 6817337, 951006; Empl.: 200; *Sls. Mgr.:* Bob Mel

Local Sales Offices & Reps

CA	Oxnard, Quality Testing Consultants	805-985-1144
IL	Bensenville, Sonoscan	312-766-7088
MA	Westboro, N.E. N.D.T. Sls. Co.	617-366-9800
MI	Chelsea, Michigan Nondestructive Gage Co.	313-475-2979
NJ	Swartswood, E.M.C.O.	201-362-9306
TX	Houston, General Svcs.	713-931-1201
WA	Poulsbo, Engineering Technlg.	206-779-5550

PANASONIC, IND'L. ELCTRN. COMPS., Panasonic, Elctrn. Comps. Div., Box 1503, Secaucus, NJ 07094, Tel: 201-348-7000, Telex: 701 992-8920; Empl.: 25 .... **3**•1414-1419

Local Sales Offices & Reps

AL	Huntsville, Rep, Inc.	205-881-9270
AZ	Phoenix, Stitzer-Dodd	602-944-2237
CA	Pleasanton, Moulthrop Sls.	415-463-0450
CA	San Diego, Tauber & Assoc.	619-274-7242
CA	Van Nuys, K & R Sls.	213-781-0522
CO	Denver, Component Sls.	303-759-1666
CT	Madison, Conti-Younger Assoc.	203-245-1136
FL	Ft. Lauderdale, Reynolds & Assoc.	305-581-6611
FL	Melbourne, Reynolds & Assoc.	305-259-7000
FL	St. Petersburg, Reynolds & Assoc.	813-360-1484
GA	Tucker, Rep, Inc.	404-938-4358
IL	Palatine, Techn. Sls.	312-991-6600
IN	Indianapolis, Mktg. Engrs.	317-872-5665
KS	Olathe, Rush & West	913-764-2700
MD	Ellicott City, Mktg. Techn.	301-465-5944
MA	Burlington, Conti-Younger Assoc.	617-273-1582
MI	Birmingham, Favco Assoc.	313-644-0173
MN	Eden Prairie, Electro Mark	612-944-5850
MO	Ballwin, Rush & West	314-394-7271
NH	Melvin Village, Conti-Younger Assoc.	603-544-7378
NJ	Mount Laurel, Comtek	609-235-8505
NY	Great Neck, Cooper-Simon & Co.	516-487-1142
NY	N. Syracuse, Advanced Comp. Corp.	315-699-2671
NC	Raleigh, REP. Inc.	919-851-3007
OH	Cleveland, Del Steffen & Assoc.	216-461-8333
OH	Dayton, Del Steffen & Assoc.	513-293-3145
OH	Lexington, Del Steffen & Assoc.	419-884-2313
OR	Tigard, Elec. Sources	503-684-0040
PA	Pittsburgh, Del Steffen & Assoc.	412-276-7366
TN	Jefferson City, Rep Inc.	615-475-9012
TX	Austin, Dunbar Assoc.	
TX	Dallas, Dunbar Assocs.	214-239-7151
UT	Salt Lake City, Comp. Sls.	801-268-8440
VA	Lynchburg, Marketing Techn.	804-384-6459
WA	Bellevue, Elctrn. Sources	206-451-3500

Local Distributors

AL	Huntsville, Resistacap	205-883-4270
CA	Burlingame, Rose Elect. Distr. Co.	415-348-2740
CA	San Diego, Tauber Elctrns.	619-274-7242
CA	San Jose, Cypress Elctrns.	800-538-5112
CA	Van Nuys, NESCO	213-781-0505
IL	Chicago, Power Pak	312-286-5566
MA	Canton, Impact Sls. Co.	617-821-1500
MI	Brighton, AP Sls.	313-229-6550
NJ	Plainfield, Mars Elctrns.	201-757-4332
NY	Commack, Brentronics	516-499-5155
TX	Dallas, Computer Comp. Corp.	214-239-0271

PANAVISE PRODS., 2850 E. 29th St., Long Beach, CA 90806, Tel: 213-569-8108, Telex: 18-2135; Empl.: 29; *Sls. Mgr.:* Michael Steffen; *Dist. Mgr.:* Michael Steffen

PANDUIT CORP., 17301 Ridgeland Ave., Tinley Park, IL 60477-0981, Tel: 312-532-1800, Telex: 25-4560; Empl.: 1200 .... **2**•1532-1534, 2136-2139

Local Sales Offices & Reps

AL	Birmingham, Frank Parker & Assoc.	205-853-3152
AZ	Phoenix, Panduit Corp.	602-252-4515
AR	Little Rock, Byron Carson Co.	501-568-6798
CA	Los Altos, Ewing-Foley	415-941-4525
CA	San Diego, Tak Sls.	619-287-6141
CA	Santa Ana, Panduit Corp.	714-546-5700
CO	Denver, I. W. Strong & Assocs.	303-292-6900
FL	Lakeland, Panduit Corp.	813-665-5850
GA	Atlanta, Panduit Corp.	404-256-5940
HI	Honolulu, Agencies Co./Pacific	808-847-6581
IN	Fort Wayne, Panduit Corp.	219-424-4082
IN	Indianapolis, Panduit Corp.	317-251-8332
IA	Des Moines, Panduit Corp.	515-280-8343
KS	Kansas City, Panduit Corp.	913-764-7170
KY	Louisville, A. L. Pickens Co.	502-491-4215
LA	New Orleans, Panduit Corp.	504-581-7181
MD	Landover, Agency Group, Inc.	301-773-9292
MI	Fraser, Panduit Corp.	313-791-1700
MI	Grand Rapids, Panduit Corp.	616-942-0420
MN	Minneapolis, Electric Comp. Sls.	612-933-2594
MO	St. Louis, Panduit Corp.	314-894-7800
NH	Salem, Sales Eng. Co.	603-893-5521
NJ	Leonia, Panduit Corp.	201-461-7790
NY	Buffalo, Panduit Corp.	716-632-5182
NY	Rochester, Panduit Corp.	716-244-9480
NY	Syracuse, Panduit Corp.	315-476-6161
NC	Winston-Salem, L. G. White Southern	919-725-3612
OH	Cincinnati, Panduit Corp.	513-874-0660
OH	Cleveland, Panduit Corp.	216-835-2050
OH	Columbus, Panduit Corp.	614-262-6052
OK	Tulsa, Panduit Corp.	918-745-1420
OR	Portland, Panduit Corp.	503-248-1971
PA	Carnegie, Myles F. Smith & Assoc.	412-276-5363
PA	Glenside, Kunz, Powell & Assoc.	215-224-2434
TN	Knoxville, Panduit Corp.	615-588-2476
TN	Memphis, Byron Carson Co.	901-345-5187
TX	Dallas, Panduit Corp.	214-620-7713
TX	Houston, Panduit Corp.	713-580-0100
UT	Salt Lake City, I. W. Strong & Assocs.	801-942-6998
VA	Richmond, L. G. White Southern	804-740-7093
WA	Bellevue, Panduit Corp.	206-454-7267
WV	Dunbar, Myles F. Smith & Assoc.	304-768-9910
WI	Appleton, H. Mercer Co.	414-739-6223
WI	Brookfield, H. Mercer Co.	414-786-6431

PANEL COMPONENTS CORP., P.O. Box 6626M, Santa Rosa, CA 95406, Tel: 707-523-0600, Telex: 176-747; Empl.: 18 ....**1A**•1606-1610; **1B**•1282, 1283; **2**•1536-1539, 2140, 2141

Local Sales Offices & Reps

AL	Huntsville, DHR Mktg. Inc.	205-533-5165
CA	Santa Clara, Ross Mktg. Assoc.	408-988-8111
CO	Littleton, Omega Ltd.	303-798-7040
GA	Atlanta, DHR Mktg., Inc.	404-451-9848
IL	Northbrook, Raines & Assocs.	312-498-0890
IA	Marion, M-S-B Assocs., Inc.	319-377-6261
KS	Shawnee Mission, M-S-B Assocs., Inc.	913-432-2131
MA	Lexington, Zieco	617-861-8300
MN	St. Paul, Arkco Sls.	612-777-7454
MO	St. Charles, M-S-B Assocs., Inc.	314-946-5577
NM	Albuquerque, Burt Dieruf Assocs.	505-299-0989
NY	Great Neck, Tylinski Assocs.	516-466-9070
NY	Rochester, Lloyd Hart Assocs.	716-244-3253
NC	Raleigh, DHR Mktg., Inc.	919-876-5450
OH	Chesterland, K-T Depco	216-729-3588
OR	Portland, Earl & Brown Co.	503-245-2283
PA	Doylestown, T.O.E. Sls.	215-348-2212
PA	Pittsburgh, K-T Depco	412-487-8777
SC	Greenville, DHR Mktg. Inc.	803-235-3594
TN	Knoxville, DHR Mktg. Inc.	615-584-5286
TX	Lewisville, Jim Hughes Co.	214-221-1536
TX	Stafford, Jim Hughes Co.	713-343-0673
WA	Seattle, Earl & Brown Co.	206-284-1121

PANEL CONTROLS, 1000 Mt. Elliott Ave., Detroit, MI 48207, Tel: 313-568-2400; Empl.: 24

PANELGRAPHIC CORP., 10 Henderson Dr., W. Caldwell, NJ 07006, Tel: 201-227-1500, TWX: 710-734-4367; FSC No.: 52657; Empl.: 100

PAN-MAGNETICS INTL., INC., 455-A Carson Plaza Dr., Carson, CA 90746, Tel: 213-532-1790, Telex: 664-759; *Sls. Mgr.:* W. Dull ....**1A**•2215-2221

Local Sales Offices & Reps

AZ	Scottsdale, E.D.P. & Assocs.	602-991-6119
CT	Marlborough, Precision Sls.	203-295-0580
IN	South Bend, Schillinger Assoc.	219-282-4570
KS	Overland Park, Electri-Rep	913-649-2168
MD	Towson, Electronic Comp. Mktg.	301-321-8611
MA	Newton, Precision Sls.	617-969-0594
MN	Minneapolis, DeBeck-Hays Assocs.	612-835-3610
MO	St. Louis, Electri-Rep	314-878-0583
OR	Tigard, Electronic Sources	503-684-0040
WA	Bellevue, Electronic Sources	206-643-0400

PANNIER CORP., Graphics Div., John Fitch Industrial Park, Warminster, PA 18974, Tel: 215-672-3600; Empl.: 45; *Sls. Mgr.:* Barry Stefaniw

PAPST MECHATRONIC CORP., Aquidneck Indl. Pk., Newport, RI 02840, Tel: 401-849-5930, Telex: 952092; *Sls. Mgr.:* Emanuel V. Lauria

PARABAM, INC., 3017 E. Las Hermanas St., Rancho Dominguez, CA 90221, Tel: 213-537-1771; Empl.: 85

PARAGON ELECT., 606 Parkway Blvd., Two Rivers, WI 54241, Tel: 414-793-1161, Telex: 26-3450; Empl.: 1000; *Sls. Mgr.:* Don Karman

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PARALINE TRANSFORMER CORP., 511 South Palm Ave., Alhambra, CA 91803, Tel: 213-281-0222; FSC No.: 59465; Empl.: 34 ....**1A**•2223-2225

PARAMOUNT TUBE, INC., 1430 Progress Rd., Ft. Wayne, IN 46808, Tel: 219-484-4111; Empl.: 46; *Sls. Mgr.:* D. F. Weimer

PARKER SEAL GRP., P.O. Box 11751, Lexington, KY 40512, Tel: 606-269-2351; Empl.: 2,200; *Sls. Mgr.:* Frand Chesnik

PARLEX CORP., 145 Milk St., Methuen, MA 01844, Tel: 617-685-4341, TWX: 710-342-1538; Empl.: 450; *Sls. Mgr.:* J. Pollack Kutchin

PARSONS MFG., 1055 O'Brien Dr., Menlo Park, CA 94025, Tel: 415-324-4726, TWX: 910-373-2106; Empl.: 85; *Sls. Mgr.:* C. E. Plummer

Local Sales Offices & Reps

CO	Boulder, Scientific Devices	303-449-9466
FL	Melbourne, Reynolds & Assocs.	305-259-7000
GA	Doraville, South Pack, Inc.	404-452-0773
IL	Elmhurst, Cougar Package Designers	312-833-0346
OH	Cleveland, Donray Co.	216-449-6450
PA	Philadelphia, Thermo-Pak Co.	215-742-0447
TX	Fort Worth, Dyna Rep	817-451-1392

PASO SOUND PRODS., 14 First St, Pelham, NY 10803, Tel: 914-738-4800, Telex: 646783 Paso Pelm; Empl.: 50

PASS & SEYMOUR, INC., P.O. Box 4822, Syracuse, NY 13221, Tel: 315-468-6211; *Sls. Mgr.:* Jack Wells

PATHCOM, INC., Pace Two-Way Radio Prods., 24105 S. Frampton Ave., Harbor City, CA 90710, Tel: 213-325-1290; Empl.: 600

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PCA ELCTRNS., 16799 Schoenborn St., Sepulveda, CA 91343, Tel: 818-892-0761, Telex: 67-4681, TWX: 910-496-1525; FSC No.: 97722; Empl.: 45; *Sls. Mgr.:* Janice Fowler ....**1A**•1558-1564

Local Sales Offices & Reps

AZ	Phoenix, Toward Engrg. Assocs.	602-955-3193
CA	San Diego, Littlefield & Smith Assoc.	619-455-0055
CA	Santa Clara, Fahrner-Miller Assocs.	408-727-9800
FL	Boca Raton, Lawrence Assocs.	305-368-7373
FL	Clearwater, Lawrence Assocs.	813-584-8110
IL	Westchester, W. G. Brouillette & Assocs.	312-345-6500
MA	Framingham, KSA of New England	617-879-3835
MN	Minneapolis, Bill Deming and Assocs.	612-888-5000
NJ	Wayne, Howard Kagan Assocs.	201-694-1115
OH	Cleveland, Weschler Elec. Corp.	216-238-2550
OR	Portland, Elctrn. Comp. Sls.	503-245-2342
TX	Dallas, Blackburn Assocs.	214-692-8885
TX	Houston, Blackburn Assocs.	713-463-1354
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301
WA	Seattle, Elctrn. Comp. Sls.	206-232-9301

PCB PIEZOTRONICS, 3425 Walden Ave., Depew, NY 14043-2495, Tel: 716-684-0001, TWX: 710-263-1371; Empl.: 110; *Sls. Mgr.:* Roy Maines

PCK TECHNLG. DIV./KOLLMORGEN CORP., 322 South Service Rd., Melville, NY 11747, Tel: 516-454-4400, Telex: 6852163; Empl.: 200; *Sls. Mgr.:* J. F. Dennis-Browne

PCM-PAC CYBER-METRIC, 6800 Sierra Ct., Dublin, CA 94568, Tel: 415-829-8700, TWX: 910-389-6890; Empl.: 19; *Sls. Mgr.:* T. J. Netoff

PC TRANSFORMER CORP., 64 D Nancy St., West Babylon, NY 11704, Tel: 516-491-3300; FSC No.: 62281; Empl.: 6; *Sls. Mgr.:* Stanley L. Goldstein ....**1A**•2226-2229

PEARSON ELCTRNS., 1860 Embarcadero Rd., Palo Alto, CA 94303, Tel: 415-494-6444, Telex: 171-412; FSC No.: 05280; Empl.: 18; *Sls. Mgr.:* Patricia L. Pearson ....**1A**•2230

PECA, INC., 4957 Pearson Ave., Philadelphia, PA 19114, Tel: 215-824-1550; Empl.: 15; *Sls. Mgr.:* Jean Douglass

PENFIELD, INC., West & W. Main Sts., Plantsville, CT 06479, Tel: 203-621-9141; Empl.: 25

PENN AIRBORNE PRODS., Industrial Hwy., Southampton, PA 18966, Tel: 215-355-3400, Telex: 834759; FSC No.: 25805; Empl.: 25; *Sls. Mgr.:* W. Williams

PENN ENGRG. & MFG., P.O. Box 1000, Danboro, PA 18916, Tel: 215-766-8853; FSC No.: 46384; Empl.: 370; *Sls. Mgr.:* John E. O'Brien

PENN FIBRE & SPEC., 4343 "G" St., P.O. Box 4890A, Philadelphia, PA 19124, Tel: 215-288-7366; Empl.: 66; *Sls. Mgr.:* L. C. Jones

PENN KEYSTONE CORP., Unimax Switch Corp., Ives Rd., P.O. Box 152, Wallingford, CT 06492, Tel: 203-269-8701, Telex: 96-3485, TWX: 710-476-1397; FSC No.: 03034; *Sls. Mgr.:* Jack Fitzgerald

PENN RESCH. CORP. (PRC), 2652 South Main St., P.O. Box 3357, Kennesaw, GA 30144, Tel: 404-429-9061, Telex: 753010; *Sls. Mgr.:* Wallace Hundley

PENN TRANSFORMER CO., Box 1321, Rte. 144N, Wingate, PA 16880, Tel: 814-355-1521, Telex: EASY LINK 706473

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MN	Minneapolis, Intl. Sls. Co.	612-831-8423
OR	Portland, Intertech Sls.	503-775-7885

PA	Glenside, Koebert Assocs. Inc.	215-887-2301
UT	Salt Lake City, Aspen Sls., Inc.	801-467-2401

PENNTUBE PLASTICS, Madison Ave. & Holly St., Clifton Heights, PA 19018, Tel: 215-622-2300, Telex: 845-212; Empl.: 145

PENN VIDEO INC., 929 Sweitzer Ave., Akron, OH 44311, Tel: 216-762-4840, Telex: 98-6327 PVI-AKR; *Sls. Mgr.:* Sandra Donaldson

PENNWALT CORP., Three Pkwy., Philadelphia, PA 19102, Tel: 215-587-7000, TWX: 215-569-9748

PENRIL, 5520 Randolph Rd., Rockville, MD 20852, Tel: 301-984-8225, TWX: 710-828-0522; Empl.: 250; *Sls. Mgr.:* Dave L. Johnson

PERFECT GEAR & INSTR., 55 S. Denton Ave., New Hyde Park, NY 11040, Tel: 516-328-3300, TWX: 510-223-0642; Empl.: 210

PERFECTION MICA CO., see Magnetic Shield Div.

PERFORMANCE CONTROLS INC., 333 Byberry Rd., Hatboro, PA 19040, Tel: 215-675-6500; Empl.: 22; *Sls. Mgr.:* M. Edward Wokulich

PERIPHERALS, 3001 Red Hill, Bldg. 6, Ste. 107, Costa Mesa, CA 92626, Tel: 714-540-4925; *Sls. Mgr.:* Jone Ford; *Dist. Mgr.:* Jonê Ford

PERITEK CORP., 5550 Redwood Rd., Oakland, CA 94619, Tel: 415-531-6500, TWX: 910-366-2029; *Sls. Mgr.:* John Brogan

PERKIN-ELMER

PERKIN-ELMER CORP., Elctrn. Prods. Dept., Main Ave., Norwalk, CT 06856, Tel: 203-762-4786, TWX: 710-468-3213; Empl.: 70 ....**1A**•2231

Local Sales Offices & Reps

CA	Encino, C.D.H. Assocs.	213-707-1970

PERMAG, 400 Karin La., Hicksville, NY 11801, Tel: 516-822-3311, TWX: 710-581-5264; Empl.: 50

PERMAGILE-SALMON LTD., Insulcast Div., 101 Commercial St., Plainview, NY 11803, Tel: 516-349-1100, Telex: 221720 PERM UR; *Sls. Mgr.:* A. Zack Zarcadoolas; *Dist. Mgr.:* Edward R. Salmon

Local Distributors

FL	Boca Raton, Olson Assocs.	305-368-1845
IL	Algonquin, Adhesive Sys., Inc.	312-658-4583
OH	Dayton, Electro Supply	513-299-5020

PERMALUSTER, INC., 1844 N. Keystone St., Burbank, CA 91504, Tel: 818-849-4543; Empl.: 9; *Sls. Mgr.:* J. Ross

PERMANENT MAGNET, 4437 Bragdon St., Indianapolis, IN 46226, Tel: 317-547-1336; Empl.: 85; *Sls. Mgr.:* Jack Amigh

PERMA POWER ELCTRNS., 5615 W. Howard Ave., Chicago, IL 60648, Tel: 312-647-9414; Empl.: 85-100; *Sls. Mgr.:* Michael Shatz ....**1B**•1284; **2**•1862, 1863

Local Sales Offices & Reps

AR	El Dorado, D. Bellew Sls.	214-373-4590
CA	San Francisco, Techn. Sls.	415-467-1434
CA	Sun Valley, Tegni-Rep	213-768-4223
CO	Denver, Stan Sliz & Assoc.	303-666-4760
CT	West Hartford, Smith Co.	203-523-0512
IN	Indianapolis, Green-Wissler	317-291-2232
MI	Plymouth, J. Malcolm Flora	313-453-4296
MN	St. Paul, Skor	612-426-1160
MO	Jefferson City, C. A. Vignola	314-636-3121
NJ	Marlton, Fahy Mktg.	609-983-2366
NY	Phelps, L. S. M. Assocs.	315-548-4891
NY	Plainview, Landau & Mack	516-293-3310
NC	Greensboro, Adams & Assocs.	919-272-6838
OH	Whitehall, Mandabach-Lehner	614-235-0265
TX	Dallas, Berthold Sls.	214-328-0067
WA	Seattle, Northmar Inc.	206-524-5170
EXP	N.Y., Plainview, Morhan Export.	516-293-5582

PERRY AMPLIFIER, 138 Fuller St., Brookline, MA 02146, Tel: 617-734-0844; Empl.: 18; *Sls. Mgr.:* N. Geskos

PERSONAL MICRO COMPUTERS, 475 Ellis St., Mountain View, CA 94043, Tel: 415-962-0224, TWX: 910-379-5022

PERTEC PERIPHERALS CORP., P.O. Box 2198, Chatsworth, CA 91311, Tel: 818-882-0030, TWX: 910-494-2093; Empl.: 650

PERVEL INDS., INC., Bemis, P.O. Box 61, Community Ave., Plainfield, CT 06374, Tel: 203-564-2741, Telex: 966450; Empl.: 350; *Sls. Mgr.:* Stan Furman

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CA	Los Gatos, Specialized Plastic Svcs.	408-866-5786
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FL	Clearwater, Brennan Assocs., Inc.	813-446-5006
IL	Chicago, Brock and Cushman, Inc.	312-622-4110
MI	Grand Rapids, R. P. Urban & Assoc.	616-245-0511
MN	St. Paul, Bonament Heyda Co., Inc.	612-484-8531
WA	Mercer Island, Cirkits Co.	206-236-2380

PFC, See Southern Elctrns. Co. Inc.

PHALO CORP., Transitron Elctrn. Corp., 530 Boston Tpke., Shrewsbury, MA 01545, Tel: 617-845-5000, Telex: 92-0416, TWX: 710-392-1383; Empl.: 450

PHAOSTRON INSTRUMENT & ELECTRONIC CO., 151 Pasadena Ave., South Pasadena, CA 91030, Tel: 213-255-1471

PHELPS DODGE CABLE & WIRE, Box 2100, Greenwich, CT 06836, Tel: 203-625-3200, TWX: 710-560-0006; Empl.: 750; *Sls. Mgr.:* T. P. Reilly

PHELPS DODGE INTL., 2121 Ponce de Leon Blvd., Ste. 850, Coral Gables, FL 33134, Tel: 212-775-1395, 800-221-3333

PHELPS DODGE MAGNET WIRE, P.O. Box 600, Ft. Wayne, IN 46801, Tel: 219-456-4444, TWX: 810-332-1501; *Sls. Mgr.:* G. H. Guyer; *Dist. Mgr.:* W. H. Deininger

PHILADELPHIA INSULATED WIRE CO. INC., 333 New Albany Rd., Moorestown, NJ 08057, Tel: 609-235-6700, TWX: 710-897-0187; Empl.: 110; *Sls. Mgr.:* Fred Newman

PHILAMON, INC., 33 Dubon Ct., Farmingdale, NY 11735, Tel: 516-249-2700, TWX: 510-224-6512; FSC No.: 95267; Empl.: 27; *Sls. Mgr.:* B.F. Grib

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PHILIPS ECG, See Sylvania Electronic Components

PHILIPS ECG, INC., 3101 Pleasant Valley Blvd., Altoona, PA 16603, Tel: 814-943-1126

PHILIPS ELMET, 1560 Lisbon Rd., Lewiston, ME 04240, Tel: 207-784-3591, TWX: 710-223-0675; Empl.: 250

PHILIPS TELEVISION SYS., INC., P.O. Box 618, 900 Corporate Dr., Mahway, NJ 07430, Tel: 201-529-1550, Telex: 37-62558; *Sls. Mgr.:* Warren Anderson, Dir. of Mktg.

PHILIPS TEST & MEASURING INSTRS., 85 McKee Dr., Mahwah, NJ 07430, Tel: 201-529-3800; Empl.: 70; *Sls. Mgr.:* Bob Hynes

PHILMORE MFG., 40 Inip Dr., Inwood, NY 11696, Tel: 516-239-6161; Empl.: 22

PHI TECHNOLOGIES, INC., 4605 North Stiles, Oklahoma City, OK 73105, Tel: 405-521-9000, TWX: 901-831-3286; Empl.: 60; *Sls. Mgr.:* Gary Zebrowski ....3•1090

PHOENIX CONTACT, 1900 Greenwood St., Harrisburg, PA 17104, Tel: 717-232-0500, TWX: 510-650-4913; *Sls. Mgr.:* Howard C. Minnick, Jr.; *Dist. Mgr.:* Mark F. Gilliford .... 2•1540-1542

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CA	Pasadena, Luscombe Engrg. Co.	213-684-2000
CA	San Diego, Luscombe Engrg. Co.	619-295-4300
CO	Denver, Spectrum Sls.	303-696-1601
CT	Bloomfield, Zaslow Sls. Co.	203-242-7781
FL	Tampa, J-R Controls	813-961-9478
GA	Atlanta, Holman-Lobsinger Co.	404-256-9120
IL	Mt. Prospect, Magnuson Assocs./Magnuson Elctrns.	312-956-0700
KS	Merriam, Mid-West Tech. Sls.	913-236-8557
MD	Baltimore, McCourt Co., Inc.	301-747-0044
MI	Canton, R. W. Barrick & Assocs.	313-453-0591
MN	Minneapolis, Grissinger-Johnson Sls. Inc.	612-544-5451
NJ	Rockaway, R.O.I. Sls. Co.	201-627-8879
NY	North Syracuse, Lachut Electrical Sls.	315-422-2575
NC	Charlotte, Mec-Tric Control Co.	704-376-8555
OH	Medina, J. C. Hofstetter Co.	216-241-4880
PA	Carnegie, Brown-Yates Electrical Equip. Co.	412-279-1101
PA	Willow Grove, Jacobson-Rodger Assocs.	215-657-4300
TX	Dallas, Lynn Elliott Co., Inc.	214-239-8533
TX	Houston, Lynn Elliott Co., Inc.	713-499-1571
VA	Richmond, McCourt Co., Inc.	804-741-3253
WA	Bellevue, Comtec	206-453-1188

Local Distributors

AZ	Phoenix, Sterling Elctrns.	602-268-2121
CA	Concord, Control Room Prods.	415-671-7796
CA	Duarte, Nelson West Coast, Inc.	213-303-1526
CA	Gardenia, Cal Switch	213-770-2330
CA	Riverside, Elctrn. Supply Co.	714-787-9220
CT	Wallingford, Sager Electrical	203-265-4600
FL	Lakeland, A-A Elec.	813-665-6941
GA	Atlanta, A-C Equip.	404-451-2747
IL	Lombard, MacGregor & Co., Inc.	312-629-5752
LA	Baton Rouge, Ralph's Indl. Elctrns.	504-344-3761
LA	Lafayette, Ralph's Indl. Elctrns.	318-234-4507
LA	New Orleans, Long Elec. Supp.	504-524-8383
MD	Baltimore, A.I.C.	301-747-0044
MA	Hingham, Sager Electrical	617-749-6700
MI	Flint, Roth Elec. Supply Co.	313-234-8661
MI	Roseville, Madison Elec.	313-778-7640
MO	St. Charles, Lectronix Inc.	314-946-6424
NJ	East Rutherford, A-A Elec.	201-777-5477
NJ	Pennsauken, Resco Elctrns.	609-662-4000
NY	Orchard Park, Park Elec.	716-662-7070
NY	Rochester, Rochester Radio	716-454-7800
NY	Syracuse, Salmon Motor Repair Svc.	315-454-9278
NC	Charlotte, Dixie Elctrns.	704-377-5413
OH	Cincinnati, Schuster Elec. Co.	513-489-1400
OH	Twinsburg, Schuster Elec. Co.	216-425-8134
OR	Portland, United Radio Supp.	503-233-7151
PA	Bradford, B-B Elec. Supp. Co.	814-368-4173
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PA	Reading, R.A.M. Motors and Controls	215-376-7102
SC	Columbia, Dixie Elctrns.	803-779-5332
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Houston, Sterling Elctrns.	713-627-9800
TX	Houston, Timers & Controls, Inc.	713-894-0714
TX	Port Arthur, All-Phase Elec.	409-983-3315
WI	Cedarburg, A-A Elec.	414-377-8000

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PHOENIX MICROSYSTEMS, P.O. Box 4206, Huntsville, AL 35802, Tel: 205-881-2173, Telex: 752592; Empl.: 28; *Sls. Mgr.:* Mel Mayo

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Local Sales Offices & Reps

AL	Huntsville, JMS	205-533-5450
CA	Burlingame, BHL Assocs.	415-342-7850
CA	San Luis Obispo, Johnson Assocs.	213-670-4794
IL	Rosemont, Synmark Sls. Co.	312-825-3455
IN	Ossian, Science Sls.	219-622-7383
MA	Sudbury, Poulin Assocs.	617-443-7333
MN	Minneapolis, All Phase Agency	612-835-4940
NJ	Pennsauken, Scientific Reps.	609-662-5222
NM	Albuquerque, Grady Moore Assocs.	505-262-1416
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NC	Fayetteville, Zim-Tek	919-485-2222
OH	Risingsun, Mecom Inc.	419-457-3231
TX	Dallas, Southwestern Engrg. & Equip. Co.	214-340-1741
TX	Houston, Southwestern Engrg. & Equip. Co.	713-820-2500
VA	Fairfax, Scientific Assocs.	703-385-0600
WA	Walla Walla, Northwest Tech. Co.	509-529-2051

PHOTON TECHNLG., 14125 Capri Dr. #4, Los Gatos, CA 95030, Tel: 408-866-0566, Telex: 17-1618 refer: Photon; Empl.: 12; *Sls. Mgr.:* John M. Fleischer

PHOTO RESCH., 3000 N. Hollywood Way, Burbank, CA 91505, Tel: 213-843-6100, Telex: 69-1427; FSC No.: 92434; Empl.: 68; *Sls. Mgr.:* M. L. Woolsey

PHOTRONIC LABS., Secor Rd., Brookfield Ctr., CT 06805, Tel: 203-775-0465; Empl.: 55; *Sls. Mgr.:* Deno Macricostas

PHO-TRONICS, 8701 W. Bradley Rd., Milwaukee, WI 53224, Tel: 414-355-6704, TWX: 910-262-3099; Empl.: 85; *Sls. Mgr.:* John R. Henry

PIC DESIGN, P.O. Box 1004, Middlebury, CT 06762, Tel: 203-758-8272, TWX: 710-477-5234; Empl.: 150; *Sls. Mgr.:* J. Baldwin

PICO CRIMPING TOOLS, 9832 Jersey Ave., Santa Fe Springs, CA 90670, Tel: 213-723-2150; Empl.: 12

PICO ELCTRNS., 453 North MacQuesten Pkwy., Mt. Vernon, NY 10552, Tel: 914-699-5514, 800-431-1064; FSC No.: 31669; *Sls. Mgr.:* Joe Sweeney ....1A•1271-1275, 2233-2255

Local Sales Offices & Reps

AZ	Scottsdale, Piper Sls. Co.	602-946-4437
CA	Santa Clara, Fisher Assocs.	408-733-7350
CO	Arvada, Piper Sls. Co.	303-420-4646
WA	Seattle, W. Spaulding Co.	206-282-9173

PICONICS, Cummings Rd., Tyngsboro, MA 01879, Tel: 617-649-7501, TWX: 710-347-6663; FSC No.: 26618; Empl.: 48; *Sls. Mgr.:* I. Kadesh ....1A•1277, 1611, 1680

Local Sales Offices & Reps

AZ	Scottsdale, Semper-Fi Sls.	602-991-4601
CA	N. Hollywood, Jewett Co.	213-789-8103
CA	Palo Alto, J/M Assocs.	415-857-1260
CO	Parker, Mikro Sls. Co.	303-841-4131
FL	Lighthouse Point, R. C. Simon	305-941-2757
IL	Chicago, Shaumberg Phoenix Co.	312-980-7060
MA	Natick, Wayland Engrg. Sls. Co.	617-655-6080
MN	Minneapolis, Peterson, Snater & Assocs.	612-884-3483
MO	Grandview, Harris-Hanson Co.	816-763-6200
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NY	Huntington, Regulus Indl. Sls. Co.	516-673-6252
NY	Rochester, J. G. Welch Assocs.	716-244-1100
OH	Cincinnati, G&H Sls. Co.	513-272-0580
PA	Glenside, R. F. Koebert & Assocs.	215-887-2310
TX	Ft. Worth, El-Tec Sales	817-268-2896
VA	Gladys, Ralley Entprs.	804-283-5656

PIEZO CRYSTAL, 100 "K" St., Box 619, Carlisle, PA 17013, Tel: 717-249-2151, TWX: 510-650-2280; Empl.: 250; *Sls. Mgr.:* Roy Burkholder

PIEZO ELEC. PRODS., INC., 212 Durham Ave., CN-15, Metuchen, NJ 08840, Tel: 201-548-2800, TWX: 710-998-0592; Empl.: 125; *Sls. Mgr.:* Jack Gray .... 1B•1820, 1821, 1871

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
CA	Mountain View, IFM, Inc.	415-961-2828
FL	Melbourne, Beacon Elctrns.	305-724-8010
GA	Atlanta, Beacon Elctrns.	404-256-9640
IL	Lisle, W-G Controls	312-963-5954
IN	Ft. Wayne, Given Corp.	219-432-5585
MD	Ellicott City, Mktg. Techn.	301-465-5944
MA	Lexington, Hathaway Elctrns. Inc.	617-861-7010
MN	Minneapolis, Elctrn. Innovators	612-941-0830
NJ	Middlesex, Cornell Assocs.	201-469-1303
NY	Rochester, Canavan-Scanlon Assocs.	716-424-1830
NY	Syracuse, Canavan-Scanlon Assocs.	315-437-1271
NC	Raleigh, Beacon Elctrns.	919-787-0330
OH	Dayton, Berberich Assocs.	513-433-0342
PA	Harleysville, Thomas Jackson Assocs.	215-643-5560
TX	El Paso, El Paso Elctrn. Comps.	915-593-8481
TX	Houston, Aid Elctrns.	713-937-3373
TX	Irving, Aid Elctrns.	214-259-4761

PIEZO TECHNOLOGY INC., 2525 Shader Rd., Orlando, FL 32804, Tel: 305-298-2000, TWX: 810-850-4136; FSC No.: 25120; Empl.: 610; *Sls. Mgr.:* Dave Stewart ....1A•1308, 1404-1409

Local Sales Offices & Reps

AZ	Scottsdale, Faser Tech. Sls.	602-948-4404
CA	Los Altos, Cain-White & Co.	415-948-6533
CA	Van Nuys, R.L. Assocs.	213-782-7826
CT	Milford, Bengal Assocs.	203-878-3946
DC	Washington, M. Lader Co.	202-296-2497
FL	Maitland, D. J. Ellis & Assocs.	305-645-1101
IN	South Bend, Schillinger & Assocs.	219-282-4570
KS	Overland Park, Barnes Mid-West Sls.	913-341-9317
MA	Randolph, Bengal Assocs.	617-961-4120
MN	Chanhassen, Barnes Sls. Assocs.	612-934-2907
NJ	Haddonfield, Mesa Tech. Assocs.	609-429-9531
NY	Buffalo, Quality Comps.	716-837-5430
NY	Great Neck, Phase 4, Inc.	516-482-1790
TX	Richardson, Vector Sls. Co.	214-234-4291

PIHER INTL., 565 W. Golf Rd., Arlington Hgts., IL 60005, Tel: 312-640-8300, 800-323-6693, Telex: 254190, TWX: 710-393-6784; Empl.: 100; *Sls. Mgr.:* Gus Stoltz; *Dist. Mgr.:* Wm. Pragit

PINLITES, See Refac Elctrns.

PIONEER COMPS., 2352 E. 66th St., Brooklyn, NY 11234, Tel: 212-444-3880; Empl.: 3; *Sls. Mgr.:* Michael R. Verter; *Dist. Mgr.:* Michael R. Verter

PIONEER MAGNETICS, 1745 Berkeley St., Santa Monica, CA 90404, Tel: 213-829-6751, Telex: 182-093, TWX: 910-343-6249; FSC No.: 08676; Empl.: 450; *Sls. Mgr.:* A. Hagiwara .... 3•1666, 1667

Local Sales Offices & Reps

CA	Los Altos, Frauman Assocs.	415-941-0660
CA	Santa Monica, Pioneer Magnetics, Inc.	213-829-6751

CO	Commerce City, Williams Assocs.	303-289-5647
FL	Deerfield Beach, Pen-Tec Assocs.	305-421-4989
KS	Olanthe, Rush & West Assocs.	913-754-2700
MA	Waltham, Daner-Hayes	617-894-7290
MN	Eagan, Pioneer Magnetics	612-452-7747
OH	Westlake, KRW Sales	216-871-7521
PA	Cheltenham, Stein Instrm.	215-379-1990
TX	Dallas, Remtek	214-387-2855
WA	Vashon, RTS, Inc.	206-285-1363

PIRELLI CABLE CORP., Special Cable Div., P.O. Box 50, Wallingford, CT 06492, Tel: 203-265-5533, 800-243-3959, TWX: 710-476-0764; Empl.: 110; *Sls. Mgr.:* Art Fabritiis

PIRELLI CIMCO, 800 Rahway Ave., Union, NJ 07083, Tel: 201-687-8444, Telex: 138918, TWX: 6874009; Empl.: 80; *Sls. Mgr.:* John N. Vanderbeek

PITTMAN CORP., 343 Godshall Dr., Harleysville, PA 19438, Tel: 215-256-6601, TWX: 510-661-8696; FSC No.: 98938; Empl.: 135 ....**1B**•1170, 1171

Local Sales Offices & Reps

AZ	Fountain Hills, Halbar Assocs.	602-837-2464
CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Commerce City, Williams-Assocs.	303-289-5647
FL	Bradenton, Tropi-Tec, Inc.	813-748-2868
FL	Plantation, Tropi-Tec	305-581-0101
GA	Atlanta, Electro-Rep Assocs.	404-320-1134
IL	Mount Prospect, K-W Assocs.	312-253-6680
IN	Fort Wayne, Neal Engrg.	219-436-2300
IN	Indianapolis, Neal Engrg.	317-849-4201
MA	Ashland, M. L. Assocs.	617-485-6190
NJ	Summit, R.A. Potter	201-277-0220
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	Buffalo, Application Spec.	716-834-3377
NY	Rochester, Application Spec.	716-586-6226
NY	Syracuse, Application Spec.	315-437-2813
NC	Charlotte, Electro-Rep Assocs.	704-527-2530
OH	Cleveland, Servo-Mark	216-871-2353
OK	Tulsa, Blair Engrg.	918-747-3100
TX	Austin, Blair Engrg.	512-458-3107
TX	Dallas, Blair Engrg.	214-241-5655
TX	Houston, Blair Engrg.	713-776-0011
UT	Salt Lake City, Williams-Assocs.	801-485-6511
WA	Redmond, Halbar Assocs.	206-882-0990
WA	Vancouver, Halbar Assocs.	206-696-0170
PR	Hato Rey, Tropi-Tec	809-759-7303

PLAINVIEW ELCTRNS., 28 Cain Dr., Plainview, NY 11803, Tel: 516-249-6677, Telex: 125043; Empl.: 6; *Sls. Mgr.:* B. Erde

PLANT SPECIALTIES, INC., PO Box 1097, Carrollton, TX 75006, Tel: 214-245-9673; *Sls. Mgr.:* J. E. Bryer

PLASMAGRAPHICS CORP., 141 Mount Bethel Rd., P.O. Box 4903, Warren, NJ 07060, Tel: 201-757-5000, Telex: 83-3456-0, TWX: 710-997-9529; *Dist. Mgr.:* Ronald Pignatello

PLASMA-THERM, INC., Rt. 73, Kresson, NJ 08053, Tel: 609-767-6120, Telex: 837220; *Sls. Mgr.:* John D. Raffl

Local Sales Offices & Reps

AZ	Phoenix, Plasma-Therm	602-962-4522
CA	San Jose, Plasma-Therm	408-945-9000
CA	San Jose, PT Analytical	408-943-0777
IL	Hinsdale, Plasma-Therm	312-789-2636
MA	Wakefield, Plasma-Therm	617-246-4800
MA	Woburn, Plasma Sys.	617-933-9170
NJ	Kresson, Plasma-Therm Sys.	609-767-6120
PA	Whitehall, Plasma-Therm	215-776-0330

PLASTIC CAPACITORS, INC., 2623 N. Pulaski Rd., Chicago, IL 60639, Tel: 312-489-2229, TWX: 910-221-1354; FSC No.: 99120; Empl.: 105; *Sls. Mgr.:* F. J. Pavey

PLASTIC FORMING CO., INC., 5 Lunar Dr., P.O. Box N, Woodbridge, CT 06525, Tel: 203-397-1338, Telex: 963437; Empl.: 37; *Sls. Mgr.:* John C. Womer

PLASTIGLIDE MFG., 2701 W. El Segundo Blvd., Hawthorne, CA 90250, Tel: 213-777-8108; Empl.: 425; *Dist. Mgr.:* J. Shulman

PLASTOID CORPORATION, 45 Gingerbread Castle Rd., Hamburg, NJ 07419, Tel: 201-827-7141

PLASTRONICS INC., 3111 Gardenbrook, Dallas, TX 75234, Tel: 214-243-0611, TWX: 910-860-5542; Empl.: 47

PLATO PRODS., 2120 E. Allen Ave., Glendora, CA 91740, Tel: 800-423-4510, Telex: 673-488; FSC No.: 32399; Empl.: 75; *Sls. Mgr.:* Walter Schaub

Local Distributors

AZ	Phoenix, Scottsdale Tool & Supply	602-273-7376
CA	El Segundo, Wassco	213-640-1060
CA	Sunnyvale, COM-KYL	408-734-9660
CO	Arvada, Western Tool	303-422-3413
CO	Denver, Grenfell Supp.	303-893-3111
FL	Orlando, Deanco	305-851-2480
GA	Marietta, Deanco	404-429-0126
IL	Chicago, E M F	312-889-8323
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
KS	Overland Park, Burke Sls	913-492-1880
MD	Gaithersburg, Deanco	301-948-5444
MA	Boston, Hub Material	617-542-7531
MA	Burlington, Contact East	617-272-5051
MN	St. Paul, R.G. Ragon	612-488-0201
NM	Albuquerque, Intl. Elctrns	505-265-6456
NC	Raleigh, Deanco	919-851-2065
OR	Portland, Murphy Indl Supp.	503-620-8680
TX	Dallas, Roy E. Davis	214-688-0652
TX	El Paso, Intl Elctrns	915-778-9761
UT	Salt Lake City, Techn. Devices	801-972-5935
VA	Virginia Beach, Deanco	804-499-3322

PLESSEY CERAMIC DIV., 8th & Harrison Sts., Frenchtown, NJ 08825, Tel: 201-996-2121, TWX: 510-235-3399; Empl.: 198; *Sls. Mgr.:* William Blackford

PLESSEY ELECTRO-PRODUCTS, 3860 Centinela Ave., Los Angeles, CA 90066, Tel: 213-390-3585, TWX: 910-343-6483; Empl.: 60; *Sls. Mgr.:* Joan Marie Hill

PLESSEY MICROSYSTEMS, Plessey Trading Corp., 1641 Kaiser Ave., Irvine, CA 92714, Tel: 714-540-9931/9932, TWX: 910-595-1930; *Sls. Mgr.:* Garry T. Tomlins

PLESSEY MICROSYSTEMS, 451 Hungerford Dr., Rockville, MD 20850, Tel: 301-279-2892, TWX: 710-828-9815; *Sls. Mgr.:* Garry Tomlins; *Dist. Mgr.:* Randy Williams

PLESSEY SEMICONDUCTORS, 1641 Kaiser Ave., Irvine, CA 92714, Tel: 714-540-9979, TWX: 910-595-1930; FSC No.: 52648; Empl.: 75; *Sls. Mgr.:* Jerry Surloff

PLUMER PRECISION OPTICS, 601 Montgomery Ave., Pennsburg, PA 18073, Tel: 215-679-6272; Empl.: 160; *Sls. Mgr.:* Ray Boulay

PMI MOTORS, KOLLMORGEN CORP., 5 Aerial Way, Syosset, NY 11791, Tel: 516-938-8000, TWX: 510-221-1875; Empl.: 230; *Sls. Mgr.:* F. Sarstedt; *Dist. Mgr.:* R. Malton

Local Sales Offices & Reps

AR	El Dorado, Indl. Controls Assocs.	501-862-2051
CA	San Jose, Motion Control	408-997-0544
CA	San Marino, Motion Control	213-796-0189
CO	Denver, Control Agency	303-936-6641
FL	Altamonte Springs, A. Lovisek	305-788-6606
IL	Bartlett, T. Meyer	312-830-3374
IN	Elkhart, Shaum Mfg.	219-264-0771
IN	Spencer, Shaum Mfg. Inc.	317-842-2255
IA	Marion, Design Solutions, Inc.	319-377-1129
KS	Shawnee Mission, Design Solutions, Inc.	913-432-3109
KS	Wichita, Design Solutions, Inc.	316-529-0114
LA	Baton Rouge, Industrial Controls Assocs.	800-643-1109
MA	Beverly, Electro Kinetics	617-922-4007
MA	Wellesley, Electro Kinetics	617-235-9415
MI	Ann Arbor, Pyramid Integrated Control Sys.	313-996-4162
MI	Belding, Shaum Mfg. Inc.	616-897-5385
MN	Newport, Applied Motion Technlg.	612-459-0600
MO	St. Louis, Design Solutions, Inc.	314-961-7170
NY	Cazenovia, D & O Engrg.	315-655-8602
NY	Syosset, B. Lewis	516-938-8000
NY	Syosset, Motion Control Sls.	516-921-5656
NY	Youngstown, D & O Engrg.	716-745-3915
NC	Greensboro, Engrg. & Mktg. Corp. of Virginia	919-275-1309
NC	Plymouth, Engrg. & Mktg. Corp. of Virginia	919-793-4461
OH	Chagrin Falls, Exonic Sys.	216-247-4788
PA	Pittsburgh, Exonic Systems	412-784-8400
TX	Fort Worth, Industrial Controls Assocs.	800-643-1109
TX	Spring, Industrial Controls Assocs.	800-643-1109
UT	Salt Lake City, Control Agency	801-328-4305
VA	Roanoke, Engrg. & Mktg. Corp. of Va	703-986-1410
WA	Renton, Drive Motor Control Sys. Co.	206-226-9294
WI	Racine, T. Beyer	414-632-6100

Distributor

POCO SALES, 8925 Fullbright St., Chatsworth, CA 91311, Tel: 818-700-8727 .... pgs. 642, 680, 685, 687

POLARAD ELCTRNS., INC., 5 Delaware Dr., Lake Success, NY 11042, Tel: 516-328-1100, TWX: 510-223-0414; FSC No.: 82199; Empl.: 175; *Sls. Mgr.:* Ron Ramirez

POLAROID CORP., 784 Memorial Dr., Cambridge, MA 02139, Tel: 617-577-2024, Telex: 921482, TWX: 710-320-0610; *Sls. Mgr.:* Sal La Rocca

POLYCORE ELCTRNS., 1107 Tourmaline Dr., Newbury Pk., CA 91320, Tel: 213-991-1061, Telex: 910-336-1547; Empl.: 30; *Sls. Mgr.:* S.K. Leong

POLYMER CORP., P.O. Box 422, Reading, PA 19603, Tel: 215-320-6600, Telex: 836-440, TWX: 510-651-5396; Empl.: 1000; *Sls. Mgr.:* R. S. Spangler

POLYPHASE INSTR., 175 Commerce Dr., Ft. Washington, PA 19034, Tel: 215-643-6950, Telex: 84-6327; FSC No.: 98330; Empl.: 175; *Sls. Mgr.:* R.H. Simmons

POLYPHASER CORPORATION, P.O. Box 1237, Gardnerville, NV 89410, Tel: 702-782-2511, Telex: 215406 TBYT UR: PolyPhaser .... **1B**•1285

Local Sales Offices & Reps

CA	North Hollywood, Crown Elctrns.	818-877-3550
CO	Aurora, Electro-Tek Sls.	303-343-8937
GA	Marietta, Consumer Mktg.	404-424-9097
HI	Honolulu, Manon Engrg.	808-833-9545
IL	Elk Grove Village, IRO Co.	312-593-0644
MI	Rochester, Webster Assocs.	313-375-0420
MN	Stillwater, Ned Gordon & Assocs.	612-430-1572
MO	Liberty, LectroReps	816-781-2522
NV	Gardnerville, PolyPhaser Corp.	702-782-2511
NM	Albuquerque, Electro-Tek Sls., Inc.	505-883-4871
NC	Pineville, Consumer Mktg.	704-527-4045
OH	Toledo, Webster Assocs.	419-535-0708
OK	Tulsa, Horizon Engrg. Sls. Co.	918-252-7222
OR	Portland, Manon Engrg.	503-245-7553
PA	Venetia, Webster Assocs.	412-941-8848
RI	Lincoln, Adams-McGregor	401-726-1300
TX	Houston, Horizon Engrg. Sls. Co.	713-495-1018
TX	Rockwall, Horizon Engrg. Sls. Co.	214-226-4712
TX	Rowlett, Horizon Engrg.	214-475-1179
UT	Salt Lake City, Electro-Tek Sls.	801-973-8435
WA	Kirkland, Manon Engrg.	206-827-7449
WY	Sheridan, Electro-Tek Sls., Inc.	307-672-9368

Local Distributors

CO	Aurora, Electro-Tek Sls.	303-343-8937
IL	Elk Grove Village, IRO-Co.	312-593-0644
KS	Dodge City, Teletron	316-225-3736
NV	Gardnerville, PolyPhaser Corp.	702-782-2511
NC	Greensboro, West Antenna	919-621-2473
TX	Rockwall, Horizon Engrg. Sls. Co.	214-226-4712
TX	Rowlett, Horizon Engrg. Sls.	214-475-1179

POLY-SCIENTIFIC, 1213 N. Main St., Blacksburg, VA 24060, Tel: 703-552-3014, TWX: 710-875-3694; Empl.: 625

POLYTRON DEVICES, Box 398 - River St. Sta., Paterson, NJ 07544, Tel: 201-345-5885; Empl.: 10

POMFRET RESEARCH OPTICS, 817 Long Ridge Rd., Stamford, CT06902, Tel: 203-322-6386; Empl.: 5

POMONA ELECTRONICS, See ITT Pomona

POP FASTENERS DIV., 510 River Rd., Shelton, CT 06484, Tel: 203-735-9341, Telex: 963465, TWX: 710-451-3734; Empl.: 375; *Sls. Mgr.:* James Lynch

PORTESCAP TRANSICOIL, Trooper Rd., P.O. Box 99, Worcester, PA 19490-9990, Tel: 215-277-1300, TWX: 510-660-0132; FSC No.: 82686; Empl.: 220; *Sls. Mgr.:* P. Schoenacker 1B•1172, 1185

Local Sales Offices & Reps

CA	Huntington Beach, Portescap Transicoil	714-963-3069
MA	Medfield, Portescap Transicoil	617-359-2336
MA	Plymouth, Portescap Transicoil	216-224-6533
NJ	Kinnelon, Avionics Engrg. Sls.	201-838-8105
OR	Beaverton, Portescap Transicoil	503-645-7523
PA	Andalusia, Portescap Transicoil	215-245-5366
PA	Media, Homersmith, Inc.	215-543-2434
TX	Richardson, Portescap Transicoil	214-690-9000
EXP	PA, Worcester, Portescap Transicoil	215-277-1300

PORTESCAP U.S., 1547 Trooper Rd., P.O. Box 666, Worcester, PA 19490, Tel: 215-277-0433, Telex: 846367; *Sls. Mgr.:* George Beauchemin 1B•1172, 1873

Local Sales Offices & Reps

CA	Pomona	714-622-4185
MA	Medfield	617-359-2336
NJ	Ft. Lee	201-461-8803
OR	Beaverton	503-645-7523
TX	Richardson	214-690-9000

POSITRONIC INDS., 423 North Campbell, Springfield, MO 65806, Tel: 417-866-2322, Telex: 436445; FSC No.: 28198; Empl.: 196; *Sls. Mgr.:* J.E. Myers; *Dist. Mgr.:* Linda Haley

POTTER & BRUMFIELD, P.O. Box 322, Princeton, IN 47671, Tel: 812-386-1000, Telex: 27-8451, TWX: 810-350-2343; Empl.: 3000; *Sls. Mgr.:* Don Morrow; *Dist. Mgr.:* Gordon Collins

POTTER CO., P.O. Box 337, North Hwy. 51, Wesson, MS 39191, Tel: 601-643-2215, TWX: 510-981-4072; FSC No.: 601-643-5126; Empl.: 300 1A•1612

Local Sales Offices & Reps

CA	Los Angeles, Potter Co.	818-704-1151
CA	San Jose, Potter Co.	408-297-6222
FL	Orlando, Potter Co.	305-831-2782
IL	Chicago, Potter Co.	312-364-0424
MA	Boston, Potter Co.	617-449-1242
MN	Minneapolis, Potter Co.	612-933-7712
NY	Mineola, Colucci Sls.	516-746-0397
OH	Dayton, Allen Nace Co.	513-836-0931
PA	Philadelphia, Potter Co.	215-525-4752
TX	Austin, Potter Co.	512-451-5721

Local Distributors

AZ	Phoenix, Kachina Elctrn. Distrs.	602-269-6201
AZ	Tucson, Kachina Elctrn. Distrs.	602-792-2223
CA	Cerritos, El-Com, Inc.	714-739-5656
CA	San Diego, El-Com, Inc.	619-578-0900
CA	San Francisco, KEA Elctrn. Distributing	415-481-5588
CA	Santa Clara, Western Electromotive	408-727-7411
CT	New Haven, Cronin Elctrns.	203-265-3134
CT	Orange, Milgray Elctrns.	203-795-0711
FL	Orlando, Intertec Comps.	305-834-7777
FL	Winter Park, Milgray Elctrns.	305-647-5747
GA	Atlanta, Milgray Elctrns.	404-393-9666
IL	Chicago, Advent Elctrns.	312-297-6200
IN	Indianapolis, Advent Elctrns.	317-872-4910
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
KS	Kansas City, Milgray Elctrns.	913-236-8800
MD	Rockville, Milgray Elctrns.	301-468-6400
MA	Boston, Cronin Elctrns.	617-449-5000
MA	Burlington, Milgray Elctrns.	617-272-6800
MI	Detroit, Advent Elctrns.	313-477-1650
NJ	Marlton, Milgray Elctrns.	609-983-5010
NY	Freeport, Milgray Elctrns.	516-546-6000
NY	North Syracuse, ANDCO	315-699-2660
OH	Cleveland, Milgray Elctrns.	216-447-1520
OR	Portland, Radar Electric	503-232-3404
PA	Philadelphia, Century Elctrn. Comps.	215-631-5400
WA	Seattle, Radar Electric	206-282-2511
WA	Spokane, Radar Electric	509-747-3053

POTTER INSTR., 10 Main St., Gonic, NH 03867, Tel: 603-332-1991, Telex: 94-4483; FSC No.: 11-1563382; Empl.: 20; *Sls. Mgr.:* S. Alexander

POULIN ASSOCIATES, INC., 302 North Rd., Sudbury, MA 01776, Tel: 617-443-7333; *Sls. Mgr.:* Scott Spalding

POWERBOX, INC., 1860 Broadway, New York, NY 10023, Tel: 212-586-1992; *Sls. Mgr.:* Len Elmlund

POWERCOMPONENTS
Power Components Company
Subsidiary of Vanguard Electronics Co., Inc.

POWER COMPS. CO., Vanguard Elctrns. Co., 1480 W. 178th St., Gardena, CA 90248, Tel: 213-323-8120, TWX: 910-346-7067; *Sls. Mgr.:* Ken Finley 3•1668, 1669

Local Sales Offices & Reps

AZ	Tempe, Sys. Sls. of AZ.	602-829-9338
CA	Canoga Park, Chandler Assoc.	213-340-6103
CA	San Diego, T.D.I.	619-286-5107
CA	San Jose, Silicon Valley Sls.	408-286-7510
CO	Denver, W. H. Howard	303-426-3499
IL	Franklin Park, Dekotech, Inc.	312-455-5100
IN	Fort Wayne, Tx Sls. Indiana	219-489-4447
MD	Columbia; Raleigh, Robert Elect. Sls.	301-995-1900
MA	Medfield; Concord, Nortech Engr. Sls.	617-359-6063
MI	Jackson, Norwood Scroggs Co.	517-878-0434
MN	Minneapolis, Bill Deming & Assoc.	612-888-5000
NY	Commack, RC Engr. Sls.	516-543-3325
OH	Akron, Arkay	216-836-8497

POWER CONTROL, 122 Gamma Dr., Pittsburgh, PA 15238, Tel: 412-782-3120; Empl.: 75

POWER CONTROLS, P.O. Box 5860, San Antonio, TX 78201, Tel: 512-734-7155, Telex: 767222; Empl.: 90; *Sls. Mgr.:* Robert A. McAlister

POWER CONVERSION PRODS., 42 East St., Box 380, Crystal Lake, IL 60014, Tel: 815-459-9100, TWX: 910-634-3356; FSC No.: 31751; Empl.: 130; *Sls. Mgr.:* C. Seyer

POWERCUBE CORP., Sub. Unitrode Corp., 8 Suburban Pk. Dr., Billerica, MA 01821, Tel: 617-667-9500, TWX: 710-347-6792; FSC No.: 31557; Empl.: 140; *Sls. Mgr.:* James A. Ward

POWER DESIGNS, INC., 1700 Shames Dr., Westbury, NY 11590, Tel: 516-333-6200, TWX: 510-222-6561; Empl.: 100; *Sls. Mgr.:* Lillian Kelly 3•1672-1679

Local Sales Offices & Reps

CA	North Hollywood, O'Halloran Assocs.	818-877-0173
CA	Palo Alto, O'Halloran Assocs.	415-326-1493
CA	San Diego, O'Halloran Assocs.	619-224-2824
CT	South Windsor, Addelco Corp.	203-644-1233
FL	Melbourne, Reynolds & Assocs.	305-259-7000
IL	Elk Grove Village, Loren Green & Assocs.	312-593-0282
IN	Indianapolis, Loren Green & Assocs.	317-293-9827
MD	Gaithersburg, Powell Pendergraph	301-921-4200
MA	Needham, Addelco Corp.	617-444-4754
MN	Minneapolis, Loren Green & Assocs.	612-781-1611
NY	Port Chester, Radiation Elctrns.	914-937-2300
PA	Willow Grove, Powell-Pendergraph	215-657-0330
VA	Richmond, Powell-Pendergraph	703-264-2341
WA	Bellevue, Topp Engrg. Sls. Corp.	206-747-5400

POWER DYNAMICS, 177 Valley, S. Orange, NJ 07079, Tel: 201-762-6886, Telex: 666 173, TWX: 136567 (PDI); FSC No.: 60046; *Sls. Mgr.:* James Papianni; *Dist. Mgr.:* Lyle Scott 1B•1286, 1287, 1740; 2•1544-1546, 1782, 1783

Local Sales Offices & Reps

CA	Laguna Niguel, David Budge & Assoc.	714-831-7720
CA	Mountain View, Bart Budge Assocs.	415-961-0940
CT	Vernon, GM Assoc.	203-646-4443
FL	Coral Springs, E.P.M. Corp.	305-755-5387
GA	Lawrenceville, BTF, Inc.	404-963-9495
IL	Crystal Lake, E. S. Healy & Assocs.	815-459-4386
KY	Louisville, KW Elctrn. Sls.	502-451-1860
MA	Framingham, GM Assoc.	617-872-4871
MI	Ypsilanti, Tamco Inc.	313-572-1950
MN	Minneapolis, R. K. Sls.	612-786-5713
NH	Exeter, GM Assoc.	603-778-7472
NJ	Englewood Cliffs, Ed Glass Assoc.	201-592-0200
NC	Raleigh, BTF, Inc.	919-782-3493
OH	Dayton, KW Elctrn. Sls.	513-890-2150
OH	Shaker Heights, KW Elctrn. Sls.	216-491-9177
OH	Worthington, KW Elctrn. Sls.	614-888-0483
OR	Tigard, Electronic Comp. Sls.	503-245-2342
PA	Allison Park, KW Elctrn. Sls.	412-487-4300
PA	Prospect Park, Elf Sls.	215-534-3340
TX	Dallas, Rem-Air Comps.	214-234-1069
UT	Salt Lake City, Aspen Sls.	801-467-2401
WA	Mercer Island, Electronic Comp. Sls.	206-232-9301

Local Distributors

CA	Burlingame, Rose Elctrns.	415-348-2740
CA	Inglewood, Force Elctrns.	213-670-8570
CA	San Jose, Force Elctrns.	408-943-1324
FL	Ft. Lauderdale, KSM Elctrns.	305-971-5900
FL	Ft. Lauderdale, NRC Elctrns.	305-772-4500
IL	Crystal Lake, Sub-Sem	312-782-3954
MN	St. Paul, Munsee Elctrns.	612-228-0267
NC	Raleigh, Century Elctrns.	919-755-0537
PA	Norristown, Century Elctrns.	215-631-5400
TN	Memphis, Electrotec	901-362-1350
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Stafford, Southwest Elctrns.	713-491-4900
WA	Redmond, Murphy Elctrns.	206-881-1234

POWER ELCTRNS., 96 Milton Rd., Rochester, NH 03867, Tel: 603-332-3334; Empl.: 125; *Sls. Mgr.:* Robert S. Karstedt

POWER FUNCTIONS ENGRG., 3831 Cavalier Dr., Garland, TX 75042, Tel: 214-278-0996; Empl.: 9

POWER
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POWER GENERAL, 152 Will Dr., Canton, MA 02021, Tel: 617-828-6216, TWX: 710-348-0200; Empl.: 200; *Sls. Mgr.:* Steve Dutton; *Dist. Mgr.:* John H. Gallagher 3•1680-1691

Local Sales Offices & Reps

AL	Huntsville, Murcota	205-539-8476
AZ	Scottsdale, TC Electrn. Sls.	602-994-5153
CA	Milpitas, Sales One	408-945-1250
CA	Orange, XBX Sls.	714-998-8200
CA	Redwood City, Sales One	415-367-1188
CO	Englewood, Grimes Mktg.	303-799-6063
CT	Avon, Power Mark	203-678-0123
FL	Melbourne, EMS	305-724-1027
FL	Plantation, EMS	305-587-7146
FL	Sarasota, EMS	813-924-7415
HI	Honolulu, Aloha Assocs.	808-941-1574
IL	Palatine, T-Squared Assoc.	312-991-2144
IA	Cedar Rapids, Palatine Eng. & Sls.	319-365-8071
KS	Mission, Palatine Eng. & Sls.	913-831-0555
MA	Canton, Power General	617-828-6216
MI	Birmingham, Favco	313-644-0173
MI	Grand Rapids, Favco	616-459-4425
MN	Minneapolis, Comtek Sls.	612-888-7011
MO	Hazelwood, Palatine Eng. & Sls.	314-839-0800
NJ	Perth Amboy, AstroRep	201-826-8050
NY	Babylon, AstroRep Inc.	516-422-2500
NY	Babylon, AstroRep Inc.	201-624-4408
NY	DeRuyter, Net Sls.	315-662-7996
NY	Fairport, Net Sls.	716-467-4538
NY	Troy, Net Sls.	518-274-4758
NC	Winston Salem, Murcota	919-722-9445
OH	Columbus, McFadden Sls.	614-459-1280
OR	Lake Oswego, Huntley Assoc.	503-636-7558
TX	Austin, Mech-Tron Mktg.	512-835-0980
TX	Dallas, Mech-Tron Mktg.	214-343-3786
TX	Houston, Mech-Tron Mktg.	713-462-1432
VA	Fairfax, Beacon North	800-572-0405
VA	Falls Church, Beakon North Inc.	703-591-1300
WA	Everett, Huntley Assoc.	206-353-1833

Local Distributors

Intl	Belgium, Gent, Belgium Computer Prods.	
Intl	France, Orsay, Microel	907.08.24
Intl	W. Germany, Muenchen, Fey Elektronik Bauelemente	(089) 184041

POWER GROUP INTERNATIONAL, 1137 Cliff Rd., Burnsville, MN 55337, Tel: 612-890-1360; FSC No.: 25441; Empl.: 500; *Sls. Mgr.:* Hortense M. Rowe 3•1420, 1421

POWER INSTRS., INC., 7352 N. Lawndale Ave., Skokie, IL 60076, Tel: 312-676-2300, TWX: 910-223-0835; Empl.: 45; *Sls. Mgr.:* Tony Ruggiero

POWER INTEGRITY CORP., 1840 Pembroke Rd., P.O. Box 9682, Greensboro, NC 27408, Tel: 919-379-9773; *Sls. Mgr.:* James T. Fesmire

POWER LABS, INC., 5 Towle Ave., Dover, NH 03820, Tel: 603-742-4613; Empl.: 9

POWERMARK, 3855 Ruffin Rd., San Diego, CA 92123, Tel: 619-565-8363; Empl.: 75; *Sls. Mgr.:* Ron Baietto 3•1904-1906

Local Sales Offices & Reps

AL	Birmingham, Sesco	205-988-8304
AK	Anchorage, John P. Bagoy & Assocs.	907-274-8531

AZ	Phoenix, Bob Anderson Co.	602-266-2070
CA	Milpitas, Lee/Allan Assocs.	408-946-8300
CO	Denver, Cleveland Entprs. of Colo.	303-751-3252
FL	St. Petersburg, Sesco	813-576-6991
GA	Atlanta, Sesco	404-458-6423
HI	Honolulu, Ind'l. Elctrns.	808-533-6095
ID	Boise, Underwood-Hanify Assocs.	208-343-5600
IL	Elk Grove Village, Loren Green Assocs.	312-593-0282
IN	Indianapolis, Loren Green Assocs.	317-293-9827
KS	Shawnee, Atech	913-268-9644
LA	Baton Rouge, Sesco	504-928-4951
LA	Metairie, Sesco	504-456-2684
MD	Bethesda, Powell-Pendergraph	301-656-4535
MA	Wellesley, Power Conversion Sys.	617-235-7884
MI	Mt. Clemens, O'Hara Assocs.	313-791-7140
MN	Minneapolis, Loren Green Assoc.	
MO	St. Louis, Atech	314-428-7447
NH	Londonderry, Power Conversion Sys.	603-434-2371
NJ	Ridgewood, Ballou, Inc.	201-444-6990
NY	Clarence, Trott Elctrns.	716-634-8500
NY	Pittsford, Trott Elctrns.	716-586-8251
NC	Cary, Sesco	919-467-7482
NC	Charlotte, Sesco	704-535-4920
OH	Cleveland, Jim Finnegan & Co.	215-238-5905
OK	Tulsa, Sesco	918-622-3868
PA	Brunnerville, J. E. Cuesta & Co.	717-626-2020
PA	Valley Forge, J. E. Cuesta & Co.	215-265-5800
TX	Austin, Sesco	512-892-2490
TX	Dallas, Sesco	214-231-9364
TX	Houston, Sesco	713-999-3510
UT	Salt Lake City, Cleveland Entprs. of Colo	801-355-8424
VA	Richmond, Powell-Pendergraph	804-270-1400
WA	Bellevue, Underwood-Hanify Assocs.	206-451-8223
WA	Vancouver, Underwood-Hanify Assocs.	503-641-4463

POWER/MATE CO., 514 S. River St., Hackensack, NJ 07601, Tel: 201-440-3100, TWX: 710-990-5023: Empl.: 650; *Sls. Mgr.:* J. R. Hoeffler; *Dist. Mgr.:* G. Vardakas

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PHONE: (914) 698-9332

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power-one

POWER-ONE, INC., Power-One Dr., Camarillo, CA 93010, Tel: 805-484-2806, TWX: 910-336-1297; FSC No.: 54407; Empl.: 531 .... 3•1692-1695

Local Sales Offices & Reps

AZ	Scottsdale, Thorson Desert States	602-998-2444
CA	Los Angeles, A-F Sls. Engrg.	213-681-5631
CA	Pasadena, A-F Sls. Engrg.	213-681-5631
CA	San Diego, A-F Sls. Engrg.	619-274-2225
CA	San Jose, Richards Assocs.	408-297-3010
CO	Denver, Quorum 3	303-696-8480
FL	Casselberry, Elctrn. Mktg.	305-339-7070
GA	Marietta, ELW Southeast	404-424-1731
IL	Itasca, L-Tec	312-773-2900
IN	Ft. Wayne, J&B Engrg.	219-483-2813
IN	Indianapolis, J&B Engrg.	317-894-8697
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
KS	Overland Park, ATS	913-642-6675
MA	Brockton, Forsberg	617-522-6300
MI	Southfield, L. H. Dickelman	313-353-8210
MN	Minneapolis, Components Grp. Corp.	612-374-1250
MO	St. Louis, ATS	314-227-4448
NE	Lincoln, Lorenz Sls.	402-475-4660
NM	Albuquerque, Thorson Desert States	505-293-8555
NY	Great Neck, Trionic Assocs.	516-466-2300
NY	Pittsford, C. W. Beach	716-586-3200
NY	Syracuse, C. W. Beach	315-446-9587
OH	Columbus, Tom Mulligan Co.	614-457-2242
OK	Tulsa, Advance Tech. Sls.	918-664-0482
OR	Beaverton, W3	503-641-5790
PA	Philadelphia, Eastern Comp. Sls.	215-825-8610
PA	Stewartstown, Eastern Comp. Sls.	800-223-3850
TX	Austin, Advance Tech. Sls.	512-459-1351
TX	Dallas, Advance Tech. Sls.	214-340-1300
TX	Houston, Advance Tech. Sls.	713-440-3888
UT	Sandy, Quorum 3	801-943-9227
VA	Manasas, Eastern Comp. Sls.	703-368-3936
WA	Seattle, W3	206-285-2667
WI	Milwaukee, L-Tec	414-774-1000

Local Distributors

AZ	Phoenix, Arrow Elctrns.	602-968-4800
AZ	Phoenix, Aero Space Southwest	602-861-1785
AZ	Phoenix, PLS Assocs.	602-246-6614
CA	Chatsworth, Diplomat Elctrns.	818-341-4411
CA	Chatsworth, Arrow Elctrns.	213-701-1133
CA	Costa Mesa, FLW	818-989-5237
CA	Los Angeles, Hanex, Inc.	213-556-3807
CA	Newport Beach, Arrow Elctrns.	714-851-8961
CA	San Diego, Diplomat Elctrns.	619-292-5693
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	San Jose, Compumech Elctrns.	408-289-9171
CA	Sunnyvale, Diplomat Elctrns.	408-734-1900
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CO	Denver, Arrow Elctrns.	303-696-1111
CO	Denver, PLS Assocs.	303-773-1218
CO	Englewood, Diplomat Elctrns.	303-799-8300
CT	Danbury, Diplomat Elctrns.	203-797-9674
CT	Wallingford, Sterling Elctrns.	203-265-9535
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Clearwater, Diplomat Elctrns.	813-443-4514
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Miami, Elctrn. Equip. Co.	305-871-3500
FL	Palm Bay, Arrow Elctrns.	305-725-1480
GA	Norcross, Diplomat Elctrns.	404-449-4133
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Arlington Heights, C. W. Elctrns.	312-489-9810
IL	Bensenville, Diplomat Elctrns.	312-595-1000
IL	Northbrook, Classic Comps.	312-272-9650
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Advent Elctrns.	317-872-4910
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IA	Cedar Rapids, Deeco, Inc.	319-365-7551
KS	Edwardville, C. Tennant & Sons	913-441-1801
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Columbia, Diplomat Elctrns.	301-995-1226
MD	Timonium, Zebra Elctrns.	301-252-6576
MA	Canton, Impact Sales	617-821-1500
MA	Woburn, Arrow Elctrns.	617-933-6770
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Battle Creek, Great Lakes Elctrns.	616-731-4156
MI	Livonia, Reptron	313-525-2700
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minneapolis, Aero Space Computer	612-884-4725
MO	St. Charles, Finnigan Elctrns.	314-946-6201
MO	St. Louis, Arrow Elctrns.	314-567-6888
NE	Omaha, Scott Elctrns.	402-734-6750
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NJ	Perth Amboy, Sterling Elctrns.	201-442-8000
NJ	Saddle Brook, Arrow Elctrns.	201-797-5800
NJ	Totawa, Diplomat Elctrns.	201-785-1830
NM	Albuquerque, Sterling Elctrns.	505-854-1900
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Mamaroneck, Logicomp Elctrns.	914-698-9332
NY	Melville, Diplomat Elctrns.	516-454-6400
NY	Rochester, Zeller Elctrns.	716-254-8840
NY	Rochester, Arrow Elctrns.	716-275-0300
NY	Rochester, CAM/RPC Elctrns.	716-865-2080
NC	Raleigh, Southeastern Elctrns.	919-828-2311
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Cincinnati, Applied Data Mgt.	513-579-8108
OH	Cleveland, CAM/RPC Elctrns.	216-461-4700
OH	Columbus, Reptron	614-436-6675
OH	Solon, Arrow Elctrns.	216-248-3990
OK	Tulsa, Sterling Elctrns.	918-663-2410
PA	Lancaster, CAM/RPC Elctrns.	717-392-8141
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Pittsburgh, Alder Tronics	412-821-5565
PA	Pittsburgh, CAM/RPC Elctrns.	412-782-3770
PA	Wayne, Peak Elctrns.	215-293-9000
RI	Warwick, Major Edwards Elctrns.	401-781-3000
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Dallas, Solid State Elctrns.	214-438-5700
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Houston, Sterling Elctrns.	713-627-9800
TX	Houston, Solid State Elctrns.	713-772-8483
TX	Stafford, Arrow Elctrns.	713-491-4100
UT	Salt Lake City, Diplomat Elctrns.	801-486-4135
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Bellevue, Integrated Elctrns.	206-455-2727
WA	Bellevue, Arrow Elctrns.	206-643-4800
WA	Seattle, Radar Electric	206-282-2511
WI	Oak Creek, Arrow Elctrns.	414-764-6600
EXP	CA, Los Angeles, Hanex, Inc.	213-556-3807

POWER PAC INC.

POWER PAC, 32 Meadow St., S. Norwalk, CT 06856, Tel: 203-866-4484; FSC No.: 53998; Empl.: 175; *Sls. Mgr.:* Abe Partner .... 3•1696-1700

Local Sales Offices & Reps

AL	Huntsville, BCI	205-539-4411
CA	Los Altos, AARD Engr.	415-948-5740
CA	Westlake Village, Jayess Co.	213-991-0632
CT	Hamden, Digital Sls. Assoc.	203-248-3641
GA	Chamblee, BCI	403-455-0405
IL	Des Plaines, Synmark Sls. Co.	312-296-0180
MD	Seabrook, W. A. Brown-Equip. Co.	301-577-6105
MA	Waltham, Digital Sls. Assoc.	617-899-4300
MI	Dearborn Hgts., Electro Sls. Assoc.	313-474-7320
MN	Minneapolis, R.J. Inc.	612-866-3661
NJ	E. Hanover, Emtec	201-428-0600
NJ	Princeton, Murtronics	609-394-3737
NJ	Teaneck, SGL Sls.	201-837-2352
NY	Cazenovia, S.T. Woolard	315-655-8145
NY	Melville, Emtec	516-752-1630
NC	Raleigh, BCI	919-781-9426
OH	Cleveland, Electro Sls. Assoc.	216-261-5440
OH	Dayton, Electro Sls. Assoc.	513-426-5551
PA	Harrisburg, Beil & Whitaker	717-564-6900
TX	Houston, Scientific Sls.	713-666-5318
TX	Richardson, Scientific Sls.	214-231-6541

Local Distributors

CT	Hamden, Digital Sls. Assoc.	203-248-3641
MA	Waltham, Digital Sls. Assoc.	617-899-4300

POWER-PAK, INC., 6232 N. Pulaski Rd., Chicago, IL 60646, Tel: 312-286-5566, TWX: 910-221-5928; *Sls. Mgr.:* Robert Villari

POWER PRODUCTS DIV., COMPUTER PRODS., INC., See Power Products Group

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POWER PRODUCTS DIV., Computer Products, Inc., 2801 Gateway Dr., Pompano Beach, FL 33060, Tel: 305-974-2442, TWX: 510-956-3098; FSC No.: 62125; Empl.: 700 .... 3•1438, 1701-1725

POWER-SCIENCE, 7667 Vickers St., San Diego, CA 92111, Tel: 619-292-4322; Empl.: 6; *Sls. Mgr.:* E. Cooper

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POWER-SONIC, Box 5242, 3106 Spring St., Redwood City, CA 94063, Tel: 415-364-5001, Telex: 348400; Empl.: 30; *Sls. Mgr.:* B. A. Ender; *Dist. Mgr.:* B. A. Ender .... 3•1422

Local Sales Offices & Reps

CA	Irvine, English/Damco	714-837-3801
FL	Tampa, SRT Mktg.	813-884-4805
IL	River Forest, Pete Collins	312-366-7076
MA	Natick, Steve Dworkin	617-653-7188
MS	Jackson, Welch & Doby	601-932-5534
NY	Wantagh, Dony Tech. Sls.	516-826-5550
NC	Raleigh, DHR Mktg.	919-876-5450
PA	Media, W. Reeves Assocs.	215-566-6709
SC	Greenville, DHR Mktg.	803-235-3594
TX	Dallas, Power Connection	214-357-8207

Local Distributors

CA	Chatsworth, Mil-Comm Distr.	213-998-3111
CA	Fountain Valley, Components Center	714-979-0433
CA	Mountain View, Cornett Electronics	415-969-5420
CA	Santa Clara, Components Center	408-988-3751
CO	Denver, Hensley Battery	303-455-3643
CT	Westport, Secres Distr.	203-226-7371
FL	Miami, ESL Elctrn. Distr.	305-633-6973
FL	Tampa, Leader Elctrns.	813-870-3315
GA	Atlanta, Allied Elctrns.	404-237-3366
GA	Atlanta, Security Wherehouse	404-955-1006
IL	Chicago, Allied Elctrns.	312-697-8200
IL	Villa Park, Melvin Elctrns.	312-378-7741
LA	Lafayette, Ralph's Elctrns.	318-234-4507
MA	Sharon, Adcour	617-784-3996
MI	Detroit, Alarm Supp.	313-425-2500
MO	St. Louis, Olive Elctrns.	314-426-4500
NM	Albuquerque, Detatron, Inc.	505-344-2381
NY	Ridgewood, J.A. McDermott Corp.	212-456-3606
OK	Tulsa, Radio, Inc.	918-587-9123
PA	Pittsburgh, Triangle Elctrns.	412-441-9659
TX	Austin, Harrison Indl. Elctrns.	512-458-3555
TX	Ft. Worth, Allied Elctrns.	817-265-9341
TX	Houston, Harrison Equip.	713-652-4700
TX	San Antonio, Sherman Elctrns.	512-224-1001
VA	Richmond, Sterling Elctrns.	804-226-2190

POWER SYSTEMS, 12 Tobey Rd., Bloomfield, CT 06002, Tel: 203-243-0357, TWX: 710-425-8778; FSC No.: 50463; Empl.: 375; *Sls. Mgr.:* Leon Gedacht .... 3•1726, 1727

Local Sales Offices & Reps

AZ	Phoenix, Tech Sls./Powerhouse	602-246-1614
CA	San Jose, Powerhouse	408-748-1555
CA	Santa Ana, Powerhouse	714-549-9599
MA	Tyngsboro, Comptech	617-649-3030

POWER SYSTEMS & CONTROLS, INC., 3206 Lanvale Ave., Richmond, VA 23230, Tel: 804-355-2803; Empl.: 40

POWER SYS. GRP., Rantec Div., Emerson Elec., 9401 Oso Ave., Chatsworth, CA 91311, Tel: 818-885-8223, TWX: 910-493-1247; FSC No.: 04971; Empl.: 265; *Sls. Mgr.:* Daniel L. Esau

POWERTEC, INC.

POWERTEC, INC., 20550 Nordhoff St., Chatsworth, CA 91311, Tel: 818-882-0004, TWX: 910-494-2092; Empl.: 349 .... 3•1728-1745

POWERTECH, INC., 0-02 Fairlawn Ave., Fairlawn, NJ 07410, Tel: 201-791-5050, Telex: 130389; FSC No.: 32953; Empl.: 49

Local Sales Offices & Reps

CA	Tarzana, Power Comp. Sls.	213-881-9111

Power Technology Inc.

POWER TECHNOLOGY, INC., P.O. Box 9769, Little Rock, AR 72219, Tel: 501-568-1995, TWX: 910-722-7313; Empl.: 40; *Sls. Mgr.:* Thomas H. Burgess .... 3•1746

Local Sales Offices & Reps

IN	Ossian, Science Sales, Inc.	219-622-7383
PA	Glenside, Koebert Assoc., Inc.	215-887-2310

POWERTREND, INC., 3139-G Los Feliz Dr., Thousand Oaks, CA 91362, Tel: 805-496-2945; *Sls. Mgr.:* R. Jones

POWER TEN, INC., 486 Mercury Dr., Sunnyvale, CA 94086, Tel: 408-738-5959, Telex: 172588 SNLO; FSC No.: 61987; *Sls. Mgr.:* Vince Mutascio

POWERTRON, See Industrial Test Equipment Co., Inc.

POWERTRON, Contraves Goerz Corp., 3821 Barranger Dr., Charlotte, NC 28210, Tel: 704-525-8962, Telex: 572-444; *Sls. Mgr.:* Sam LoBue

POWR-UPS CORP., 50 Orville Drive, Bohemia, NY 11716, Tel: 516-567-9620; Empl.: 6; *Sls. Mgr.:* Steve Summer .... 1B•1173

Local Sales Offices & Reps

CA	Fullerton, ESCO	714-879-7260
CA	San Diego, Total Elctrns. Int'l.	619-224-3291
MA	Southborough, Motion Engrg.	617-485-2144
NY	Cazenovia, D & O Engrg.	315-655-8602
OH	Dover, AJ Assocs.	216-343-2224
VA	Roanoke, Engrg. & Mktg. Corp. of Va.	703-986-1410

PPC PRODS., 7516 Central Industrial Dr., Riviera Beach, FL 33404, Tel: 305-848-9606, TWX: 510-952-7611; FSC No.: 33178; Empl.: 50; *Sls. Mgr.:* Nick Ernick

PPD, INC., Hwy. 70W, Resco Ct., P.O. Box 31347, Raleigh, NC 27612, Tel: 919-781-3955; *Sls. Mgr.:* Wm. Bagliani .... 1A•1173-1179

PPM, INC., 23945 Mercantile Rd., Cleveland, OH 44122, Tel: 216-292-6006; Empl.: 20; *Sls. Mgr.:* A. L. Bletcher .... 3•1285

Local Sales Offices & Reps

AZ	Phoenix, J. Smith & Assocs.	602-267-0981
CO	Denver, J. Smith & Assocs.	303-597-5343
MI	Ferndale, Tiby Co.	313-547-3550
NM	Albuquerque, J. Smith & Assocs.	505-265-3406
NC	Charlotte, Binco	704-366-5092
OH	Cleveland, Tiby Co.	216-371-5335
OH	Dayton, Tiby Co.	513-277-3822

PRACTICAL AUTOMATION, Trap Falls Rd., Shelton, CT 06484, Tel: 203-929-5381, Telex: 6813310; Empl.: 150; *Sls. Mgr.:* R. M. Banzaca

PRACTICAL TECHNOLOGY, 12 Village Ctr., Box 449, Carmel Valley, CA 93924, Tel: 408-659-3128; FSC No.: 59089; Empl.: 7; *Sls. Mgr.:* Keith Rosburg

PRAGMATIC DESIGNS, INC., 950 Benicia Ave., Sunnyvale, CA 94086, Tel: 408-736-8670, Telex: 17-1627, TWX: Nanet D Suvl; FSC No.: 94-2543110; Empl.: 45

PRD ELCTRNS., DIV. OF HARRIS CORP., see Harris Corp., PRD Electronics Div.

PRECICONTACT, INC., Ultra Precision, 1150 Wheeler Way, Langhorne, PA 19047, Tel: 215-757-1202, Telex: 83-4253; FSC No.: FSCM 60197; *Sls. Mgr.:* Edward W. Swirsky; *Dist. Mgr.:* John Dirado .... 2•1547, 1892

Local Sales Offices & Reps

AZ	Litchfield Park, G. B. Elctrns.	602-935-3984
CA	Mountain View, Gene C. Woempner Co.	415-964-5454
CA	Orange, Elctrn. Tech. Assoc.	714-998-2901
CO	Englewood, White Sls. Co.	403-694-9555
FL	Orlando, Over & Over	305-857-4057
GA	Norcross, Over & Over	404-449-6205
IL	Rolling Meadows, Heartland Tech. Mktg.	312-577-9222
IN	Indianapolis, Hoster & Sieloff Assoc.	317-842-3700
MD	Gaithersburg, Mechtronics Sls.	301-340-2130
MA	S. Dartmouth, Kentronics	617-999-2188
MA	Wakefield, Kentronics	617-246-0245
MO	Ravtown, Cadon Tech. Sls.	816-356-7685
MO	St. Louis, Cadon Tech Sls. Co.	314-645-8670
NJ	Mountain Lakes, Components for Elctrns.	201-334-2921
NY	Albion, Sys. Hardware Rep.	716-589-4908
NY	Corbettsville, SHR, Inc.	717-967-2607
NY	East Northport, Comps. For Elctrns.	516-266-5020
NY	Kew Gardens, Ayer Business Sys.	212-621-9002
NC	Charlotte, Over & Over	704-527-3070
NC	Raleigh, Over & Over	919-872-2262
OH	Cincinnati, Makin Assoc.	513-871-2424
OR	Portland, Elctrn. Mktg. Grp.	503-289-5320
PA	Hatboro, Jacobsen Assocs.	215-674-2937
PA	Lebanon, Jacobsen Assocs.	717-273-9746
PA	Pittsburgh, Kneip Sls.	412-824-1600; 823-0169
TN	Antioch, Over & Over	615-834-0140
TX	Austin, OM Sls.	512-452-1838
TX	Houston, OM Sls.	713-789-4426
TX	Richardson, OM Sls.	214-690-6746
UT	Salt Lake City, Charles Fields & Assocs.	801-277-4859
WA	Redmond, Elctrn. Mktg. Grp.	206-882-0962
WI	Milwaukee, Heartland Tech. Mktg.	414-931-0606

Local Distributors

AZ	Litchfield Park, GB Elctrns.	602-935-3984
CA	Chatsworth, I.E.C./Jaco	800-423-5731
CA	Fremont, Term. Sls.	415-656-7722
CA	Orange, Elctrn. Connexions Corp.	714-998-2901
CA	San Diego, Park West	619-277-8433
CA	San Jose, Cypress Elctrns.	408-945-8400
CO	Denver, CSID, Inc.	303-292-9594
CT	Norwalk, Park Distrs.	203-853-2010
CT	Wallingford, Cronin Elctrns.	203-265-3134
FL	Clearwater, Elctrn. Precepts of Florida	813-530-9781
FL	Lake Park, Park South	305-863-7275
FL	Pompano Beach, Components South	305-971-0350
IL	Palatine, OHM Elctrns.	312-359-5500
MA	Needham, Cronin Elctrns.	617-449-5000
MA	Westwood, Emtel Elctrns.	617-326-6522
MA	Wilmington, Aved Elctrns.	617-657-8310
NJ	Bellmawr, Mid-Atlantic Elctrns.	609-931-5303
NJ	Berlin, GCI Corp.	609-768-6767
NJ	Englewood, T.E.D./Powell	201-894-0800
NJ	Springfield, Route Elctrns.	201-379-7710
NM	Albuquerque, Connecting Comps. Div. T.M.A. Inc.	505-345-8921
NY	Bohemia, Norelcom Elctrns. Corp.	516-567-8866
NY	Brooklyn, Beryl Elctrns.	212-383-2208
NY	Brooklyn, Connector Resources	212-383-2208
NY	East Syracuse, Future Elctrns.	315-463-6633
NY	Hauppauge, Jaco Elctrns.	516-273-5500
OH	Mansfield, Rush Elctrns.	419-756-2311
OR	Beaverton, Component Resources	503-641-8488
PA	Wayne, Peak Elctrns.	215-293-9000
PA	York, E.C.I.	717-843-8971
TX	Allen, Prime Distrbg. Co.	214-231-0170
TX	Grand Prairie, Dial Supp.	214-647-2371
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Richardson, Jaco Elctrns.	214-235-9575
TX	Stafford, Southwest Elctrns.	713-491-4900
WA	Bellevue, I.E.C./Jaco	206-455-2727
WA	Seattle, Pacific Elctrns.	206-575-1050

PRECISION COMPONENTS, INC., 1110 W. National Ave., Addison, IL 60101, Tel: 312-543-6400; *Sls. Mgr.:* B. A. Gravens .... 3•1747

PRECISION ELCTRN. COMPS. LTD., 19 Hafis Rd., Toronto, Ont., Canada M6M 2V6, Tel: 416-249-7103, Telex: 06-969671 .... 1A•2052

PRECISION ELCTRNS., 9101 King Ave., Franklin Park, IL 60131, Tel: 312-678-5350; Empl.: 25

PRECISION EXTRUSIONS, INC., Box 120, Bensenville, IL 60106, Tel: 312-766-0340; *Sls. Mgr.:* Jim Achen

PRECISION FILTERS, INC.

PRECISION FILTERS, 240 Cherry St., Ithaca, NY 14850, Tel: 607-277-3550, Telex: 646846; FSC No.: 66-II-F & 66-II-I; Empl.: 49; *Sls. Mgr.:* Tom Rockwell .... **1A**•1613-1617; **3**•1016-1020, 1286

Local Sales Offices & Reps

AZ	Tempe, Cleveland Entprs.	602-820-1127
CA	La Crescenta, Beckrep	213-957-1111
CO	Denver, Cleveland Entprs.	303-751-3252
FL	Osprey, Dick Ridgewell Co.	813-966-4401
IL	Park Ridge, Electronic Instr.	312-298-2290
IN	Indianapolis, Electronic Instr.	317-257-7231
MD	Fulton, Gans & Pugh Assocs.	301-953-3724
MN	Eden Prairie, Electronic Instr. Conslts.	612-937-9701
NM	Albuquerque, Cleveland Entprs.	505-265-7893
OH	Cleveland, Comtel Instr.	216-442-8080
OH	Dayton, Comtel Instr.	513-298-7573
OH	Hilliard, Comtel Instr.	614-876-8305
OR	Portland, Topp Engrg. Sls.	503-244-7265
PA	Pittsburgh, Comtel Instr.	412-922-5720
UT	Salt Lake City, Cleveland Entprs.	801-355-8424
VA	Arlington, Gans & Pugh Assocs.	703-527-3262
WA	Bellevue, Topp Engrg. Sls.	206-747-5400

PRECISION LAMP, INC., 480 Aaron Dr., Cotati, CA 94928, Tel: 707-792-0333, Telex: 348498; Empl.: 25

PRECISION LEVEL VIAL CO., Warren Industries Inc., 1800-D Mearns Rd., Warminster, PA 18974, Tel: 215-675-2355; *Sls. Mgr.:* Michael Joyce; *Dist. Mgr.:* Michael Joyce

PRECISION MECHANISMS, 44 Brooklyn Ave., Westbury, NY 11590, Tel: 516-ED3-5955; FSC No.: 08127; Empl.: 26; *Sls. Mgr.:* Leon N. Canick

PRECISION METAL PRODS. CO., Centennial Indl. Pk., Peabody, MA 01960, Tel: 617-532-5500, TWX: 710-347-0123; FSC No.: 86577; Empl.: 54; *Sls. Mgr.:* Robert H. Degnan

PRECISION MICRO IMAGES, Box 1330, Altamonte Springs, FL 32701, Tel: 305-830-7244, Telex: 56-4303; *Sls. Mgr.:* Williams S. Hodges

PRECISION MOLDED PRODUCTS, INC., 582 Meyer Lane, Redondo Beach, CA 90278, Tel: 213-372-7373

PRECISION MONOLITHICS, 1500 Space Dr., Santa Clara, CA 95050, Tel: 408-727-9222, TWX: 910-338-0218; FSC No.: 06665; Empl.: 700; *Sls. Mgr.:* Steve Pass; *Dist. Mgr.:* Mike Dennison

PRECISION RESISTIVE PRODS., INC., P.O. Box 189, Highway 61 South, Mediapolis, IA 52637, Tel: 319-394-9131; Empl.: 90; *Sls. Mgr.:* Oscar Cline; *Dist. Mgr.:* Oscar Cline .... **1A**•1925

Local Sales Offices & Reps

CA	Los Altos, Frauman Assoc.	415-941-0660
CA	San Diego, KCE	619-278-7640
CO	Denver, Williams Assocs.	303-373-4730
CT	Milford, Cuming Assocs.	203-878-3946
FL	Cocoa Beach, Reynolds & Assocs.	305-784-4700
IL	Chicago, Ellinger Sls.	312-763-1570
IN	Greenwood, Valentine Assocs.	317-888-2200
MA	Waltham, Jesco, Inc.	617-893-0094
MI	Warren, DEM Elctrns. Sls.	313-575-9444
MN	Minneapolis, Intl. Sls.	617-831-8423
MO	St. Charles, Chesco	314-946-6677
NJ	Paramus, Design Elctrns.	201-845-6224
NY	Syracuse, Electra Sls. Corp.	315-463-1248
TX	Richardson, Campion Sls. Co.	214-238-8145
WA	Seattle, Arneson Assoc.	206-762-7664

PRECISION RESISTOR CO., INC., 109 U.S. Hwy. 22, Hillside, NJ 07205, Tel: 201-926-3036, Telex: 13-6479-413; FSC No.: 48615; Empl.: 45; *Sls. Mgr.:* R. L. Wright .... **1A**•1926, 1927

PRECISION TECH. SEWING, 921 E. Charleston Rd., Palo Alto, CA 94303, Tel: 415-856-2128

PRECISION TIMER, 13 Westbrook Ind'l. Pk., Westbrook, CT 06498, Tel: 203-399-6253; Empl.: 25; *Sls. Mgr.:* A. Hockert

PRECISION TUBE, Church Rd. & Wissahickon, N. Wales, PA 19454, Tel: 215-699-5801, Telex: 84-6439; FSC No.: 82413; Empl.: 240; *Sls. Mgr.:* William J. McNeil

Local Sales Offices & Reps

CA	Mountain View, Walter Assoc.	415-965-4131
CA	Santa Ana, RMS Assocs.	714-556-4155
CO	Golden, J. R. Hurlbut Co.	303-279-7796
FL	Melbourne, Hanson Assocs.	305-727-7474
IN	Indianapolis, Sukup & Cox	317-253-1215
IA	Cedar Rapids, Snider Sls. Co.	319-362-4410
MA	Burlington, Tri Tek	617-272-4550
MO	St. Charles, Buse Sls. Co.	314-946-6430
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NY	Huntington, CDB Enterprises	516-692-5200
TX	Garland, Carey McMahill & Zerbe	214-681-1414
UT	Salt Lake City, J. R. Hurlbut Co.	801-973-4443
VA	Fairfax, Schibley Assocs.	703-591-3008
WA	Redwood City, Woodworth Co.	

PREFERRED ELCTRNS., INC., Main Line Dr, P.O. Box 954, Westfield, MA 01086, Tel: 413-568-2301, Telex: 955-339; Empl.: 250; *Sls. Mgr.:* Merton I. Rosenberg

PREMAX PRODS. DIV., Highland & College Aves., Niagara Falls, NY 14305, Tel: 716-285-9186, Telex: 91-531; FSC No.: 74183; Empl.: 350

PREMIER METAL

PREMIER METAL PRODS. CO., 381 Canal Pl., Bronx, NY 10451, Tel: 212-993-9200; Empl.: 75 .... **2**•1044, 1045

Local Sales Offices & Reps

AZ	Phoenix, PLS Assocs.	602-246-6477
CA	City of Industry, Premier Metal	818-336-4534
CA	Garden Grove, West Elctrn. Sls. Co.	714-898-0120
CO	Englewood, PLS Assocs.	303-773-1218
CT	East Haven, Eagle Assocs.	203-467-6542
FL	Lake Worth, Adams & Assocs.	305-588-7630
GA	Marietta, Adams & Assocs.	404-973-0853
IL	Elmhurst, Utronix Sls.	312-834-1100
KS	Overland Park, Delltron Co.	913-649-2078
MD	Burtonsville, Eastern Instrmn.	301-384-8500
MA	Needham, Eagle Assocs.	617-444-3446
MI	Brighton, Electronic Sources	313-227-3598
MN	Minneapolis, J.E.M. Anderson Co.	612-823-6459
MO	St. Louis, Delltron Co.	314-869-4779
NM	Albuquerque, PLS Assocs.	505-255-2330
NY	Mt. Vernon, Sonkin Assocs.	914-668-9809
NY	New Hyde Park, Harris & Aldrich Sls.	516-488-2622
NY	Syracuse, Lewis-Dunnigan Co.	315-446-5522
NC	Greenboro, Adams & Assocs.	919-272-6838
OH	Akron, ImTech Inc.	216-666-1185
PA	Bensalem, Eastern Instrmn.	215-245-6660
TN	Knoxville, Adams & Assocs.	615-577-4241
TX	Arlington, W. Pat Fralia Co. Inc.	817-640-9101
TX	Houston, W. Pat Fralia Co. Inc.	713-772-1572
UT	Salt Lake City, PLS Assocs.	801-466-8729
EXP	FL, Miami, Emec, Inc.	305-871-3124

Local Distributors

AL	Huntsville, Mock Elctrns.	205-539-2401
AL	Opelika, Southern Elctrns.	205-745-5298
AZ	Phoenix, Dalis Elctrns.	602-275-2885
CA	Burlingame, Rose Elctrns.	415-348-2740
CA	San Jose, Quement Elctrns.	408-998-5900
CT	Middletown, Midstate Elctrns.	203-347-5638
CT	Wallingford, Sager Electrical Supp.	203-265-4600
FL	Dania, Summit Elctrns.	305-920-6253
FL	Miami, Electronic Equip. Co.	305-871-3500
IL	Elk Grove Village, GBL/Gould Elctrns.	312-593-3220
IN	Fort Wayne, Graham Elctrns.	219-423-3422
LA	Baton Rouge, Menard Elctrns.	504-355-0323
MD	Baltimore, ASI Elctrns.	301-265-5100
MD	Baltimore, Resco	301-823-0070
MD	Bethesda, Empire Elctrns.	301-656-3300
MA	Hingham, Sager Electrical Supp.	617-749-6700
MA	Newton, Greene-Shaw Co.	617-969-8900
MI	Ann Arbor, Purchase Radio Supp.	313-668-8696
MO	Kansas City, Walters Radio Supp.	816-531-7015
NJ	Cranford, Garden State Indl. Elec.	201-272-6400
NJ	Green Brook, Green Brook Elctrn.	201-968-3500
NJ	Hanover, State Elctrns. PTS	201-887-2550
NJ	Kenilworth, Federated Purchaser	201-272-0505
NY	Albany, E. E. Taylor Co.	518-438-7811
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Hauppauge, Broadline Elec. Dist.	516-231-4100
NY	Hempstead, Davis Elctrn. Corp.	516-483-9200
NY	LIC, H. L. Dalis Inc.	212-361-1100
NY	Lynbrook, Peerless Radio Dist. Corp.	212-523-3456
NY	New York, Martin Audio/Video Corp.	212-541-5900
NY	New York, Argil Elec. LTD	212-691-8111
NY	Port Chester, Wise Comps.	914-939-8600
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rochester, Simcona Elctrn. Corp.	716-328-3230
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Rockville Centre, Midway Industrial	516-764-2400
NY	Yonkers, Yonkers Elec. Supp.	914-969-6044
NC	Raleigh, Southeastern Radio	919-828-2311
OH	Warren, Rem Elctrns.	814-453-5626
PA	Allentown, Federated Elctrns.	215-437-4481
PA	Braddock, Leff Elctrns.	412-271-7100
PA	Horsham, Toner Cable Equip.	215-675-2053
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Reading, Barbey Elctrns.	215-376-6116
PA	West Chester, West Chester Elec. Supp.	215-696-7500
RI	Warwick, Edwards Elctrns.	401-732-3200
SC	Charleston, Wholesale Indl. Elec.	803-722-2634
TN	Clarksville, Randolph Hale & Matthews	615-647-2325
TN	Cookeville, Randolph & Parks	615-526-6184
TN	Nashville, Randolph & Rice	615-255-5601
TN	Tullahoma, Randolph Rice & Williams	615-455-4531
TX	Farmers Branch, Summers Elec. Co.	214-748-6533
TX	Ft. Worth, Swieco Inc.	817-335-6521
TX	Houston, Lenert Co.	713-225-1465
VA	Arlington, Arlington Elctrns.	703-524-2412
WA	Seattle, Radar Elec. Co.	206-282-2511

PREMIER MICROWAVE, 35 New Broad St., Port Chester, NY 10573, Tel: 914-939-8900, TWX: 710-569-1609; FSC No.: 15870; Empl.: 60 .... **1A**•1775

Local Sales Offices & Reps

CA	Los Angeles, R.F. Assocs.	213-478-1586
CA	Mountain View, Mark V. Assocs.	415-964-6275
FL	Orlando, BC Elctrns. Sls.	305-894-6071
GA	Smyrna, BC Elctrn. Sls.	404-436-5169
IL	Chicago, L.G.S. Elctrns. Sls.	312-456-9616
MD	Catonsville, Callas Elctrns. Dist.	301-744-7711
MA	Natick, Gerald Rosen	617-879-5505
MO	St. Louis, Boweng Tech. Rep.	314-429-7327
NY	Huntington, C.D.B. Entprs.	516-692-5220
OH	Dayton, BEK Assocs.	513-278-1343
EXP	CA, N. Hollywood, Air Frame Mfg. & Supp.	213-765-2600

PREM MAGNETICS, 3521 N. Chapel Hill Rd., McHenry, IL 60050, Tel: 815-385-2700, TWX: 910-642-3763; Empl.: 300; *Sls. Mgr.:* D. Hertel;D. Brooke (Tech.) .... **1A**•2257-2259

Local Sales Offices & Reps

AZ	Tempe, Gassner & Clark Co.	602-968-9037
CA	Vista, Sado Sls.	714-941-2654
CT	Bristol, Texell Co.	203-583-0703
IL	McHenry, Mesa, Inc.	815-344-2820
IA	Hiawatha, Gassner & Clark Co.	319-393-5763
NJ	Springfield, F. F. Sylvester Assoc.	201-376-3324
OR	Portland, Components West	503-643-5588
PA	W. Conshohocken, Eastern Comps. Sls. Corp.	215-825-8610
WA	Renton, Components West	206-271-5252

PRES-AIR-TROL CORP., 895 Mamaroneck Ave., Mamaroneck, NY 10543, Tel: 914-698-2026, 800-431-2625 (exc NY); Empl.: 6 .... **1B**•1741

PRESIDIO COMPS., INC., 7185 Construction Ct., San Diego, CA 92121, Tel: 619-578-9390, TWX: 910-335-1254 .... **1A**•1181

Local Sales Offices & Reps

AZ	Phoenix, Eltron	602-266-2164
CA	La Mirada, Select Elctrns.	714-739-8891

CA	San Jose, Meade Assocs.	408-446-1991
CA	Santa Clara, Meade Advantage	408-748-1991
FL	Orlando, Micro Mktg.	305-788-0886
IL	Palantine, R-Tek	312-991-4404
IN	Fort Wayne, R-Tek	219-432-8783
MA	Shrewsbury, Compatible Comps.	617-842-2022
MA	W. Boylston, Compatible Comps.	617-835-3614
MN	Minneapolis, Peterson Sls. & Assoc.	612-944-0030
NY	Chappaqua, Micrel	914-238-4961
NY	Fair Haven, Feikert Assocs.	315-652-5577
PA	Colmar, E & L Assocs.	215-822-2510
TX	Dallas, Merino Sls.	214-233-6002
TX	El Paso, EPEC, Inc.	915-593-8481
WA	Bellevue, MARS	206-747-3292

Local Distributors

TX	Richardson, Central States Comps.	214-644-2070

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CA	San Diego, Saber Entprs.	619-271-1523
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RAULAND-ZENITH RADIO CORP., 2407 W. North Ave., Melrose Pk., IL 60160, Tel: 312-345-4700, Telex: 72-1488; Empl.: 2300

RAWAY BEARING, 8 Melnick Rd., Monsey, NY 10952, Tel: 914-352-4944; FSC No.: 3110-3120; Empl.: 6; *Dist. Mgr.:* Rachel Baskin

RAYCHEM CORP., Elctrns. Grp., 300 Constitution Dr., Menlo Park, CA 94025, Tel: 415-361-3860, Telex: 34-8316, TWX: 910-373-1728; *Sls. Mgr.:* Robert Simpson; *Dist. Mgr.:* Joseph Rodgers

RAYMOND ENGRG. INC., Raycorder Prods. Div., 217 Smith St., Middletown, CT 06457, Tel: 203-632-1000, TWX: 710-428-7944; FSC No.: 92059; Empl.: 550; *Sls. Mgr.:* Bruce Greenfield

RAYOVAC CORPORATION, 101 E. Washington Ave., Madison, WI 53703, Tel: 608-252-7400, Telex: 26-5462, TWX: 910-286-2730; FSC No.: 6135; Empl.: 2400; *Sls. Mgr.:* Ed Peterson ....3•1423

Local Sales Offices & Reps

CA	North Hollywood, The Bassett Sls. Corp.	213-877-7129
CO	Denver, W. J. Purdy Co.	303-777-1411
FL	Coral Springs, Frank Peck & Assocs.	305-753-3136
IL	Chicago, G. McL Cole Co.	312-774-3535
IN	Indianapolis, Electronic Mktg. Consultants	317-253-1668
MA	Framingham, G/M Assocs., Inc.	617-872-4871
MI	Southfield, R. C. Merchant Co.	313-354-4300
MI	St. Joseph, R. C. Merchant Co.	616-983-7378
MN	Minneapolis, HMR, Inc.	612-831-7400
MO	Kansas City, Forristal-Young Sls. Co.	816-358-6771
MO	St. Louis, Forristal-Young Sls. Co.	314-968-9975
NE	Omaha, Forristal-Young Sls. Co.	402-333-0800
NJ	Cherry Hill, Trinkle Sls., Inc.	609-795-4200
NJ	Teaneck, Fisher Elctrn. Assoc.	201-837-1200
NM	Albuquerque, W. J. Purdy Co.	505-266-7959
NY	East Syracuse, NYCOM, Inc.	315-437-8343
NY	Grand Island, L. J. McTaggart Assoc., Inc.	716-773-9222
NY	Port Washington, Paul D. Aaron Assoc.	516-883-0600
NC	Greensboro, Adams & Assocs., Inc.	919-272-6838
OH	Richfield, Bear Mktg. Inc.	216-659-3131
TX	Garland, Tesco Co.	214-681-1376
WA	Seattle, Don Dussault & Assoc.	206-527-5454

Local Distributors

AL	Birmingham, American Elctrns. Supp.	205-254-3280
AL	Huntsville, Mock Elctrns.	205-539-2401
AZ	Phoenix, Elctrn. Parts Co.	602-277-7281
AR	Little Rock, Carlton-Bates	501-562-9100
CA	Costa Mesa, House of Batteries	714-642-8222
CA	Long Beach, Battery Specialties	213-437-1809; 213-435-5058
CA	Sacramento, The Supp. Station, Inc.	916-920-2919
CO	Colorado Springs, Centennial Elctrns. Inc.	303-633-4666
CT	Danbury, Pilgrim Elctrns., Inc.	203-792-7247
ID	Idaho Falls, Schwendiman's Wholesale, Inc.	208-522-2492
ID	Pocatello, Kimball Elctrns.	208-232-2201
IL	Arlington Heights, Reptron Elctrns., Inc.	312-593-7070
IL	Elk Grove, GBL Goold Elctrns. Inc.	312-593-3222
IN	Indianapolis, Graham Elctrns. Supp., Inc.	317-634-8202
IN	Indianapolis, Battery Man, Inc.	317-257-1998
IA	Cedar Rapids, Bergquist	319-366-8733
KS	Wichita, RSC Elctrns. Inc.	316-267-5213
MD	Gaithersburg, Pioneer-Washington Elctrns. Inc.	301-948-0710
MA	Sharon, Adcour, Inc.	617-784-8123
MN	Minneapolis, Bergquist	612-835-2322
MO	Springfield, HTD Entprs., Inc.	417-865-3993
MO	St. Louis, Olive Elctrns.	314-426-4500
MT	Billings, Interstate Distrb.	406-245-5141
NJ	Saddle Brook, Tide Elctrns.	201-794-9660
NJ	Springfield, Route Elctrns.	201-467-0166
NM	Albuquerque, Elctrn. Parts Co., Inc.	505-293-6161
NY	Buffalo, Goldcrest Elctrns.	716-885-5878
NY	Plainview, Trace Elctrns.	516-249-4455
NY	Port Washington, Connector Concepts	516-883-3800
NY	Rochester, Masline Elctrns., Inc.	716-546-5373
OK	Tulsa, Norvell Elctrns.	918-663-1247
OR	Portland, Radar Electric	503-232-3404
OR	Salem, J. W. Elctrns.	503-399-8565
PA	McKeesport, Barno Radio	412-751-5966
PA	Philadelphia, Jan Industrial Elctrn. Co., Inc.	215-922-1321
SC	Columbia, Hesco, Inc.	803-254-4575
TX	Dallas, Norvell Elctrns. Inc.	214-233-0020
TX	Dallas, Wallace Elctrns.	214-340-0400
TX	El Paso, Ideal Indl. Supp.	915-779-6647
UT	Salt Lake City, Kimball Elctrns. Inc.	801-328-2075
VA	Norfolk, Priest Elctrns., Inc.	804-855-0105
WA	Seattle, Robert E. Priebe Co.	206-682-8242
WA	Seattle, Radar Elec Co., Inc.	206-282-2511
WA	Tumwater, JW Electronics	206-943-1071
WI	Milwaukee, Marsh Elctrns. Inc.	414-475-6000

RAYTHEON CO., 465 Centre St., Quincy, MA 02169, Tel: 617-479-5300, TWX: 710-337-1020; *Sls. Mgr.:* R. Whitt

RAYTHEON CO., Laser Center, Fourth Ave., Burlington, MA 01803, Tel: 617-272-6402, Telex: 92-3455, TWX: 710-324-6568; Empl.: 45; *Sls. Mgr.:* L. Smetana

RAYTHEON CO., Microwave & Power Tube Div., 190 Willow St., Waltham, MA 02154, Tel: 617-899-8400, TWX: 710-324-6568; *Sls. Mgr.:* A. F. Vacaro; *Dist. Mgr.:* R. K. Whitt

RAYTHEON CO., Submarine Signal Div., 1847 W. Main Rd., P.O. Box 360, Portsmouth, RI 02871, Tel: 401-847-8000, Telex: 927787, TWX: 710-382-6923; FSC No.: 94404; Empl.: 2600; *Sls. Mgr.:* Jerry K. Martin

RAYTHEON OCEAN SYS. CO., Submarine Signal Div., Risho Ave., Westminster Pk., E. Providence, RI 02914, Tel: 401-438-1780, Telex: 6814078; Empl.: 90

RAYTHEON SEMICONDUCTOR, 350 Ellis St., Mountain View, CA 94043, Tel: 415-968-9211, TWX: 910-379-6481; FSC No.: 07933; Empl.: 950; *Sls. Mgr.:* R. Goedjen; *Dist. Mgr.:* R. Johnson

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RCA DISTR. & SPECIAL PRODS. DIV., RCA Corp., 2000 Clements Bridge Rd., Deptford, NJ 08096, Tel: 609-541-3636; *Sls. Mgr.:* H. L. Craton

RCA SOLID STATE DIV., Route 202, Somerville, NJ 08876, Tel: 201-685-6000, TWX: 710-480-9333; FSC No.: 19089; *Sls. Mgr.:* J. M. Cleary; *Dist. Mgr.:* V. R. Bonanno

RCA SOLID STATE DIV., CMOS IC Mktg., Rte. 202, Somerville, NJ 08876, Tel: 201-685-6000, TWX: 710-480-9333

RCA SOLID STATE DIV., Linear Integrated Circuits, Rte. 202, Somerville, NJ 08876, Tel: 201-685-6000, TWX: 710-480-9333

RCA SOLID STATE DIV., Micro Processors, Route 202, Somerville, NJ 08876, Tel: 201-685-6000, TWX: 710-480-9333

RCA SOLID STATE DIV., Thyristors & Rectifiers, Rte. 202, Somerville, NJ 08876, Tel: 201-685-6000, TWX: 710-480-9333

RCA SOLID STATE DIV., Transistors, Rte. 202, Somerville, NJ 08876, Tel: 201-685-6000, TWX: 710-480-9333

RCD COMPONENTS, INC., 330 Bedford St., Manchester, NH 03101, Tel: 603-669-0054, Telex: 943-512 RCD COMP MAN; Empl.: 350 ....**1A**•1928, 1929

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg. Inc.	205-830-0498
AZ	Phoenix, Elec-Com Assoc.	602-967-8644
CA	Canoga Park, Cummings & Assocs.	213-340-6035
CA	Santa Clara, Cummings & Assocs.	408-247-8656
CA	Woodland Hills, Cummings & Assocs.	213-340-6035
CO	Denver, Cummings & Assocs.	303-455-6860
FL	Apopka, G. F. Bohman	305-886-1882
GA	Norcross, Montgomery Mktg. Inc.	404-447-6124
ID	Boise, N. R. Schultz Co.	208-377-8686
IL	Elk Grove Village, The John G. Twist Co.	312-593-0200
KS	Overland Park, Ensco-Rep Inc	913-381-7557
MI	Livonia, Electronic Salesmasters	800-321-1848
MO	Maryland Heights, Ensco-Rep Inc	314-423-3935
NJ	Cherry Hill, Trinkle Sales Inc.	609-795-4200
NM	Alburquerque, Elec-Com Assocs.	505-898-6101
NY	Hempstead, Kahgan Sls.	516-538-2300
NY	Kingston, R. P. Kennedy Co., Inc.	914-876-2700
NY	Rochester, R. P. Kennedy Co., Inc.	716-271-6322
NC	Cary, Montgomery Mktg. Inc.	919-467-6319
OH	Beachwood, Electronic Salesmasters	216-831-9555
OR	Beaverton, N. R. Schultz Co.	503-643-1644
PA	Allentown, Trinkle Sls. Inc.	800-257-8210
TX	Dallas, Design Mktg. Inc.	214-680-9767
TX	Irving, Design Mktg.	214-255-2110
TX	Round Rock, Design Mktg.	512-255-9686
WA	Bellevue, N. R. Schultz Co.	206-454-0300
WI	Brookfield, The John G. Twist Co.	414-782-2670

R. C. ELCTRNS. INC., 5386 Hollister Ave., Santa Barbara, CA 93111, Tel: 805-964-6708, Telex: 295281; *Sls. Mgr.:* Chao-Sun Pang; *Dist. Mgr.:* Chao-Sun Pang

RCI/DATA, 1992 Lakewood Rd., Toms River, NJ 08753, Tel: 201-341-8361; Empl.: 15; *Sls. Mgr.:* Robert Fierro

RCL·Shallcross

RCL ELECTRONICS, INC., 195 McGregor St., Manchester, NH 03102, Tel: 603-627-3831, TWX: 710-220-1876; FSC No.: 01686; Empl.: 300 ....**1A**•1930-1936

SHALLCROSS, INC., U.S. 70 East, Smithfield, NC 27577, Tel: 919-934-5181, TWX: 510-939-1463; FSC No.: 54294; Empl.: 150 ....**1A**•1930-1936

RCL-Shallcross Local Sls. Offs. & Reps.

AL	Huntsville, CSR Elctrns.	205-533-2444
AZ	Phoenix, ISDS	602-971-6250
CA	Chatsworth, WCV Co.	818-700-0933
CA	Palo Alto, Mollard Mktg.	415-961-0456
CO	Denver, Elcom	303-337-2300
CT	North Haven, Kitchen & Kutchen	203-239-0212
FL	Ft. Lauderdale, APM Assoc.	305-565-0056
FL	Longwood, APM Assoc.	305-869-6831
FL	Merritt Island, APM Assoc.	305-453-4322
FL	Tampa, APM Assoc.	813-886-2457
GA	Dunwoody, CSR Elctrns.	404-396-3720
IL	Schaumburg, Gassner & Clark	312-882-8608
IA	Cedar Rapids, Lorenz Sls.	319-377-4666
MD	Columbia, Delta III Assoc.	301-730-4700
MA	Burlington, Kitchen & Kutchen	617-229-2660
MI	Livonia, Luebbe Sls. Co.	313-477-3131
MN	Minneapolis, Elec. Comp. Sls.	612-933-2594
MO	Grandview, Harris/Hanson Co.	816-763-6200
MO	St. Louis, Harris/Hanson Co.	312-432-3611
NE	Lincoln, Lorenz Sls. Co.	402-475-4660
NJ	Marlton, BGR Assoc.	609-983-1020
NY	Buffalo, Quality Comps.	716-837-5430
NY	Manlius, Quality Comps.	315-682-8885
NY	Melville, Comtronic Assoc.	516-249-0505
NC	Raleigh, CSR Elctrns.	919-878-9200
OH	Cincinnati, Luebbe Sls. Co.	513-891-5770
OH	Cleveland, Luebbe Sls. Co.	216-333-0425
OH	Columbus, Luebbe Sls. Co.	614-431-0474
OH	Dayton, Luebbe Sls. Co.	513-294-0426
OK	Tulsa, Bonser/Philhower	918-496-3236
OR	Portland, James J. Backer Co.	503-297-8744
OR	Salem, James J. Backer Co.	503-362-0717
PA	Pittsburgh, Luebbe Sls. Co.	412-931-0414
SC	Taylors, CSR Elctrns.	803-292-2292
TX	Austin, Bonser/Philhower	512-458-3569
TX	Dallas, Bonser/Philhower	214-234-8438
TX	El Paso, Q. T. Wiles Assoc.	602-971-6250
TX	Houston, Bonser/Philhower	713-531-4144
UT	Salt Lake City, Elcom	801-532-7940
WA	Seattle, James J. Backer Co.	206-285-1300

RCL-Shallcross Local Distributors

AZ	Phoenix, TTI	602-966-1616
AZ	Tempe, Shelley Elctrns.	602-894-2058

CA	Chatsworth, Shelley Elctrns.	818-998-3333
CA	N. Hollywood, TTI	818-982-0201
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Jose, T.T.I.	408-943-9155
CA	San Jose, Shelley Elctrns.	408-942-9111
CO	Boulder, Shelley Elctrns.	303-442-2718
CT	Hamden, Almo Elctrns.	203-288-6556
CT	Stratford, Utronics	203-378-4201
FL	Ft. Lauderdale, Dielco	305-973-8700
FL	Orlando, TTI	305-859-1000
FL	Tampa, Impala Elctrns.	813-885-4747
FL	Tampa, Shelley Elctrns.	813-884-0946
IL	Melrose Park, Belford Elctrns.	312-865-2400
IL	Northbrook, Classic Comps.	312-272-9650
MD	Columbia, Aztech Elctrns.	301-995-1760
MA	Billerica, A.W. Mayer Co.	617-229-2255
MA	Wilmington, RC Comps.	617-273-1860
MA	Woburn, TTI	617-938-8800
MN	Minneapolis, Aerospace Computer Supplies	612-884-4725
NY	Bohemia, TTI	516-567-1500
NY	Farmingdale, Command Elctrns.	516-293-1212
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Rochester, Simcona	716-328-3230
NY	Rome, Rome Elctrns.	315-337-4500
NC	Raleigh, Resco-Raleigh	919-781-5700
OH	Dayton, Stotts Friedman	513-298-5555
OH	Englewood, Argent Inds.	513-836-8633
OH	Solon, REH-Electra	216-248-1636
OK	Tulsa, Altair	918-252-5781
PA	McKean, Advacom	814-476-7774
PA	McKeesport, Barno Radio	412-751-5966
PA	Norristown, Century Elctrn. Comps.	215-631-5400
PA	Pittsburgh, Aldertronics	412-821-5565
TX	Ft. Worth, TTI	817-429-1440
TX	Houston, Altair	713-462-3029
TX	Richardson, Altair	214-231-5166
WA	Bellevue, Almac Elctrns.	206-643-9992
WI	New Berlin, Classic Comps.	414-786-5300

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RDI/REED DEVICES INC., 525 Randy Rd., Carol Stream, IL 60188, Tel: 312-682-4100, TWX: 910-252-2118; FSC No.: 53337; Empl.: 85; *Sls. Mgr.:* H. J. Roeser ....2•1548-1551

Local Sales Offices & Reps

AL	Huntsville, Alpha	205-533-0766
AZ	Glendale, Adtek	602-931-9289
CA	Los Angeles, Wiley Co.	213-666-1611
CA	Sunnyvale, Schwerin/Merrill	408-735-7900
FL	Ft. Lauderdale, APM Assoc.	305-565-0056
FL	Longwood, APM Assoc.	305-869-6831
FL	Merritt Island, APM Assoc.	305-453-4322
FL	Tampa, APM Assoc.	813-886-2457
GA	Atlanta, Alpha	404-491-9430
IL	Glen Ellyn, Rockford Controls	312-469-6016
IN	Indianapolis, Rockford Controls	317-248-2518
IA	Cedar Rapids, Palatine Sls.	319-365-8071
KS	Mission, Palatine Sls.	913-831-0555
KS	Rosehill, Palatine Sls.	316-776-0065
KY	Louisville, K W Elctrn. Sls.	502-451-1860
LA	New Orleans, D. Bellew Sls.	504-283-8979
MA	Norwood, Augat Sls.	612-792-3164
MI	Novi, Lektronics	313-349-3304
MN	Minneapolis, HMR	612-831-7400
MO	Hazelwood, Palatine Sls.	314-839-0800
NJ	Pitman, Colrud Corp.	609-589-5866
NJ	Woodcliff Lake, J. Freid & Assoc.	201-391-8091
NY	Albany, H.C. Johnson	518-459-1239
NY	Great Neck, F & F Metro	516-482-4080
NY	Rochester, H.C. Johnson	716-586-0777
NY	Williamsville, H.C. Johnson	716-632-7880
NC	Kernersville, Wallace Elctrn.	919-996-2742
OH	Columbus, K.W. Elec. Sls.	614-888-0483
OH	Dayton, K W Elctrn. Sls.	513-890-2150
OH	Shaker Hts., K.W. Elec. Sls.	216-496-9177
OR	Portland, Eltech	503-238-0805
PA	Allison Park, K.W. Elec. Sls.	412-487-4300
TN	Memphis, D. Bellew Sls.	901-452-1468
TN	Oak Ridge, Alpha Mktg.	615-482-1660
TX	Austin, Barry Sls.	512-836-3616
TX	Houston, Barry Sls.	713-784-5860
TX	Richardson, Barry Sls.	214-234-0255
VA	Reston, Colrud Corp	804-353-6320
WA	Bellevue, Eltech	206-643-4330

Local Distributors

AL	Huntsville, Comp. Dist.	205-883-7501
AZ	Phoenix, Tri-Tek	602-995-9352
AZ	Phoenix, Dalis	602-275-2885
AZ	Tucson, Inland Elec. Supp.	602-889-5301
AR	Little Rock, Southern Elec.	501-372-4196
AR	Little Rock, Carlton-Bates	501-562-9100
CA	Buena Park, Control Des.	714-521-5040
CA	Burlingame, Rose Elec.	415-348-2740
CA	Fremont, Term. Sls.	415-656-7722
CA	Gardena, Calif. Switch & Signal	213-538-9830
CA	Los Angeles, Elec. Switches	213-660-1310
CA	San Carlos, Control Des.	415-592-4808
CA	San Diego, Lectro Comp.	714-578-4290
CA	San Jose, Con. Parts	408-263-9521
CA	Santa Monica, Master Distr.	213-452-1229
CO	Denver, CSID	303-292-9594
CO	Englewood, Indl. Elctrns.	303-694-9444
CT	Stratford, Utronic	203-378-4201
FL	Ft. Lauderdale, Comp. Dist.	305-971-4950
GA	Atlanta, Elctrl. Control Prod.	404-455-1216
GA	Stone Mountain, Control Des.	404-979-3500
IL	Addison, Lectro Comps.	312-543-1680
IL	Arlington Heights, Lo Dan Elctrns.	312-398-5311
IL	Oak Park, Newark Elctrns.	312-524-1800
IL	Rockford, Mid-West Assoc.	815-962-8036
IN	Ft. Wayne, Graham Elec.	219-423-3422
IN	Indianapolis, Control Des.	317-788-4559
IA	Cedar Rapids, Deeco	319-365-7551
KY	Louisville, CED/E & H Elec. Supp. Co.	502-587-0991
LA	Lafayette, Ralph's Indl. Elec.	318-234-4507
LA	New Orleans, Wm. B. Allen Supp.	800-535-9593
LA	Shreveport, Indl. Elctrn. Supp.	318-222-9459
MD	Beltsville, Treeko Sls.	301-937-8260
MA	Burlington, QPL Elec. Dist.	617-229-2424
MA	Middleboro, The Stockroom	617-947-4262
MI	Southfield, Michigan Lectrols	313-353-1350
MN	Minneapolis, Aero-Space Computer Supp.	612-884-4725
MN	Minneapolis, Newark Elec.	612-331-6350
MN	Minneapolis, Control Des.	612-721-1628
MO	St. Louis, Olive Indl.	314-426-4500
MO	St. Louis, Control Des.	314-426-3150
NE	Lincoln, Scott Elctrn.	402-466-8221
NJ	Fairlawn, Relay Specialties	201-797-3313
NJ	Jersey City, Cuny & Gerber	201-653-0222
NY	Buffalo, Summit	716-884-3450
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Mt. Vernon, QAR Indl. Elec. Sls.	914-699-2224
NY	Rochester, R. Baker Elctrns.	716-586-9164
NC	Charlotte, Control Des.	704-588-4410
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Southeastern Radio	919-828-2311
OH	Akron, Akron Elctrn.	216-762-8818
OH	Cincinnati, URI Elctrns.	513-761-4030
OH	Columbus, Elctrns. Mktg. Co.	614-299-4161
OH	Dayton, ESCO	513-226-1133
OH	Wickliffe, Gateway Megatech	216-944-8565
OK	Tulsa, Radio	918-587-9123
OR	Eugene, Vitus Elec. Supp.	503-484-6333
OR	Portland, Radar	503-232-3404
PA	Malvern, Control Des.	215-296-0150
PA	McKean, Advacom	814-476-7774
PA	Philadelphia, Phila. Elec.	215-568-7400
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Memphis, Brownell Electro	901-795-8487
TX	Dallas, Control Des.	214-358-1441
TX	Dallas, Dallas Meter-Tech.	214-349-6044
TX	Houston, Angie Elctrns.	713-659-8386
TX	Longview, Summers Elec.	214-757-6021
UT	Salt Lake City, Stuart Elctrns. Supp.	801-466-8603
WA	Seattle, Pacific Elctrns.	206-575-1050
WA	Seattle, Radar Elec.	206-282-2511
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WI	New Berlin, Control Des.	414-784-1015
WI	West Allis, Marsh Elctrns.	414-475-6000

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Local Sales Offices & Reps

CA	North Hollywood, Crown Elctrns.	213-877-3550
CA	Sunnyvale, ESCO Assocs.	408-745-1410
FL	Largo, Electro Craft	813-530-4749
MA	Wakefield, Nerem	617-245-4426
VA	Fairfax, Beacon North	703-591-1300

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RECORDER SYS. DIV., See Gulton Inds., Inc., Graphic Instrs. Div.

RECOTON CORP., 46-23 Crane St., Long Island City, NY 11101, Tel: 212-392-6442, Telex: 236047 RCTN; Empl.: 150; *Sls. Mgr.:* George Calvi

REDINGTON COUNTERS, 130 Addison Rd., Windsor, CT 06095, Tel: 203-688-6205, Telex: 64-3390 REDCO WSOR; *Sls. Mgr.:* Alan Schoenhut

REED SWITCH DEV. CO. INC., PO Box 1464, Kerrville, TX 78028, Tel: 512-896-4444; Empl.: 1

RE-EL CIRCUITS, INC., See RCI/Data

REEVE ELCTRNS., 444 N. Orleans, Chicago, IL 60610, Tel: 312-670-0150; Empl.: 25; *Sls. Mgr.:* George Elliott

REEVES-HOFFMAN
Division, Dynamics Corporation of America

REEVES-HOFFMAN DIV., 400 W. North St., Carlisle, PA 17013, Tel: 717-243-5929, TWX: 510-650-3510; Empl.: 291; *Sls. Mgr.:* Edward J. Sweeney .... **1A**•1413-1417; **2**•1795-1797

Local Sales Offices & Reps

AZ	Phoenix, Chaparral Elctrns.	602-252-0897
CA	Culver City, Westaironics	213-641-4123
CA	Mountain View, Peninsula Tech. Sls.	415-965-3636
CO	Boulder, R.G. Entprs.	303-447-9211
FL	Fern Park, EIR Inc.	305-830-9600
GA	Kennesaw, BWS Marketing	404-974-5107
ID	Boise, N. R. Schultz Co.	208-377-8686
IL	Chicago, ESCO Assocs.	312-763-0800
KS	DeSoto, Midtec Assocs.	913-441-6565
MD	Baltimore, R. A. Wafer Assocs.	301-744-1133
MA	Wakefield, H. Jappe	617-245-9359
MN	Minneapolis, Intl. Elctrns.	612-571-0000
MO	Florissant, Midtec Assocs.	314-837-5200
NY	Huntington, Compar New York Inc.	516-423-5660
NC	Winston-Salem, Murcota	919-722-9445
OH	Cincinnati, Tri-State Mktg.	513-761-7993
OR	Beaverton, N. R. Schultz Co.	503-643-1644
PA	Hatboro, Electro Rep Engrg.	215-674-4421
TX	Irving, Kite Elctrns. Sls.	214-438-9336
WA	Bellevue, N. R. Schultz Co.	206-454-0300

REFAC ELCTRNS. CORP., P.O. Box 809, Winsted, CT 06098, Tel: 203-379-2731, TWX: 710-449-6464; FSC No.: 28564; Empl.: 80; *Sls. Mgr.:* Chuck Altschul .... **1B**•1094

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Luscombe Engrg.	602-949-9333
CA	Campbell, Luscombe Engrg.	408-370-2020
CA	Pasadena, Luscombe Engrg.	818-684-2000
CA	San Diego, Luscombe Engrg.	619-295-4300
CO	Boulder, Luscombe Engrg.	303-772-3342
CT	Kensington, Norman Stachelek Co.	203-828-6161
FL	Clearwater, Delmac Sls.	813-447-5192
FL	Orlando, Delmac Sls.	305-898-4688
FL	Palm Bay, Delmac Sls.	605-724-8377
FL	Tamarac, Delmac Sls.	305-726-1330
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Mt. Prospect, Interep	312-577-8899
MD	Baltimore, Burgin-Kreh Assocs.	301-265-8500
MA	Canton, New England Elctrn. Sls.	617-828-4835
MI	Madison Heights, Pine Sls.	313-539-0350
MN	Spring Lake Park, Holmgren Assocs.	612-786-7641
MO	Gladstone, Delltron Co.	816-436-6445
MO	St. Louis, Delltron Co.	314-869-4779
NJ	Englewood, Sprung/Nussbaum	201-569-5666
NY	E. Syracuse, Nycom Co.	315-437-8343
NY	Williamsville, Nycom Co.	716-633-9395
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Dayton, J. C. Hoffstetter Co.	513-296-1010
OH	Medina, J. C. Hoffstetter Co.	216-241-4880
OK	Tulsa, Ion Assocs.	918-664-0186
OR	Beaverton, Luscombe Engrg.	503-636-6664
PA	Pittsburgh, J. C. Hoffstetter Co.	412-356-2305
PA	Southampton, Campbell Assocs.	215-322-6630
TX	Austin, Ion Assocs.	512-346-7160
TX	Grand Prairie, Ion Assocs.	214-647-8225
TX	Houston, Ion Assocs.	713-977-4354
VA	Lynchburg, Burgin-Kreh Assocs.	804-239-2626
WI	Milwaukee, Interep	414-774-1100

REGDON CORP., 3713 Grand Blvd., Brookfield, IL 60513, Tel: 312-485-5152, TWX: 910-691-2214; FSC No.: 27190; Empl.: 65 .... **1B**•1497

Local Sales Offices & Reps

AL	Decatur, Tenn Tech	205-350-0630
CA	Los Altos, J. W. Wilhoit	415-961-3660
CA	Valencia, DJM Elctrns.	213-362-4309
CT	Woodbury, Mark-Rep Assocs.	203-263-3047
FL	Fern Park, EIR, Inc.	305-830-9600
GA	Clarkston, Tenn Tech	404-292-5368
IL	Downers Grove, Richmar Elect. Corp.	312-968-0118
IN	Indianapolis, Richmar Elctrns.	317-846-6383
MN	Edina, T.H. Hanson & Co.	612-893-9960
MN	Edina, Wendell Lee & Assoc.	612-831-5056
NH	Atkinson, Mark-Rep Assocs.	603-362-4526
NJ	Livingston, Varrelman-Gorman Co.	201-992-2505
NY	Ilion, NHA	315-894-9943
NY	Pittsford, NHA	716-586-9002
NC	Raleigh, Tenn Tech	919-266-3610
OH	New Lebanon, J. N. Bailey	513-687-1325
PA	Abington, Indl. Mktg. Specialists Co.	215-659-0444
TX	Austin, K & H Sales	512-258-8841
TX	Plano, K & H Sales	214-423-6520
WI	Milwaukee, Richmar Elctrns.	414-781-1730

Local Distributors

CA	Burlingame, Logan Elctrn. Supp.	415-697-6481
MA	Lynn, Land Elctrns.	617-592-2220
NJ	Fairlawn, Relay Specialties	201-797-3313

REGENT CONTROLS, 39 Fanny St., P.O. Box 767, Shelton, CT 06484-0767, Tel: 203-736-2924; *Sls. Mgr.:* Wendell E. Carroll

REHLANDER ASSOCS., 363 Rantoul St., Beverly, MA 01915, Tel: 617-922-5961; *Sls. Mgr.:* Michael Rehlander

REICH ASSOCS., P.O. Box 73, Plano, TX 75074, Tel: 214-424-7904, Telex: 794783, TWX: 910-989-1691; FSC No.: 55916; Empl.: 10

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Electronics for Test and Communication

RE INSTRUMENTS CORP., 31029 Center Ridge Rd., Westlake, OH 44145, Tel: 216-871-7617, TWX: 810-427-9257; Empl.: 15; *Sls. Mgr.:* B. A. Gravens .... **3**•1291

Local Sales Offices & Reps

CA	Los Gatos, Pacific Coast Mktg.	408-395-7021

REI SLS., 19525 Business Centre Dr., Northridge, CA 91324, Tel: 617-938-0900; Empl.: 5; *Sls. Mgr.:* T. P. Fitzgerald

RELATIONAL MEMORY SYS., 1650 Berry Essa Rd., Ste. B, San Jose, CA 95133-1082, Tel: 408-729-3011, TWX: 910-379-0014

R. E. LAW INSTRU. INC., 7735 W. 112th Pl., Palos Hills, IL 60465, Tel: 312-974-4000; FSC No.: 6685-6695; *Sls. Mgr.:* Harry Booth; *Dist. Mgr.:* R. Gene Law

RELAY SERVICE CO., 1310 N. Pulaski Rd., Chicago, IL 60651, Tel: 312-AL2-2700; Empl.: 30; *Sls. Mgr.:* Chas. H. Badger

Local Sales Offices & Reps

CA	Danville, Stuart Assoc.	415-837-8197
CA	Vista, Sado Sls.	619-941-2654
CT	Bethany, Reps. Corp.	203-393-0024
IL	Woodridge, Trend-Tronics	312-985-0626
MD	Fulton, Samuel A. Jeffries	301-792-7452
MA	Wellesley, Reps. Corp.	617-237-6476
OH	Cincinnati, John O. Olsen	513-574-7711
OH	Cleveland, John O. Olsen	216-662-3454
OR	Tigard, Elctrn. Comp. Sls.	503-245-2342
PA	Narbreth, Samuel A. Jeffries	215-664-8500
PA	Pittsburgh, John O. Olsen	412-279-2550
TX	Dallas, Elctrn. Prod. Reps.	817-467-0377
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301

RELAY SPECIALTIES, 1300 Plaza Rd., Fair Lawn, NJ 07410, Tel: 201-797-3313, 800-526-5376, Telex: 642751; Empl.: 48; *Sls. Mgr.:* S. R. Gershberg

Local Sales Offices & Reps

CA	Cypress, The Rep House	213-596-4922
IN	Noblesville, Newton & Assocs.	317-845-4087
MD	Baltimore, Com Tech Assocs.	301-583-1993
TX	Dallas, Art Brawner & Assocs.	214-824-4013

RELCO PRODS., 5594 E. Jefferson Ave., Denver, CO 80237, Tel: 303-756-1143; FSC No.: 14454; Empl.: 7

RELIABILITY INC., 16400 Park Row, P.O. Box 218370, Houston, TX 77218, Tel: 713-492-0550, TWX: 910-881-1739; FSC No.: 54098; Empl.: 350; *Sls. Mgr.:* J. Marcussen .... **3**•1752-1755

Local Sales Offices & Reps

AZ	Phoenix, PLS Assocs.	602-246-6477
CA	Carson, Amasco	213-516-8561
CA	Sunnyvale, Amasco	408-733-8690
CO	Englewood, PLS Assocs.	303-773-1218
CT	Hamden, Digital Sls. Assocs.	203-248-3641
FL	Orlando, Gra-Mar	305-894-3351
IL	Elk Grove, Loren Green & Assocs.	312-593-0282
IN	Ft. Wayne, Jim Finnegan & Co.	219-747-9525
IA	Davenport, Ensco-Rep	319-386-6600
KS	Overland Park, Ensco	913-381-7557
KS	Wichita, Ensco-Rep	316-683-1070
MD	Wheaton, Brim Berg Sls.	301-946-2670
MA	Waltham, Digital Sls. Assocs.	617-899-4300
MO	St. Louis, Ensco-Rep	314-567-3935
NM	Albuquerque, PLS & Assocs.	505-345-5501
NY	Mt. Vernon, Sonkin Assocs.	914-668-9809
NC	Raleigh, Barker & Assocs.	919-876-0282
OH	Cinncinatti, Jim Finnegan & Co.	513-931-1686
OH	Cleveland, Jim Finnegan & Co.	216-238-5905
OH	Mansfield, Jim Finnegan & Co.	419-526-3564
OH	Maumee, Jim Finnegan & Co.	419-893-1052
OK	Tulsa, Advanced Techn. Sls.	918-664-0482
OR	Beaverton, General Elctrns.	503-641-5288
PA	Glenside, Koebert Assocs.	215-887-2310
PA	Pittsburg, Jim Finneagan & Co.	412-561-4687
TX	Austin, Advance Techn. Sls.	512-459-1351
TX	Dallas, Advance Techn. Sls.	214-361-8584
TX	Houston, Advance Techn. Sls.	713-440-8066
UT	Salt Lake City, PLS Assocs.	801-466-8729
WA	Tukwila, General Elctrns.	206-575-4030

Local Distributors

AZ	Phoenix, Weatherford	602-272-7144
CA	Anaheim, Weatherford	714-634-9600
CA	Glendale, Weatherford	213-849-3451
CA	Pomona, Weatherford	713-623-1261
CA	San Diego, Weatherford	619-695-1700
CA	Santa Barbara, Weatherford	805-965-8551
CA	Sunnyvale, Weatherford	408-738-8694
CO	Denver, Weatherford	303-428-6900
CO	Englewood, PLS Assocs.	303-773-1218
CT	Wallingford, Sager Elctrl. Supp.	203-265-4600
IL	Elk Grove, Dot-Tronics	312-593-0282
MD	Baltimore, Whitney Distrs.	301-944-8080
MA	Hingham, Sager Elctrl. Supp.	617-749-6700
MA	Middleboro, Stockroom	617-947-4262
MO	Maryland Heights, Ensco	314-423-3935
NY	Mt. Vernon, Kintronics	800-431-1658
OH	Dayton, Koehlke Comps.	513-435-5435
TX	Austin, S. W. Elctrns.	512-837-8977
TX	Dallas, Weatherford	214-931-7333
TX	Houston, Weatherford	713-688-7406
TX	Richardson, Southwest Elctrn. Supp.	214-234-3050
TX	Stafford, Southwest Elctrn. Supp.	713-491-4900
WA	Seattle, Weatherford	206-575-1340

RELMS, See Relational Memory Systems, Inc.

REMEE PRODS. CORP., 41 Bridge St., Florida, NY 10921, Tel: 914-651-4451, Telex: 64-6715; *Sls. Mgr.:* Joseph R. Fichtl; *Dist. Mgr.:* Joseph R. Fichtl

REMEX, Ex-Cell-O Corp., 1733 Alton St., Irvine, CA 92714, Tel: 714-957-0039, Telex: 681-333, TWX: 910-595-1715; *Sls. Mgr.:* Rich McGowan; *Dist. Mgr.:* Don Schulze

RENBRANDT, INC., 6 Parmelee St., Boston, MA 02118, Tel: 617-445-8910; FSC No.: 99934; Empl.: 25; *Sls. Mgr.:* M. Rogers

RENCO
Division of Electro-Craft Corporation
Industrial Automation Group

RENCO, 26 Coromar Dr., Goleta, CA 93017-3094, Tel: 805-968-1525, TWX: 910-334-1180; FSC No.: 34479; Empl.: 110; *Sls. Mgr.:* Don Risk .... **1B**•1874, 1875; **3**•1139

Local Sales Offices & Reps

CA	Garden Grove, Advanced Digital Group, Inc.	714-897-0319
CA	San Jose, Renco/Electrocraft	408-554-0234
CA	Westlake Village, Electro-Craft Corp.	818-889-3631
CO	Englewood, Integrated Motion Sys., Inc.	303-762-1817
CO	Englewood, Renco Corp.	303-762-1754
CT	Vernon, Renco/Electrocraft	203-871-8053
GA	Atlanta, Renco Corp.	404-971-2669
GA	Marietta, Renco/Electrocraft	404-971-2669
IL	Palatine, Renco/Electrocraft	312-991-4570
MI	Troy, Renco/Electrocraft	313-528-2940

MN	Hopkins, Electro-Craft Corp.	612-931-2700
NH	Salem, Electro-Craft Corp.	603-893-5552
NJ	Cherry Hill, Electro-Craft Corp.	609-662-0555
NJ	Monmouth Junction, Renco Corp	201-329-6233
NY	Ballston Lake, Ross Equip. Co., Inc.	518-877-5533
NY	Buffalo, Ross Equip. Co., Inc.	716-634-0990
NY	Elmira, Ross Equip. Co., Inc.	607-734-4175
NY	Rochester, Ross Equip Co.	716-271-5660
NY	Syracuse, Ross Equip. Co., Inc.	315-463-6691
OH	Cincinnati, Renco/Electrocraft	513-474-4171
WA	Bellevue, Sweo Engrg.	206-644-2725

RENCO ELCTRNS., 60 Jefryn Blvd. E., Deer Park, NY 11729, Tel: 516-586-5566, Telex: RCA 220883; Empl.: 70; *Sls. Mgr.:* Ed Rensing ....**1A**•1278-1280, 2260, 2261

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For sales and sales service information about RENCO products, please call (516) 586-5566. For engineering assistance please dial our toll-free number (800) 645-5828.

REPCO, 2421 N. Orange Blossom Trail, Box 7065, Orlando, FL 32854, Tel: 305-843-8484, Telex: 56-6536 ....**3**•1065

Local Sales Offices & Reps

CT	Niantic, Northeast Reg. Sls. Off.	203-739-6877
TX	Lewisville, Southwest Reg. Sls. Off.	214-434-1139
WA	Seattle, Western Reg. Sls. Off.	206-542-6500

REPRODUCTION TECHNOLOGIES INC., Dept. EM, P.O. Box 815, Bristol, IN 46507-0518, Tel: 219-848-5233; Empl.: 8 ....**3**•1050, 1051

All sales are factory direct.

REPUBLIC ELCTRNS. CORP., 176 E. 7th St., Paterson, NJ 07524, Tel: 201-279-0300, TWX: 710-988-5908; FSC No.: 93958; Empl.: 125; *Sls. Mgr.:* W. Eisenberger ....**1A**•1182

Local Sales Offices & Reps

CA	Los Angeles, Corcoran Assocs.	213-823-2425
CA	Sunnyvale, W. W. Posey Co.	408-746-0771
CO	Commerce City, Williams Assocs.	303-289-5647
FL	Sunrise, Arnold Milrot & Assoc.	305-748-6446
IL	Chicago, Ropek, Cahill & Vogt	312-631-0070
IN	Ft. Wayne, Given Corp.	219-432-5585
IA	Cedar Rapids, Ard Sales Co.	319-393-6392
MD	Ellicott City, Nelson Elecs.	301-747-7887
MA	Lowell, Underwood Sls. Corp.	617-256-8191
MN	Edina, Grayden & Flemmer	612-941-1120
MO	Grandview, R. R. Burton & Assocs.	816-763-5385
MO	Maryland Hgts., R. R. Burton & Assocs.	314-434-1678
NJ	Hasbrouck Hgts., Comp-Tech Sls.	201-288-7400
NY	Liverpool, Precision Sls.	315-451-3480
NY	New Hyde Park, Comp-Tech Sls.	516-593-2628
NY	Pittsford, Precision Sls.	716-381-2820
NY	Pleasant Valley, Precision Sls.	914-635-3233
NC	Charlotte, Jake Rudisill Assocs.	704-377-6901
OH	Columbus, Tom Mulligan & Assocs.	614-457-2242
OK	Tulsa, Hugh J. Daly Co.	918-627-4159
PA	Lancaster, Electro Rep.	717-299-5877
TX	Houston, Rainwater Reps.	713-376-0442
WA	Seattle, Blum & Assocs.	206-777-6656

Local Distributors

CA	San Fernando, Petell Elctrns.	213-365-9841
IL	Skokie, Kellner Elctrns.	312-677-1120
NJ	Perth Amboy, Metuchen Capacitors	201-442-0500
NY	Hauppauge, Semi Cap Elctrns.	516-582-4400

REPUBLIC ELECTRONICS, INC., 575 Broad Hollow Rd., Melville, NY 11747, Tel: 516-249-1414, Telex: 96-1460; FSC No.: 95750; Empl.: 100; *Sls. Mgr.:* J. Anderson

REPUBLIC PACKAGING CORP., 9160 S. Green St., Chicago, IL 60620, Tel: 312-233-6530, Telex: 25-4621; *Sls. Mgr.:* Hal Grossman; *Dist. Mgr.:* Herb Fasth

RESDEL ENGRG., 300 E. Live Oak Ave., Arcadia, CA 91006, Tel: 213-684-2600, TWX: 910-582-3219; Empl.: 190

RESEARCH, INC., Box 24064, Minneapolis, MN 55424, Tel: 612-941-3300, Telex: 29-0502; Empl.: 250; *Sls. Mgr.:* Brian Callahan

RESEARCH PRODS., 1015 E Washington Ave., Madison, WI 53701, Tel: 608-257-8801, TWX: 910-286-2781

RESISTANCE TECHNOLOGY INC., 1260 Red Fox Rd., St. Paul, MN 55112, Tel: 612-636-9770; *Sls. Mgr.:* Roger H. Falde; *Dist. Mgr.:* Roger H. Falde

RESISTORS, INC., 5226 W. 26th St., Chicago, IL 60650, Tel: 312-652-7555; Empl.: 50 ....**1A**•1937

Local Sales Offices & Reps

CT	Plantsville, Parnetics Co.	203-628-9343
FL	Melbourne, Jerry Williams, Inc.	305-259-7700
IL	Arlington Hgts., Resistance Specialists	312-259-6571
IA	Cedar Rapids, J.R. Sls. Engrg.	319-393-2232
MI	Lathrup Village, R.C. Nordstrom & Co.	313-559-7373
NY	New York City, Symon Assocs.	212-757-3638
OH	Wickliffe, W.J. Brauer & Assocs.	216-943-0601
WI	Milwaukee, Honkamp Sls. Co.	414-463-2530

RES-NET, 110 Route 10, Whippany, NJ 07981, Tel: 201-887-2260, out of state 800-526-0704; FSC No.: 55 877; Empl.: 42; *Sls. Mgr.:* Henry Brandi ....**1A**•1938

Local Sales Offices & Reps

CA	Irvine, Angle Assocs.	714-833-0692
CA	Palo Alto, Mollard Mktg.	415-961-0456
MA	Waltham, Dynasel Assocs.	617-890-6777
NJ	Florham Park, Harry Thaw Sls.	201-992-2711
TX	Houston, Rep Master	713-692-8204

REVERE CORP. OF AMER., 845 N. Colony Rd., Wallingford, CT 06492, Tel: 203-269-7701, Telex: 96-3482, TWX: 710-476-3197; Empl.: 389; *Sls. Mgr.:* J. McGurkin

REXNORD CHEMICAL PRODS. INC., 6120 E. 58th Ave., Commerce City, CO 80022, Tel: 303-289-5651, Telex: 45-0331; *Sls. Mgr.:* Michael P. Manegold

Local Sales Offices & Reps

CA	Glendora, Rexnord Chem. Prods.	818-963-1109
IL	Northfield, Special Elec.	312-446-5113
MI	Roseville, Special Elec. Co.	800-558-0604
MN	Excelsior, JPM Assocs.	612-474-3408
MO	St. Louis, Special Elec. Co.	314-962-1150
OH	Cleveland, Special Elec. Co.	216-441-5244
RI	Lincoln, Special Elec. Co.	401-727-1136
WI	Milwaukee, Special Elec.	414-383-6370

RFD, INC., 5024 Nassau St., Tampa, FL 33607, Tel: 813-872-1502, TWX: 810-876-9146; *Sls. Mgr.:* Thomas W. Facer

RFI CORPORATION, 100 E. Pine Aire Dr., Bay Shore, NY 11706, Tel: 516-231-6400, TWX: 510-227-6233; FSC No.: 13619; Empl.: 250 ....**1A**•1618

Local Sales Offices & Reps

AL	Huntsville, Murcota Corp.	205-539-8476
AZ	Scottsdale, Williams-Assocs.	602-947-4297
CA	Monterey Park, M.W. Riedel Co.	213-283-7694
CA	Mountain View, Peninsula Tech. Sls.	415-965-3636
CO	Denver, Williams-Assocs.	303-373-4730
FL	St. Petersburg, Tech-Rep Assocs.	813-577-2779
IL	North Riverside, J. Popp Sls.	312-447-6124
IN	Ft. Wayne, Denton Mktg., Inc.	219-627-5515
IA	Davenport, Ensco-Rep	319-386-6600
KS	Overland Park, Ensco-Rep	913-381-7557
MD	Rockville, Mechtronics Sls.	301-340-2130
MO	St. Louis, Ensco-Rep	314-423-3935
NH	Hudson, EMC Sls. Inc.	603-880-3671
NJ	Cherry Hill, H.J. White Co.	609-428-4544
NM	Albuquerque, Williams-Assocs.	505-255-1638
NY	Great Neck, Trionic Assocs.	516-466-2300
NC	Winston-Salem, Murcota Corp.	919-722-9445
PA	McKean, Ecco Elctrn. Sls.	814-476-1376
TX	Garland, McBride Sci. Sls.	214-494-5000
WA	Seattle, Granville Gillette Assocs.	206-284-3344

RFL INDS., A Dowty Grp. Co./Comms. Div., Powerville Rd., Boonton, NJ 07005, Tel: 201-334-3100, TWX: 710-987-8352; FSC No.: 49673; Empl.: 300

RFL INDS., A Dowty Grp. Co./Instr. Div., Powerville Rd., Boonton, NJ 07005, Tel: 201-334-3100, TWX: 710-987-8352; FSC No.: 49673; Empl.: 300

RFL INDS., Thermocontrol Div., W. Prospect St., Box 250, Brandon, VT 05733, Tel: 802-247-6811; TWX: 710-987-8352; Empl.: 350; *Sls. Mgr.:* Bob Berman; *Dist. Mgr.:* Bob Berman

RF MONOLITHICS, INC., 4441 Sigma Rd., Dallas, TX 75234, Tel: 214-233-2903, TWX: 910-860-5474; Empl.: 90; *Sls. Mgr.:* William Spurgeon

RHG ELECTRONICS LAB., INC., 161 E. Industry Ct., Deer Park, NY 11729, Tel: 516-242-1100, TWX: 510-227-6083; Empl.: 150; *Sls. Mgr.:* Martin D. Markson

RHOMBUS INDS., 15801 Chemical Ln., Huntington Bch., CA 92649-1595, Tel: 714-898-0960, TWX: 910-596-1826; Empl.: 60

Local Sales Offices & Reps

CA	Irvine, J. V. Earley & Assocs.	714-833-1806
CA	Redwood City, James S. Heaton Co.	415-367-9000
CO	Parker, A-5 Co.	303-841-3651
TX	Irving, Space Elctrns.	214-251-3636

RICHARD-LEE CO., Box 724, New Providence, NJ 07974, Tel: 201-276-0710; Empl.: 8

RICHARDS, ARKLAY S., CO., INC., 72 Winchester St., Newton Highlands, MA 02161, Tel: 617-527-1512; *Sls. Mgr.:* L. K. Richards

RICHCO PLASTIC CO., 5825 N. Tripp Ave., Chicago, IL 60646, Tel: 312-539-4060, TWX: 910-221-1938; Empl.: 400; *Sls. Mgr.:* Craig Richardson; *Dist. Mgr.:* Mike Dornik

RIDGE TOOL CO., Sub. Emerson Elec. Co., 400 Clark St., Elyria, OH 44036, Tel: 216-323-5581, Telex: 0243420

RIFA INC., Greenwich Office Park 3, P.O. Box 3110, Greenwich, CT 06836-3110, Tel: 203-625-7300, TWX: 710-579-2970 ANCONERICS-GRC ....**3**•1756, 1757

RIL ELCTRNS., INC., 125 Titus Ave., P.O. Box H, Warrington, PA 18976, Tel: 215-EL5-1361; Empl.: 25

RIPLEY, 46 Nooks Hill Rd., Cromwell, CT 06416, Tel: 203-635-2200, TWX: 710-428-9567; Empl.: 100; *Sls. Mgr.:* R. S. Clark

RISK, GEORGE, INDS., GRI Plaza, Kimball, NE 69145, Tel: 308-235-4645, TWX: 910-620-9040; FSC No.: 24229; Empl.: 100; *Sls. Mgr.:* J. Fisher; *Dist. Mgr.:* J. Fisher ....**1B**•1792

Local Sales Offices & Reps

AZ	Tempe, Cleveland Entprs. of Ariz.	602-820-1127
CA	Anaheim, Galaxie Sales Int'l.	714-752-1580
CA	Escondido, Cirolia Elctrn. Sls.	619-743-3015
CA	San Carlos, Kafco	415-591-6758
FL	Tamarac, SRT Marketing	305-920-2222
GA	Atlanta, Young & Lawrence	404-255-5450
IL	Wheaton, Chadra-Schilke & Assoc.	312-653-8126
MD	Baltimore, Stemler Assocs.	301-944-8262
MA	Milton, Naton Assocs.	617-698-0670
MN	St. Paul, Countryman Assocs.	612-645-9151
MO	Maryland Heights, Kebco	314-576-4111

Local Distributors

AZ	Phoenix, TRI Tek, Inc.	602-995-9352
CA	Hawthorne, Jade Computers	213-973-7707
CA	Los Angeles, Electric Switches	213-660-1310
CA	Santa Ana, Advanced Computer Prods.	714-558-8813

RLC ELCTRNS., INC., 83 Radio Cir., Mt. Kisco, NY 10549, Tel: 914-241-1334, TWX: 710-571-2103; FSC No.: 12598; *Sls. Mgr.:* Philip H. Wright

RMF PRODS., INC., 1275 Paramount Pkwy., P.O. Box 520, Batavia, IL 60510, Tel: 312-879-0020; Empl.: 11; *Sls. Mgr.:* R. Frieders ....**2**•1785

RMS ELECTRONICS INC., 50 Antin Pl., Bronx, NY 10462, Tel: 212-892-6700; Empl.: 100; *Dist. Mgr.:* Seymour Goldberg

Local Sales Offices & Reps

CA	Santa Ana, RMS Electronics Inc. Western	714-662-1041

RMS TECHN., 706 Industry Dr., Hampton, VA 23661, Tel: 804-838-2458; Empl.: 7

ROANWELL, 180 Varick St., New York, NY 10014, Tel: 212-989-1090, TWX: 710-581-6555; FSC No.: 82872; Empl.: 200; *Sls. Mgr.:* A. W. Mazzeo; *Dist. Mgr.:* A. W. Mazzeo

Local Sales Offices & Reps

CA	N. Hollywood, Jewett Co.	818-789-8103

RO ASSOCIATES

RO ASSOCS., 246 Caspian Dr., Box 61419, Sunnyvale, CA 94086, Tel: 408-744-1450, TWX: 910-339-9304; Empl.: 90; *Sls. Mgr.:* R. D. Okada .... **3**•1758

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns.	205-881-5031
AZ	Phoenix, Sigma	602-241-1334
AR	Little Rock, Beacon Elctrns.	501-224-5449
CA	Los Angeles, Amasco	213-516-8561
CA	San Francisco, Amasco	408-733-8690
CO	Denver, F.G. Mktg.	303-795-9176
DC	Washington, Gans & Pugh	703-527-3262
FL	Melbourne, Beacon Elctrns.	305-724-8010
GA	Atlanta, Beacon Elctrns.	404-256-9640
HI	Honolulu, Aloha Assoc.	808-941-1574
IL	Chicago, John Kennaugh & Assoc.	312-980-2570
IN	Indianapolis, SAI Mktg.	317-241-9276
KS	Shawnee Mission, Midtec	913-441-6565
MD	Baltimore, Gans & Pugh	703-527-3262
MA	Boston, Intersell	617-273-3844
MI	Detroit, SAI Mktg.	313-227-1786
MN	Minneapolis, R-J Inc.	612-866-3661
MO	St. Louis, Midtec	314-837-5200
NM	Albuquerque, Sigma	602-241-1334
NY	Mt Vernon, Sonkin Assoc.	914-668-9809
NY	Utica, B. D. Hummel Co.	315-736-7821
NC	Raleigh, Beacon Elctrns.	919-787-9330
OH	Cleveland, SAI Mktg.	216-751-3633
OH	Columbus, SAI Mktg.	614-454-8942
OH	Dayton, SAI Mktg.	513-435-3181
OK	Tulsa, Cunningham Components Corps.	918-492-0390
PA	Philadelphia, Gans & Pugh	703-527-3262
TX	Dallas, Cunningham Comps. Corp.	214-233-4303
TX	Houston, Cunningham Comps. Corp.	713-461-4197
WA	Seattle, Huntley Assocs.	206-353-1833

ROBBINS & MEYERS, INC., Motor & Control Sys. Div., Rte. 4, Bob McCormick Rd., Gallipolis, OH 45631, Tel: 614-446-9868, Telex: 205-427 .... **1B**•1175

ROBERT BOSCH CORP., See Bosch, Robert, Corp.

ROBINSON-HALPERN, One Apollo Rd., P.O. Box 248, Plymouth Meeting, PA 19462-0248, Tel: 215-825-9200, TWX: 510-660-8637; Empl.: 65; *Sls. Mgr.:* J. Lanza

ROBINSON-NUGENT, INC., 800 East 8th St., New Albany, IN 47150, Tel: 812-945-0211, TWX: 810-540-4082; Empl.: 567; *Sls. Mgr.:* Hap Taylor .... **2**•1552-1555

Local Sales Offices & Reps

AL	Huntsville, Electronic Mktg.	205-837-7363
AZ	Phoenix, Stitzer Dodd	602-944-2237
CA	El Monte, Cook Ent.	213-686-2120
CA	San Diego, Cook Entprs.	619-584-0936
CA	Santa Clara, Logan Sls.	408-496-0660
CO	Denver, W. J. Purdy	303-777-1411
FL	Boca Raton, Conley Assoc.	305-395-6108
FL	Oviedo, Conley Assoc.	305-365-3283
FL	Tampa, Conley Assoc.	813-885-7658
GA	Atlanta, Elctrn. Mktg.	404-448-1215
IL	Park Ridge, Metcom	312-696-1490
IN	Indianapolis, Mktg. Engrs.	317-872-5665
IA	Cedar Rapids, PMR Corp.	319-362-9177
KS	Overland Park, PMR Corp.	913-381-0004
KS	Wichita, PMR Corp.	316-684-4141
MA	Lexington, John E. Boeing Co.	617-862-2500
MN	Minneapolis, Professional Sls. for Ind.	612-944-8545
MS	Jackson, Welch and Doby	601-932-5534
MO	Maryland Heights, PMR Corp.	314-569-1220
NM	Albuquerque, W. J. Purdy	505-266-7959
NY	Manhasset, Win-Cor	516-627-9474
NY	Rochester, Canavan-Scanlon	716-424-1830
NY	Syracuse, Canavan-Scanlon	315-437-1271
NC	Raleigh, Elect. Mktg.	919-847-8800
OH	Beachwood, Electronic Salesmasters	216-831-9555
OR	Silverton, Vantage Corp.	503-873-5090
PA	Broomall, L. D. Lowery	215-356-5300
SC	Greenville, Elect. Mktg.	803-233-4637
TX	Austin, Space Elctrns.	512-451-3173
TX	Houston, Space	713-266-9245
TX	Irving, Space	214-251-3636
UT	Salt Lake City, William J. Purdy Co.	801-486-8557
VA	Charlottesville, L. D. Lowery	804-973-6672
WA	Seattle, Vantage Corp.	206-455-3460
WI	West Allis, Metcom Assocs.	414-476-1300

Local Distributors

AL	Huntsville, Schweber Elctrns.	205-882-2200
AL	Huntsville, RM Elctrns. Co.	205-852-1550
AZ	Phoenix, Schweber Elctrns.	602-997-4874
AZ	Phoenix, Cetec	602-272-7951
AZ	Tempe, Bell Inds.	602-267-7774
AZ	Tempe, Acacia Sls.	602-894-2874
CA	Buena Park, RPS Elctrns.	714-521-5230
CA	Canoga Park, Schweber Elctrns.	213-999-4702
CA	Chatsworth, Diplomat Elctrns.	314-700-8700
CA	Costa Mesa, Diplomat Elctrns.	714-549-8401
CA	Fullerton, Pyramid Elctrns.	714-773-0781
CA	Irvine, Schweber Elctrns.	714-556-3880
CA	Irvine, Cetec Elctrns.	714-250-4141
CA	Manhattan Beach, Prime Electro	213-379-3642
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Sacramento, Schweber Elctrns.	916-929-9732
CA	San Diego, Diplomat Elctrns.	619-292-5693
CA	San Diego, Sigma Elctrn.	619-565-2000
CA	San Diego, Cetec	619-278-5020
CA	San Jose, Anthem Elctrns.	408-946-8000
CA	San Jose, Cetec	408-263-7373
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CA	Santa Clara, Schweber Elctrns.	408-748-4700
CA	South Gate, Cetec	213-773-6521
CA	Sunnyvale, Diplomat Elctrns.	408-734-1900
CA	Sunnyvale, Acacia Sls.	408-745-7200
CO	Denver, Ragon Elctrn. Parts	303-744-3601
CO	Englewood, Diplomat Elctrns.	303-799-8300
CO	Lakewood, Acacia Sls.	303-232-2882
CT	Danbury, Diplomat Elctrns.	203-797-9674
CT	Danbury, Schweber Elctrns.	203-792-3500
CT	Hamden, ALmo Elctrns.	203-288-6556
FL	Altamonte Springs, Schweber Elctrns.	305-331-7555
FL	Clearwater, Diplomat Elctrns.	813-443-4514
FL	Hollywood, Schweber Elctrns.	305-927-0511
FL	Orlando, Hammond Elec.	305-849-6060
GA	Norcross, Diplomat Elctrns.	404-449-4133
GA	Norcross, Schweber Elctrns.	404-449-9170
IL	Bensenville, Diplomat Elctrns.	312-595-1000
IL	Chicago, Nep Elctrns.	312-625-8400
IL	Elk Grove Village, Schweber Elctrns.	312-364-3750
IL	Lombard, RM Elctrns.	312-932-5150
IL	Northbrook, Classic Comps.	312-272-9650
IN	Evansville, Hutch & Son	812-425-7201
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, RM Elctrns. Co.	317-247-9701
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Cedar Rapids, Schweber Elctrns.	319-373-1417
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
KS	Overland Park, Schweber Elctrns.	913-492-2922
KY	Louisville, P. I. Burks	502-589-3960
MD	Baltimore, Resco	301-823-0070
MD	Beltsville, Resco/Washington	301-937-9100
MD	Columbia, Diplomat Elctrns.	301-995-1226
MD	Gaithersburg, Schweber Elctrns.	301-840-5900
MA	Bedford, Schweber Elctrns.	617-275-5100
MA	Canton, Almo Elctrns.	617-821-1450
MA	Westboro, Future Elctrns.	617-366-2400
MA	Woburn, Diplomat Elctrns.	617-366-2400
MI	Grand Rapids, R-M Michigan	616-531-9300
MI	Livonia, Schweber Elctrns.	313-525-8100
MI	Walled Lake, Ambur Elctrns.	313-669-3710
MN	Fridley, Voyager Elctrns.	612-571-7766
MN	Minneapolis, Schweber Elctrns.	612-941-5280
MO	Earth City, Schweber Elctrns.	314-739-0526
MO	Kansas City, LComp	816-221-2400
MO	Maryland Heights, LComp	314-291-6200
NE	Lincoln, Scott Elec.	402-466-8221
NE	Omaha, Scott Elctrns.	402-734-6750
NH	Hudson, C & H Elctrns.	603-882-1133
NH	Manchester, Schweber Elctrns.	603-625-2250
NJ	Fairfield, Schweber Elctrns.	201-227-7880
NJ	Totowa, Diplomat	201-785-1830
NM	Albuquerque, Bell Inds.	505-292-2700
NY	Bohemia, Car-Lac	516-567-4200
NY	Buffalo, Summit Dist.	716-887-2800
NY	Farmingdale, Harrison Elec.	516-293-7990
NY	Liverpool, Diplomat Elctrns.	315-652-5000
NY	Lynbrook, Peerless Radio Corp.	516-593-2121
NY	Melville, Diplomat Elctrns.	516-454-6400
NY	Mt. Vernon, QAR Elect.	914-699-2224
NY	Rochester, Schweber Elctrns.	716-424-2222
NY	Rochester, CAM/RPC Indl. Electrns.	716-865-2080
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Westbury, Schweber Elctrns.	516-334-7474
NC	Greensboro, Hammond Elec.	919-275-6391
NC	Raleigh, Schweber Elctrns.	919-876-0000
OH	Beachwood, Schweber Elctrns.	216-464-2970
OH	Cleveland, CAM/RPC Indl. Electrns.	216-461-4700
OH	Dayton, Stotts Friedman	513-298-5555
OH	Dayton, Schweber Elctrns.	513-439-1800
OH	Maumee, R S Elctrns.	419-893-0721
OK	Tulsa, Schweber Elctrns.	918-622-8000
OK	Tulsa, Connec-Tek	918-664-8812
OR	Beaverton, Acacia Sls.	503-646-3377
OR	Portland, Radar Elec.	503-232-3404
OR	Wilsonville, Zepher Inds.	503-682-2929
PA	Horsham, Schweber Elctrns.	215-441-0600
PA	Lancaster, CAM/RPC Indl. Electronics	717-392-8141
PA	McKean, Advacom	814-476-7774
PA	Philadelphia, Almo	215-698-4000
PA	Pittsburgh, CAM/PRC Indl. Elctrns.	412-782-3770
PA	Pittsburgh, Schweber Elctrns.	412-782-1600
SC	Columbia, Dixie Elctrn.	803-779-5332
SC	Greenville, Hammond Elec.	803-233-4121
TX	Addison, Connec-Tek	214-239-7552
TX	Austin, Schweber Elctrns.	512-458-8253
TX	Austin, Connec-Tek	512-835-0220
TX	Austin, Southwest	512-837-8971
TX	Dallas, RM Elctrns. Co.	214-263-8361
TX	Dallas, Schweber Elctrns.	214-661-5010
TX	Ft. Worth, Allied	817-336-5401
TX	Houston, Schweber Elctrns.	713-784-3600
TX	Houston, Powerline Prods.	713-578-3222
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Richardson, Fisher Brownell	214-235-3177
TX	Stafford, Southwest Elctrns.	713-491-4900
TX	Sugar Land, Connec/Tek	713-491-2255
UT	Salt Lake City, Bell Inds.	801-972-6969
UT	Salt Lake City, Diplomat-Alta	801-486-4134
VA	Charlottesville, Virginia Radio	804-296-4184
WA	Kent, Pyramid Elctrns.	206-872-5800
WA	Seattle, Zepher Elctrns.	206-241-1980
WA	Seattle, Radar Elec.	206-282-2511
WI	Brookfield, Schweber Elctrns.	414-784-9020
WI	New Berlin, RM Elctrns. Co.	414-784-4420
WI	New Berlin, Classic Comps. Supply	414-786-5300
WI	New Berlin, NEP Elctrns.	414-785-9100

ROBISON ELECTRONICS, INC.

ROBISON ELCTRNS., P.O. Box Y, San Luis Obispo, CA 93406, Tel: 805-544-8000; FSC No.: 19080; Empl.: 45 .... **2**•1870, 1887

ROCHESTER INSTR. SYS., 255 N. Union St., Rochester, NY 14605, Tel: 716-263-7700, Telex: 978457; Empl.: 330

ROCKBESTOS CO., P.O. Box 1102, New Haven, CT 06504, Tel: 203-772-2250

ROCKLAND INSULATED WIRE & CABLE, 87 Broadway, Haverstraw, NY 10927, Tel: 914-429-3103; FSC No.: 12111

ROCKLAND SYS. CORP., See Wavetek Rockland Inc.

ROCKWELL FILTER PRODS., 2990 Airway Ave., Costa Mesa, CA 92626, Tel: 714-540-7640, Telex: 685532; Empl.: 100; *Sls. Mgr.:* Lee Cornett

ROCKWELL INT'L., 4311 Jamboree Rd., Newport Beach, CA 92660, Tel: 800-854-8099, TWX: 910-591-1654; FSC No.: 34576; Empl.: 1995; *Sls. Mgr.:* K. MacDonald; *Dist. Mgr.:* K. Foster

ROCKWELL INTL., Commercial Elctrns. Opers., 1200 N. Alma Rd., Richardson, TX 75081, Tel: 214-996-5000, Telex: 73-307, 73-2490, TWX: 910-867-4709; Empl.: 15,000

RODALE ELCTRNS. CORP., 603 Chestnut St., Garden City, NY 11530, Tel: 516-222-0050, TWX: 510-222-0274; *Sls. Mgr.:* John B. Clement

RODELCO ELCTRNS. CORP., 356A Comac Rd., Deer Park, NY 11729, Tel: 516-643-5110; Empl.: 28

ROD-L
ELECTRONICS, INC.

ROD-L ELECTRONICS, INC., 1098 Hamilton Ct., Menlo Park, CA 94025, Tel: 415-322-0711, TWX: 296210 .... 3•1292-1295

Local Sales Offices & Reps

AL	Huntsville, Sci. Svcs. SE	205-536-1969
AZ	Phoenix, Venturesearch	602-894-5216
CA	Carson, Amasco	213-516-8561
CA	Sunnyvale, Amasco	408-733-8690
CO	Conifer, Energy Equip. Sls.	303-674-8111
FL	Orlando, Sci. Dvcs. SE	305-841-8180
IL	Elk Grove, Loren Green Assocs.	312-593-0282
IN	Indianapolis, Loren Green Assocs.	317-293-9827
MD	Baltimore, Sci. Reps.	301-321-1411
MA	Reading, Scheinfein Assocs.	617-944-2304
MN	Minneapolis, Instrmn. Svcs. Inc.	612-544-8916
MO	Florissant, Web Elctrns.	314-921-5720
MO	Kansas City, Paloma Sls. Co.	816-358-7272
NJ	Fairfield, Addem Sls.	201-882-0993
NJ	Pennsauken, Sci. Reps.	609-662-5222
NY	De Witt, DB Assocs.	315-446-0220
NC	Winston-Salem, Sci. Dvcs.	919-765-5776
OH	Centerville, Micro Sls.	513-433-8171
OK	Tulsa, Spectra Sls.	919-633-7188
OR	Portland, Control Tek Sls. Limited	503-641-8180
TX	El Paso, Venturesearch	915-594-4094
TX	Houston, Spectra Sls.	713-747-2798
TX	Richardson, Spectra Sls.	214-234-3600
VA	Fairfax, Sci. Reps.	703-385-0600
WA	Spokane, Control Tek Sls. Ltd.	509-922-2971

ROEAN INDUSTRIES, INC., 12970 Branford, Ste. C, Pacoima, CA 91331, Tel: 818-767-7047, Telex: 758630 TGMC FTW; Empl.: 8

ROEDERSTEIN ELCTRNS., INC., P.O. Box 5588, Statesville, NC 28677, Tel: 704-872-8101

ROGAN, 3455 Woodhead Dr., Northbrook, IL 60062, Tel: 312-498-2300, TWX: 910-686-0008; Empl.: 100; *Sls. Mgr.:* D. Pelletier; *Dist. Mgr.:* D. Pelletier .... 2•1786

Local Sales Offices & Reps

AZ	Phoenix, O'Donnell Southwest	602-944-9542
CA	San Diego, O'Donnell Assocs.	619-578-1645
CA	San Jose, O'Donnell Assocs.	408-263-6500
CA	Torrance, O'Donnell Assocs.	213-539-9664
CO	Arvada, Challange Sls.	303-427-3149
IN	Fort Wayne, Aktron Corp.	219-747-3650
IA	Cedar Rapids, Dytronix	319-377-8275
MA	Westwood, Apex Assocs.	617-326-5042
MN	Minneapolis, R. W. Marshall	612-929-0457
MO	Bridgeton, Dytronix	314-731-5799
MO	Independence, Dytronix	816-373-6600
NJ	Pitman, Colrud Co.	609-589-5866
NY	Mount Vernon, Sonkin Assocs.	914-668-9809
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OR	Portland, SD-R2 Prods. & Sls.	503-295-6779
PA	Pittsburgh, J. C. Hofstetter Co.	412-327-1410
TX	Dallas, W. Reese Assocs.	214-638-6575
TX	Houston, W. Reese Assocs.	713-621-3134
WA	Bellevue, SD-R2 Sls.	206-747-2483

Local Distributors

AL	Huntsville, Component Distrs.	205-883-7501
AR	Little Rock, Component Distrs.	501-227-6278
CA	Sunnyvale, Cazco Sls.	408-745-7221
CA	Torrance, Cazco Sls.	213-328-9710
FL	Ft. Lauderdale, Component Distrs.	305-971-4950
IL	Northbrook, Classic Comps.	312-272-9650
IL	Rosemont, Advent Elctrns.	312-297-6200
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
MA	Newton, Greene-Shaw Co.	617-969-8900
MI	Livonia, RS Elctrns.	313-525-1155
NJ	Bellmawr, Mid-Atlantic Elctrns.	609-931-5303
NJ	East Hanover, State Elctrns.	201-887-2550
NC	Raleigh, Component Distrs.	919-781-0177
OH	Medina, Electro-Supply	216-241-4880
TX	Austin, SW Elctrns.	512-837-8971
TX	Richardson, SW Elctrns.	214-234-3050
TX	Stafford, SW Elctrns.	713-494-6021
Can	Pointe Claire, Quebec, Future Elctrns.	514-694-7710

ROGERS CORP., Box 700, Chandler, AZ 85224, Tel: 602-963-4584, TWX: 910-950-1961; Empl.: 400; *Sls. Mgr.:* Paul Anderson

ROGERS CORP., One Technology Dr., Rogers, CT 06263, Tel: 203-774-9605, TWX: 710-448-0047; Empl.: 2500; *Sls. Mgr.:* Paul L. Anderson .... 2•1894

Local Sales Offices & Reps

AL	Huntsville, G. S. Jordan	205-881-7971
AZ	Scottsdale, H.R. Crowder	602-991-8908
AZ	Tempe, M. F. Iosue	602-839-5478
CA	Corona, R. A. Forester	714-734-5881
CA	Granada Hills, W. E. Pollock	213-368-0703
CA	Mission Viejo, A. C. Young	714-859-8028
CA	Palo Alto, R. A. Greenman	408-947-7797
CA	Poway, A.W. Riel	619-487-1065
CA	Redwood City, K. R. Sinisgalli	408-947-7797
CA	San Clemente, W. A. J. Waters	714-496-7305
CA	San Jose, R.H. Jackson	408-947-7797
CA	San Jose, W. J. Stolp	408-947-7797
CA	Van Nuys, D. Bergheimer	213-988-7138
CA	Westminster, D. Bergheimer	714-775-0179
CA	Woodland Hills, A. W. Riel	213-347-7435
CO	Littleton, G. B. Lange	303-795-3600
CT	Bristol, J. F. Witkewicz	203-583-4341
CT	Brooklyn, A. J. Boulia	203-774-0729
CT	Jewett City, G. R. Jessel	203-376-0276
CT	Norwich, G.R. Jessel	203-376-0276
FL	Melbourne Beach, P. R. Pratt	305-725-6105
GA	Roswell, J. N. Anderson	404-992-4307
IL	Chicago, R. E. Albright	312-798-5800
IL	Edwardsville, W. T. Davison	618-288-7786
IL	Hazel Crest, J. R. Menees	312-798-5800
KY	Prospect, G. A. Keibler	502-228-5792
MI	Garden City, L. J. Bradley	313-422-7150
MI	Rochester, Kent & Assocs.	313-651-1890
MN	Minneapolis, E. J. Sandor	612-330-3663
MN	Minneapolis, H. R. Crowder	612-574-7440
MN	Northfield, W. P. Kelly	507-663-1050
NH	Londonderry, W. J. Coyne	603-434-5358
NJ	Pitman, R. M. Neidig	609-582-1666
NJ	Springfield, S. D. Wellen	201-944-7777
NY	Endwell, T. H. Johnston	914-471-4707
NY	Rochester, R. C. Bangs	716-454-6520
NC	Cary, D. C. Reed	919-836-0415
OH	Shaker Hgts., E. R. Perme	216-283-5486
OH	Xenia, J. L. Forte	513-426-8993
PA	Downingtown, T. G. Sleasman	215-873-0180
PA	Hermitage, H. A. Harriman	412-983-3742
SC	Rock Hill, E. E. Wild	803-366-2952
TX	Carrollton, K. W. Norvell	214-446-1095
TX	Round Rock, B.D. Duke	512-244-3074
VA	Lynchburg, L.J. Rodrigue	804-384-9517
VA	Roanoke, J. L. Settles	703-774-8478
WA	Seattle, L. B. Keen	206-575-4175

R-OHM (EASTERN OPER.) , 2303 W. Meadowview Rd. #3, Kingston Bldg., Greensboro, NC 27407, Tel: 919-855-0217

ROLM CORP., 1 River Oaks Pl., San Jose, CA 95134, Tel: 408-988-2900, TWX: 910-338-0247; FSC No.: 14345; Empl.: 6240; *Sls. Mgr.:* Dave Pidwell (MSC); R. Nugent (CBX); *Dist. Mgr.:* Ken Batorski (CBX)

ROLYN OPTICS CO., 738 Arrowgrand Cir., Covina, CA 91722-2199, Tel: 818-915-5707/5717, Telex: 67-0380

ROHM CORP., 8 Whatney, Irvine, CA 92714, Tel: 714-855-2131, TWX: 910-595-1721; Empl.: 100; *Sls. Mgr.:* Mike Hammel

ROME CABLE CORP., P.O. Box 71, Rome, NY 13440, Tel: 315-337-3000

RONOR SYSTEMS, 145 N. Plains Ind. Pk. Rd., Wallingford, CT 06492, Tel: 203-265-2110; Empl.: 12

RONTRON ENGINEERING, 25 Rose St., Branford, CT 06405, Tel: 203-488-5020

ROSE

ROSE ENCLOSURES SYS., INC., 12140 Parklawn Dr., Rockville, MD 20852, Tel: 301-984-1783, Telex: 908-107 Resi Rove; *Sls. Mgr.:* Richard Ramsey .... 2•1046

ROSEMONT-NASHVILLE, INC., See Chromalox Instrs. & Controls

ROSS ENGRG. CORP., 559 Westchester Dr., Campbell, CA 95008, Tel: 408-377-4621, TWX: 910-590-8033; FSC No.: 23598; Empl.: 45; *Sls. Mgr.:* Hugh C. Ross .... 1B•1472

Local Sales Offices & Reps

CA	Mountain View, Energy Devices	415-969-0330

ROSTONE CORP., P.O. Box 7497, Lafayette, IN 47903, Tel: 317-474-2421, TWX: 810-342-1887; Empl.: 600

ROTEK INSTR. CORP., 390 Main St., Waltham, MA 02254, Tel: 617-899-4611; *Sls. Mgr.:* Eliot Warner

Local Sales Offices & Reps

AL	Huntsville, Kemp Instrs.	205-837-4304
CA	Calabasas, Max Shovlowsky	805-498-6547
CA	Cupertino, Patterson Control Sys.	408-973-1050
CT	Mount Carmel, Sci. Dev.	203-248-9361
FL	Palm Harbor, Teqspec	813-785-2276
IL	La Grange, PVA Co.	312-579-9300
KS	Wichita, Aero Hill Sls.	316-682-2052
MA	Waltham, Sci. Dev.	617-890-2252
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
NJ	Parlin, JMR Sls.	201-727-5335
NY	Rochester, Sci. Dev.	716-334-2445
NC	Winston-Salem, Radco	919-722-9671
PA	Philadelphia, Techn. Instr. Sls.	215-836-2222
PA	Pittsburgh, Meas. Instr. East	412-459-8090
TX	Dallas, True Techn.	214-691-7870
VA	McLean, Sci. Dev. DC	703-893-6513
WA	Seattle, Eicher Richards	206-523-7888

ROTRON, INC., See EG & G Rotron

ROWE INDUSTRIES, INC., 6225 Benore Rd., P.O. Box 6877, Toledo, OH 43612, Tel: 419-729-9761, TWX: 810-442-1734; FSC No.: 82878; Empl.: 85; *Sls. Mgr.:* D. L. Mang; *Dist. Mgr.:* D. L. Mang .... 2•1556-1558, 2143

Local Sales Offices & Reps

AZ	Chandler, Blackhart Assocs.	602-831-2566
CA	San Jose, V. C. Robinson	415-969-4831
CT	Wethersfield, Underwood Sls.	203-563-3046
FL	Fern Park, EIR, Inc.	305-830-9600
KS	Leawood, Thunderbird	913-642-7220
KS	Wichita, Thunderbird	316-684-3941
MD	Baltimore, R. A. Wafer Assocs.	301-744-1133
MA	Burlington, Don C. Richard	617-272-1595
MA	Lowell, Underwood Sls.	617-256-8191
MI	Holland, Com-Tek Sls.	616-399-5719
MN	Hopkins, KITS Co.	612-933-1888
MO	Maryland, Thunderbird	314-567-6488
NJ	Haddonfield, Mills-Brown Assocs.	609-429-1005
NJ	Middletown, Astrorep	201-826-8050
NJ	Perth Amboy, Astrorep	201-826-8050
NM	Albuquerque, Ron-tek	505-299-4124
NY	Babylon, Astrorep	516-422-2500
NY	Farmingdale, Astrorep	201-624-4408
NC	Charlotte, Dula Assocs.	704-334-7090
NC	Winston-Salem, Dula Assocs.	919-768-7166
OH	Beachwood, RC Assocs.	216-292-4954
OH	Cuyahoga Falls, Lee Tronics	216-928-8584
TX	Richardson, Thunderbird	214-690-0763

RTE AEROVOX INC., P.O. Box B-970, 740 Belleville Ave., New Bedford, MA 02741, Tel: 617-994-9661, TWX: 710-344-6985; FSC No.: 4K459; Empl.: 700; *Sls. Mgr.:* Jack Chmura; *Dist. Mgr.:* Matthew Simon .... 1A•1619-1621

RTE DELTEC CORP., 2727 Kurtz St., San Diego, CA 92110, Tel: 619-291-4211, TWX: 910-335-1246; FSC No.: 52297; Empl.: 200; *Sls. Mgr.:* John J. Waterman .... 3•1907

Local Sales Offices & Reps

AL	Huntsville, FM Assocs., Ltd.	205-882-0689
AK	Soldotna, Air Tek	907-262-5937
AZ	Scottsdale, Barnhill Assocs.	602-947-7841
CA	Los Altos, Jay Stone & Assocs.	415-948-4563
CO	Englewood, Barnhill Assocs.	303-779-3600
CT	Avon, Power Mark	203-678-0123
FL	Jupiter, FM Assocs., Ltd.	305-746-2996
FL	Orlando, FM Assocs., Ltd.	305-851-5710
GA	Atlanta, FM Assocs., Ltd.	404-451-2293
HI	Honolulu, EMC	808-836-1138
IL	Chicago, PoweReP, Inc.	312-641-3321
IN	Indianapolis, Tech Sls. & Mktg.	317-849-6612
IA	W. Des Moines, Data Power Technlg. Corp.	515-255-6113
KS	Lenexa, Engineered Equip. Co.	913-492-9221
LA	Baton Rouge, Barnhill Assocs.	504-924-6826
MN	Golden Valley, JR Assocs.	612-546-4110
MO	St. Louis, Applied Power Sys.	314-383-5858
NE	Omaha, Data Power Technlg. Corp.	402-592-7860
NJ	Lodi, SDM Reps.	201-368-0125
NJ	Pennsauken, Scientific Reps.	609-662-5222
NM	Albuquerque, Barnhill Assocs.	505-299-7658
NY	Rochester, SDM Reps.	716-247-8770
NC	Ramseur, FM Assocs., Ltd.	919-824-2196
OH	Cleveland, Instrumentation Sys.	216-845-8800
OH	Dayton, Instrumentation Sys.	513-294-2838
PA	Pittsburgh, Instrumentation Sys.	412-243-1111
TX	Austin, Barnhill Assocs.	512-451-0217
TX	Houston, Barnhill Assocs.	713-688-9971

TX	Richardson, Barnhill Assocs.	214-231-2573
UT	Murray, Barnhill Assocs.	801-262-3000
VA	McLean, Creative Mktg. Assocs., Ltd.	703-442-9100
WA	Seattle, F/M Sales Co.	206-628-9620
WI	Milwaukee, PoweReP	414-272-4684
EXP	CA, San Diego, RTE Deltec Corp.	619-291-4211

Local Distributors

AL	Huntsville, RTS Distributing	205-882-0689
AZ	Scottsdale, Beta Distrs.	602-947-7841
CO	Englewood, Beta Distrs.	303-779-4494
CT	Ridgefield, Data Set Cable Co.	203-438-9684
FL	Fort Lauderdale, Nabra Entprs.	305-584-9105
FL	Jupiter, RTS Distributing	305-746-2996
FL	Orlando, RTS Distributing	305-851-5710
GA	Atlanta, RTS Distributing	404-451-2293
HI	Honolulu, EMC Assocs.	808-836-1138
LA	Baton Rouge, Beta Distrs.	504-924-6826
NV	Las Vegas, Data Set Cable Co.	702-382-6777
NJ	Lodi, SSI Distribution	201-368-1025
NM	Albuquerque, Beta Distrs.	505-299-7658
NY	Rochester, SSI Distribution	716-247-8770
NC	Ramseur, RTS Distributing	919-824-2196
TX	Austin, Beta Distrs.	512-452-0199
TX	Houston, Beta Distrs.	713-688-9971
TX	Richardson, Beta Distrs.	214-231-2573
UT	Murray, Beta Distrs.	801-262-3000

RTE POWER/MATE, See Power/Mate Co.

RTRON CORP., 7324 Lawndale, Skokie, IL 60076, Tel: 312-679-7180, TWX: 910-223-0810; FSC No.: 19130; *Sls. Mgr.:* R. McLean

Local Sales Offices & Reps

AZ	Tucson, J.J. Riley & Assocs.	602-888-4627
CA	Redondo Beach, J.J. Riley & Assocs.	213-374-3468
CT	Washington, Tri-Com	205-563-2241
MA	Burlington, Tri-Com	617-272-8163
MI	Detroit, R.P. Urban & Assoc.	313-535-2355
MI	Grand Rapids, R.P. Urban & Assoc.	616-245-0511
MN	Brooklyn Center, Northwest Savespro	612-566-0196
NJ	Plainfield, S. Glassman Assoc.	201-561-3866
NY	Glen Cove, S. Glassman Assoc.	516-676-1039
OH	Cincinnati, J. Olsen Co.	513-451-5995
OH	Cleveland, J. Olsen Co.	216-662-3454
OR	Aloha, Elctrnc. Comp. Sls.	503-245-2342
PA	Jenkintown, Arnold Assoc.	215-PI 2-0600
PA	Pittsburgh, J. Olsen Co.	412-279-2550
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301

RTS SYSTEMS, INC., Compact Video, Inc., 1100 W. Chestnut St., Burbank, CA 91506, Tel: 818-843-7022, Telex: 194855, TWX: 910-498-4987; Empl.: 40; *Sls. Mgr.:* Bob Tourkow ....3•1066

Local Sales Offices & Reps

AL	Birmingham, Sonics Assocs.	205-942-9631
AL	Birmingham, Gray Comms. Conslt.	205-942-2824
AL	Cropwell, Broadcast Sys.	205-525-5467
AL	Huntsville, Central Dynamics Corp.	205-837-5180
AL	Mobile, Gray Comms. Conslt.	205-343-0662
AK	Anchorage, N V S Sys.	907-349-3523
AZ	Cottonwood, R I A Corp.	602-634-8065
AZ	Phoenix, Siboney Communications Inc. (SCI)	602-252-5992
AZ	Tucson, SCI	602-881-5432
CA	Berkeley, Curtis M. Karplus, Esq.	415-642-1942
CA	Burbank, H N E Inc.	213-508-7543
CA	Burbank, Tri Tronics	213-843-2170
CA	City of Industry, SCI	213-965-2281
CA	El Monte, Cetec Vega	213-442-0782
CA	Encino, Everything Audio	213-995-4175
CA	Glendale, Paramount Sound Sys. Corp.	213-956-3222
CA	Inglewood, Audio Visual Hdqtrs. Corp.	213-419-4040
CA	Lawndale, Omega Video	213-679-9021
CA	Long Beach, K T Elctrns.	213-424-0979
CA	Los Angeles, Acromedia Corp.	213-410-4141
CA	Los Angeles, Tourkow & Co.	213-664-8884
CA	Los Angeles, Shoreline Ltd.	213-851-1236
CA	Los Angeles, Hollywood Sound Sys.	213-466-2416
CA	Los Angeles, Skaggs Video Los Angeles	213-556-2133
CA	N. Hollywood, Audio Svcs. Corp.	213-980-9891
CA	N. Hollywood, Doc Siegel Audio	213-877-2300
CA	N. Hollywood, Best Audio	213-763-2378
CA	N. Hollywood, Theatre Vision	213-769-0928
CA	Newbury Park, Westlake Audio	213-655-0303
CA	Nipomo, Broadcast Sys.	805-929-4476
CA	Pasadena, Audio Engrg. Assocs.	213-798-9127
CA	San Diego, Skaggs Video San Diego	619-578-9640
CA	San Diego, SCI	714-578-7777
CA	San Diego, Pacific Recorders & Eng. Corp.	619-453-3255
CA	San Diego, Centro Corp.	619-560-1578
CA	San Francisco, Sound Genesis	415-285-8900
CA	Santa Clara, Video Comms. Corp.	408-988-2968
CA	Sun Valley, Burns Audio	213-768-1701
CA	Sunnyvale, Video Media	408-733-6500
CA	Walnut, Video Comms. Corp.	714-594-2442
CO	Denver, Film/Video Equip. Svc.	303-778-8616
CO	Denver, R I A Corp.	303-320-5521
CO	Englewood, Skaggs Video Denver	303-740-9031
CT	Shelton, Anton Bauer	203-929-1100
FL	Gainesville, Gray Comms. Conslt.	904-376-2435
FL	Miami, Hubbard Comms.	305-594-0744
FL	Miami, Midwest Corp.	305-592-5355
FL	Miami, Gray Comms. Conslt.	305-591-3637
FL	Orlando, Gray Comms. Conslt.	305-896-7414
FL	St. Petersburg, Hubbard Comms.	813-577-7759
FL	Tampa, SCI	813-985-4687
FL	Tampa, Gray Comms. Conslt.	813-885-1411
GA	Albany, Gray Comms. Conslt.	912-883-2121
GA	Doraville/Atlanta, Gray Comms. Conslt.	404-455-3121
GA	Norcross, SCI	404-441-3300
GA	Norcross/Atlanta, Tech. Video Sys.	404-447-6621
GA	Union City/Atlanta, Allied Broadcast Equip.	404-964-1464
IL	Chicago, Allied Broadcast Equip.	312-794-0224
IL	Elk Grove Vlg., Swiderski Elctrns.	312-364-1900
IL	Harvey, Bridgewater Custom Sound	312-596-0309
IL	Morton Grove, Roscor Corp.	312-539-7700
IL	Quincy, Harris Corp.	217-222-8200
IN	Evansville, Kavco	812-476-6327
IN	Indianapolis, Kavco	317-251-0800
IN	Indianapolis, R C A Corp.	317-273-3547
IN	Indianapolis, Midwest Corp.	317-251-5750
IN	Richmond, Allied Broadcast Equip.	317-962-8596
IA	Davenport, Video Midwest	319-322-1525
IA	Des Moines, Video Midwest	515-244-1447
KY	Edgewood, Midwest Corp.	800-543-1584
KY	Lexington, Midwest Corp.	606-277-4994
KY	Louisville, Midwest Corp.	502-491-2888
LA	Harahan/New Orleans, Gray Comms. Conslt.	504-733-7265
MD	Bethesda, Professional Prods.	301-657-2141
MD	Lanham, Midwest Corp.	301-577-4903
MD	Rockville, Peirce Phelps Inc.	301-984-7979
MA	Boston, Professional Recording & Sound	617-254-2110
MA	Framingham, Landy Assocs.	617-877-9570
MA	Needham Hgts., Capron Lighting & Sound Co.	617-444-8850
MA	Newton, Lake Sys. Corp.	617-244-6881
MI	Ann Arbor, Hy James Audio Professionals	313-994-0934
MI	Oak Park, Midwest Corp.	313-399-6361
MI	Troy/Detroit, Midwest Corp.	313-689-9730
MN	Burnsville, Emmons Assocs.	612-890-8920
MN	Minneapolis, Video Midwest	612-831-2248
MN	Minneapolis, Todd Comms.	612-941-0556
MS	Bay St. Louis, Harris Corp. S. Central Reg.	601-255-3337
MO	Chesterfield, Television Engrg. Corp.	314-532-4700
MO	El Dorado Springs, Broadcast Sys.	417-876-6254
MO	St. Louis, Antech Labs	314-997-5666
NE	Omaha, Todd Comms.	402-341-7600
NV	Las Vegas, Western Media Entprs.	702-873-2014
NV	Las Vegas, Acromedia Corp. Las Vegas	702-362-7552
NJ	Atlantic City, Telemeasurements	609-345-2670
NJ	Cherry Hill, Landy Assocs.	609-424-4660
NJ	Clifton, Telemeasurements	201-473-8822
NJ	Mahwah, Philips Television Sys.	201-529-1550
NJ	Mountain Lakes, Turner Engrg.	201-263-0023
NJ	Northvale, A F Assocs.	201-767-1000
NM	Albuquerque, SCI	505-884-6858
NM	Los Lunas, Dyma Engrg.	505-865-6700
NY	New York, Martin Audio/Video Corp.	212-541-5900
NY	New York, Westec Audio Video	212-586-1662
NY	New York, Tech. Video Sys.	212-580-3104
NY	New York, M P C S Video Inds.	212-586-3690
NY	New York, Adcom Comms.	212-265-1760
NY	New York, Camera Mart	212-757-6977
NC	Charlotte, Reliable Music	704-375-8662
NC	Charlotte, Midwest Corp.	704-399-6336
NC	RTP, Broadcast Sys.	919-851-1956
NC	Raleigh, Southeastern Sight & Sound	919-828-2311
NC	Winston-Salem, Tech. Video Sys.	919-748-0916
OH	Cleveland, Midwest Corp.	216-447-9745
OH	Columbus, Midwest Corp.	614-476-2800
OH	Columbus, Kavco	614-274-0180
OH	Dayton, Kavco	513-898-2003
OH	Dayton, Midwest Corp.	513-275-3339
OH	N. Royalton, Kavco	216-237-1950
OH	Parma Hgts., Reddish Sound	216-885-1222
OK	Claremore, R I A Corp.	918-341-9066
OK	Tulsa, M Z B & Assocs.	918-743-2661
OR	Portland, Baldwin Mktg. Co.	503-234-1359
PA	Allentown, Daveland Co.	215-439-8701
PA	Carnegie, Alpha Video & Elctrns.	412-923-2070
PA	Gibsonia, Midwest Corp.	412-443-6720
PA	King of Prussia, Maris Equip. Corp.	215-275-9300
PA	Philadelphia, Peirce Phelps Inc.	215-879-7205
PA	Philadelphia, Lerro Elctrl. Corp.	215-223-8200
PA	Pittsburgh, R P C Elctrns.	412-782-3770
TN	Knoxville, Gray Comms. Conslt.	615-523-3107
TN	Nashville, Gray Comms. Conslt.	615-883-9175
TN	Nashville, Consolidated Media Sys.	615-244-3933
TX	Amarillo, Magnetic Media Corp.	806-358-2468
TX	Arlington, Midcom	817-640-4573
TX	Austin, SCI	512-454-7194
TX	Austin, M Z B & Assocs.	512-837-7240
TX	Austin, Magnetic Media Corp.	512-451-0138
TX	Austin, Broadcast Sys.	512-836-6014
TX	Corpus Christi, SCI	512-883-6688
TX	Dallas, Video Sys.	214-349-0951
TX	Dallas, Magnetic Media Corp.	214-931-0404
TX	Dallas, M Z B & Assocs.	214-233-5535
TX	El Paso, SCI	915-598-8538
TX	Houston, L D Systems	713-695-9400
TX	Houston, M Z B & Assocs.	713-448-0881
TX	Houston, SCI	713-686-9685
TX	Houston, Magnetic Media Corp.	713-771-9125
TX	Houston, Video Sys.	713-686-9651
TX	Irving, SCI	214-258-8470
TX	Lubbock, Video Sys.	806-792-2325
TX	Madison, SCI	615-865-1980
TX	Plano, Allied Broadcast Equip.	214-423-8667
TX	Plano, Broadcast Sys.	214-867-8775
TX	San Antonio, Video Sys.	512-824-2311
UT	Salt Lake City, R I A Corp.	801-486-8822
UT	Salt Lake City, Skaggs Video Sls.	801-539-1420
UT	Salt Lake City, Skaggs Telecom Svc.	801-539-1420
VA	Richmond, Professional Prods.	804-794-2585
VA	Virginia Beach, Midwest Corp.	804-464-6256
VA	Woodbridge, Broadcast Sys.	703-494-4998
WA	Federal Way, Allied Broadcast Equip.	206-927-4337
WV	Charleston, Midwest Corp. Corporate H/Q	304-343-8874
WV	Nitro/Charleston, Midwest Corp.	304-722-2921
WI	Madison, Full Compass Sys.	608-271-1100

RUSH/HOUSTON, INC., 600 Kealrick, Ste C-40, Houston, TX 77060, Tel: 713-682-5151; *Sls. Mgr.:* Fred Murphy

RUSSELL INDS., 3000 Lawson Blvd., Oceanside, NY 11572, Tel: 516-536-5000; Empl.: 20; *Sls. Mgr.:* H. Russell

RUTHERFORD RESCH. PRODS., Box 249, Rutherford, NJ 07070, Tel: 201-933-2091; Empl.: 4; *Sls. Mgr.:* Dr. A. Blanck; *Dist. Mgr.:* Dr. A. Blanck

RYAN INTL. CORP., 4800 Evanswood Dr., Columbus, OH 43229, Tel: 614-885-3303; Empl.: 26 ....3•1219

RYE INDS., INC., 125 Spencer Pl., P.O. Box M, Mamaroneck, NY 10543, Tel: 914-698-0080; Empl.: 50

SABRE COMMS. CORP., 117 Main St., Soiux City, IA 51102, Tel: 712-258-6690; FSC No.: 60348; *Sls. Mgr.:* Bailey Aalfs; *Dist. Mgr.:* Richard Krone

Local Sales Offices & Reps

FL	Coral Springs, SECOM Sys.	305-753-6777
GA	Chamblee, SECOM Sys.	404-455-0672
NC	Kings Mountain, SECOM Sys.	704-739-9297
TN	Bloomington Springs, SECOM Sys.	615-653-4363

Local Distributors

FL	Coral Springs, SECOM Sys.	305-753-6777
GA	Chamblee, SECOM Sys.	404-455-0672
NC	Kings Mountain, SECOM Sys.	704-739-9297
TN	Bloomington Springs, SECOM Sys.	615-653-4363

SABRITEC, 16631 Noyes Ave., Irvine, CA 92714, Tel: 714-549-7350, Telex: 678401; *Sls. Mgr.:* M. J. Bennett

SAFEWAY PRODUCTS, 440 Middlefield St., Middletown, CT 06457, Tel: 203-346-6601, TWX: 710-428-7225; Empl.: 241

SAFT AMERICA INC., Box 1886, Valdosta, GA 31601, Tel: 912-247-2331, Telex: 547620, TWX: 810-786-5866

SAFT AMERICA INC., Advanced Battery Sys. Div., 107 Beaver Ct., Cockeysville, MD 21030, Tel: 301-666-3200

SAFT AMERICA INC., Elctrn. Sys. Div., 2414 W. 14th St., Tempe, AZ 85281, Tel: 602-894-6864

SAFT

SAFT AMERICA INC., Power Sources Div., 711 Industrial Blvd., Valdosta, GA 31601, Tel: 912-247-2331, Telex: 547-620; Empl.: 1300; *Sls. Mgr.:* R. Bartmes ....3•1398, 1424-1429

Local Sales Offices & Reps

CA	Chatsworth	818-998-0626
CO	Denver	303-740-7781
FL	Orlando	305-282-2245
IL	Chicago	312-991-6396
MA	Quincy	617-773-7980
MN	Minneapolis	612-770-0082
NC	Winston-Salem	919-765-6690
OH	Columbus	216-861-1877
PA	Philadelphia	215-831-9520
TX	Dallas	214-436-0757
VT	Rutland	802-773-8748

Local Distributors

AL	Montgomery, Avail	205-284-3001
AK	Anchorage, Standard Aero Ltd.	907-349-9655
AK	Anchorage, Avail	907-248-4624
AK	Anchorage, Van Dusen Aircraft Supp.	907-561-1644
AZ	Phoenix, Avail	602-275-4434
AZ	Phoenix, Van Dusen Aircraft Supp.	602-275-4493
AZ	Phoenix, Standard Aero Ltd.	602-273-7451
AR	Little Rock, Avail	501-376-0379
CA	Burbank, Aero Quality Sls.	818-841-6163
CA	El Cajon, Avail	619-448-2885
CA	Fresno, Van Dusen Aircraft Supp.	209-292-2222
CA	Long Beach, Standard Aero Ltd.	213-421-8431
CA	S. San Francisco, Van Dusen Aircraft Supp.	415-589-3133
CA	San Jose, Standard Aero Ltd.	408-926-2505
CA	San Leandro, Avail	415-638-8736
CA	Van Nuys, Van Dusen Aircraft Supp.	818-988-7308
CA	Van Nuys, Avail	818-997-0242
CO	Broomfield, Avail	303-457-2461
CO	Denver, Van Dusen Aircraft Supp.	303-393-0813
FL	Hollywood, Avail	305-925-8330
FL	Miami, Aero Quality Sls.	305-592-5055
FL	Miami Springs, Van Dusen Aircraft Supp.	305-885-3481
FL	Orlando, Avail	305-277-2191
GA	Atlanta, Van Dusen Aircraft Supp.	404-766-8334
GA	College Park, Avail	404-997-3935
HI	Honolulu, Van Dusen Aircraft Supp.	808-833-0061
HI	Honolulu, Standard Aero Ltd.	808-833-2447
ID	Boise, Van Dusen Aircraft Supp.	208-384-0030
IL	Elk Grove Village, Van Dusen Aircraft Supp.	312-437-5230
IL	Wheeling, Avail	312-541-7040
KS	Kansas City, Van Dusen Aircraft Supp.	913-321-4200
KS	Overland Park, Avail	913-341-2999
KS	Wichita, Van Dusen Aircraft Supp.	316-943-2418
LA	Lafayette, Avail	318-233-8930
LA	Lafayette, Standard Aero Ltd.	318-269-1111
LA	New Orleans, Van Dusen Aircraft Supp.	504-246-3166
MA	East Boston, Van Dusen Aircraft Supp.	617-567-3000
MA	Stow, Avail	617-897-3400
MI	Pontiac, Van Dusen Aircraft Supp.	313-666-2240
MI	Romulus, Avail	313-946-9110
MI	St. Clair Shores, Aero Quality Sls.	313-772-7810
MN	Edina, Van Dusen Aircraft Supp.	612-835-6988
MN	Minneapolis, Standard Aero Ltd.	612-835-9250
MN	Minneapolis, Avail	612-884-4441
MS	Southaven, Van Dusen Aircraft Supp.	601-393-5500
MO	Chesterfield, Avail	314-532-3458
MO	Kansas City, Standard Aero Ltd.	816-842-3903
MO	St. Louis, Van Dusen Aircraft Supp.	314-731-1700
MT	Billings, Van Dusen Aircraft Supp.	406-245-2309
NE	Lincoln, Van Dusen Aircraft Supp.	402-474-3512
NV	Las Vegas, Van Dusen Aircraft Supp.	702-739-9322
NJ	Lyndhurst, Aero Quality Sls.	201-288-5510
NJ	Teterboro, Van Dusen Aircraft Supp.	201-288-1500
NY	Bohemia, Avail	516-567-2002
OH	Cincinnati, Avail	513-871-6623
OH	Cleveland, Van Dusen Aircraft Supp.	216-473-6711
OH	Vandalia, Van Dusen Aircraft Supp.	513-898-4672
OK	Bethany, Avail	405-787-4630
OK	Oklahoma City, Van Dusen Aircraft Supp.	405-682-4496
OK	Tulsa, Avail	918-838-3316
OR	Fairview, Avail	503-667-5068
PA	New Cumberland, Van Dusen Aircraft Supp.	717-774-3511
PA	Philadelphia, Avail	215-677-9700
PA	Pittsburgh, Avail	412-664-4440
TN	Mt. Juliet, Van Dusen Aircraft Supp.	615-754-7700; 800-251-5775
TN	Nashville, Avail	615-833-7431
TX	Addison, Avail	214-458-0525
TX	Dallas, Van Dusen Aircraft Supp.	214-352-2611
TX	Dallas, Avail	214-688-0811
TX	Dallas, Standard Aero Ltd.	214-931-7480
TX	Dallas, Aero Quality Sls.	214-350-8881
TX	Ft. Worth, Avail	817-626-3795
TX	Houston, Avail	713-645-3376
TX	Houston, Aero Quality Sls.	713-943-3906
TX	Houston, Van Dusen Aircraft Supp.	713-643-8566
TX	Midland, Van Dusen Aircraft Supp.	915-563-0907
TX	San Antonio, Avail	512-340-3938
UT	Salt Lake City, Avail	801-355-2717
UT	Salt Lake City, Van Dusen Aircraft Supp.	801-532-5194
VA	Richmond, Van Dusen Aircraft Supp.	804-222-7287
WA	Bellevue, Standard Aero Ltd.	206-643-4220
WA	Seattle, Standard Aero Ltd.	206-762-0550
WA	Seattle, Avail	206-763-1350
WA	Seattle, Van Dusen Aircraft Supp.	206-763-1544

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SAGE LABORATORIES, INC., 3 Huron Dr., Natick, MA 01778, Tel: 617-653-0844, TWX: 710-346-0390; FSC No.: 07180; *Sls. Mgr.:* Tony Cieri

SAI TECHNLG. CO., Science Applications Inc., 4060 Sorrento Valley Blvd., San Diego, CA 92121, Tel: 619-452-9150, TWX: 756769; FSC No.: 54779; Empl.: 300

SAMARIUS, INC., 300 Seymour Ave., P.O. Box 377, Derby, CT 06418, Tel: 203-735-7405, TWX: 710-451-2495; FSC No.: 18065; Empl.: 90 ....1A•2053

SAMTEC, 810 Progress Blvd., P.O. Box 1147, New Albany, IN 47150, Tel: 812-944-6733, TWX: 810-540-4095; FSC No.: 55322; Empl.: 50; *Sls. Mgr.:* B. Shine; *Dist. Mgr.:* C. Roll

S & EI MFG., Box 832, Northridge, CA 91324, Tel: 818-349-4111, TWX: 910-493-1252; FSC No.: 24152; Empl.: 85

Local Sales Offices & Reps

CA	Sacramento, John Wayner	916-689-1281
CA	San Diego, Qualtronics	619-560-8955
FL	Ft. Lauderdale, Electro Comp. Assocs.	305-491-4141
IL	Chicago, Ropek-Cahill	312-631-0070
KS	Parker, S. W. Wollard Co.	913-898-6552
MA	Boston, TEC Sys.	617-834-4663
MO	St. Louis, Abrams & Assocs.	314-569-0047
NJ	Cherry Hill, Danco Corp.	609-627-2218
OH	Dayton, Berberich & Assocs.	513-433-0342

SANDERS ASSOCS., Flexprint Prods. Div., Grenier Fld., Manchester, NH 03103, Tel: 603-669-4615, TWX: 710-220-9999; FSC No.: 4L 277; Empl.: 500; *Sls. Mgr.:* Martin S. Schwartz

Local Sales Offices & Reps

AL	Huntsville, BJR	205-881-3569
AZ	Tempe, Spectrum Assoc. S.W.	602-966-1788
CA	Downey, Trimarco	213-861-8244
CA	Downey, Trimarco	213-861-8244
CA	Los Altos, El Repco	415-941-4990
CA	San Jose, Cero	408-298-1918
FL	Cocoa Bch., JEPCO	305-783-3037
IL	Downers Grove, Momak Sls.	312-963-6400
MD	Baltimore, R. A. Wafer Assoc.	301-744-1133
MD	Glen Burnie, New Era Sls.	301-768-6666
MA	Burlington, Microwave Mktg. Spec.	617-272-7530
MN	New Brighton, TWC	612-636-1770
NH	Amherst, Callahan & Tremblay	603-883-9000
NJ	Wayne, GT Assocs.	201-694-6040
NY	Great Neck, Phase 4	516-482-1790
PA	Hatboro, Jacobsen Assoc.	215-674-2937
TX	Austin, Kruvand Assoc.	512-441-6777
TX	Dallas, Kruvand Assoc.	214-691-4592

S & H INDUSTRIES, INC.

S & H INDS., 119 Glen Cove Dr., Glen Head, NY 11545, Tel: 516-671-5600; Empl.: 50; *Sls. Mgr.:* R. Smith ....3•1767, 1908, 1928

SAN DIEGO INSTR. LAB, See SANLAB

SAN FERNANDO ELEC. MFG., See SFE Techn.

SANFORD-MILLER CORP., 8 John St., Lynbrook, NY 11563, Tel: 516-593-2025, Outside NY 800-645-5900; Empl.: 10

SANGAMO CAPACITOR DIV., Box 128, Pickens, SC 29671, Tel: 803-878-6311, Telex: 57-0441, TWX: 810-397-2496; FSC No.: 00853; *Sls. Mgr.:* J. Kolkowski; *Dist. Mgr.:* J. Kolkowski

SANKEN ELEC. CO., 1-22-8 Nishi-Ikebukuro, Toshima-Ku, Tokyo, Japan, Tel: 03-986-6151, Telex: 272-2323; Empl.: 2,500; *Sls. Mgr.:* K. Imaizumi; *Dist. Mgr.:* S. Muramoto

SANKEN ELEC. U.S.A. CORP., 3848 Carson St., Ste. 105, Torrance, CA 90503, Tel: 213-540-2209, Telex: 181839; Empl.: 5; *Sls. Mgr.:* Mr. Tack Kunimi; *Dist. Mgr.:* Mr. Tack Kunimi

SAN-O INDUSTRIAL CORP., 85 Orville Dr., Bohemia, NY 11716, Tel: 516-567-5556, TWX: 510-228-7701; Empl.: 50; *Sls. Mgr.:* M. Castellano

SANTA BARBARA RESCH. CTR., 75 Coromar Dr., Goleta, CA 93117, Tel: 805-968-3511, Telex: 910-334-1885, TWX: Hacsbar; Empl.: 2025; *Sls. Mgr.:* D.K. Smith

SANTA FE TEXTILES, 3151 W. Adams St., Santa Ana, CA 92704, Tel: 714-751-7733; FSC No.: 31415; Empl.: 20; *Sls. Mgr.:* J. Tresseh; *Dist. Mgr.:* J. Abbey

SANYO ELEC. INC., 200 Riser Rd., Little Ferry, NJ 07643, Tel: 201-641-2333, Telex: 134-394; Empl.: 500; *Sls. Mgr.:* H. Matsuoka ....3•1430

Local Sales Offices & Reps

CA	Compton	213-537-5830
IL	Schiller Park	312-671-3261
NJ	Little Ferry	201-641-2333

SANYO SEMICONDUCTOR CORP., 7 Pearl Ct., Allendale, NJ 07401, Tel: 201-825-8080, Telex: 135138 SANYOSEMI ALNJ; Empl.: 16; *Sls. Mgr.:* Koichi Takahashi; *Dist. Mgr.:* Aki Goto

SAPHIKON, 51 Powers St., Milford, NH 03055, Tel: 603-673-5831, Telex: 95-3067; Empl.: 45; *Sls. Mgr.:* K. G. Lonie

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SARONIX, 4010 Transport at San Antonio, Palo Alto, CA 94303, Tel: 415-856-6900, Telex: 348465; FSC No.: 61441; Empl.: 24; *Sls. Mgr.:* Michael N. Blewett; *Dist. Mgr.:* Michael N. Blewett ....**1A•**1418, 1419

Local Sales Offices & Reps

AZ	Tempe, Elec Com	602-967-8644
CA	Culver City, Bestronics Inc.	213-870-9191
CA	Fallbrook, Matronix/Chilcote	619-728-7678
CA	Irvine, Bestronics Inc.	714-261-7233
CA	Southern California, Bestronics Inc.	213-704-5616
CA	Woodland Hills, Bestronics Inc.	213-704-5616
CO	Denver, Lindberg Co.	303-758-9033
FL	Orlando, Delmac Sls.	305-898-4688
GA	Marietta, Rick Burns Assoc.	404-951-1181
IL	Elk Grove Vlg., John G. Twist Co.	312-593-0200
IN	South Bend, Schillinger Assoc. Inc.	219-291-6258
KS	Overland Park, EPI Inc.	314-962-1411
MA	Andover, Richard Purinton	617-475-7055
MN	Bloomington, John G. Twist Co.	612-835-2120
MO	St. Louis, EPI Inc.	314-962-1411
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NJ	Englewood, Harold Gray Assocs.	201-894-0894
NM	Albuquerque, Lindberg Co.	505-881-1006
NY	Cazenovia, S. T. Woolard Co.	315-655-8145
NC	Raleigh, Rick Burns Assoc.	919-876-2224
OH	Dayton, J. C. Hofstetter	513-296-1010
OH	Medina, J. C. Hofstetter	216-241-4880
TX	Austin, Logic 1 Sls.	512-459-1297
TX	Houston, Logic 1 Sls.	713-462-0641
TX	Richardson, Logic 1 Sls.	214-234-3375
UT	Salt Lake City, Lindberg Co.	801-969-2400
WA	Bellevue, Hood Engrg.	206-953-9375
WI	Brookfield, John G. Twist Co.	414-782-2670
WI	Milwaukee, The John G. Twist Co.	414-782-2670
EXP	CA, Palo Alto, SaRonix	415-856-6900

Local Distributors

AZ	Tempe, Anthem Elctrns.	602-244-0900
CA	Chatsworth, Anthem Elctrns.	213-700-1000
CA	Costa Mesa, Deco Elctrns.	714-754-1322
CA	Manhattan Beach, Prime Electro Prods.	213-379-3642
CA	San Diego, Deco Elctrns.	619-693-1595
CA	San Diego, Anthem Elctrns.	619-279-5200
CA	San Jose, Anthem Elctrns.	408-946-8000
CA	Tustin, Anthem Elctrns.	714-730-8000
CO	Englewood, Anthem Elctrns.	303-790-4500
IN	Indianapolis, MAR Elctrns. Inc.	317-875-4510
MA	Andover, R² Elctrns.	617-475-3777
OR	Lake Oswego, Anthem Elctrns.	503-684-2661
TX	Addison, Active Comp. Technlg.	214-980-1888
TX	Austin, Active Comp. Technlg.	512-452-5254
TX	Houston, Active Comp. Technlg.	713-496-4000
UT	Salt lake City, Anthem Elctrns.	801-973-8555
WA	Redmond, Anthem Elctrns.	206-881-0850
Intl	England, Kent, Electrautom Ltd.	0622 673131
Intl	France, St. Quentin En Yvelines, A S A P	604 7878
Intl	Germany, Munich, LSI-Electronic Vertriebs	089 310-7272
Intl	Switzerland, Duebendorf-Zuerich, Compona	01 821-3737

SAVOY ELCTRNS., P.O. Box 5727, Ft. Lauderdale, FL 33310, Tel: 305-563-1333, 800-327-1282, TWX: 510-955-9766; FSC No.: 59-1672492; Empl.: 60; *Sls. Mgr.:* Lorayne Beardsley

SAWTEK INC., P.O. Box 18000, Orlando, FL 32860, Tel: 305-886-8860, Telex: 514083, TWX: 810-862-0835; FSC No.: 58068; Empl.: 140 ....**1A•**1420, 1565, 1622, 1623

Local Sales Offices & Reps

AL	Huntsville, L&D Inc.	205-837-1469
AZ	Scottsdale, Faser Tech. Sls.	602-948-4404
CA	Los Altos, Cain-White & Co.	415-948-6533
CA	Van Nuys, R-L Assocs.	213-782-7826
FL	Maitland, D. J. Ellis & Assoc.	305-645-1101
GA	Atlanta, L & D	404-455-3483
IL	Palatine, R. Tek	991-222-1830
IN	Fort Wayne, R-Tek	219-432-8783
KS	Overland Park, Barnes-Midwest Sls.	913-341-9317
MD	Burtonsville, Eastern Instrmn. Corp.	301-384-8500
MN	Chanhassen, Barnes Sls. Assocs.	612-934-2907
NH	Amherst, Callahan & Tremblay Inc.	603-883-9000
NJ	East Windsor, Micro-Lambda	609-443-3113
NY	Buffalo, Quality Comps.	716-837-5430
NY	Great Neck, Phase 4 Technical Rep., Inc.	516-482-1790
NY	Manlius, Quality Comps.	315-682-8885
NC	Greensboro, L & D	919-292-3201
NC	Raleigh, L & D	919-876-5301
OH	Fairfield, Selectron Sls. Assocs.	513-829-2251
TX	Richardson, Vector Sls.	214-234-4291

SAWYER INDS., 5649 Peck Rd., Arcadia, CA 91006, Tel: 213-442-5981, TWX: 910-587-3534; FSC No.: 18098; Empl.: 167

SAXTON PRODS., 215 N. Rte. 303, Congers, NY 10920, Tel: 914-268-6848, 800-431-2774, Telex: 13-1538; FSC No.: 16164; Empl.: 130; *Sls. Mgr.:* Bill Cullen; *Dist. Mgr.:* Steve Shelley ....**2•**2144-2149

Local Sales Offices & Reps

CA	Cerritos, Saxton Prod.	213-926-5596
CA	Livermore, Reptronixx	415-443-5343
CA	Pleasanton, Electro Des.	415-846-9257
CA	San Jose, Reptronixx	408-995-6433
CA	Santee, Southwestern Mktg.	619-562-2422
CO	Denver, J & B Sls.	303-698-2211
CT	Guilford, Phil Orzell Assocs.	203-453-6488
GA	Atlanta, Atlanta Cable Sls.	404-448-6311
GA	Marietta, Consumer Mktg.	404-424-9097
IN	Angola, Waid Assocs.	219-833-3523
MA	Milford, Jonel Sales Assocs.	617-478-4650
MA	Sharon, Adcour	617-784-8123
MN	Burnsville, Strong & Assocs.	612-890-3168
MS	Jackson, Welch & Dolby	601-932-5524
NJ	Livingston, Accurate Wire & Cable	201-533-0103
NY	Mohegan Lake, Travano & De Palma Assocs.	914-245-5269; 914-968-1084
OR	McMinnville, Electro Des.	503-472-0481
PA	Collegeville, Steve Linton	215-489-9473
TX	Austin, TPC	512-443-1577
TX	Dallas, TPC	214-357-8207
VA	Arlington, Howard Golen Paul & Assocs.	703-525-5898

Local Distributors

CA	Downey, David Levy Co.	213-869-2539
CA	Montebello, Atlas Wire & Cable	213-723-2401
CA	San Jose, Sundown Sls.	408-995-6433
CT	Manchester, Inventory Mgt. Svs.	203-649-4415
CT	Meriden, New England Insulated Wire	203-204-8927
MS	Hattiesburg, Wright Elctrn.	601-545-2545
NY	Brooklyn, Ceco Comm.	212-646-1617
NC	Greenville, Pair Elctrns.	919-756-8007
PA	Broomall, Omni Cable	215-544-7766
SC	Columbia, Hesco	803-254-4575
VA	Arlington, Arlington Elctrn.	703-524-2412
VA	Leesburg, Elctrn. Wire & Cable	703-777-3551

SCANBE DIV., 3445 Fletcher Ave., El Monte, CA 91731, Tel: 213-579-2300, TWX: 910-587-3437; Empl.: 125

SCANNING DEVICES, 108 Elm St., Waltham, MA 02154, Tel: 617-891-8991; Empl.: 25; *Sls. Mgr.:* Louis Goldenberg

SCHAEVITZ ENGRG., U.S. 130, Union Ave., Pennsauken, NJ 08110, Tel: 609-662-8000, TWX: 710-892-0714; FSC No.: 93190; Empl.: 325; *Sls. Mgr.:* F. R. Pisaro

Local Sales Offices & Reps

AZ	Scottsdale, Dave Menegay Assoc.	602-994-9519
CA	Long Beach, Saber Entprs.	213-595-5646
CA	San Carlos, Elctrn. Engrg.	415-593-2189
CA	San Diego, Saber Entprs.	714-271-1523
CO	Boulder, Meas. Conslts. of CO	303-449-7506
CT	Tolland, R.G. Assoc.	203-875-4201
FL	Orlando, MicroSpec, Inc.	305-299-6508
GA	Lawrenceville, MicroSpec	404-979-3444
IL	Deerfield, Torkelson Assoc.	312-945-8700
IL	Lombard, Patrick & Douglas	312-971-1800
IN	Indianapolis, Torkelson Assoc.	317-244-7867
KS	Mission, Vertec Assoc.	913-677-3200
MI	Farmington Hills, Carter, McCormic & Peirce	313-477-7700
MI	Farmington Hills, Anderson Elctrns.	313-553-7600
MN	Minneapolis, Trask Engrg.	612-537-2434
MO	Manchester, Vertec Assocs.	314-394-6242
NJ	Cherry Hill, Ana Lectro, Inc.	609-424-2883
NM	Albuquerque, Odyssey 1	505-265-6645
NY	Latham, L-Tron Corp.	518-785-5032
NY	Rockaway Park, Metropolitan Sls.	212-634-3100
OH	Columbus, R. D. Cloon Assoc.	614-459-2890
PA	Pittsburgh, Wainwright Tech. Sls.	412-487-5055
SC	Rock Hill, MicroSpec	803-366-3015
TX	Dallas, Measurement Sys. & Sls.	214-243-5782
UT	Salt Lake City, Meas. Conslts. of UT	801-364-3174
WA	Seattle, Brett Assocs.	206-935-8054
WI	Brookfield, Torkelson Assoc.	414-784-7736
WI	Glendale, Stapleman Corp.	414-352-5777

SCHAFFNER EMC INC., Component Div., 825 Lehigh Ave., Union, NJ 07083, Tel: 201-851-0644, Telex: 685-3444; FSC No.: 201-467-1330; *Sls. Mgr.:* Thomas Pate

Local Sales Offices & Reps

AL	Brownsboro, JHU Assoc. Inc.	205-536-7455
AZ	Tuscon, Clemick & Assoc. Inc.	602-749-4003
CA	Burlingame, Jack Logan & Assoc.	415-348-8822
CA	Costa Mesa, Berman Gravley Co., Inc.	714-549-2122
CA	Fallbrook, Martronix	619-728-7678
CO	Westminster, D/Z Assoc. Inc.	303-429-9369
CT	No. Haven, Kitchen & Kutchin Inc.	203-239-0212
FL	Orlando, OEM Mktg. Corp.	305-293-7117
GA	Atlanta, JHU Assoc. Inc.	404-634-1000
MA	Burlington, Kitchen & Kutchin Inc.	617-229-2660
NJ	Teaneck, R T Reid Assoc. Inc.	201-692-0200
OH	Cleveland, Jim Finnegan & Co., Inc.	216-238-5905
OR	Portland, Harry Levinson Co.	503-245-1902
TN	Talbot, JHU Assoc. Inc.	615-581-4141
TX	Richardson, Lone Star Technig. Inc.	214-238-2709
UT	Salt Lake City, D/Z Assoc. Inc.	801-486-4233
WA	Seattle, Harry Levinson Co.	206-382-1300

SCHAFFNER EMC INC., Instr. Div., 825 Lehigh Avenue, Union, NJ 07083, Tel: 201-851-0644, Telex: 685-3444

Local Sales Offices & Reps

CA	Fullerton, GRU Assoc.	714-738-0903
CO	Boulder, Herb Bass Assoc.	303-530-7509
IL	Elk Grove Village, Loren F. Green Assoc./Cen.	312-593-0282
IN	Indianapolis, Loren F. Green Assoc. of Indiana	317-293-9827
MI	Northville, Micro Sls. Corp.	315-459-1670
MN	Minneapolis, Loren F. Green Assoc. of Minnesota	612-571-6666
OH	Centerville, Micro Sls. Corp.	513-433-8171
OH	N. Olmstead, Micro Sls. Corp.	216-734-3080
OR	Portland, Harry Levinson Co.	503-245-1902
WA	Seattle, Harry Levinson Co.	206-382-1300

SCHAUER MFG., 4500 Alpine Ave., Cincinnati, OH 45242, Tel: 513-791-3030, Telex: 21-4576; Empl.: 195; *Sls. Mgr.:* A. A. Groenewold; *Dist. Mgr.:* Dan Shaw

SCHNEIDER INSTR., 8115 Camargo Rd., Cincinnati, OH 45243, Tel: 513-561-6803; Empl.: 23; *Sls. Mgr.:* C. A. Schneider, Pres.

SCHONSTEDT INSTR. CO., 1775 Wiehle Ave., Reston, VA 22090, Tel: 703-471-1050, TWX: 710-833-9880; Empl.: 45

SCHOTT CORP., 1000 Parkers Lk. Rd., Wayzata, MN 55391, Tel: 612-475-1173, TWX: 910-576-2964; FSC No.: 80023; Empl.: 325; *Sls. Mgr.:* A. Schmitt

SCHOTT ELCTRNS., Hershey Dr., Ansonia, CT 06401, Tel: 203-736-2677, Telex: 170 451 8911; *Sls. Mgr.:* Don Davis

SCHOTT OPTICAL GLASS INC., York Ave., Duryea, PA 18642, Tel: 717-457-7485, TWX: 510-671-4535; FSC No.: 23-169-1403; Empl.: 600; *Sls. Mgr.:* J. Nimmerfroh

SCHRACK NORTH AMERICA CORP., 76 N. Broadway, Irvington, NY 10533, Tel: 914-591-7900, Telex: 646149; Empl.: 4; *Sls. Mgr.:* Zach Zager

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SCHROFF INC., 170 Commerce Dr., Warwick, RI 02886, Tel: 401-732-3770, Telex: 952175; *Sls. Mgr.:* Thomas Kennedy ....**2•**1053

Local Sales Offices & Reps

AL	Decatur, Tenn. Tech.	205-350-0630
AZ	Scottsdale, Luscombe Engr.	602-949-9333
CA	Campbell, Luscombe Engr.	408-370-2020
CA	Pasadena, Luscombe Engr.	213-684-2000
CA	San Diego, Luscombe Engr.	619-295-4300
FL	Pompano Beach, EMA	305-943-3732
FL	Winter Park, EMA	305-671-6800
GA	Atlanta, Tenn Tech.	404-622-5784
IL	Berkeley, Cadre Tech. Rep.	312-449-3900
MI	Troy, C. B. Jensen	313-643-0506
MN	Minneapolis, D. A. Case Assoc.	612-869-3700
NH	Salem, Sales Engr.	603-893-5521
NJ	Englewood, Sprung-Nussbaum	201-569-5666
NY	Central Sqare, Bastian Sls.	315-668-2957

NY	Fairport, Bastian Sls.	716-223-0237
NY	Port Crane, Bastian Sls. Agency Inc.	607-722-3421
NC	Raleigh, Tenn Tech.	919-266-3610
OH	Aurora, EMA	216-562-6104
OH	Centerville, EMA	513-433-2800
PA	Huntington Valley, Omega Elctrn. Sls.	215-947-4135
TX	Austin, CMZ	512-255-1663
TX	Garland, CMZ	214-681-1414
TX	Houston, CMZ	713-771-1500

SCHROFF UK LTD., Maylands Ave., Hemel Hempstead, Herts, HP2 4SG, England, Tel: 0442-40471/6, Telex: 825658; *Sls. Mgr.:* Mr. B-U Kaupisch

SCHULZ CONTROLS, INC., P.O. Box 9555, New Haven, CT 06511, Tel: 203-562-2555, 800-243-4570; Empl.: 35; *Sls. Mgr.:* Paula Calabrese; *Dist. Mgr.:* Paula Calabrese

SCHURTER, INC., 1016 Clegg Ct., Petaluma, CA 94952, Tel: 707-778-6311, Telex: 176-084; FSC No.: 61935; *Sls. Mgr.:* Bruno H. Schurter

Local Sales Offices & Reps

CA	Fullerton, Gru Assocs.	714-738-0903
CA	San Jose, Ruppert Sls. & Engrg.	408-998-8717
CO	Lakewood, Cristee-Meade Co.	303-232-0287
FL	Ft. Lauderdale, IMR, Inc.	305-741-2449
IL	Arlington Hgts., MJ Petersen & Assoc., Ltd.	312-577-8200
MN	Minnetonka, Frank Anthony Mktg.	612-934-0773
MS	Jackson, Welch & Doby.	601-932-5534
NH	Nashua, Bell Controls	603-882-6984
NJ	Ho-Ho-Kus, D. J. Fisher Co.	201-652-0090
NJ	Medford, Champion Elctrn. Sls. Co.	609-983-0932
NY	Fairport, TAC Sls, Inc.	716-425-1070
OH	Beachwood, Electronic Salesmasters	216-831-9555
OR	Portland, Dussault & Associates Inc.	503-641-8780
TX	Austin, OM Sls., Inc.	512-452-1838
TX	Dallas, OM Sls., Inc.	214-241-3876
TX	Houston, OM Sls., Inc.	713-789-4426
WA	Seattle, Dussault & Associates Inc.	206-527-5454

Local Distributors

CA	San Jose, Quail Elctrns.	408-995-0812
FL	Clearwater, Elctrn. Hardware for Industry	813-577-2998
IL	Elk Grove Village, Nu-Way Elctrn. Distrbs. Inc.	312-437-7120
MD	Rockville, FIC Corp.	800-638-6594
TX	Dallas, Fuses, Inc.	214-341-6407

SCHWEITZER, DIV., Kimberly Clark Corp., Lee, MA 01238, Tel: 413-243-1000, TWX: 413-243-2121; Empl.: 750

SCIENCE ACCESSORIES CORP., 970 Kings Hwy. W., Southport, CT 06490, Tel: 203-255-1526, Telex: 964300 SAC SPRT; *Sls. Mgr.:* H. A. Cleveland

SCIENCE/ELCTRNS., 1224-26 McCook Ave., Dayton, OH 45404, Tel: 513-228-6011, Telex: 288-004; Empl.: 25; *Sls. Mgr.:* E. E. Pohl; *Dist. Mgr.:* J. Tanksley

SCIENTECH, INC., 5649 Arapahoe Ave., Boulder, CO 80303, Tel: 303-444-1361, 800-525-0522, TWX: 910-940-0994; Empl.: 57

Local Sales Offices & Reps

CA	Hayward, Avionics Liaison	415-783-1131
CA	San Jose, Scientific Spectrum	408-289-9733
CO	Englewood, SCT Sls., Inc.	303-761-2934
GA	Atlanta, Schoonover	404-396-8877
IL	Crystal Lake, Stanmatic Sls.	815-459-1741
MD	Silver Spring, SOC Assocs.	301-439-3200
NH	Deerfield, Kronk Scientific	603-463-7866
NJ	Oakland, Non-Linear Devices	201-337-0666
WA	Seattle, Avionics Liaison	206-767-3870

SCIENTIFIC-ATLANTA, INC., P.O. Box 105600, Atlanta, GA 30348, Tel: 404-441-4000, Telex: 0542898, TWX: 810-766-4912

SCIENTIFIC-ATLANTA, INC., New Jersey Div., Randolph Park W., Rte 10, Randolph Township, NJ 07801, Tel: 201-361-3100, TWX: 710-987-7946; Empl.: 100; *Sls. Mgr.:* E. Stagnitti

SCIENTIFIC-ATLANTA, INC., See Optima Enclosures

SCIENTIFIC COLUMBUS, INC., Esterline Corp., 1900 Arlingate La., Columbus, OH 43228, Tel: 614-274-7160, Telex: 245-426; Empl.: 210; *Sls. Mgr.:* Don Yore; *Dist. Mgr.:* Don Yore ....**1B**•1876, 1877

Local Sales Offices & Reps

AL	Birmingham, Spader & Assocs.	205-879-1366
AZ	Scottsdale, Young of Ariz.	602-991-9191
CA	Glendale, R. A. Young & Co.	213-242-2171
CA	S. San Francisco, Wrathall & Krusi	415-777-0226
CO	Denver, Cliff Beabout Co.	303-831-7259
FL	Orlando, RJC Assocs.	305-894-7371
GA	Decatur, Spader & Assocs.	404-296-3024
HI	Honolulu, Berkley Engrg. & Equip. Co.	808-845-9377
IL	La Grange, PVA Co.	312-579-9300
IN	Nobelsville, C. D. Arnold Co.	317-773-5821
IA	Cedar Rapids, Harry Ferris Co.	319-377-1226
IA	Des Moines, Harry E. Ferris Co.	515-255-5008
KS	Kansas City, Power Equip. Sls. Co.	913-384-3848
LA	Baton Rouge, Mid-South Sls. Co.	504-924-0106
LA	Slidell, Mid-South Sls. Co.	504-641-7480
MA	Needham Heights, Danek Assocs.	617-444-8838
MI	Troy, George R. Peters Assocs.	313-362-1220
MN	Minneapolis, Arjay Sls.	612-854-4972
MO	St. Louis, Ken Way Co.	314-567-0051
NE	Lincoln, Harry Ferris Co.	402-464-6148
NM	Albuquerque, Bryant Co.	505-843-9450
NY	Albany, Robert F. Lamb Co.	518-869-3355
NY	Buffalo, Robert F. Lamb Co.	716-874-4900
NY	Rochester, Robert F. Lamb Co.	716-544-5580
NY	Syracuse, Robert F. Lamb Co.	315-455-2469
NC	Charlotte, Robert W. Chapman & Co.	704-525-2421
NC	Greensboro, Robert W. Chapman & Co.	919-282-0740
NC	Raleigh, Robert W. Chapman & Co.	919-782-2624
OH	Cincinnati, Annett Indl. Sls.	513-271-0030
OH	Cleveland, M. A. Blankenburg & Co.	216-251-7010
OK	Tulsa, C. B. Anderson Elec. Co.	918-836-4661
OR	Portland, McLaren Inc.	503-297-2248
PA	Dylestown, The Gee Co.	215-348-3300
PA	Philadelphia, Gee Co.	215-348-3300
PA	Pittsburgh, Russell F. Clark Co.	412-242-9500
SC	West Columbia, Robert W. Chapman & Co.	803-256-0072
TN	Murfreesboro, Robert W. Chapman & Co.	615-895-1019
TX	Amarillo, C. B. Anderson Electric Co.	806-376-6443
TX	Arlington, Ev Smith Sls. Co.	817-572-2911
TX	Houston, Ev Smith Sls. Co.	713-649-5756
UT	Salt Lake City, Instrumentation Sls.	801-277-2044
VA	Alexandria, Hildenbrand Co.	703-998-0445
VA	Richmond, Robert W. Chaman & Co.	804-744-4848
WA	Bellevue, McLaren Inc.	206-454-3400
WI	Wauwatosa, T. R. Bickler Assocs.	414-784-2600

SCIENTIFIC COMMUNICATIONS, INC., 3425 Kingsley Rd., Garland, TX 75041, Tel: 214-271-3685, TWX: 910-860-5172; *Sls. Mgr.:* Donald G. Luiken

SCIENTIFIC RADIATION CORP., 1201 San Antonio Rd., Mountain View, CA 94043, Tel: 415-965-0910, Telex: 345506; *Dist. Mgr.:* James A. Lazzara

SCIENTIFIC RESEARCH CORP., See TRAK Microwave Corp.

SCIENTIFIC TECHNLG., 1201 San Antonio Rd., Mountain View, CA 94043, Tel: CA 415-965-0910, 800-221-7060, Telex: 34-5506; Empl.: 50

SCOTT AVIATION, Figgie International Inc., 123 East Montecito Ave., Sierra Madre, CA 91024, Tel: 213-355-4281

SCREENPRINT/DOW INDUSTRIES, 271 Ballardvale St., Wilmington, MA 01887, Tel: 617-935-6395, Telex: 948227; *Sls. Mgr.:* W. F. Donovan Jr.

SEABOARD ELCTRNS., 70 Church St., New Rochelle, NY 10805, Tel: 914-235-8073, Telex: 646289; Empl.: 78; *Sls. Mgr.:* Dr. Richard Ader; *Dist. Mgr.:* Dr. R. Ader

SEACLIFF TECHNOLOGY, INC., 320 Judah Street, San Francisco, CA 94122, Tel: 415-661-4800

SEACOR, INC., 123 Woodland Ave, Westwood, NJ 07675, Tel: 201-666-5600, Telex: 135-354; Empl.: 45 ....**1A**•1183

Local Sales Offices & Reps

AZ	Scottsdale, Arcom Sales	602-947-5745
CA	Santa Ana, Seacor West	714-641-4040
IL	Skokie, Mar-Con	312-675-6450
MI	Farmington, Amtech Reps.	313-474-8300
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
NY	Rochester, Sweetco	716-225-2383
NY	Utica, Sweetco Assoc.	315-797-6721
OH	Northfield, Val-Skol Sls.	216-467-1392
PA	King of Prussia, D. Freedman	215-279-5767
TN	Chattanooga, Dimark	615-892-7630
TN	Greenville, Dimark	615-639-0113
TX	Cypress, Wessco Prods.	713-469-7814
TX	Garland, Wessco Prods.	214-530-8857
PR	San Juan, David S. Ternent	809-762-2688

Local Distributors

AZ	Tempe, T.T.I	602-966-1616
CA	Burbank, TAW Elctrns.	213-846-3911
CA	Cypress, On-Line Elect.	714-826-8200
CA	Garden Grove, Natl. Cap. Supp.	800-854-2451
CA	San Diego, Sigma Elctrns.	619-565-2000
CA	Santa Clara, California Capacitor	408-980-8495
CT	Stratford, Utronics	203-378-4201
IL	Chicago, Bell Indus.	312-982-9210
MD	Beltsville, Resco/Wash.	301-937-9100
MA	Burlington, TLC	617-273-0140
MA	N. Chelmsford, Pilgrim Elect.	617-251-8746
MA	Needham, Cronin	617-449-0500
MI	Westland, Westland Elctrns.	
MN	Minneapolis, The Joel Corp.	612-545-5669
NY	Farmingdale, SAI	516-293-2710
NY	Lynbrook, Varitech Elctrns.	516-593-9300
OH	Cleveland, Roberts Elctrns.	
OK	Pryor, Combined Technology	918-825-5715
PA	Philadelphia, Jan Indl. Elec.	215-922-1321
TX	Addison, Captronics	214-980-0123
TX	Austin, Captronics	512-459-4328
TX	Ft. Worth, Allied Elect.	817-336-5401
TX	Ft. Worth, T.T.I	817-831-0441
TX	Houston, Captronics	713-776-2100

SEA DATA CORP., One Bridge St., Newton, MA 02158, Tel: 617-244-3216, Telex: 951107; Empl.: 40; *Sls. Mgr.:* W. Hill

SEALECTRO, 225 Hoyt St., Mamaroneck, NY 10543, Tel: 914-698-5600; Empl.: 1600; *Sls. Mgr.:* T. Lynn; *Dist. Mgr.:* N. Buonanno ....**2**•1561

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Phoenix, M/R Engrg.	602-956-4670
CA	Carlsbad, Addem Elctrns.	619-729-9216
CA	Manhattan Beach, Sealectro West	213-318-3326
CA	Mountain View, Sealectro West	415-965-1212
CO	Denver, Spectrum Sls.	303-696-1601
FL	Orlando, OEM Mktg.	305-299-1000
GA	Norcross, Montgomery Mktg.	404-447-6124
ID	Boise, N. R. Schultz	208-377-8686
IL	Arlington Hgts., Diethert-Angel	312-593-7600
KS	Overland Park, Advanced Tech. Sls.	913-642-6675
MD	Rockville, Mechtronics Sls.	301-340-2130
MO	Ellisville, Advanced Tech. Sls.	314-227-4448
NH	Salem, Sls. Engrg.	603-893-5521
NJ	Marlton, BGR Assocs.	609-428-2440
NY	Mt. Vernon, Friedman-Smith	914-664-4866
NY	Syracuse, I. A. Hotze Assoc.	315-479-6641
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Columbus, McFadden Sls.	614-459-1280
OR	Beaverton, N. R. Schultz	503-643-1644
TX	Dallas, Allied Comps.	214-238-0408
WA	Bellevue, N. R. Schultz	206-454-0300

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AL	Huntsville, Pioneer Elctrns.	205-837-9300
AZ	Phoenix, R. V. Weatherford	602-272-7144
CA	Glendale, R. V. Weatherford	213-849-3451
CA	San Jose, Powell Elctrns.	408-943-9020
CA	Sunnyvale, R. V. Weatherford	408-738-8694
FL	Altamonte Springs, Pioneer/Fla.	305-834-9090
FL	Ft. Lauderdale, Powell Elctrns.	305-979-5000
IN	South Bend, Genesis Elctrns.	219-287-2911
IA	Cedar Rapids, Deeco	319-365-7551
KS	Wichita, Radio Supp.	316-267-5213
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Columbia, Powell Elctrns.	301-995-0410
MD	Gaithersburg, Pioneer Elctrns.	301-921-0660
MA	Burlington, Milgray Elctrns.	617-272-6800
MA	Westboro, Powell Elctrns.	617-366-6100
MN	Minneapolis, Indl. Comps.	612-831-2666
MO	Maryland Hgts., L Comp	314-291-6200
NJ	Kenilworth, Federated Purchaser	201-272-0505
NY	Bohemia, Car Lac Elctrns.	516-567-4200
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Farmingdale, Milgray Elctrns.	516-420-9800
NY	Rochester, Summit Distrs.	716-334-8110
NC	Charlotte, Pioneer Elctrns.	704-527-8188
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Solon, Repco Elctrns.	216-248-8900
PA	Horsham, Pioneer/Delaware Valley	215-674-4000
PA	Philadelphia, Powell Elctrns.	215-365-1900
TX	Dallas, Pioneer/Dallas	214-386-7300
TX	Dallas, R. V. Weatherford	214-931-7333
WA	Seattle, R. V. Weatherford	206-575-1340

SEALTRON, INC., 9705 Reading Road, Cincinnati, OH 45215, Tel: 513-733-8400

SEASTROM MFG. CO., INC., 701 Sonora Ave., Glendale, CA 91201, Tel: 818-245-9121, TWX: 910-497-2271; FSC No.: 86928; Empl.: 75

SEATTLE COMPUTER PRODUCTS, INC., 1114 Ind. Dr., Seattle, WA 98188, Tel: 206-575-1830, 800-426-8936; *Sls. Mgr.:* Max Gerdts

SECURITY PLASTICS INC., 14427 N.W. 60th Ave., Miami Lakes, FL 33014, Tel: 305-823-5440, Telex: 803303; Empl.: 350; *Sls. Mgr.:* J. Licht

SEIKO INSTRUMENTS

SEIKO INSTRS. U.S.A., INC., 2990 W. Lomita Blvd., Torrance, CA 90505, Tel: 213-530-8777, TWX: 910-347-7307; *Sls. Mgr.:* John Hawkins, Lee Guio; *Dist. Mgr.:* Lee Guio, John Hawkins .... **1A**•1421; **1B**•1095; **3**•1091

Local Sales Offices & Reps

AL	Huntsville, Electro-Mech	205-533-2100
AZ	Scottsdale, Fred Board Assocs.	602-994-9388
CA	Los Alamitos, Santana Sls.	714-827-9100
CA	San Diego, SR Elctrns.	619-560-8330
CA	Santa Clara, Quorum Tech. Sls.	408-980-0812
CT	Madison, Forsberg Sls.	203-245-4314
FL	Clearwater, Gallagher & Assocs.	813-726-3187
FL	Plantation, Gallagher & Assocs.	305-473-2101
GA	Atlanta, Electro-Mech	404-447-6478
IA	Cedar Rapids, Coombs Assocs.	319-362-4116
KS	Overland Park, Kebco	913-541-8431
KS	Wichita, Kebco	316-733-1301
MD	Annapolis, Vince Iorio Assocs.	301-261-1716
MA	Brockton, Forsberg Sls.	617-522-6300
MI	Grosse Pointe Pk., Greiner Assoc.	313-499-0188
MN	Bloomington, Quantum Sls.	612-884-4700
MO	Maryland Hgts., Kebco	314-576-4111
NM	Albuquerque, Fred Board Assocs.	505-293-1399
NY	Kingston, R. P. Kennedy Co.	914-876-2700
NY	Rochester, R. P. Kennedy Co.	716-271-6322
NY	Rochester, R. P. Kennedy Co.	607-271-6322
OH	Akron, Imtech	216-666-1185
OH	Dayton, Imtech	513-278-6507
OR	Tigard, Components West	503-684-1671
PA	Broomall, TCA Assocs.	215-353-2022
TN	Nashville, Electro-Mech	615-753-5841
TX	Austin, TL Mktg.	512-453-4586
TX	Dallas, TL Mktg.	214-357-1752
WA	Redmond, Components West	206-885-5880

Local Distributors

AL	Huntsville, Contact Elctrns.	205-881-9321
AZ	Phoenix, Sterling Elctrns.	602-268-2121
CA	Santa Ana, Pacesetter Elctrns. USA	714-557-7131
CA	Sunnyvale, Pacesetter Elctrns. USA	408-734-5470
CA	Walnut, A.C.I. Elctrns. Corp.	213-331-0735
CO	Denver, A.C.T.	303-422-9229
CT	Wallingford, Sterling Elctrns.	203-265-9535
LA	Metairie, Sterling Elctrns.	504-887-7610
MD	Middletown, Current Comps.	301-473-5333
MA	Waltham, Sterling Elctrns.	617-894-6200
MA	Woburn, A.C.I. Elctrns. Corp.	617-935-7230
MO	St. Louis, Ric-Tronics	314-576-9816
NJ	Perth Amboy, Sterling Elctrns.	201-442-8000
NM	Albuquerque, Sterling Elctrns.	505-884-1905
NY	Plainview, A.C.I. Elctrns. Corp.	516-293-6630
OK	Tulsa, Sterling Elctrns.	918-663-2410
OR	Lake Oswego, Moore Elctrns.	503-684-3100
TX	Austin, Sterling Elctrns.	512-836-1341
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Houston, Sterling Elctrns.	713-627-9800
UT	Salt Lake City, A.C.T.	801-487-8131
VA	Richmond, Sterling Elctrns.	804-226-2190
Can	Downsview, Westburne Indl. Entprs.	416-635-2950

SEIKO INSTRUMENTS U.S.A., INC., Robotics/Automation Div., 2990 W. Lomita Blvd., Torrance, CA 90505, Tel: 213-530-8777; *Sls. Mgr.:* John Dudley

SEKAI ELCTRNS. OF AMER., INC., 14700 E. Firestone Blvd., Suite 122, La Mirada, CA 90638, Tel: 714-670-1854, Telex: 685521; FSC No.: 8V398; Empl.: 4; *Sls. Mgr.:* Larry Klementowski

SELCO PRODUCTS CO., 7580 Stage Rd., Buena Park, CA 90621, Tel: 714-521-8673, Telex: 65-5457; Empl.: 18; *Sls. Mgr.:* Bill Wilkinson; *Dist. Mgr.:* Ray McDowell

SELEC-KEY, Microdot, 302 Roma Jean Pkwy., Streamwood, IL 60103, Tel: 312-837-7970; *Sls. Mgr.:* Charles Stelzner

SEL-REX DIV., OMI Intl. Corp., 75 River Rd., Nutley, NJ 07110, Tel: 201-667-5200, Telex: 133-320, TWX: 710-989-1423; Empl.: 250; *Sls. Mgr.:* Larry Price

SEMCO, Rte. 6, No. Windham, CT 06226, Tel: 203-423-6316; *Sls. Mgr.:* Alan Giordano

SEMICOA, 333 McCormick Ave., Costa Mesa, CA 92626, Tel: 714-979-1900, Telex: 678-315, TWX: 910-595-1961; FSC No.: 34156; Empl.: 65; *Sls. Mgr.:* Mark Ellsberry

SEMICON, 10 North Ave., Burlington, MA 01803, Tel: 617-272-9015, TWX: 710-332-1919; Empl.: 550; *Sls. Mgr.:* Tom Le Blanc; *Dist. Mgr.:* L. Le Bow

SEMICONDUCTOR
CIRCUITS, INC.

SEMICONDUCTOR CIRCUITS, 49 Range Rd., Windham, NH 03087, Tel: 603-893-2330, TWX: 710-366-0505; Empl.: 500; *Sls. Mgr.:* Steven Troscianecki; *Dist. Mgr.:* Marc Gauthier .... **3**•1759-1766

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Scottsdale, Sls. Engrg.	602-994-3230
CA	Milpitas, Lee/Allan Assocs.	408-946-8300
CA	San Diego, Tauber & Associates	619-274-7242
CA	Thousand Oaks, SC³	805-496-7307
CA	Tustin, SC³	714-731-9206
CO	Denver, Component Sls.	303-759-1666
CT	Westport, Compass Technology, Inc.	203-222-1787
FL	Ft. Meyers, Rainbow Sales, Inc.	813-332-2210
FL	Melbourne, Rainbow Sls. Inc.	305-259-6692
GA	Atlanta, Remco	404-447-6937
IL	Des Plaines, Janus	312-298-9330
IN	Fort Wayne, Wilson Technical Sales	219-424-5288
IN	Indianapolis, Wilson Tech. Sls.	317-298-3345
IA	Des Moines, The Beams Company	515-255-1148
KS	Shawnee Mission, The Beams Company	913-631-0300
MD	Baltimore, Micro Comp.	301-247-0400
MA	Woburn, Compass Technology, Inc.	617-933-3336
MI	Brighton, A.P. Associates	313-299-6550
MN	Minneapolis, Northstar Comps.	612-553-1888
MO	St. Louis, The Beams Company	314-434-8448
NJ	Livingston, Varrelman-Gorman Co.	201-992-2505
NY	Clark Mills, KLM Garner	315-853-6126
NY	North Syracuse, KLM Garner	315-458-6214
NY	Pittsford, KLM Garner	716-381-8350
NC	Raleigh, Remco	919-847-5079
OH	Dayton, J.C. Hofstetter Co.	513-296-1010
OH	Medina, J.C. Hofstetter Co.	210-241-4880
OK	Tulsa, Southern States Mktg.	918-665-8338
PA	Hickory, J.C. Hofstetter Co.	412-356-2305
PA	King of Prussia, KSI	215-783-6400
TX	Austin, Southern States Mktg.	512-473-2741
TX	Houston, Southern States Mktg.	713-988-0991
TX	Richardson, Southern States Mktg.	214-238-7500
UT	Salt Lake City, Component Sls.	801-466-8623
WA	Maple Valley, Electronic Sls. N.W.	206-432-1002
WI	Milwaukee, Janus	414-476-9104

Local Distributors

CA	Milpitas, Power Systems Distrs.	408-946-8300
GA	Atlanta, Trans-Southern Elctrns.	404-451-4425
IL	Elk Grove Village, GBL/Goold Elctrns.	312-593-3222
IN	Carmel, Altex Elctrns.	317-848-1323
MD	Baltimore, MPI	800-368-2527
MA	Wellesley Hills, Target Elctrn. Supp.	617-235-2545
MI	Brighton, A.P. Sales, Inc.	313-229-6550
NY	Rochester, Simcona Elctrns.	716-328-3230
OR	Lake Oswego, Moore Elctrns.	503-684-3100
TX	Stafford, Southwest Elctrns.	713-240-4000

SEMICONDUCTOR PACKAGING MATLS. CO. INC., 700 Waverly Avenue, Mamaroneck, NY 10543, Tel: 914-698-5353, TWX: 710-566-1103

SEMICONDUCTOR TECHNLG., INC., 3131 S.E. Jay St., Stuart, FL 33494, Tel: 305-283-4500, TWX: 510-953-7511; Empl.: 45

SEMIKRON INTL., INC., 11 Executive Dr., P.O. Box 66, Hudson, NH 03051, Tel: 603-883-8102, TWX: 710-228-1494; FSC No.: 58687; Empl.: 40; *Sls. Mgr.:* Frank Haase

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Phoenix, Trembly Assocs.	602-967-2058
CA	Downey, Trimarco	213-861-8244
CA	Redwood City, Ault Assocs.	415-367-1710
CO	Denver, Trembly Assocs.	303-233-9544
FL	Oldsmar, Boggs & Assocs.	813-855-1812
GA	Atlanta, Remco	404-447-6937
HI	Honolulu, Aloha Assocs.	808-951-1574
IL	Chicago, Ropek, Cahill & Vogt	312-631-0070
KS	Kansas City, Harris-Hanson Co.	816-763-6200
MI	Detroit, Favco	313-644-0173
MN	Eden Prairie, Bohlig & Assocs.	612-944-8404
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NV	Las Vegas, Trembly Assocs.	702-369-8700
NH	Hudson, Eva-Tec Mktg.	603-888-7478
NM	Albuquerque, Trembly Assocs.	505-266-8616
NY	Albany, H.C. Johnson Agencies	518-459-1239
NY	Buffalo, H. C. Johnson Agencies	716-632-7880
NY	Rochester, H. C. Johnson Agencies	716-586-0777
NC	Raleigh, Remco	919-847-5079
OH	Dayton, Cleary Sls. Co.	513-890-8642
OH	Hamilton, B & J Entprs.	513-863-1353
OR	Portland, Doran Sls. Assocs.	503-357-3333
PA	Pittsburgh, Electrosystems Sls.	412-468-8811
TX	Kingwood, Coulomb Elctrns. & Assocs.	713-358-9595
UT	Salt Lake City, Trembly Assocs.	801-486-5292
WA	Seattle, Doran Sls. Assocs.	206-885-1885

Local Distributors

MI	Detroit, Osborne Transformer Co.	313-368-4136
NJ	Roselle, Lectron Inds.	201-245-5858
NC	Gastonia, JMT Elctrns. & Controls	704-867-4401
WA	Seattle, Pacific Elctrns.	206-575-1050

SEMTECH, 652 Mitchell Rd., Newbury Park, CA 91320, Tel: 213-628-5392, TWX: 910-336-1264; FSC No.: 14099; Empl.: 350

SENCORE, 3200 Sencore Dr., Sioux Falls, SD 57107, Tel: 605-339-0100, TWX: 910-660-0300; Empl.: 250

SENSITEK CORPORATION, 1000 Lincoln Drive, Marlton, NJ 08053, Tel: 609-983-3600, TWX: 710-897-1648; *Sls. Mgr.:* E. F. Bickel

Sensitive Research

SENSITIVE RESEARCH INSTRS., 25 Dock St., Mt. Vernon, NY 10550, Tel: 914-699-9717; FSC No.: 32590; Empl.: 35 .... **3**•1296-1298

Local Sales Offices & Reps

AZ	Scottsdale, Williams Assocs.	602-947-4297
CO	Commerce City, Williams Assocs.	303-289-5647
DC	Washington, Whitcomb Assocs.	202-737-0763
IL	Lincolnwood, Saffro & Assocs.	312-677-9720
KS	Shawnee Mission, Comtel - Midwest	913-722-1030
MD	Baltimore, Whitcomb Assocs.	301-889-1245
MA	Lexington, Zieco	617-861-8300
MI	Southfield, Comtel Instrs. Co.	313-358-2505
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
MO	St. Louis, Comtel - Midwest	314-991-5363
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Mount Vernon, Elctrl. Instr. Svc.	914-699-9717
OH	Cleveland, Comtel Instrs. Co.	216-442-8080
OH	Dayton, Comtel Instrs. Co.	513-298-7573
OH	Hilliard, Comtel Instrs. Co.	614-876-8305
OK	Tulsa, Data Mktg. Assocs.	918-438-4911
PA	Pittsburgh, Comtel Instrs. Co.	412-922-5720
TX	Austin, Data Mktg. Assocs.	512-451-5174
TX	Dallas, Data Mktg. Assocs.	214-661-0300
TX	Houston, Data Mktg. Assocs.	713-780-2511
TX	San Antonio, Data Mktg. Assocs.	512-342-3031
UT	Salt Lake City, Williams Assocs.	801-532-7701
WI	Lake Mills, Saffro & Assocs.	414-648-2605

SENSOR CORP., Box 140, Scottdale, PA 15683, Tel: 412-887-4080; Empl.: 6

SENSOR ELECTRONICS, INC., 105 Fairway Terrace, Mt. Laurel, NJ 08054, Tel: 609-778-0850; *Sls. Mgr.:* J. M. Langberg; *Dist. Mgr.:* J. M. Langberg

SENSOR SCIENTIFIC, INC., 1275 Bloomfield Ave., Fairfield, NJ 07006, Tel: 201-227-7790; *Sls. Mgr.:* Bob Brinley

SENSOR SYSTEMS, INC., 8929 Fullbright Ave., Chatsworth, CA 91311, Tel: 818-341-5366, Telex: 69-1583; *Sls. Mgr.:* E. Schneider

SENSORTEK, INC., 154 Huron Ave., Clifton, NJ 07013, Tel: 201-779-5577; Empl.: 24

SENSOR TECHN., 21012 Lassen St., Chatsworth, CA 91311, Tel: 213-882-4100, TWX: 910-494-4776; Empl.: 350; *Sls. Mgr.:* Robert Bryden

SENSOTEC INC., 1200 Chesapeake Ave., Columbus, OH 43212, Tel: 614-486-7723, TWX: 810-482-1188; FSC No.: 29927; *Sls. Mgr.:* Jack Fell

SENSYM, INC., 1255 Reamwood Ave., Sunnyvale, CA 94089, Tel: 408-744-1500, Telex: 176376, TWX: 910-339-9625; *Sls. Mgr.:* Joe Fijak; *Dist. Mgr.:* Joe Fijak

SENTRY MFG., Crystal Park, Chickasha, OK 73018, Tel: 405-224-6780, 800-654-8850, TWX: 910-830-6425; Empl.: 150; *Sls. Mgr.:* R. Stephens

SEQUENTIAL INFO. SYS., 249 N. Saw Mill River Rd., Elmsford, NY 10523, Tel: 914-592-5930, TWX: 710-567-1212; Empl.: 90; *Sls. Mgr.:* Murray E. Vinarub

Local Sales Offices & Reps

AL	Jasper, Smith Lake Automation	205-221-2492
CA	Campbell, Sedillo Co.	408-374-5220
CA	Huntington Beach, Wheatcroft Engrg.	714-964-4681
HI	Honolulu, Aloha Assocs.	808-941-1574
IL	Schaumberg, Control Sys. Research	312-228-8061
MA	Bedford, Datasource	617-275-8460
MI	Detroit, Automatic Controls	313-533-8890
MN	Minneapolis, Busch Elctrns.	612-835-2044
MO	St. Louis, Prod. Automation	314-441-6600
NJ	Point Pleasant, A. Ackerman (E. Reg. Sls. Mgr.)	201-295-2737
NY	Elmira, Powertrain	607-962-3291
OH	Cincinnati, J. W. Murray	513-574-8500
OH	Cincinnati, J.W. Murray	513-574-8500
OH	Cleveland, Automatic Controls	216-631-0333
PA	King of Prussia, Freedman & Malta	215-337-9211
TX	Houston, Scientific Sls.	713-460-9170
TX	Richardson, Scientific Sls.	214-231-6541
VA	Springfield, Mid-States Mktg.	703-569-2661
WA	Seattle, Penryn Sls. & Engrg.	203-783-4334
WI	Shorewood, Werking Indl. Sls.	414-964-2225

SERIAL LAB PRODS., INC., 50 Brigham St., P.O. Box 766, Marlboro, MA 01752, Tel: 617-481-1684, Telex: 955318 Attn: SERIAL LAB; Empl.: 12; *Sls. Mgr.:* R. L. Wiedeman; *Dist. Mgr.:* D. Kreck

Local Sales Offices & Reps

CA	San Carlos, Electronic Engrg. Assocs.	415-593-2189
CT	Hamden, Digital Sls. Assocs.	203-248-3641
FL	Indian Rocks Beach, Par Assocs.	813-596-8841
GA	Atlanta, Par Assocs.	404-448-4181
IL	Chicago, Electro Tech Mktg.	312-588-4535
MD	Gaithersburg, Wright Mktg. Co. Ltd.	301-840-1928
MA	Waltham, Digital Sls. Assocs.	617-899-4300
MN	Minneapolis, Deerland Distrs.	612-331-6433
MO	Grandview, Digital Systems Sls.	816-765-3337
TX	Houston, Dalton Systems	713-556-1216
TX	Lewisville, Dalton Systems	214-221-5611
WI	Milwaukee, Deerland Distrs.	414-258-7660

SERMETEL, 155 Limerick Rd., Limerick, PA 19468, Tel: 215-948-5100, Telex: 84-6335, TWX: 710-637-1263; Empl.: 177; *Sls. Mgr.:* Luke McLaughlin

SERVO-INSTRS. CORP., See Valley Electromagnetics

SERVOMETER CORP., 501 Little Falls Rd., Cedar Grove, NJ 07009, Tel: 201-785-4630; FSC No.: 18469; Empl.: 105; *Sls. Mgr.:* D. Walker

SERVO-TEK PRODS. CO., 1086 Goffle Rd., Hawthorne, NJ 07506, Tel: 201-427-3100; Empl.: 86; *Sls. Mgr.:* J. Duffy .... **1B**•1177

Local Sales Offices & Reps

AZ	Fountain Hills, Halbar Assocs.	602-837-2464
CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Denver, Anderson Controls	303-692-0290
DC	Washington, Automation Indl. Control	301-944-8400
FL	Orlando, Seybert Sls.	305-299-6508
GA	Lawrenceville, MicroSpec	404-979-3444
IL	Hinsdale, Patton Sls.	312-325-2170
IN	Ft. Wayne, Aktron Corp.	219-747-3650
MA	Salem, Forbes Engrg. Sales	617-744-1693
MN	St. Paul, Northstar Motion & Control	612-770-5311
OH	Chagrin Falls, K. F. Nauerz Co.	216-338-8450
OH	Cincinnati, Drivex Corp.	513-474-5100
OR	Beaverton, Halbar Assoc.	503-226-0451
SC	Rock Hill, Johnson Sls.	803-366-3015
TN	Knoxville, Stephenson Controls & Sys.	615-588-7474
VA	Richmond, Automation Indl. Control	804-741-3253
WA	Redmond, Halbar Assocs.	206-882-0990

SETRA SYSTEMS, INC., 45 Nagog Park, Acton, MA 01720, Tel: 617-263-1400, Telex: 948440; FSC No.: 53367; Empl.: 65; *Sls. Mgr.:* William R. Stern

Local Sales Offices & Reps

AL	Huntsville, Burnette Techno Metrics	205-533-9073
CA	Los Altos, Qcon, Inc.	415-941-5530
CA	Los Angeles, Dynasales Co.	213-268-1175
CO	Westminster, RMS Sls.	303-429-1111
FL	Orlando, Datarep	305-843-5224
GA	Atlanta, Craft Assocs.	404-256-0420
IL	Chicago, Data Elctrns.	312-283-0300
IN	Indianapolis, Data Elctrns.	317-359-5368
LA	Metairie, Slaton & Assocs. Inc.	504-455-3855
MA	Framingham, J. M. Lancaster Co.	617-875-8893
MI	Hazel Park, Tiby Co.	313-547-3550
MN	Plymouth, Data Elctrns.	612-559-1434
MO	St. Louis, Adelphi, Inc.	314-821-1232
NJ	Cedar Grove, KLS Assocs.	201-785-4450
NY	E. Rochester, A&D Devices	716-385-2778
OH	Cleveland, Tiby Co.	216-371-5335
OH	Tulsa, Inotek Corp.	918-622-8570
OR	Portland, McLaren, Inc.	503-297-2248
PA	Cheltenham, Stein Instrumentation	215-379-1990
TX	Dallas, Inotek Corp.	214-243-7000
TX	Houston, Inotek Corp.	713-688-7000
WA	Bellevue, McLaren, Inc.	206-454-3400

SEVEN MOUNTAINS SCI. INC., P.O. Box 650, Boalsburg, PA 16827, Tel: 814-466-6559; Empl.; 4; *Sls. Mgr.:* Josephine Chesworth

SFE TECHNOLOGIES, 1501 1st St., San Fernando, CA 91341, Tel: 213-365-9411, TWX: 910-496-1535; FSC No.: 96733; Empl.: 2000; *Sls. Mgr.:* J. Lucia; *Dist. Mgr.:* J. Lucia

SGL ELECTRONICS, 300 Harvard Ave., Westville, NJ 08093, Tel: 609-456-7300, TWX: 710-944-0758; Empl.: 60; *Sls. Mgr.:* Dan Holdstein

Local Sales Offices & Reps

AZ	Phoenix, Conductors & Dielectrics, Inc.	602-263-0042
CA	S. Pasadena, Deniston/JDA	213-289-2844
CA	San Francisco, Conductors & Dielectrics, Inc.	415-494-1044
FL	St. Petersburg, K-Square	813-381-1893
IL	Hanover Park, J. R. Ripley Assocs.	312-289-5365
MA	Newton Upper Falls, Anchor Engrg. Corp.	617-964-6205
MN	Minneapolis, Charles D. Atwater Assoc.	612-925-1672
NJ	Berkeley Heights, Cambridge Allen	201-464-0203
NY	Camillus, Ontec Elctrn. Mktg. Inc.	315-672-5626
NY	New York, Cambridge Allen Assoc.	212-592-6361
NY	Rochester, Ontec Elctrn. Mktg. Inc.	716-464-8636
NY	Wappingers Falls, Ontec Elctrn. Mktg. Inc.	914-462-7188
NC	Garner, Candor Co.	919-876-4999
OH	Akron, Augnat Assocs.	216-239-1621
OR	Portland, Conductors & Dielectrics, Inc.	503-242-1456
SC	Myrtle Beach, Candor Co.	803-448-8361
TX	Dallas, Southwest Elctrn. Inds.	214-690-9881
TX	Houston, Dunkel Elctrns. Assoc.	713-729-1670
WA	Seattle, Conductors & Dielectrics, Inc.	206-282-5032

SGL HOMALITE, Div. of SGL Inds., 11 Brookside Dr., Wilmington, DE 19804, Tel: 302-652-3686, TWX: 510-666-3450; Empl.: 70; *Sls. Mgr.:* R. L. Quell

SGL INDUSTRIES, 76 Euclid Ave, Haddonfield, NJ 08033

SGL PLASTICS, Route 248, Nazareth, PA 18064, Tel: 215-759-0280; Empl.: 60; *Sls. Mgr.:* W. Tomko

SGL PRINTED CIRCUITS, 827 Black Oak Ridge Rd., Wayne, NJ 07470, Tel: 201-835-2765; Empl.: 34; *Sls. Mgr.:* R. J. Puzo

SGL WABER®

SGL WABER, 300 Harvard Ave., Westville, NJ 08093, Tel: 609-456-5400, 800-257-8384; Empl.: 170; *Sls. Mgr.:* R. C. Waldron .... **2**•1864; **3**•1909

Local Sales Offices & Reps

AL	Huntsville, Hollingsworth & Still	205-859-5562
CA	Burlingame, Carelli-EMA	415-342-5546
CA	Gardena, Ungar Sls. Assocs.	213-538-2811
CO	Denver, Walter Engrg.	303-777-5585
FL	Miami, Hollingsworth & Still	305-431-1631
FL	Orlando, Hollingsworth & Still	305-859-9423
FL	Winter Park, Hollingsworth & Still	305-678-2858
GA	Norcross, Hollingsworth & Still	404-447-1700
HI	Honolulu, Lee Gabor Co.	808-536-2457
IL	Northbrook, Wm. M. Linz Assocs.	312-498-9600
IN	Indianapolis, Robert Milsk Co.	317-842-3400
MD	Silver Spring, David S. Linz Co.	301-593-2477
MA	Scituate, K. J. Walsh & Assocs.	617-545-3145
MI	Southfield, Robert Milsk Co.	313-354-3310
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
MO	Blue Springs, Kathrinus-Kelly-Baumhauer	816-229-0001
MO	St. Louis, Kathrinus-Kelly-Baumhauer	314-627-2400
NM	Albuquerque, C. T. Carlberg & Assocs.	505-888-3883
NY	Rochester, Warren Kaufman & Assocs.	716-266-2728
NY	Whitestone, Jack Brown Sls.	212-769-1979
NC	Kernersville, Hollingsworth & Still	919-996-4622
OH	Beachwood, Elctrn. Salesmasters	216-831-9555
OR	Beaverton, Wm. J. Purdy Co.	503-641-9373
PA	Philadelphia, David S. Linz Co.	215-379-0734
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
TX	Dallas, Forner Sls. Co.	214-241-2166
WA	Redmond, Wm. J. Purdy Co.	206-882-3144

Local Distributors

AL	Huntsville, Mock Elctrns.	205-539-2401
AZ	Phoenix, Parts Elctrn.	602-258-6476
AZ	Tucson, Inland Elect.	602-889-5301
AR	Little Rock, Carlton Bates Co.	501-562-9100
CA	Berkeley, Al Lasher's Dealer Elect.	415-843-5915
CA	Canoga Park, Sandy's Elctrn. Supp.	213-346-8353
CA	Costa Mesa, MarVac Elctrns.	714-540-3280
CA	El Monte, Claude Michael	213-696-0141
CA	Fullerton, Orvac Elctrns.	714-871-1020
CA	Gardena, California Switch & Signal	213-770-2330
CA	Glendale, Western Elctrns.	213-246-4861
CA	Hollywood, Pacific Radio Exch.	213-462-1393
CA	Hollywood, Yale Radio	213-465-3186
CA	Mountain View, Abacus Elctrns.	415-961-1500
CA	Oakland, Brill Elctrns.	415-834-5888
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Pasadena, Dow Radio	213-793-1195
CA	Riverside, Electronic Supp.	714-836-7300
CA	San Diego, Shanks & Wright	714-239-0176
CA	San Francisco, Zack Elctrns.	415-626-1444
CA	San Jose, Quement Elctrns.	408-998-5900
CA	Sunnyvale, Com-Kyl	408-734-9660
CO	Denver, Denver Wintronics	303-934-2406
CO	Denver, Elctrn. Parts	303-744-1992
CT	Stamford, Mar Le Co.	203-348-2645
CT	Waterbury, Suburban Supp.	203-757-1251
FL	Miami, Elctrn. Equip.	305-871-3500
FL	Miami, ESL Elctrn. Distrs.	305-633-6973
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	Pensacola, Grice Elctrns.	904-434-2481
GA	Atlanta, Ack Radio Supp.	404-351-6340
GA	Atlanta, Specialty Distrib.	404-873-2521
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Elk Grove Village, GBL Elctrns.	312-593-3220
IL	Niles, Joseph Elctrns.	312-297-4200
IL	Northbrook, Classic Comps.	312-272-9650
IL	Palatine, Ohm Elctrns.	312-359-5500
IL	Peoria, Klaus Radio & Elctrns.	309-691-4840
IL	Rockford, Mid-West Associated	815-962-8036
IN	East Chicago, Acro Elctrns.	312-357-1269
IN	Ft. Wayne, Ft. Wayne Elctrns.	219-423-3422
IN	Indianapolis, Meunier Elect.	317-635-3511
IN	Indianapolis, Radio Distrib.	317-257-2231
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Terre Haute, Midwest Supp. Elec.	812-232-0187
KY	Lexington, Radio Elctrn. Equip.	606-255-6661
KY	Louisville, P.I. Burks Co.	502-589-3960
KY	Louisville, Peerless Elctrn. Equip.	502-637-7674
LA	Lafayette, Ralphs of Lafayette	318-234-4507
LA	Shreveport, Industrial Elect.	318-222-9459
MD	Baltimore, Radio Elctrn. Svc. Co.	301-823-0700
MD	Baltimore, ASI Elctrns.	301-265-5100
MD	Gaithersburg, Pioneer/Wash. Elect.	301-948-0710
MD	Rockville, Capitol Radio Whlsrs.	301-881-2270
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	Lynn, Land Elec. Supp.	617-592-2220
MA	Needham, You-Do-It Elctrns.	617-449-1005
MA	Newton Upper Falls, In-Stock Prods. Co.	617-964-6200
MA	Norwood, Gerber Elctrns.	617-769-6000
MA	W. Newton, A. W. Mayer Co.	617-965-1111
MI	Ann Arbor, Wedemeyer Elect. Supp.	313-665-8611
MI	Detroit, RS Elctrns.	313-491-1012
MN	Minneapolis, Stark Elctrns.	612-332-1325
MN	Minneapolis, Electronics Ctr.	612-371-5200
MS	Jackson, Ellington Elect. Supp.	601-355-0561
MO	Kansas City, Electronic Supp. Co.	816-921-0250

MO	Kansas City, Walters Radio Supp.	816-531-7015
MO	St. Louis, Van Sickle Radio	314-621-5000
MO	St. Louis, Olive Indl. Elect.	314-863-7800
NE	Lincoln, Scott Elec. Supp.	402-466-8221
NE	Omaha, Radio Equip.	402-341-7700
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Camden, General Radio Supp.	609-964-8560
NJ	Hanover, State Elctrn. Parts	201-887-2550
NJ	Springfield, Route Elctrns.	201-467-0166
NJ	Springfield, Federated Purchaser	201-376-8900
NM	Albuquerque, Electronic Parts	505-293-6161
NM	Albuquerque, Walker Radio Co.	505-247-2288
NY	Buffalo, Summit Distrib.	716-884-3450
NY	Farmingdale, Fordham Radio	516-752-0500
NY	Hauppauge, Broadline Elctrns.	516-420-8320
NY	Hempstead, Davis Elctrns.	516-483-9200
NY	Long Island City, H. L. Dalis, Inc.	212-361-1117
NY	New York, Argil Elctrns.	212-691-8111
NY	Portchester, Wise Comps.	203-531-4880
NY	Rochester, Simcona Elctrns.	716-328-3230
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Rome, Rome Elctrns.	315-337-5400
NY	Schenectady, Adirondack Elctrns.	518-842-8350
NC	Raleigh, Southeastern Radio Supp.	919-828-2311
OH	Akron, Akron Elctrn. Supp.	216-762-8818
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cincinnati, United Radio	513-662-2610
OH	Cleveland, Pioneer-Standard Elect.	216-587-3600
OH	Cleveland, Pattison Supp.	216-441-3000
OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Dayton, Becker Elctrns.	513-226-1341
OH	Dayton, ESCO, Inc.	513-226-1133
OH	Dayton, Pioneer Elctrns.	513-236-9900
OH	Solon, Repco	216-248-8900
OH	Toledo, Warren Radio	419-248-3364
OK	Oklahoma City, Trice Whlsl. Elect.	405-524-4411
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Portland, EOFF Elec.	503-222-9411
PA	Allentown, A. A. Peters	215-434-5237
PA	Huntingdon Valley, Shap Elctrns.	215-322-7150
PA	Philadelphia, Almo Elctrns.	215-698-4000
PA	Philadelphia, Herbach & Rademan	215-426-1700
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
PA	Plymouth Meeting, Techni-Tool	215-825-4900
PA	Reading, Barbey Elctrns.	215-376-6116
RI	Providence, Wm. Dandreta & Co.	401-861-2800
SC	Charleston, Wholesale Radio Supp.	803-747-9672
TN	Chattanooga, Curle Elctrns.	615-266-4727
TN	Kingsport, Radio Elect. Supp.	615-247-8111
TN	Nashville, Electra Distrib.	615-329-3971
TN	Nashville, Randolph & Rice	615-255-5602
TX	Austin, Harrison Ind. Elctrns.	512-458-3555
TX	Corpus Christi, Douglas Elctrns.	512-883-5103
TX	Dallas, Wallace Elctrns.	214-340-0400
TX	Dallas, KA Elect. Sls.	214-634-7870
TX	Dallas, Wholesale Elect. Supp.	214-824-3001
TX	Ft. Worth, Sweico	817-335-6521
TX	Houston, City Electronic Supp.	713-621-1060
TX	Houston, Electrotex	713-941-7016
TX	Houston, Harrison Ind. Elctrns.	713-652-4700
TX	Houston, Lenert Co.	713-225-1465
TX	San Antonio, Sherman Elect. Supp.	512-224-1001
UT	Salt Lake City, Standard Supp.	801-486-3371
VA	Arlington, Arlington Elctrn.	703-524-2412
VA	Portsmouth, Distributors	804-399-2446
VA	Richmond, Avec Elctrns.	804-359-6071
VA	Roanoke, Peoples Radio & TV Supp.	703-342-8933
WA	Seattle, Radar Elect.	206-282-2511
WI	Madison, Satterfield Elctrns.	608-257-4801
WI	Milwaukee, Marsh Elctrns.	414-475-6000

SGS-ATES SEMICONDUCTOR CORP., 240 Bear Hill Rd, Waltham, MA 02154, Tel: 617-890-6688, Telex: 923495; Empl.: 9000

SHALLCO, Box 1089, Smithfield, NC 27577, Tel: 919-934-3135, TWX: 510-939-1479; Empl.: 35; *Sls. Mgr.:* M. D. Sutton .... **1B•1744-1747; 3•1052, 1053**

Local Sales Offices & Reps

CA	Chatsworth, WCV/RALTECH	818-700-0933
CA	Santa Clara, Fischer Assocs.	408-733-7350
IL	Northfield, Imex	312-446-8934
IA	Cedar Rapids, S & O Sls.	310-393-1845
KS	Shawnee Mission, Tech. Sls.	913-888-3330
MD	Towson, Holden Engrg. Sls.	301-823-3763
MA	Norwood, MPS Elctrn.	617-769-8700
MN	Minneapolis, R. J. Inc.	612-866-3661
MO	Ferguson, Tech. Sls.	314-725-5361
NY	Lynbrook, HLJ	516-599-2999
NY	Manhattan, Lothar Sanford Corp.	212-757-3881
NY	Pittsfield, D. Hurley Sls.	716-586-6159
OH	Englewood, Allen Nace Co.	513-836-0931

Local Distributors

FL	Jacksonville, Southeast Elctrns.	904-356-3007
MI	Grand Rapids, Audio Distrib.	616-452-1596
NY	Lynbrook, Peerless Radio	516-593-2121
OH	Cincinnati, United Radio	513-761-4030
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
TN	Bristol, Broadcast Equip. & Supp.	615-878-2531
TX	Dallas, Wholesale Elctrns.	214-824-3001
Can	Montreal, Que., Braydon Electro	514-332-5650

SHALLCROSS, INC., See RCL-Shallcross

SHALLTRONIX CORP., Preston St., P.O. Box 235, Selma, NC 27576, Tel: 919-965-6346; FSC No.: 58258; *Sls. Mgr.:* Joe Deans .... **3•1299**

Local Sales Offices & Reps

TX	Arlington, Electronic Prod. Reps.	817-467-0377

SHAPE MAGNETRONICS, INC., 901 DuPage Ave., Lombard, IL 60148, Tel: 312-620-8394, TWX: 910-991-2352; *Sls. Mgr.:* J. Hilgenberg .... **3•1910, 1911**

SHAPIRO SCIENTIFIC INST., 3500 E. Coast Hwy., Corona del Mar, CA 92625, Tel: 714-675-1024; Empl.: 7

SHELLY associates

SHELLY ASSOCIATES, INC., 2942 Dow Ave., Tustin, CA 92680, Tel: 714-544-9970, TWX: 910-595-1589; FSC No.: 00303; Empl.: 30; *Sls. Mgr.:* Chuck Feeney .... **1B•1096**

Local Sales Offices & Reps

CA	Mountain View, Leddy Assocs.	415-969-6313
CA	Redondo Beach, Vedax, Inc.	213-540-1255
CT	Madison, Eastronix, Inc.	203-421-4514
FL	Ft. Lauderdale, Reynolds & Assocs.	305-581-6611
FL	Melbourne, Reynolds & Assocs. Inc.	305-259-7000
FL	St. Petersburg, Reynolds & Assocs.	813-360-1384
GA	Acworth, Reynolds & Assocs. Inc.	404-451-9558
IL	Downers Grove, Splon Assocs. Inc.	312-963-7011
IN	Ft. Wayne, Scott Elctrns.	219-484-7865
IN	Indianapolis, Scott Elctrns. Inc.	317-897-9976
KS	Shawnee Mission, Florence and Meyer, Inc.	913-722-5210
LA	Covington, HBT Assocs. Inc.	504-892-4045
MA	Bedford, Eastronix	617-275-5775
MI	Lake Orion, C C Elctrns. Inc.	313-338-7400
MN	Edina, Splon Assocs. Inc.	612-927-6744
NJ	Boonton, TMA	201-263-2946
NY	Port Washington, TMA	516-883-2432
NC	Spring Hope, Reynolds & Assocs. Inc.	305-259-7000
OH	Cincinnati, Scott Elctrns.	513-791-2513
OH	Cleveland, Scott Elctrns. Inc.	216-473-5050
OH	Dayton, Scott Elctrns. Inc.	513-294-0539
OH	Reynoldsburg, Scott Elctrns.	614-863-1281
PA	Pittsburgh, Scott Elctrns.	412-963-6116
PA	Wynnewood, Metz-Benham Assocs.	215-896-7300
TX	Dallas, Tag Techn. Sls.	214-986-0568
TX	Irving, Tag Tech. Sls.	214-253-1310
UT	Salt Lake City, Sunbird Inds. Inc.	801-272-1303
VT	Shelburne, Eastronix, Inc.	802-985-3743

Local Distributors

CA	Anaheim, Bisco Inds. Inc.	714-635-0380
CA	San Jose, Bisco Inds. Inc.	408-946-8980
CT	Norwalk, Park Distrs. Inc.	203-853-2010
CT	Wallingford, Midstate Elctrns. Co.	203-265-9900
IL	Franklin Park, Bisco Inds. Inc.	312-451-1230
MA	Chelmsford, Pilgrim Elctrns.	617-251-8746
MA	Woburn, Elctrn. Packaging Comps.	617-935-0400
NJ	Cranford, Garden State Indl. Elctrns.	201-272-6400
NJ	East Brunswick, Brothers Elctrns.	201-238-2200
NJ	Fair Lawn, Relay Specialties	201-797-3313
NJ	Saddle Brook, Tide Elctrns.	201-794-9660
NY	Elmsford, White Plains Elctrl. Supp. Co.	914-592-9555
OH	Strongsville, Roberts Elctrns. Co., Inc.	216-238-1711
OK	Tulsa, Radio, Inc.	918-587-9123
TX	Dallas, Wilkinson Brothers Co.	214-941-9963
WI	Mequon, Lakeview Elctrns.	414-377-8250

SHIELDING TECHNOLOGY, INC., 120 Ethel Rd. West, Piscataway, NJ 08854, Tel: 201-985-8800, TWX: 710-480-6297; *Sls. Mgr.:* Mason Carter

SHINANO KENSHI CORP. (SKC), 7525 Ethel Ave., Ste. 1, N. Hollywood, CA 91605, Tel: 818-764-4266; Empl.: 5; *Sls. Mgr.:* William F. Dowis .... **1B•1181**

Local Sales Offices & Reps

CA	North Hollywood, Shinano Kenshi Corp.	818-764-4266
CA	Santa Clara, Logan Sales	408-496-0660
CO	Denver, Tech Rep Sls. Co.	303-758-7031
CT	Madison, SIR Assocs.	203-245-2242
FL	Orlando, Irby & Connolly Inc.	305-894-8471
IL	Barrington, Richard Fisk Mktg.	312-381-0653
MA	Bedford, SIR Assocs.	617-275-5550
MI	Southfield, Fred Gehrke & Assoc.	313-559-5363
MN	Eagan, J. Jorgenson & Assoc.	612-452-9541
NJ	Hatboro, PA, Electro Rep	215-674-4421
NJ	Oxford, Malin Assocs.	201-689-7398
NY	Rochester, The Robert F. Lamp Co.	716-323-1250
NC	Greenville, Ranico Representatives	615-639-7696
OK	Richardson, TX, Precision Technology Assocs.	214-234-8071
OR	Portland, Intertech Sls.	503-775-7885
TN	Greenville, Lamons Sales Co.	615-639-8711
TX	Austin, Precision Technlg. Assocs.	512-250-0201
TX	Fort Worth, Gene Moody Entprs.	817-572-1068
TX	Houston, Precision Technlg. Assocs.	713-463-6801
TX	Richardson, Precision Technlg. Assoc.	214-234-8071
WA	Seattle, Rep West	206-283-8351

Local Distributors

CA	N. Hollywood, Digilog Devices	818-764-9777

SHOGYO

SHOGYO INTL. CORP., 287 Northern Blvd., Great Neck, NY 11021, Tel: 516-466-0911, Telex: 4758024, TWX: 12218 .... **1A•2055, 2263; 1B•1097; 2•1562-1564, 2150; 3•1054, 1348, 1349**

SHOKAI FAR EAST LTD., 280 North Central Ave., Hartsdale, NY 10530, Tel: 914-681-0700, Telex: 22-4219; Empl.: 362; *Sls. Mgr.:* Martin N. Rubin .... **3•1055**

SHOW 'N TELL PRODUCTS, AMG, Inc., 155 Franklin Street, Dayton, OH 45402, Tel: 513-223-8211; *Sls. Mgr.:* Jon A. Bloyd

SHUGART ASSOCS., 475 Oakmead Pkwy., Sunnyvale, CA 94086, Tel: 408-733-0100, TWX: 910-339-9355; Empl.: 3000; *Sls. Mgr.:* Gary Galusha; *Dist. Mgr.:* Gary Galusha

SHURE BROS., 222 Hartrey Ave., Evanston, IL 60204, Tel: 312-866-2200, Telex: 72-4381, TWX: 910-231-0048; *Sls. Mgr.:* R. T. Murphy, Sales Manager

SHURITE METERS, INC., 577 Grand Ave., P.O. Box 1848, New Haven, CT 06508, Tel: 203-624-1188; Empl.: 30; *Sls. Mgr.:* Joseph V. LeBlanc; *Dist. Mgr.:* Joseph V. LeBlanc

Local Sales Offices & Reps

AZ	Tempe, Gassner & Clark Co.	602-968-9037
CA	Los Angeles, Modco	213-848-2215
CA	Sunnyvale, W. W. Posey Co.	408-746-0771
CO	Denver, Nelson	303-295-1017
FL	Longboat, R. S. Cushing	813-383-1770
IL	Park Ridge, Bob Burns & Assoc.	312-823-9360
IN	Indianapolis, Sukup & Cox	317-253-5501
IA	Des Moines, The Beams Co.	515-255-1148
MI	E. Detroit, Jack M. Thorpe	313-779-6363
MN	Minneapolis, Lestronix	612-926-8466
NJ	Belleville, D. F. Tobias & Co.	201-751-8680
NY	Rochester, H. C. Johnson Agen.	716-586-0777
NC	Raleigh, B. T. Funderburk	919-782-3493
OH	Cincinnati, John O. Olsen	513-574-7711
PA	Ardmore, John Wurtz	215-649-6300
RI	Lincoln, Adams-McGregor	401-726-1300
TX	Dallas, Crockett Sls.	214-350-3377
WA	Seattle, Don Smith Sls.	206-633-3160

SIDEREAL CORP., 9600 S.W. Barnes Rd., Portland, OR 97225, Tel: 503-297-5531, Telex: 36-0640, TWX: 910-464-6139; *Sls. Mgr.:* Jim Miller & Jeff Gretz; *Dist. Mgr.:* Joy Sakata

SIECOR CORP., Box 489, Hickory, NC 28603, Tel: 704-328-2171, Telex: 800-510, TWX: 510-934-1204; Empl.: 600; *Sls. Mgr.:* J. English

SIEMENS COMPS., INC., Optoelectronics Div., 19000 Homestead Rd., Cupertino, CA 95014, Tel: 408-257-7910, Telex: 352084, TWX: 910-338-0022; FSC No.: 50579; Empl.: 1100; *Sls. Mgr.:* Gary Durgin; *Dist. Mgr.:* Merv Stamberger

SIEMENS CORP., 186 Wood Ave., S., Iselin, NJ 08830, Tel: 201-494-1000, TWX: 710-998-0588; Empl.: 800

SIEMENS CORP., Colorado Comps. Div., 800 Hoyt St., Broomfield, CO 80020, Tel: 303-469-2161, Telex: 45-4357; Empl.: 373; *Sls. Mgr.:* Bill Hacker

Sierracin/Magnedyne

SIERRACIN/MAGNEDYNE, 2258 Rutherford Rd., P.O. Box 458, Carlsbad, CA 92008, Tel: 619-438-3321, Telex: 910 322-1391; Empl.: 190 .... 1B•1178, 1179

Local Sales Offices & Reps

AL	Huntsville, L & D Inc.	205-837-1469
CA	Campbell, Luscombe Engrg. Co.	408-370-2020
CA	Laguna Beach, Comar Co.	619-540-1219
CA	Torrance, Carl J. Aguirre	213-375-9485
CA	W. Los Angeles, Mike McNeil	213-478-6942
FL	Ft. Lauderdale, Electrocomp Assocs.	305-491-4141
GA	Atlanta, L & D Inc.	404-455-3483
IL	Rolling Meadows, KMA Sls. Co.	312-398-5300
MD	Churchville, Atlantic Tech. Sls.	301-879-2236
MN	St. Paul, North Star Motion & Controls	612-770-5311
NJ	Paramus, Carnes Diamond Assocs.	201-967-1309
NY	Centerport, Carnes Diamond Assocs.	516-261-8100
NY	Pittsford, Controlled Motion Prods. Co.	716-381-1933
NC	Greensboro, L & D Inc.	919-292-3201
OH	Cleveland, Servo-Mark	216-871-2353
PA	King of Prussia, Rivco January	215-265-5211
TX	Dallas, Thorson Co.	214-233-5744
WI	Milwaukee, KMA Sls. Co.	414-259-1771

Sierracin/Power Systems

SIERRACIN/POWER SYSTEMS, 20500 Plummer St., Chatsworth, CA 91311, Tel: 818-998-9873, TWX: 910-494-4830; FSC No.: 58999; Empl.: 450; *Sls. Mgr.:* Nick Freyling; *Dist. Mgr.:* Nick Freyling .... 3•1768-1770

Local Sales Offices & Reps

AZ	Tempe, Chapman Assocs.	602-894-6775
CA	San Diego, Interstate Mktg.	619-292-8117
CA	Santa Clara, Fahner-Miller	408-727-9800
CA	Woodland Hills, Interstate Mktg.	818-883-7606
CT	Guilford, Whitehead Assoc.	203-453-3762
FL	Altamonte Springs, Semtronic Assocs.	305-831-8233
FL	Clearwater, Semtronic Assocs.	813-461-4675
FL	Ft. Lauderdale, Semtronics	305-730-2484
IL	Rolling Meadows, Sumer, Inc.	312-991-8500
IA	Cedar Rapids, Comstrand	319-377-1575
KS	Merriam, Midwest Tech. Sls.	913-236-8555
KS	Wichita, Midwest Tech. Sls.	316-262-7240
KY	Louisville, KW Elctrn. Sls.	502-451-1860
MA	Lynnfield, Whitehead Assoc.	617-246-5070
MI	Novi, Lektronics	313-349-3304
MN	Minneapolis, Comstrand	612-788-9234
MO	St. Charles, Midwest Tech. Sls.	314-441-1012
NJ	Ridgewood, Hansen & Hughes	201-652-7055
NY	Mendon, Tech-Mark, Inc.	716-624-3840
NC	Raleigh, J & B Sls.	919-878-8600
OH	Dayton, K. W. Elctrn. Sls.	513-890-2150
OH	Shaker Heights, K. W. Elctrn. Sls.	216-491-9177
OH	Worthington, K. W. Elctrn. Sls.	614-888-0483
OR	Beaverton, Wm. J. Purdy Co.	503-641-9373
PA	Allison Park, K. W. Elctrn. Sls.	412-487-4300
PA	Huntingdon Valley, Omega Elctrn. Sls.	215-947-4135
TN	Tullahoma, J & B Sls.	615-455-7487
VA	Alexandria, Scott Data	703-765-7901
WA	Seattle, Wm. J. Purdy Co.	206-284-8020
WI	Brookfield, Sumer, Inc.	414-784-6641

Local Distributors

AL	Huntsville, Hall-Mark	205-837-8700
AZ	Phoenix, Hall-Mark	602-243-6601
CA	Chatsworth, Priority One	818-709-5464
CA	Citrus Heights, Hall-Mark	916-722-8600
CA	Costa Mesa, FLW	714-751-7512
CA	El Segundo, Hall-Mark	213-643-9101
CA	San Diego, FLW	619-277-0993
CA	San Diego, Hall-Mark	619-268-1201
CA	Sunnyvale, Hall-Mark	408-773-9990
CA	Tustin, Hall-Mark	714-669-0681
CO	Englewood, Hall-Mark	303-694-1662
FL	Clearwater, Hall-Mark	813-530-4543
FL	Ft. Lauderdale, Hall-Mark	305-971-9280
FL	Orlando, Hall-Mark	305-855-4020
FL	Tampa, Reptron	813-855-4656
GA	Norcross, Hall-Mark	404-447-8000
IL	Arlington Hgts., Reptron Elctrns.	312-593-7070
IL	Bensenville, Hall-Mark	312-860-3800
KS	Lenexa, Hall-Mark	913-888-4747
MD	Columbia, Hall-Mark	301-988-9800
MI	Grand Rapids, Calder Elctrns.	616-949-2900
MI	Livonia, Reptron Elctrns.	313-525-2700
MN	Bloomington, Hall-Mark	612-854-3223
MO	Maryland Hgts., Hall-Mark	314-291-5350
NJ	Cherry Hill, Hall-Mark	609-424-7300
NJ	Fairfield, Hall-Mark	201-575-4415
NY	Ronkonkoma, Hall-Mark	516-737-0600
NC	Raleigh, Hall-Mark	919-872-0712
OH	Cincinnati, Hall-Mark	513-563-5980
OH	Englewood, Argent/Electra	513-836-8633
OH	Solon, Hall-Mark	216-349-4632
OH	Solon, REH Elctrns.	216-248-1636
OH	Westerville, Hall-Mark	614-891-4555
OK	Tulsa, Hall-Mark	918-665-3200
OR	Wilsonville, Zepher Ind.	503-682-2929
PA	Pittsburgh, ATI/Electra	412-821-5565
TX	Austin, Hall-Mark	512-258-8848
TX	Dallas, Hall-Mark	214-341-1147
TX	Houston, Hall-Mark	713-781-6100
WA	Seattle, Zepher Ind.	206-241-1980
WI	Oak Creek, Hall-Mark	414-761-3000

SIERRACIN/THERMAL SYS., 13920 S. Broadway, Los Angeles, CA 90061, Tel: 213-321-4350, TWX: 910-346-6774; FSC No.: 11416; Empl.: 175

SIERRA ELEC., See Pass & Seymour, Inc.

SIGMA INSTRS., 170 Pearl St., Braintree, MA 02184, Tel: 617-843-5000, Telex: 94-0645, TWX: 710-348-1161; Empl.: 1,500

SIGMA INSTRS., Intl. Instr. Div., 88 Marsh Hill Rd., Orange, CT 06477, Tel: 203-795-4711, Telex: 714-465-2897; Empl.: 150; *Dist. Mgr.:* J. Connolly

SIGMA-NETICS, INC., One Washington Ave., Fairfield, NJ 07006, Tel: 201-227-6372

SIGMA PLASTRONICS, 14531-33 Tireman Ave, Dearborn, MI 48126, Tel: 313-846-4410; Empl.: 10; *Sls. Mgr.:* S. J. Hirshfield

SIGMAPOWER, INC., 20790 Leapwood Ave., Carson, CA 90746, Tel: 213-32-Sigma; FSC No.: 55196; Empl.: 61; *Sls. Mgr.:* Bill Adams

SIGMA SYSTEMS CORP., 3163 Adams Ave., San Diego, CA 92116, Tel: 619-283-3193; Empl.: 14; *Sls. Mgr.:* T. Stewart .... 3•1179

SIGNAL SYS. INTL., P.O. Box 198, Holmdel, NJ 07733, Tel: 201-741-1120; Empl.: 7; *Sls. Mgr.:* D. Roy

SIGNAL TRANSFORMER, 500 Bayview Ave., Inwood, NY 11696, Tel: 516-239-4510, Telex: 96-8112, TWX: 510-225-8440; FSC No.: 08779; Empl.: 280; *Sls. Mgr.:* G. Carlin .... 1A•2267-2279

Direct sales only. Inwood, NY 516-239-4510 or 516-239-7200

SIGNATRON, 12 Hartwell Ave., Lexington, MA 02173, Tel: 617-861-1500, Telex: 955329XTLSRVC ATTN:SIGNATRON; FSC No.: 59371; Empl.: 120; *Sls. Mgr.:* Joseph T. McNamara

SIGNETICS, 811 E. Arques Ave., Sunnyvale, CA 94086, Tel: 408-739-7700, TWX: 910-339-9220; Empl.: 6000; *Sls. Mgr.:* J. Luke; *Dist. Mgr.:* J. Abram

SIGNUM SYS., 726 Santa Monica Blvd., Santa Monica, CA 90401, Tel: 213-451-5382; Empl.: 7

SILICON DETECTOR CORP., 855 Lawrence Dr., Newbury Park, CA 91320, Tel: 805-498-6737, Telex: 182229; *Sls. Mgr.:* F. W. Sullivan

Local Sales Offices & Reps

MA	Holden, Poulin Assocs.	617-829-6948
NC	Fayetteville, Zimtec	919-485-2222
OH	Cleveland, Geotronix Inc.	216-526-2535
VA	Fairfax, Beacon North	703-591-1300

SILICON GENERAL, 11651 Monarch St., Garden Grove, CA 92641, Tel: 714-892-5531, Telex: 692-411, TWX: 910-596-1804; FSC No.: 34333; Empl.: 150; *Sls. Mgr.:* Joe Castellano; *Dist. Mgr.:* Larry Baumgardner

Local Sales Offices & Reps

AL	Huntsville, R. O. Whitesell and Assoc.	205-883-5100
AZ	Phoenix, I.S.D.S.	602-971-6250
CA	Cupertino, Thresum Assoc.	408-996-9889
CA	Los Angeles, I.S.D.S.	213-478-0183
CA	San Diego, I.S.D.S.	619-571-1544
CA	Santa Ana, I.S.D.S.	714-973-2162
CA	Woodland Hills, I.S.D.S.	213-883-7130
CO	Littleton, Lange Sls.	303-795-3600
FL	Clearwater, H.H.P	813-797-4447
FL	Ft. Lauderdale, H.H.P.	305-971-5750
FL	Maitland, H.H.P.	305-831-2474
GA	Norcross, Glen White Assoc.	404-441-1447
ID	Boise, N. R. Schultz	208-377-8686
IL	Rolling Meadows, Sumer	312-991-8500
IN	Ft. Wayne, R. O. Whitesell and Assoc.	219-432-5591
IN	Indianapolis, R. O. Whitesell and Assoc.	317-359-9283
IN	Kokomo, R. O. Whitesell and Assoc.	317-457-9127
IA	Cedar Rapids, Rep Assoc.	319-373-0152
KS	Overland Park, PMR	913-381-0004
KS	Wichita, PMR	316-684-4141
KY	Louisville, R. O. Whitesell and Assoc.	502-426-7696
MD	Baltimore, Conroy Sls.	301-296-2444
MI	Grand Rapids, R. O. Whitesell and Assoc.	616-942-5420
MI	Southfield, R. O. Whitesell and Assoc.	313-559-5454
MI	St. Joseph, R. O. Whitesell and Assoc.	616-983-7337
MN	Minneapolis, Comstrand	612-788-9234
MO	Maryland Hgts., PMR	314-569-1220
NH	Nashua, Bell Controls	603-882-6984
NJ	Cherry Hill, Danco Elect. Sls.	609-424-5590
NJ	Teaneck, R. T. Reid Assocs.	201-692-0200
NM	Albuquerque, Straube Assoc.	505-292-0428
NY	Rochester, Ontec	716-464-8636
NC	Raleigh, Glen White Assoc.	419-787-7023
OH	Cincinnati, R. O. Whitesell and Assoc.	513-521-2290
OH	Cleveland, R. O. Whitesell and Assoc.	216-447-9020
OH	Columbus, R. O. Whitesell and Assoc.	614-888-9396
OH	Dayton, R. O. Whitesell and Assoc.	513-298-9546
OK	Tulsa, Ion Associates Inc.	918-664-0186
OR	Beaverton, N. R. Schultz	503-643-1644
PA	Pittsburgh, R. O. Whitesell	412-963-6161
TN	Greeneville, R. O. Whitesell and Assoc.	615-639-6154
TX	Austin, Ion Associates Inc.	512-346-7160
TX	Grand Prairie, Ion Associates Inc.	214-647-8225
TX	Houston, Ion Associates Inc.	713-977-4354
UT	Salt Lake City, Lange Sls.	801-478-0843
VA	Lynchburg, Glen White Assoc.	804-237-6291
WA	Bellevue, N. R. Schultz	206-454-0300
WI	Brookfield, Sumer	414-784-6641

SILICONIX, INC., 2201 Laurelwood Rd., Santa Clara, CA 95054, Tel: 408-988-8000, TWX: 910-338-0227; Empl.: 1000; *Sls. Mgr.:* Walter Senges; *Dist. Mgr.:* Richard Otsuka

SILICON SENSORS, Hwy. 18 East, Dodgeville, WI 53533, Tel: 608-935-2707, Telex: 910-997-0072; FSC No.: 54822; Empl.: 26; *Sls. Mgr.:* Robert L. Bachner

SILICON SYSTEMS INC., 14351 Myford Rd., Tustin, CA 92680, Tel: 714-979-0941, TWX: 910-595-2809; Empl.: 92; *Sls. Mgr.:* Jim Meyer

SILICON TRANSISTOR CORP., Katrina Rd., Chelmsford, MA 01824, Tel: 617-256-3321, TWX: 710-343-0576; FSC No.: 07256; Empl.: 150; *Sls. Mgr.:* William A. Schromm; *Dist. Mgr.:* William A. Schromm

SILONEX INC., 331 Cornelia St., Plattsburgh, NY 12901, Tel: 518-561-3160, TWX: 610-421-3362; Empl.: 140; *Sls. Mgr.:* Carol Larsen .... 1B•1233

Local Sales Offices & Reps

AL	Huntsville, Glen White Assocs.	205-883-7938
CA	Arcadia, Van Gott & Assocs.	213-445-9728
CA	San Mateo, Service Inds.	415-573-1816
CT	North Branford, LJM Assocs.	203-488-4244
IL	Rolling Meadows, Hill Sls. Corp.	312-259-5190
KS	Overland Park, Kebco	913-541-8431
MD	Timonium, Glen White Assocs.	301-252-6360
MA	Topsfield, RFC Assocs.	617-887-8545
MI	Farmington, Amtech Reps.	313-474-8300
MN	Bloomington, Northport Engrg.	612-854-5556
MO	St. Louis, Kebco	314-576-4111
NJ	Fairfield, T. J. Saes Inc. of N.J.	201-667-5900
TX	Dallas, J. Clay Co.	214-350-1281
VA	Lynchburg, Glen White Assocs.	804-237-6291
WA	Kent, R&R Elctrn. Assoc.	206-251-5396

SILTRAN DIGITAL, 2250 Monterey Rd., Atascadero, CA 93422, Tel: 805-466-3209; *Sls. Mgr.:* M. F. Hordeski

SILTRONICS LTD., P.O. Box 456, Dover, MA 02030, Tel: 617-329-4068; Empl.: 55; *Sls. Mgr.:* G. Urban

SILVERED ELECTRONIC MICA CO., INC. (SEMCO), Route 6 N. Windham Rd., Williamantic, CT 06226, Tel: 203-423-6316

SIMCO CO., 2257 North Penn Rd., Hatfield, PA 19440, Tel: 215-822-2171, Telex: 846130; Empl.: 71; *Sls. Mgr.:* Merle Roberts

Local Sales Offices & Reps

AZ	Tempe, Foley, Tallent & Lee	602-894-2345
CA	Anaheim, Simco Co.	714-632-9512
CA	Camarillo, C. C. Stevens & Assoc.	805-484-5819
CA	Santa Clara, Dryden Engrg.	408-727-7321
FL	Clearwater, Marketiers Corp.	813-443-4302
GA	Atlanta, John R. Davis, Inc.	404-955-5600
GA	Gainesville, Simco Co.	404-869-3515
IL	Aurora, Dwight Smith & Assocs.	312-896-9501
IN	Columbus, Bildico, Inc.	812-342-3721
MA	North Billerica, Julie Assocs.	617-667-1958
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PA	King of Prussia, Elctrn. Mktg. Assocs.	215-265-1600
PA	Philadelphia, Elctrn. Mktg. Assocs.	215-248-5050
PA	Pittsburgh, WKM Assocs.	412-892-2953
PA	Plymouth Meeting, Elctrn. Mktg. Assocs.	215-828-7400
SC	Columbia, Saber Assocs.	800-327-0853
TX	Austin, Barnhill Assocs.	512-451-0217

TX	Houston, Barnhill Assocs.	713-688-9971
TX	Richardson, Barnhill Assocs.	214-231-2573
UT	Murray, Barnhill Assocs.	801-262-3000
VA	Norfolk, Elctrn. Mktg. Assocs.	804-461-8133
VA	Richmond, Elctrn. Mktg. Assocs.	804-320-8801
WA	Redmond, Northwest Test & Meas.	206-881-8857

SONIC INTERNATIONAL CORP., 2515 N.E. Riverside, Portland, OR 97211, Tel: 503-665-0187, Telex: 36-0325; Empl.: 130

Sonnenschein

SONNENSCHEIN BATTERIES INC., 525 New Britain Ave., Unionville, CT 06085, Tel: 203-677-5846, Telex: 710-4238 723; *Sls. Mgr.:* Robert McCarthy ....**3**•1431

Local Sales Offices & Reps

AL	Huntsville, Raycom, Inc.	205-859-2017
CA	Anaheim, Impact Elctrns.	714-533-1351
CA	Milpitas, Lee-Allan Assoc.	408-946-8300
CO	Golden, J. F. Hurlbut Co.	303-279-7796
CT	Bethel, G/M Assocs.	203-744-1426
CT	Manchester, G/M Assocs.	203-646-4443
FL	Melbourne, Raycom, Inc.	305-259-7988
IL	Park Ridge, Metcom Assocs. Corp.	312-696-1490
MA	Framingham, G/M Assocs.	617-872-4871
MI	Southfield, R. C. Merchant & Co.	313-354-4300
MI	St. Joseph, R. C. Merchant & Co.	616-983-7378
MN	St. Paul, Arkco Sls.	612-777-7454
MO	Florissant, Web Assocs/Elctrns.	314-921-5720
NH	Exeter, G/M Assocs.	603-778-7472
NJ	Linden, C. E. Kite Assocs.	201-925-1899
NY	Huntington, Registration Elec. Supp.	516-266-2808
NC	Raleigh, Raycom, Inc.	919-847-8276
OH	Chesterland, KT/Depko	216-729-3588
TX	Austin, Delta Comps.	512-458-4288
TX	Seagoville, Delta Comps.	214-287-6333
WA	Portland, Harry Levinson Co.	503-245-1902
WA	Seattle, Harry Levinson Co.	206-382-1300
WI	West Allis, Metcom Assocs. Corp.	414-476-1300

SONICOR INSTRUMENT CORP., 1365 Marconi Blvd., Copiague, NY 11726, Tel: 516-842-3344, Telex: 649494; FSC No.: 31605; *Sls. Mgr.:* Arthur Liers; *Dist. Mgr.:* Arthur Liers

SONOBOND, 200 E. Rosedale Ave., West Chester, PA 19380, Tel: 215-696-4710, Telex: 834511; Empl.: 50; *Sls. Mgr.:* John Harper

SONY CORP. OF AMERICA, Component Prods. Div., 15 Essex Road, Paramus, NJ 07652, Tel: 201-368-5000

SORENSEN CO., 676 E. Island Pond Rd., Manchester, NH 03103, Tel: 603-668-4500, Telex: 94-3459, TWX: 710-220-1339; Empl.: 850; *Sls. Mgr.:* Roy Allman

SORENSON LIGHTED CONTROLS, 75 Locust St., Hartford, CT 06114, Tel: 203-527-3092, TWX: 710-425-4093; Empl.: 100; *Sls. Mgr.:* Tom D'Allesantro ....**1B**•1102, 1103

Local Sales Offices & Reps

CA	Anaheim, Galaxie Sls.	714-752-1580
CA	Mt. View, Del Bucchia & Assoc.	415-965-8045
CT	Hartford, Atlantic Switch Co.	203-527-7705
FL	Lakeland, Switch Controls	813-644-7564
IL	Wheaton, Chadra-Schilke	312-653-8126
IN	Fort Wayne, Menze Sls.	219-747-5616
MA	Canton, Comtek Assoc.	617-828-2948
MI	Birmingham, Favco	313-644-0173
MN	Edina, Monroe/Hanna	612-566-1324
MO	Clayton, Mertens Co.	314-993-6600
NJ	Marlton, Naudain Assoc.	609-596-1562
NY	Great Neck, Pacent Eng. Co.	516-482-4678
NY	Roslyn Heights, November Elctrn. Sls.	516-621-6378
NC	Raleigh, Rick Hadley	919-362-4099
TX	Dallas, Texaswitch	214-357-1768
WA	Mercer Island, Elctrn. Comp.	206-232-9301

Local Distributors

CA	Los Angeles, Electric Switches	213-660-1310
CA	Tustin, Western Switches	714-731-4333
CA	Van Nuys, Pacific Switch Controls	213-873-4802
CO	Denver, Waco Elctrns.	303-371-4370
CT	Hartford, Atlantic Switch Controls	203-527-7705
FL	Lakeland, Switch Controls	813-644-7564
GA	Augusta, Dixie Elctrns.	404-722-2055
IL	Wheaton, Conectrix	312-653-1460
MI	St. Clair Shores, Specialties Mfg.	313-771-2700
MN	Minneapolis, Carl Berquist	612-835-2322
NJ	Mt. Laurel, Jersey Switch	609-778-8190
NY	Woodside, Switches Unltd.	212-478-5000
NC	Charlotte, Dixie Elctrns.	704-377-5413
OH	Columbus, Ohio Switch	614-885-0319
SC	Columbia, Dixie Elctrns.	803-779-5332
TX	Dallas, Texaswitch	214-357-1768
EXP	NJ, Ft. Lee, Joseph Gross	201-944-3609

SOSHIN ELEC. CO., 1-18-18 Nakamagome, Ota-Ku, Tokyo, Japan, Tel: (03) 775-2111, Telex: 246-6377; Empl.: 800; *Sls. Mgr.:* N. Hiraide, Exp. & Imp. Dept. ....**1A**•1184

Local Sales Offices & Reps

NY	Commack, Arco Elctrns.	516-864-7000

Local Distributors

CA	Chatsworth, Arco Elctrns.	213-882-8707
NY	Commack, Arco Elctrns.	516-864-7000

SOURIAU, INC., 25158 Avenue Stanford, Valencia, CA 91355, Tel: 805-257-4830, Telex: 4720328, TWX: 910-495-2028; Empl.: 55; *Sls. Mgr.:* Bill Vockerath/Richard Monstein ....**2**•1566, 1567

Local Sales Offices & Reps

AL	Brownsboro, JHU Assocs.	205-536-7455
AZ	Scottsdale, Summit Sls.	602-998-4850
AR	Fort Smith, Electra Reps	501-452-4030
CA	Los Altos, Recht Assocs.	415-964-6321
CA	Los Angeles, Wiley Co.	213-666-1611
CA	San Diego, Wiley Co.	619-571-2881
CO	Westminster, D/Z Assocs.	303-429-9369
FL	Altamonte Springs, Gugel-Tuttle Assoc.	305-788-0845
GA	Atlanta, JHU Assocs.	404-634-1000
IL	Lisle, WG Controls	312-963-5954
IN	Indianapolis, CC Elctrns.	317-255-1508
MD	Ellicott City, Doss Elctrns.	301-465-1336
MA	Stow, Today Comp. Sls.	617-897-7500
MI	Lake Orion, CC Elctrns.	313-338-7400
MO	Raytown, Centech	816-358-8100
NJ	West Caldwell, Grimm Siegel Assoc.	201-575-9300
NY	Poughkeepsie, C.W. Floring & Assoc.	914-471-2973
NY	Scottsville, C.W. Floring & Assoc.	716-271-6865
NY	Syracuse, C.W. Floring & Assoc.	315-478-2149
NC	Greensboro, JHU Assocs.	919-852-9097
OH	Dayton, Dircksen & Assoc. (DESC only)	513-294-3657
OH	Galion, CC Elctrns.	419-468-4817
OR	Aloha, Venture Elctrns.	503-642-9090
PA	Glenside, PWC	215-576-0110
TN	Talbott, JHU Assoc.	615-581-4141
TX	Dallas, Electra Reps	214-387-3594
TX	Houston, Electra Reps	713-530-2208
UT	Salt Lake City, D/Z Assocs.	801-486-4233
WA	Bellevue, Venture Elctrns.	206-454-4594

Local Distributors

AL	Huntsville, Marshall Elctrns.	205-881-9235
AZ	Scottsdale, Contech Elctrns.	602-948-3330
AZ	Tempe, Marshall Elctrns.	602-968-6181
AZ	Tempe, Acacia Sls.	602-894-2874
CA	Anaheim, Compucable	714-635-7330
CA	Canoga Park, Marshall Elctrns.	818-999-5001
CA	El Monte, Marshall Elctrns.	818-442-7204
CA	Fullerton, Pyramid Elctrns. Supp.	714-773-0781
CA	Irvine, Marshall Elctrns.	714-556-6400
CA	Irvine, Acacia Sls.	714-660-0834
CA	San Diego, Marshall Elctrns.	619-578-9600
CA	San Diego, Acacia Sls.	619-565-4365
CA	Santa Ana, Norstan Elctrns.	714-540-4165
CA	Santa Clara, Pyramid Elctrns. Supp.	408-727-9810
CA	Sunnyvale, Acacia Sls.	408-745-7200
CA	Sunnyvale, Marshall Elctrns.	408-732-1100
CA	Van Nuys, Air Electro Supp.	818-988-4400
CO	Denver, Marshall Elctrns.	303-427-1818
CO	Lakewood, Acacia Sls.	303-232-2882
CT	East Haven, J V Elctrns.	203-469-2321
CT	Norwalk, Park Distrs.	203-853-2010
CT	Wallingford, Marshall Elctrns.	203-265-3822
FL	Casselberry, Afcom	305-699-9500
FL	Clearwater, Diplomat Elctrns.	813-443-4514
FL	Orlando, Marshall Elctrns.	305-841-1878
FL	Winter Park, Zebra Elctrns.	305-677-6661
GA	Norcross, Marshall Elctrns.	404-923-5750
IL	Schaumburg, Marshall Elctrns.	312-490-0155
MD	Gaithersburg, Marshall Elctrns.	301-840-9450
MD	Timonium, Zebra Elctrns.	301-252-6576
MD	White Marsh, Resco/Baltimore	301-529-0500
MA	Burlington, Marshall Elctrns.	617-272-8200
MA	Natick, Tec-con Elctrns.	617-655-9333
MI	Livonia, Marshall Elctrns.	313-525-5850
MN	Plymouth, Marshall Elctrns.	612-559-2211
MO	Kansas City, Walters Radio Supp.	816-531-7015
MO	St. Charles, Finnigan Elctrns.	314-946-6201
NJ	Fairfield, Marshall Elctrns.	201-882-0320
NJ	Maple Shade, Zebra Elctrns.	609-779-8073
NJ	Mt. Laurel, Marshall Elctrns.	609-234-9100
NM	Albuquerque, Betatron Elctrns.	505-344-2381
NM	Albuquerque, Connecting Comps.	505-345-8921
NY	Endwell, ASI	607-754-3823
NY	Endwell, Marshall Elctrns.	607-754-1570
NY	Farmingdale, Iris Elctrns.	516-420-8400
NY	Farmingdale, Resource for Elctrns.	516-420-8555
NY	Farmingdale, Midway Indl. Elctrns.	516-293-6800
NY	Hauppauge, Marshall Elctrns.	516-273-2424
NY	Port Washington, Restart Elctrns.	516-883-3500
NY	Rochester, Marshall Elctrns.	716-235-7620
OH	Cincinnati, Schuster Elec.	513-489-1400
OH	Dayton, Marshall Elctrns.	513-236-8088
OH	Solon, Marshall Elctrns.	216-248-1788
OH	Twinsburg, Schuster Elec.	216-425-8134
OK	Oklahoma City, Electro Entprs.	405-427-6591
OR	Beaverton, Acacia Sls.	503-646-3377
PA	Allentown, P.A. Peters	215-434-5237
PA	Norristown, Comp. Entprs.	215-272-7900
TX	Addison, Connec/Tek	214-239-7552
TX	Austin, Marshall Elctrns.	512-458-5654
TX	Dallas, Target Elctrns.	214-788-0761
TX	Dallas, Marshall Elctrns.	214-233-5200
TX	Grand Prairie, Dial Supp.	214-647-2371
TX	Houston, Marshall Elctrns.	713-789-6600
TX	Sugarland, Connec/Tek	713-491-2566
UT	Salt Lake City, Diplomat Elctrns.	801-486-4134
WA	Bellevue, Marshall Elctrns.	206-747-9100
WA	Seattle, Radar Elec.	206-282-2511

SOUTHCO, INC., Concordville, PA 19331, Tel: 215-459-4000, Telex: 83-1485, TWX: 710-760-1715; *Sls. Mgr.:* R. W. Dougherty

SOUTHERN COMPUTER CORP., 3720 N. Stratford Rd. N.E., Atlanta, GA 30342, Tel: 404-231-5363; *Sls. Mgr.:* Raymond F. Marley; *Dist. Mgr.:* Robert Morris

SOUTHERN ELECTRONICS, F-Dyne, 726 So. Flower St., Burbank, CA 91502, Tel: 213-845-2458, TWX: 910-498-5707; Empl.: 100; *Sls. Mgr.:* Ron Head

SOUTH SHORE METAL PRODS., 88 E Allen Blvd., Farmingdale, NY 11735, Tel: 516-249-3322; Empl.: 30; *Sls. Mgr.:* A. G. Bauer

SOUTHWEST TECH PRODS CORP., 219 W. Rhapsody, San Antonio, TX 78216, Tel: 512-344-0242; Empl.: 34

SPACE ELECTRONICS, INC., Box 2166, Meriden, CT 06450, Tel: 203-235-7755; Empl.: 16; *Sls. Mgr.:* Richard Boynton

SPACE POWER ELCTRNS., Jeffrey Lane, RD 1, Glen Gardner, NJ 08826, Tel: 201-537-2184

SP AMERICA INC., Shin-Etsu Polymer, 1754 Technology Dr., Ste. 128, San Jose, CA 95110, Tel: 408-947-0311, TWX: 910-338-2229; *Sls. Mgr.:* R. L. Bucholtz

SPARKOMATIC, Rte. 6 & 209, Milford, PA 18337, Tel: 717-296-6444, TWX: 510-260-2682; Empl.: 300; *Sls. Mgr.:* Robert Schuler

SPEC, INC., 3014 N. Hayden Rd., Ste. 115, Scottsdale, AZ 85251, Tel: 602-994-1511; *Sls. Mgr.:* James J. Edwards

SPECIALIZED ELCTRN. MAGNETIC PRODS., 272 Loudon Ridge Rd. Route 8, Loudon, NH 03301, Tel: (603) 267-6892; *Sls. Mgr.:* Grant D. Avery

SPECIALTY CONNECTOR CO., 2620 Endress Place, Greenwood, IN 46141, Tel: 317-535-5353

SPECO DIV., Components Specialties, Inc., P.O. Box 624, 1172 Rte. 109, Lindenhurst, NY 11757, Tel: 516-957-8700, 800-645-5516, Telex: 96-7754; Empl.: 33; *Sls. Mgr.:* Mel Hulkower; *Dist. Mgr.:* Stan Hulkower

SPECTRACOM, 320 N. Washington St., Rochester, NY 14625, Tel: 716-381-4827; Empl.: 12

SPECTRAGRAPHICS CORP., 10260 Sorrento Valley Rd., San Diego, CA 92121, Tel: 619-450-0611; Empl.: 100

SPECTRAL DYNAMICS DIV., Scientific-Atlanta, Box 671, San Diego, CA 92112, Tel: 619-268-7100, TWX: 910-335-2022; Empl.: 600; *Sls. Mgr.:* Robert N. Saunders

SPECTRA LUX CORP., 12840 N.E. 21 St. Pl., Bellevue, WA 98005, Tel: 206-747-0560; FSC No.: 51896; *Sls. Mgr.:* Ron Bustad

SPECTRAN CORP., Hall Rd., P.O. Box 650, Sturbridge, MA 01566, Tel: 617-347-2261; FSC No.: 6V569; Empl.: 25

SPECTRAN INSTRUMENTS, INC., Box 891, La Habra, CA 90631, Tel: 213-694-3995

SPECTRA SONICS, 3750 Airport Rd., Ogden, UT 84403, Tel: 801-392-7531; Empl.: 35

SPECTRA-STRIP, 7100 Lampson Ave., Garden Grove, CA 92642-0415, Tel: 714-892-3361, TWX: 910-596-1314; Empl.: 300; *Sls. Mgr.:* Jerry Campbell

SPECTRO EQUIPMENT, INC., 6021 Royalton Rd., N. Royalton, OH 44133, Tel: 216-237-8910; Empl.: 25

SPECTROLAB, INC., 12500 Gladstone Ave., Sylmar, CA 91342, Tel: 213-365-4611, TWX: 910-496-1488; Empl.: 250

SPECTROL ELCTRNS., 17070 East Gale Ave., City of Industry, CA 91749, Tel: 818-964-6565, TWX: 910-584-1314; Empl.: 600; *Sls. Mgr.:* R. Shackelford ....**1A**•2056-2062

Local Sales Offices & Reps

AL	Huntsville, Beacon Sls.	205-881-5031
AZ	Phoenix, Thom Luke Sls.	602-941-1901
CA	San Diego, Hadden Assoc.	619-565-9444
CA	Santa Clara, I²	408-988-3400
CA	Ventura, Astralonics	805-653-5991
CO	Denver, Spectrum Sls.	303-696-1601
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Clearwater, Beacon Sls.	813-796-2378
FL	Ft. Lauderdale, Beacon Sls.	305-491-1054
IL	Downers Grove, Momak Sls.	312-963-6400
IA	Hiawatha, Gassner & Clark	319-393-5763
KS	Shawnee Mission, Lowell-Kangas	913-631-3515
MD	Baltimore, Component Sls.	301-484-3647
MA	Burlington, Kitchen & Kutchin	617-229-2660
MI	Livonia, Luebbe Sls.	313-477-3131
MN	St. Paul, Murnco	612-484-8200
MO	St. Louis, Lowell-Kangas	314-821-4050
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NY	Commack, E.R.A.	516-543-0510
NY	Liverpool, Precision Sls.	315-451-3480
NY	Syracuse, L Mar	315-437-7779
NC	Raleigh, Beacon Sls.	919-787-0330
OH	Cincinnati, Luebbe Sls.	513-891-5770
OH	Cleveland, Luebbe Sls.	216-333-0425
OH	Columbus, Luebbe Sls.	614-431-0474
OH	Dayton, Luebbe Sls.	513-294-0426
OR	Beaverton, Barrett-Squibb & Assocs.	503-642-1661
PA	Pittsburgh, R. F. Clark	412-242-9500
TX	Dallas, Allied Comps.	214-238-0408
TX	Houston, Allied Comps.	713-988-1600
TX	Hurst, Allied Comps.	817-589-0456
WA	Redmond, Barrett-Squibb & Assocs.	206-885-6991

SPECTRON CORP., 344 New Albany Rd., Moorestown, NJ 08057, Tel: 609-234-5700, Telex: 83-1488, TWX: 710-897-1359

SPECTRONICS CORP., 956 Brush Hollow Rd., Westbury, NY 11590, Tel: 516-333-4840, TWX: 510-222-5877; *Sls. Mgr.:* Henry K. Lee; *Dist. Mgr.:* James J. Weglarz

SPECTRONICS, DIV. HONEYWELL, See Honeywell Optoelctrns.

SPECTRUM CONTROL, INC., 8061 Avonia Rd., Fairview, PA 16415, Tel: 814-474-1571

SPECTRUM CONTROL, INC., 2185 W. 8th St., Erie, PA 16505, Tel: 814-455-0966, TWX: 510-699-6871; FSC No.: 33095; Empl.: 450; *Sls. Mgr.:* R. Greer; *Dist. Mgr.:* C. Pirro ....**1A**•1625-1627; **2**•1569-1573

Local Sales Offices & Reps

CA	Sunnyvale, Spectrum Control	408-735-9015
CA	Valencia, Spectrum Control	805-257-2280
MA	Chelmsford, Spectrum Control	617-256-3565
NJ	Brielle, Spectrum Control	201-528-8420
NJ	Fairfield, Pantronics	201-575-1177
NY	New York, Landseas	212-265-8323
TX	Irving, Spectrum Control	214-251-1669
EXP	PA, Erie, Spectrum Control	814-455-0966

Local Distributors

CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Torrance, Cypress Elctrns.	213-533-6005
FL	Dania, Summit Distrs.	305-920-6253
IL	Chicago, Newark Elctrns.	312-638-4411
NJ	Perth Amboy, Metuchen Capacitors	201-442-0500
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Rochester, Summit Distrs.	716-334-8110
OH	Dayton, Aschbacher	513-252-7785
TX	Addison, Captronics	214-980-0123
TX	Austin, Captronics	512-459-4328
TX	Houston, Captronics	713-776-2100
Intl	Australia, Rifa	03-480 1211
Intl	Denmark, E.V.J. Johanssen Elektronics	01-839022
Intl	Eng., Birmingham, Steatite Insulations	021 454-6961-2
Intl	France, Gentilly, Radio Television Franchise S.A.	664.11.01
Intl	Israel, Tel-Aviv, Landseas, Ltd.	247291-4
Intl	Japan, Tokyo, Jepico	Tokyo (03) 348-0621/0622
Intl	Netherlands, Zaandam, Bodamer Intl. BV	075-351521
Intl	Norway, H.C.A. Melbye/AS	02-106050
Intl	S. Africa, Bryanston, Taltronics Pty. Ltd.	618-2014/5
Intl	Sweden, Farsta, Traco AB	08-93-0960
Intl	Switzerland, Ebmatingen, EME, Ernst Egli	01-980-11-11
Intl	W. Germany, Ettlingen, Bodamer GmbH	(07243) 79263
Intl	W. Germany, Hamburg, Bodamer GmbH	(040) 7111091
Intl	W. Germany, Munchen, Bodamer GmbH	(089) 641801

SPECTRUM TECHNOLOGY, INC., 300 Lopez Rd., Goleta, CA 93116, Tel: 805-964-7791, TWX: 910-334-1163; FSC No.: 32464; Empl.: 100; *Sls. Mgr.:* Wm. L. Bishop ....**1A**•1426, 1427

Local Sales Offices & Reps

AZ	Tempe, Sedco Sls.	602-835-6281
AZ	Tucson, Sedco Sls.	602-298-1758
CA	Culver City, Westaironics	213-641-4122
CA	San Jose, Frequency Control Assocs.	408-446-0200
CT	Milford, Todino Engrg. Sls.	203-874-6643
FL	Ft. Myers, Rainbow Sls.	813-332-2210
FL	Melbourne, Rainbow Sls.	305-727-3305
IL	Elgin, R.K. Elctrns.	312-695-8552
MA	Needham, Todino Engrg. Sls.	617-444-7925
NJ	Haddonfield, Mesa Tech. Assocs.	609-429-9531
NM	Albuquerque, I.M.E.C.	505-883-9010
NY	Huntington, Compar N.Y.	516-423-5660
OK	Tulsa, Ion Assocs.	918-664-0186
TX	Austin, Ion Assocs.	512-458-2108
TX	Grand Prairie, Ion Assocs.	817-640-8282
TX	Houston, Ion Assocs.	713-461-5311
VA	Fairfax, Schibley Assocs.	703-591-3008

Spellman
High Voltage Electronics Corporation

SPELLMAN HIGH VOLTAGE ELCTRNS. CORP., 7 Fairchild Ave., Plainview, NY 11803, Tel: 516-349-8686, TWX: 510-221-2155; Empl.: 175; *Sls. Mgr.:* James R. Usher ....**3**•1774-1776

Local Sales Offices & Reps

CA	El Cajun, Atronics	619-444-1501
CA	Woodland Hills, Atronics	213-703-7212
FL	Orlando, Gra-Mar, Inc.	305-894-3351
MA	Concord, Nortech Engrg. Sls.	617-259-0032
MA	Medfield, Nortech Engrg.	617-359-6063
MN	St. Paul, Knox Assocs.	612-488-5402
TX	Dallas, Seaton Corp.	214-380-0414
TX	Houston, Seaton Corp.	713-731-2649

SPEMCO SWITCHES, 23425 Harper, St. Clair Shores, MI 48080, Tel: 800-482-2828; Empl.: 9

A.W. SPERRY
INSTRUMENTS INC.

SPERRY, A. W., INSTRS., P.O. Box 9300, Smithtown, NY 11787, Tel: 516-231-7050, Telex: 645104; Empl.: 40; *Sls. Mgr.:* Dennis W. Carroll ....**3**•1304

Local Sales Offices & Reps

AL	Birmingham, Russell Elctrn. Assocs.	205-822-2196
CA	N. Hollywood, Don Starr Co.	213-875-2766
CA	San Francisco, Flair Electro Sls.	415-864-0444
CA	Santa Fe Springs, New West Agency	213-921-6812
CO	Denver, E. O. Sales Co.	303-778-1900
FL	Longwood, Ralph Joyner Mktg.	305-339-0181
HI	Kailua, Don Thomas Assocs.	808-262-4818
IL	Chicago, Ken Levy & Assocs., Ltd.	312-763-5000
IL	Forest Park, J. K. Neuhauser Sls. Co.	312-771-7800
IN	Indianapolis, Blind & Assocs.	317-844-1314
IA	Council Bluffs, Bob Smith Co.	712-322-1233
LA	Mandeville, Corrigan Agency	504-626-5231
MD	Kensington, Forti Assocs.	301-949-1706
MA	Northboro, W. B. Pray Sls.	617-393-3434
MI	Detroit, Burcaw Co.	313-533-7700
MN	Minneapolis, Fruen's Sales	612-546-7173
MO	Kansas City, Johnson Elec. Sls. Co.	816-421-4891
NY	Buffalo, Rudell-Merrifield Assoc.	716-634-4300
NY	Oceanside, Bittan Assocs.	516-678-6222
NY	Syracuse, Electro-Lines	315-455-5701
NC	Charlotte, W. H. Lassiter	704-523-2736
OH	Chagrin Falls, Thomas R. Eby Co.	216-543-8141
OH	Columbus, Mandabach-Lehner	614-235-0265
TX	Dallas, Kopiuitz Co.	214-484-7557
TX	Ft. Worth, Chet Wells & Co.	817-284-0261
WA	Bellevue, Topp Engrg. Sls.	206-747-5400

SPERRY UNIVAC, Mini-Computer Operations, Box C-19504, Irvine, CA 92713, Tel: 714-754-6900, TWX: 910-596-1358; Empl.: 500

SPIRICON INC., 2600 North Main, Logan, UT 84321, Tel: 801-753-3729; Empl.: 5; *Sls. Mgr.:* Carlos Roundy

SPRAGUE ELEC. CO., 481 Marshall St., No. Adams, MA 01247, Tel: 413-664-4411, Telex: 92-6415, TWX: 710-369-1360; FSC No.: 56289; Empl.: 10,500; *Dist. Mgr.:* J. J. Judge

SPRAGUE ELEC. CO., Semiconductor Div., 115 Northeast Cutoff, Worcester, MA 01606, Tel: 617-853-5000, TWX: 710-340-6304; FSC No.: 56289; Empl.: 650

SPRAGUE-GOODMAN ELCTRNS., INC., 134 Fulton Ave., Garden City Pk., NY 11040, Tel: 516-746-1385, Telex: 14-4533; FSC No.: 52769; Empl.: 100; *Sls. Mgr.:* David Taub; *Dist. Mgr.:* David Taub ....**1A**•1185

Local Sales Offices & Reps

AZ	Phoenix, Sanford Sls. Assocs.	602-957-3570
CA	Burlingame, W. J. Purdy Co.	415-347-7701
CA	Los Angeles, R.F. Assocs.	213-478-1586
CA	San Diego, R. D. Miner Inc.	619-566-9891
CO	Denver, W. J. Purdy Co.	303-777-1411
FL	Pompano Beach, Cole-Tek	305-781-8110
GA	Smyrna, Spartech	404-432-3644
IL	Chicago, B.N.I. Elctrns.	312-447-0581
IN	Ft. Wayne, Denton Mktg. Inc.	219-627-5515
IA	Marion, M.S.B. Assoc.	319-377-6261
KS	Shawnee Mission, M.S.B. Assoc.	913-432-2131
MD	Pikesville, Imagitron Sls.	301-521-2020
MA	Southboro, KSA of New England	617-485-9432
MI	Jackson, Sprague Elec. Co.	517-787-3934
MN	Chanhassen, Barnes Sls. Assoc.	612-934-2907
MO	St. Charles, M.S.B. Assoc.	314-946-5577
NJ	Wayne, Richman Salesco - Kagan	201-694-1115
NY	Commack, Richman Salesco	516-543-5532
NY	Utica, Sweetco Assoc.	315-797-6721
OH	Cincinnati, Stegman Blaine Mktg.	513-729-1969
TX	Austin, Delta Comps.	512-458-4288
TX	Seagoville, Delta Comps.	214-287-6333
WA	Seattle, Sprague Elec. Co.	206-632-7761
WA	Vancouver, Sprague Elec.	206-892-0361

Local Distributors

CA	Belmont, Varitech Electronics	415-593-3300
CA	Garden Grove, National Capacitor Corp.	714-892-7749
CA	Santa Ana, Projections Unlimited	714-641-1472
IL	Skokie, Kellner Elctrns.	312-677-1120
MA	Burlington, T.L.C.	617-273-0140
MA	Needham, Cronin Elctrns.	617-449-5000
NY	Hauppauge, Prime Comps.	516-582-6258
NY	Lynbrook, Varitech Elctrns.	516-593-9300
NY	Stony Brook, Bomark Elctrns.	516-689-8999
PA	State College, ALVO Elctrns.	814-238-0505
TX	Addison, Captronics	214-980-0123
TX	Ft. Worth, PATCO Supp.	
WA	Seattle, KAM Elctrns.	206-285-5622

SPRAGUE PRODUCTS CO., 481 Marshall St., No. Adams, MA 01247, Tel: 413-664-4481, TWX: 710-369-1363; FSC No.: 56289; *Sls. Mgr.:* J. Judge; *Dist. Mgr.:* A. Bascomb, Vice President

SPRINGFIELD MOULDERS, INC., See ITT Thermotech

SPRUCE PINE MICA CO., Mtn. Laurel Dr., Spruce Pine, NC 28777, Tel: 704-765-4241; Empl.: 45; *Sls. Mgr.:* Hugh M. Wiseman

Local Sales Offices & Reps

CA	Mountain View, Straube Assocs.	415-969-6060
NC	Smithfield, Agents & Distrs.	919-934-7592

SQUARE D CO., Executive Plaza, Palatine, IL 60067, Tel: 312-397-2600, Telex: 255274; Empl.: 21100; *Sls. Mgr.:* R. A. Hegeman

SR ENGINEERING INC., 13961 Nautilus Dr., Dept. E, Garden Grove, CA 92643, Tel: 714-554-4200; FSC No.: 21441; *Sls. Mgr.:* Coleman W. Conrad

Local Sales Offices & Reps

AZ	Phoenix, Runyon Co.	602-840-6060
IA	Cedar Rapids, Howard Brown Sls. Co.	319-366-0635

SRS INDUSTRIES, INC., 903 S. Alta Vista Ave., Monrovia, CA 91016, Tel: 213-357-3287, TWX: 910-585-3486; FSC No.: 015362; *Sls. Mgr.:* John B. McCaffery

S S A C, Box 395, Liverpool, NY 13088, Tel: 315-622-1000, Telex: 646221, TWX: SSAC LIPL; FSC No.: 16-0985719; Empl.: 220; *Sls. Mgr.:* R. Shutt

STACKBIN CORP., Albion Road, Lincoln, RI 02865, Tel: 401-333-1600; Empl.: 75; *Sls. Mgr.:* J. J. Patterson

STACKPOLE (THE STACKPOLE CORP.), Stackpole St., St. Marys, PA 15857, Tel: 814-781-1234, Telex: 914-514, TWX: 510-693-4511; FSC No.: 78488

STACKPOLE, CARBON DIV., St. Marys, PA 15857, Tel: 814-781-1234, Telex: 914-514, TWX: 510-693-4511; *Sls. Mgr.:* T. M. Eynon

STACKPOLE COMPONENTS CO., 3400 Yonkers Rd., Raleigh, NC 27604, Tel: 919-828-6201, TWX: 510-928-0520, 29; *Sls. Mgr.:* Patrick J. Ryan; *Dist. Mgr.:* Tish Gibson

STACKPOLE COMPONENTS CO., Box M, Farmville, VA 23901, Tel: 804-392-4111, TWX: 510-928-0520/29; *Sls. Mgr.:* P. J. Ryan; *Dist. Mgr.:* Tish Gibson

STACKPOLE, ELECTRONIC COMPONENTS DIV., 201 Stackpole St., St. Marys, PA 15857, Tel: 814-781-1234, Telex: 914-514, TWX: 510-693-4511; *Sls. Mgr.:* D. L. Almquist

STACKPOLE, MAGNET DIV., 700 Elk Ave., Kane, PA 16735, Tel: 814-837-7000, TWX: 510-695-8360; *Sls. Mgr.:* V. D. Venigni

STACO, INC., See Staco Transpower

STACO
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STACO ENERGY PRODS. CO., 301 Gaddis Blvd., Dayton, OH 45403, Tel: 513-253-1191, Telex: 288-032, TWX: 810-459-1798; FSC No.: 83008; Empl.: 146; *Sls. Mgr.:* Robert Simpson ....1A•2280, 2281

Local Sales Offices & Reps

CA	Costa Mesa, Stacoswitch	714-549-3041
CA	Santa Clara, Thomas Assocs.	408-988-4484
CO	Denver, West, Inc.	303-692-0131
FL	Ft. Lauderdale, Hutto-Hawkins-Peregoy	305-917-5750
FL	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
GA	Atlanta, Millar Elctrn. Sls.	404-261-6160
HI	Honolulu, Elctrns. Sls. & Svc.	808-845-8207
IL	Evanston, Saffro & Assocs.	312-328-0140
IN	Indianapolis, Electronic Mktg.	317-842-4155
LA	Folsom, McKinney Sls. Co.	504-796-5861
MA	Lexington, Hathaway Elctrns.	617-861-7010
MN	St. Paul, SKOR	612-645-6461
MO	Kansas City, J. O. Schmitz	816-363-3414
NM	Albuquerque, C. T. Carlberg & Assocs.	505-265-1579
NY	Alexander, B. F. Tollefson Assocs.	716-591-1219
NY	Auburn, B. F. Tollefson Assocs.	315-253-4109
NY	Rochester, B. F. Tollefson Assocs.	716-271-4141
NY	Valley Stream, Levison Sls. Co.	516-561-9696
NC	Raleigh, Millar Elctrns.	919-787-9564
OH	Dayton, Dircksen & Assoc.	513-294-3657
OH	Dayton, Rockford Controls	513-898-5452
OH	Euclid, Rockford Controls	216-731-5250
OK	Tulsa, McKinney Sls. Co.	918-492-8882
OR	Portland, James J. Backer	503-297-3776
OR	Salem, Jas. J. Backer	503-362-0717
PA	Flourtown, Eastern Comps.	215-836-1616
PA	Stuartstown, Eastern Comps. Sls.	717-993-3288
PA	York, Eastern Comps.	717-764-3114
TX	Bellaire, McKinney Sls. Co.	713-444-3817
TX	Dallas, McKinney Sls. Co.	214-631-9450
VA	Herndon, Eastern Comps.	703-471-1025
WA	Seattle, James J. Backer	206-285-1300
WI	Lake Mills, Saffro & Assocs.	414-648-2605
EXP	FL, Hialeah, West Indes Sls. Co., Ltd.	305-888-1676
EXP	NY, New York, Allied Intl.	212-986-3222

STACOSWITCH, 1139 Baker St., Costa Mesa, CA 92626, Tel: 714-549-3041, TWX: 910-595-1507; FSC No.: 12522; Empl.: 100; *Sls. Mgr.:* D. Sugg

Local Sales Offices & Reps

AL	Huntsville, 20th Century Mktg., Inc.	205-533-9281
CA	San Jose, Snyder Sls.	408-559-4444
CO	Golden, J. F. Hurlbut Co.	303-279-7796
CT	Marion, Sands Co.	203-628-4363
FL	Orlando, EMA, Inc.	305-671-6800
GA	Stone Mountain, 20th Century Mktg., Inc.	404-292-7088
IL	Oak Brook, MSL Assoc.	312-655-8977
IN	Richmond, EMA, Inc.	513-433-2800
IA	Cedar Rapids, H. R. Brown Sls.	319-366-0635
KS	Kansas City, B-C Elctrn. Sls.	913-342-1211
MD	Silversprings, Youth & Nelson	301-598-5740
MA	Woburn, Sands Co.	617-935-7495
MI	Livonia, Lowell-Wendt Mktg. Co.	313-464-2722
MO	St. Louis, B-C Elctrn. Sls.	314-731-1255
NJ	Wayne, G.T. Assocs.	201-694-6040
NY	Syracuse, Lenard Co.	315-479-9191
OH	Cleveland, C.A. Robinson Co.	216-381-9049
OH	Dayton, C.A. Robinson	513-278-7969
OR	Portland, Frank Jackson Assoc.	503-292-2638
PA	Media, W. Reeves Assocs.	215-566-6709
TN	Knoxville, 20th Century Mktg., Inc.	615-690-1618
TX	Austin, Delta Comps.	512-458-4288
TX	Dallas, Delta Comp.	214-358-4288
TX	Houston, Delta Comps.	713-664-6777
UT	Salt Lake City, J. F. Hurlbut Co.	801-973-4443
WA	Redmond, Frank Jackson Assoc.	206-881-7277

STACO
TRANSPOWER

STACO TRANSPOWER, 301 Gaddis Blvd., Dayton, OH 45403, Tel: 513-253-1191, Telex: 288-032, TWX: 810-459-1798; FSC No.: 83008; Empl.: 100; *Sls. Mgr.:* T. D. McNulty ....1A•2283

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Scottsdale, Power Specialists	602-996-4100
CA	Buena Park, Chuck Cooper Co.	714-739-8526
CA	Los Altos, Frauman Assoc.	415-941-0660
CT	Natick, Benchmark Assoc.	617-899-3390
GA	Atlanta, Remco	404-447-6937
KY	Cinci, Tri-State Mktg.	513-761-7993
MA	Natick, Benchmark Assocs.	617-655-9333
MI	Southfield, Fred Gehrke & Assocs.	313-559-5363
MN	Arlington Hgts., Diethert-Angel	312-593-7600
MN	Minneapolis, Diethert Angel	612-546-6099
NJ	King of Prussia, Freeman-Malta Assoc.	215-337-9211
NJ	Mountain Lakes, Levison Sls. Co. Inc.	201-334-2921
NY	Illion, Noeth-Honsinger Assoc.	315-894-9943
NY	Pittsford, Noeth-Honsinger Assoc.	716-586-9002
NY	Valley Stream, Levison Sls.	516-561-9698
NC	Raleigh, Remco	919-847-5079
OH	Cleveland, Marlow Assocs.	216-991-6500
OH	Columbus, Marlow Assocs.	614-885-7643
PA	Pittsburgh, Marlow Assocs.	412-367-8886
UT	Salt Lake City, Aspen Sales	801-467-2401
WI	Menomonee Falls, Walter M. Braun & Assocs.	414-251-8685

STAFFALL INC., 7 Woodland St., Providence, RI 02908, Tel: 401-351-8282, TWX: 710-381-6964; Empl.: 25

STAINLESS, INC., 3rd St., N. Wales, PA 19454, Tel: 215-699-4871, TWX: 510-661-8097; Empl.: 80; *Sls. Mgr.:* Jess C. Rodriguez

STANCOR/HAMILTON STANDARD CONTROLS, 131 Godfrey St., Logansport, IN 46947, Tel: 219-722-2244, TWX: 810-295-0699; FSC No.: 80089; *Sls. Mgr.:* Hubert Daubs.......1A•2284-2292: 1B•1474

Local Sales Offices & Reps

AZ	Scottsdale, Thom Luke Sls.	602-941-1901
CA	San Diego, Haddeu Assoc. Inc.	619-565-9444

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CO	Colorado Springs, Norris & Warren Assoc.	303-576-8697
GA	Atlanta, Beacon Elctrns.	404-256-9640
IL	Glenview, Reigel Assoc.	312-729-3824
IN	Indianapolis, Electronic Reps. Inc.	317-894-1414
IA	Cedar Rapids, Gassner & Clark	319-393-5763
KS	Shawnee Mission, Lowell Kangas & Assoc. Inc.	913-631-3515
MD	Baltimore, Component Sls.	301-484-3647
MA	Needham Heights, Newscott Co., Inc.	617-444-1923
MI	East Detroit, Jack M. Thorpe Co.	313-779-6363
MN	St. Paul, Murnco	301-833-2039
NJ	Haddonfield, Sunday O'Brien	609-429-4013
NY	Commack, Engineering Reps. Assoc.	516-543-0510
NY	Liverpool, Precision	315-451-3480
OH	Cincinnati, Luebbe Sls. Co.	513-891-5770
PA	Pittsburgh, Russell F. Clark Co.	412-242-9500
TX	Dallas, Allied Comps. Inc.	214-238-0408
WA	Bellevue, B & P Sls.	206-454-6571

STANDARD CONDENSER CORP., 1065 W. Addison St., Chicago, IL 60613, Tel: 312-327-5440

STANDARD ENERGY, Div. WBH Scientific, Inc., Rte, 32, Greenville, NY 12083, Tel: 518-966-4197, Telex: 754180 ....3•1777-1779

STANDARD ENGRG., 44800 Girmmer, Fremont, CA 94538, Tel: 415-657-7555, TWX: 910-381-6048; Empl.: 40

STANDARD ENVIRONMENTAL SYSTEMS, INC., 383 Minnisink Rd., Totowa, NJ 07512, Tel: 201-256-2200, TWX: 710-988-5722; Empl.: 50

STANDARD GRIGSBY, INC., 920 Rathbone Ave., Aurora, IL 60507, Tel: 312-844-4300, TWX: 910-232-3138; Empl.: 350; *Sls. Mgr.:* Ed Barry; *Dist. Mgr.:* Bob Lynch ....**1B**•1626, 1627

Local Sales Offices & Reps

AL	Huntsville, L. & D., Inc.	205-837-1469
AZ	Tempe, Piper Sls.	602-949-0048
CA	Laguna Hills, Jack Fitch & Assocs.	714-951-0196
CA	Milpitas, Maxim Elctrn. Sls.	408-946-6001
CT	East Haven, Eagle Assocs.	203-467-6542
FL	Casselberry, Southern Elctrn. Mktg.	305-695-3335
FL	Clearwater, Southern Elctrn. Mktg.	813-441-3902
FL	Ft. Lauderdale, Southern Elctrn. Mktg.	305-475-3686
GA	Dunwoody, L. & D., Inc.	404-455-3483
IN	Ft. Wayne, Wilson Tech. Sls.	219-424-5299
IN	Indianapolis, Wilson Tech. Sls.	317-298-3345
IA	Cedar Rapids, Rep Assocs.	319-373-0152
MI	Ann Arbor, R. L. Rowe & Assocs.	313-995-8711
MI	Livonia, Luebbe Sls. Co.	313-477-3131
MN	St. Paul, Murnco	612-484-8200
NJ	Mountain Lakes, Comps. For Elctrns.	201-334-2921
NM	Ithaca, L-Mar Assoc.	607-256-5712
NY	E. Syracuse, L-Mar Assoc.	315-437-7779
NY	East Northport, Comps. for Elctrncs.	516-266-5020
NY	Rochester, L-Mar Assoc.	716-323-1000
NY	W. Seneca, L-Mar Assoc.	716-675-1277
NC	Greensboro, L. & D., Inc.	919-292-3201
NC	Raleigh, L. & D., Inc.	919-876-5301
OH	Cincinnati, Luebbe Sls.	513-891-5770
OH	Cleveland, Luebbe Sls.	216-333-0424
OH	Columbus, Luebbe Sls.	614-431-0464
OH	Dayton, Luebbe Sls.	513-294-0427
OK	Broken Arrow, Design Mktg.	918-258-8656
OR	Aloha, Micro Sls.	513-642-1818
PA	Feasterville, Knowles Assocs.	215-322-7100
PA	Pittsburgh, Luebbe Sls.	412-931-0414
TN	Seymore, L. & D., Inc.	615-557-1549
TX	Conroe, Design Mktg.	713-273-2319
TX	Dallas, Design Mktg.	214-680-9767
TX	Hurst, Design Mktg.	817-268-2004
TX	Round Rock, Design Mktg.	512-255-9896
VA	Richmond, L. & D., Inc.	804-359-0125
WA	Bellevue, Micro Sls.	206-451-0568

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STANDARD LOGIC, 2215 S. Standard Ave., Santa Ana, CA 92707, Tel: 714-979-4770, TWX: 910-595-1707; Empl.: 150; *Sls. Mgr.:* B. L. Billington

STANDARD MICROSYSTEMS, 35 Marcus Blvd., Hauppauge, NY 11787, Tel: 516-273-3100, TWX: 510-227-8898; Empl.: 310; *Dist. Mgr.:* William Rotoli

STANDARD PNEUMATIC MOTOR, Box 10530, Reno, NV 89510, Tel: 702-329-6311, Telex: 354-467; FSC No.: 53623; Empl.: 125

STANDARD POWER, INC., 1400 S. Village Way, Santa Ana, CA 92705, Tel: 714-558-8512, TWX: 910-595-1760; Empl.: 221; *Sls. Mgr.:* Sydele M. Petch; *Dist. Mgr.:* Sydele M. Petch ....3•1780-1783

Local Sales Offices & Reps

AL	Huntsville, Electronic Mfrs. Agts.	205-830-4030
AZ	Phoenix, O'Donnell Assocs.	602-944-9542
CA	San Diego, Martronix	619-728-7678
CA	Sunnyvale, O'Donnell Assocs.	408-263-6500
CA	Torrance, Orion Sls.	213-240-3151
CT	Hartford, Sturgeon Co.	203-249-7800
FL	Altamonte Springs, WMM Assocs.	305-831-4530
FL	Clearwater, WMM Assocs.	813-442-3913
FL	Davie, WMM Assocs.	305-432-2628
FL	Indialantic, WMM Assocs.	305-773-1157
GA	Atlanta, Electronic Mfrs. Agts.	404-329-0503
IL	Elmhurst, Utronix Sls.	312-834-1100
IN	Ft. Wayne, Needler Sls.	219-447-2123
IN	Indianapolis, Needler Sls.	317-255-8056
KS	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
KY	Louisville, Needler Sls.	502-241-4046
MA	Needham Hgts., Sturgeon Co.	617-444-6603
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NY	Great Neck, Cooper-Simon & Co.	516-487-1142
NY	Syracuse, T Squared Elctrns.	315-463-8592
NY	Victor, T Squared Elctrns.	716-924-9101
NC	Pineville, Electronic Mfrs. Agts.	704-541-2628
NC	Winston-Salem, Electronic Mfrs. Agts.	919-784-7304
OH	Cleveland, Marlow Assoc.	216-991-6500
OH	Columbus, Marlow Assoc.	614-885-7643
OR	Portland, Westerberg & Assocs.	503-297-1719
PA	Pittsburgh, Marlow Assoc.	412-367-8886
PA	Prospect Park, Elf Sls.	215-534-3340
TN	Donelson, Electronic Mfrs. Agts.	615-883-1414
TX	Houston, Milco Mktg.	713-946-2841
WA	Bellevue, Westerberg & Assocs.	206-453-8881

Local Distributors

AL	Huntsville, Arrow Elctrns.	205-882-2730
AL	Huntsville, R.M. Elctrns.	205-852-1550
AZ	Phoenix, Wyle Distr. Grp.	602-249-2232
AZ	Phoenix, Kachina Elect. Dist.	602-269-6201
AZ	Phoenix, R.V. Weatherford Co.	602-272-7144
CA	Anaheim, R.V. Weatherford Co.	714-634-9600
CA	Burlingame, Rose Elctrns.	415-348-2740
CA	El Segundo, Wyle Distr. Grp.	213-322-8100
CA	Glendale, R.V. Weatherford Co.	213-849-3451
CA	Irvine, Wyle Distr. Grp.	714-641-1600
CA	Los Angeles, Arrow Elctrns.	213-701-7500
CA	Pomona, R.V. Weatherford	714-623-1261
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	San Diego, Wyle Distr. Grp.	619-565-9171
CA	San Diego, R.V. Weatherford	619-695-1700
CA	San Francisco, Arrow Elctrns.	408-745-6600
CA	Santa Barbara, R.V. Weatherford Co.	805-965-8551
CA	Santa Clara, Wyle Distr. Grp.	408-727-2500
CA	Sunnyvale, R.V. Weatherford Co.	408-738-8694
CA	Tustin, Arrow Elctrns.	714-838-5422
CO	Denver, Arrow Elctrns.	303-758-2100
CO	Denver, R.V. Weatherford Co.	303-428-6900
CO	Thornton, Wyle Distr. Grp.	303-457-9953
CT	Wallingford, Sager Elect.	203-265-4600
CT	Wallingford, Arrow Elctns.	203-265-7741
FL	Ft. Lauderdale, Hammond Elctrns.	305-973-7103
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Melbourne, Arrow Elctrns.	305-725-1480
FL	Orlando, Hammond Elctrns.	305-849-6060
GA	Atlanta, Hammond Elctrns.	404-524-7502
GA	Norcross, Arrow Elctrns.	404-449-8252
HI	Honolulu, Industrial Elctrns.	808-533-6095
IL	Addison, LComp-Chicago	312-628-1400
IL	Chicago, Arrow Elctrns.	312-893-9420
IL	Lombard, RM Elctrns.	312-932-5150
IN	East Chicago, Acro Elctrns.	219-397-8681
IN	Ft. Wayne, Graham Elect. Supp.	219-423-3422
IN	Indianapolis, Advent Elctrns.	317-872-4910
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IN	Indianapolis, RM Elctrns.	317-247-9701
IN	Lafayette, Graham Elect. Supp.	317-423-5564
IA	Cedar Rapids, Iowa Radio Supp. Co.	319-393-4510
IA	Cedar Rapids, Arrow Elctrns.	319-395-7230
KS	Wichita, L Comp Inc.	316-265-5100
KS	Wichita, Radio Inc.	316-264-2798
LA	Marrero, AFG Elctrn. Supp.	504-368-9696
LA	New Orleans, Radio Parts	504-581-5959
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Baltimore, Resco/Baltimore	301-823-0070
MD	Beltsville, Resco	301-937-9100
MD	Beltsville, Treeko Sls.	301-937-8260
MA	Hingham, Sager Elec. Supply	617-749-6700
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Grand Rapids, R.S. Elctrns.	616-241-3483
MI	Grand Rapids, RM Elctrns.	616-531-9300
MI	Kalamazoo, R.S. Elctrns.	616-381-5470
MI	Livonia, R.S. Elctrns.	313-525-1155
MI	Roseville, R.S. Elctrns.	313-779-2450
MI	Wynadotte, R.S. Elctrns.	313-282-5880
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minneapolis, Northern Elctrns.	612-944-1167
MO	Kansas City, LComp-Kansas City	816-221-2400
MO	Maryland Hgts., LComp-St. Louis	314-291-6200
MO	St. Louis, Van Sickee Radio Supp.	314-621-5000
MO	St. Louis, Arrow Elctrns.	314-567-6888
NE	Lincoln, Scott Elec. Supp.	402-466-8221
NH	Manchester, Arrow Elctrns.	604-668-6968
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Farmingdale, Arrows Elctrns.	516-694-6800
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Mt. Vernon, QAR Ind'l. Sls.	914-699-2224
NY	Rochester, Arrow Elctrns.	716-275-0300
NY	Rochester, Rochester Radio Supp. Co.	716-454-7800
NY	Syracuse, Arrow Elctrns.	315-652-1000
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Cincinnati, Graham Elctrn. Supp.	513-772-1661
OH	Cincinnati, Hughes-Peters	513-351-2000
OH	Cleveland, CAM/Ohio	216-461-4700
OH	Cleveland, Arrow Elctrns.	216-248-3990
OH	Columbus, Graham Elctrn. Supp.	614-895-1590
OH	Columbus, Hughes-Peters	614-294-5351
OH	Dayton, Arrow Elctrns.	513-435-5563
OH	Dayton, Esco, Inc.	513-226-1133
OH	Toledo, R.S. Elctrns.	419-893-0721
OK	Oaklahoma City, Radio Inc.	405-789-0741
OK	Tulsa, Radio Inc.	918-587-9123
OR	Lake Oswego, Rose Elctrns.	503-635-8823
OR	Portland, Wyle Distr. Grp.	503-640-6000
PA	Drexel Hill, Kass Elctrns.	215-449-2300
PA	Pittsburgh, CAM/RPC Ind'l. Elctrns.	412-782-3770
PA	Pittsburgh, Arrow Elctrns.	415-856-7000
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Knoxville, Hammond Elctrns.	615-691-3491
TN	Nashville, Graham Elctrn. Supp.	615-242-2682
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Corpus Christi, Douglas Elctrns.	512-883-5103
TX	Dallas, R.V. Weatherford	214-931-7333
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	El Paso, ERA Elctrns.	915-592-4126
TX	Houston, R.V. Weatherford Co.	713-688-7406
TX	Houston, Arrow Elctrns.	713-491-4100
UT	Salt Lake City, Wyle Distr.	801-974-9953
UT	Salt Lake City, Bell Inds.	801-972-6969
UT	Salt Lake City, Arrow Elctrns.	801-539-1135
WA	Bellevue, Wyle Distr. Grp.	206-453-8300
WA	Bellevue, Arrow Elctrns.	206-643-4800
WA	Seattle, R.V. Weatherford Co.	206-575-1340
WI	Madison, Arrow Elctrns.	608-273-4977
WI	Mequon, Taylor Elec. Co.	414-241-4321

STANDARD REFERENCE LABS, INC., Coan Pl., Metuchen, NJ 08840, Tel: 201-549-9280, TWX: 710-998-0503; FSC No.: 57114; Empl.: 5; *Sls. Mgr.:* Dennis M. Koep; *Dist. Mgr.:* Dennis M. Koep ....3•1305

Local Sales Offices & Reps

AZ	Scottsdale, Williams Assocs.	602-947-4297
CA	San Diego, Mesa Engrg.	619-278-8037
CA	Torrance, Cutlas Elctrns.	213-324-7360
CO	Commerce City, Williams Assocs.	303-289-5647
FL	Winter Haven, Lee Assocs., Florida	813-294-5815
IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-924-3568
IA	Cedar Rapids, Marsland Assocs.	319-296-8030
MD	Wheaton, Brimberg Sls.	301-946-2670
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	St. Louis, Marsland Assocs.	314-878-2404
NM	Albuquerque, Williams Assocs.	505-255-1638
NY	Binghamton, Tae-Rep	607-722-9265
NY	Rochester, Tae-Rep	716-586-8710
UT	Salt Lake City, Williams Assocs.	801-532-7701
WA	Portland, Westcon	503-283-0132
WI	New Berlin, Marsland Assoc.	414-786-6611

STANDARD WIRE & CABLE CO., 2345 Alaska Ave., El Segundo, CA 90245, Tel: 213-536-0006, Telex: 65-3423, TWX: 910-340-6758; FSC No.: 04946; Empl.: 125; *Sls. Mgr.:* J. Gaither; *Dist. Mgr.:* Jerry Gaither

STANDEX ELCTRNS., 4538 Camberwell Rd., Cincinnati, OH 45209, Tel: 513-871-3777, Telex: 212066; Empl.: 1,039; *Sls. Mgr.:* Charles C. Johnson ....**1A**•1628, 1629; **1B**•1475

STANFORD APPLIED ENGRG. INC., 3520 De La Cruz Blvd., Santa Clara, CA 95050, Tel: 408-980-1600, TWX: 910-338-0132; Empl.: 1300; *Sls. Mgr.:* Dick Hudspeth; *Dist. Mgr.:* Dick Hudspeth

Local Sales Offices & Reps

Filters/Power Devices

AL	Huntsville, K & E Assocs.	205-883-9720
AZ	Scottsdale, American Mktg.	602-948-2778
AZ	Scottsdale, F. Board Assoc.	602-994-9388
AR	Tulsa, Kemp Engrg.	918-663-4501
CA	San Diego, Vinco	619-569-6959
CA	San Diego, Stanford Applied Engrg.	619-569-6959
CA	Santa Ana, Caltronics	714-751-9162
CA	Santa Ana, Stanford Applied Engrg.	714-751-9162
CA	Santa Clara, Caltronics	408-727-7552
CO	Denver, Quorum 3: Sls. Grp.	303-696-8480
CO	Englewood, Quorum 3: Sls. Grp.	303-696-8480
FL	Osteen, Bolton Assocs.	305-321-3077
FL	Pompano Beach, Electrocraft	305-781-5778
GA	Doraville, K & E Assocs.	404-448-7025
HI	Honolulu, Adtech	808-941-0708
IL	Barrington, Stanford Applied Engrg.	312-382-6960
IL	Wheeling, P.G. Applied Sls.	312-459-5750
IN	Indianapolis, SAI Mktg.	317-241-9276
IA	Cedar Rapids, Electromec Sls.	319-362-6413
KS	Shawnee, BAKA Corp.	913-268-5065
KS	Wichita, Baka	316-262-0179
MD	Ellicot City, Arbotek Assoc.	301-461-1323
MA	Millis, Selmark Assocs.	617-376-2914
MI	Brighton, SAI Mktg.	313-227-1786
MN	Burnsville, Electromec Sls.	612-894-8200
MN	Minneapolis, Electromec Sls.	612-894-8200
NJ	Medford, Component Conslts.	609-654-5300
NJ	Perth Amboy, Astrorep, Inc.	201-826-8050
NJ	Teaneck, Norest Techn. Sls.	201-833-0061
NM	Albuquerque, Power Entprs.	505-298-1918
NY	Babylon, Astrorep, Inc.	516-422-2500
NY	Melville, Stanford Applied Engrg.	516-420-8111
NY	North Syracuse, Advanced Comp. Sls.	315-699-2671
NY	Syracuse, Pitronics	315-455-7346
NC	Raleigh, K & E Assocs.	919-781-1406
OH	Dayton, SAI Mktg.	513-435-3181
OH	Shaker Heights, SAI Mktg.	216-751-3633
OH	Zanesville, SAI Mktg.	614-454-8942
OK	Tulsa, Kemp Engrg.	918-663-4501
OR	Beaverton, Huntley Assocs.	503-649-5288
TN	Jonesboro, K & E Assocs.	615-753-2921
TX	Austin, Mech-Tron Mktg.	512-835-0980
TX	Dallas, Mech-Tron Mktg.	214-343-3786
TX	Houston, Mech-Tron Mktg.	713-462-1432
UT	Salt Lake City, Quorum 3: Sls. Grp.	801-943-7441
WA	Everett, Huntley Assocs.	206-353-1833
WA	Kirkland, Elec. Technical Sls.	206-827-8086

Interconnections & Packaging

AL	Huntsville, K & E Assocs.	205-883-9720
AZ	Scottsdale, American Mktg.	602-948-2778
AR	Tulsa, Kemp Engrg.	918-663-4501
CA	San Diego, Vinco	619-569-6959
CA	Santa Ana, Caltronics	714-751-9162
CA	Santa Clara, Caltronics	408-727-7552
CO	Boulder, Stanford Applied Engrg.	303-530-1900
CO	Denver, Quorum 3: Sls. Grp.	303-696-8480
CT	Farmington, Stanford Applied Engrg.	203-677-6046
FL	Apopka, Bohman Assocs.	305-886-1882
GA	Doraville, K & E Assocs.	404-448-7025
HI	Honolulu, Adtech, Inc.	808-941-0708
IL	Barrington, Lancastle, Ltd.	312-381-6780
IL	Wheeling, P.G. Applied Sls.	312-459-5750
IA	Cedar Rapids, Electromec Sls.	319-362-6413
KS	Shawnee, Baka	913-268-5065
KS	Wichita, Baka	316-262-0179
MD	Ellicott City, Marketing Tech	301-465-5944
MA	Lexington, Circuit Sls. Co.	612-861-0567
MN	Burnsville, Electromec Sls.	612-894-8200
MO	Ferguson, Baka Corp.	314-878-4224
NJ	Medford, Component Conslts.	609-654-5300
NJ	Perth Amboy, Astrorep, Inc.	201-826-8050
NJ	Teaneck, Noreast Techn. Sls.	201-833-0061
NM	Albuquerque, Power Entprs.	505-298-1918
NY	Babylon, Astrorep, Inc.	516-422-2500
NY	North Syracuse, Advanced Comp. Sls.	315-699-2671
NC	Raleigh, K & E Assocs.	919-781-1406
OH	Beachwood, Electronic Salesmasters	216-831-9555
OK	Tulsa, Kemp Engrg.	918-663-4501
PA	Springhouse, Deltatronics	215-542-0250
TN	Jonesboro, K & E Assocs.	615-753-2921
TX	Austin, Mech-Tron Mktg.	512-835-0980
TX	Dallas, Mech-Tron Mktg.	214-343-3786
TX	Houston, Mech-Tron Mktg.	713-462-1432
UT	Salt Lake City, Quorum 3: Sls. Grp.	801-943-7441
WA	Tukwila, General Elctrns.	206-241-7990

Local Distributors

AL	Huntsville, RM Alabama, Inc.	205-852-1550
AL	Huntsville, Component Distrs.	205-883-7501
AZ	Phoenix, Hieland Elctrns.	602-243-7171
AZ	Phoenix, Arizona Components	602-279-9446
AZ	Tempe, Time Elctrns.	602-967-2000
AZ	Tempe, Bell Industries	602-966-7800
AR	Little Rock, Component Distrs.	501-227-6278
CA	Anaheim, Time Elctrns.	714-937-0911
CA	Chatsworth, Integrated Elctrns.	213-988-2200
CA	Costa Mesa, Escot	714-557-3252
CA	Irvine, Ryno Elctrns.	714-557-5021
CA	Irvine, Ratel Elctrns.	714-549-8611
CA	Los Angeles, Connector Distbn. Corp.	213-670-2266
CA	San Diego, Ryno Elctrns.	619-292-6022
CA	San Jose, Ratel Elctrns.	408-946-4300
CA	Santa Clara, Escot	408-988-4991
CA	Santa Clara, Caltronics	408-727-7552
CA	Sunnyvale, Time Elctrns.	408-734-9888
CA	Torrance, Time Elctrns.	213-320-0880
CO	Broomfield, Escot	303-465-2346
CO	Colorado Springs, Ratel Elctrns.	303-599-9043
CO	Englewood, Industrial Elctrns.	303-694-9444
CO	Wheatridge, Bell Industries	303-424-1985
CT	Bethel, Beilind Elctrns.	203-797-8600
FL	Ft. Lauderdale, Dielco	305-973-8700
FL	Ft. Lauderdale, Time Elctrns.	305-974-4800
FL	Ft. Lauderdale, Component Distrs.	305-971-4950
HI	Honolulu, Adtech, Inc.	808-941-0708
IL	Chicago, Bell Industries	312-982-9210
IL	Lombard, RM Illinois, Inc.	312-932-5150
IL	Mt. Prospect, Magnuson	312-956-0700
IL	Wheeling, Escot	312-459-5750
IN	Indianapolis, RM Indiana, Inc.	317-247-9701
IN	Indianapolis, Magnuson	317-247-5108
MD	Savage, Pyttronic Inds.	301-953-9650
MA	Burlington, Schaal Assocs.	617-272-7940
MA	Burlington, Heilind Elctrns.	617-272-5610
MA	Woburn, Time Elctrns.	617-935-8080
MI	Grand Rapids, RM Michigan, Inc.	616-531-9300
MN	Edina, Northern Elctric. Supply	612-944-1167
MN	St. Paul, Magnuson Elctrns.	612-227-8495
MO	St. Louis, Time Elctrns.	314-391-6444
NH	Hudson, Heilind Elctrns.	603-883-9536
NJ	Oakland, Gordon/Horne Inc.	201-337-5200
NM	Albuquerque, Bell Industries	505-292-2700
NY	Buffalo, Summit Elctrns.	716-884-3450
NY	Hauppauge, Schaal Assocs.	516-234-4600
NY	Hauppauge, Time Elctrns.	516-273-0100
NY	Rochester, Modutex Corp.	716-424-1620
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Rome, Rome Elctrns.	716-337-5400
NC	Raleigh, Component Distrs.	919-781-0262
NC	South Charlotte, Elctrn. Mktg. Corp.	704-394-6195
OH	Columbus, Elctrn. Mktg. Corp.	614-299-4161
OH	Highland Heights, Elctrn. Mktg. Corp.	216-442-3441
OK	Oklahoma City, Radio Inc.	405-789-0741
OK	Tulsa, Radio Inc.	918-587-9123
OK	Tulsa, Altair	918-252-5781
OR	Oswego, Bell Industries	503-241-4115
PA	Broomall, Time Elctrns.	215-359-1200
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
PA	Pittsburgh, Pyttronic Inds.	412-276-6722
TX	Austin, Altair Co.	512-837-4490
TX	Dallas, Heilind Elctrns.	214-351-2058
TX	Dallas, RM Texas, Inc.	214-235-3100
TX	Houston, Altair Co.	713-462-3029
TX	Richardson, Altair Co.	214-231-5166
UT	Midvale, Ratel Elctrns.	810-562-2600
UT	Salt Lake City, Bell Industries	801-972-6969
WA	Bellevue, Bell Industries	206-747-1515
WA	Bellevue, Integrated Elctrns.	206-455-2727
WI	New Berlin, RM Wisconsin	414-784-4420
WI	Waukesha, Bell Industries	414-784-0235

STANFORD TELECOMMUNICATIONS, INC., 2421 Mission College Blvd., Santa Clara, CA 95050, Tel: 408-748-1010, TWX: 910-339-9531; FSC No.: 61362; Empl.: 300; *Sls. Mgr.:* J. A. Kirby

STANLEY/AC INTERFACE, 2925 College Ave., Unit A 1, Costa Mesa, CA 92626, Tel: 714-979-9830, Telex: 655328; *Sls. Mgr.:* R. D. Henwood; *Dist. Mgr.:* R. D. Henwood

STANLEY-VIDMAR, Stanley Works, 11 Grammes Rd., Allentown, PA 18103, Tel: 215-797-6600; *Sls. Mgr.:* Ernie Gitlin

STANPAT PRODS., 366 Main St., Port Washington, NY 11050, Tel: 516-883-8400; Empl.: 25

STANTON MAGNETICS, INC., Terminal Dr., Plainview, NY 11803, Tel: 516-349-0200, TWX: 510-221-1845; Empl.: 300

STANTRON DIV., 6900 Beck Ave., N. Hollywood, CA 91605, Tel: 818-875-0800, TWX: 910-499-2177; FSC No.: 06514; Empl.: 125; *Sls. Mgr.:* G. A. Tessier ....2•1055

Local Sales Offices & Reps

AZ	Phoenix, Shefler-Kahn Co.	602-257-9015
CA	Los Angeles, Landa/Minyard	213-879-0770
CA	Pleasanton, Moulthrop Sls.	415-463-0450
CO	Golden, J. F. Hurlbut Co.	303-279-7796
CT	Farmington, Ray Perron & Co.	203-673-4825
CT	Seymour, Ray Perron & Co.	203-888-4849
FL	Pompano Beach, T. G. & Assocs.	305-781-8328
FL	Tampa, T. G. & Assocs.	813-753-5632
GA	Jonesboro, Wallace Elctrn. Sls.	404-471-6297
HI	Honolulu, J.C. Elctrns.	808-841-7477
IL	Chicago, Berndt Assocs.	312-283-0713
IN	Carmel, Berndt Assocs.	317-844-0114
KS	De Soto, Midtec Assoc.	913-441-6565
MD	Ellicott City, Sci-Rep	301-321-1411
MA	Needham, Ray Perron & Co.	617-449-6162, 800-225-4280
MI	Jackson, Norwood Scroggs	517-750-1170
MN	Minneapolis, Berndt Assocs.	612-546-2021
MO	Florissant, Midtec Assocs.	314-837-5200
NH	Dover, Ray Perron & Co.	603-742-2321
NJ	Pennsauken, Sci-Rep	609-662-5222
NJ	Wayne, G.T. Assocs.	201-694-6040
NM	Albuquerque, Shefler-Kahn Co.	505-265-7049
NY	Rochester, Gislason Sls.	716-454-4741
NC	Kernersville, Wallace Elctrn. Sls.	919-996-2742
OH	Cincinnati, J. O. Olsen Co.	513-574-7711
OH	Cleveland, J. O. Olsen Co.	216-662-3454
OK	Tulsa, Barry Sls.	918-749-7775
PA	Pittsburgh, J. O. Olsen Co.	412-279-2550
TN	Chattanooga, Wallace Elctrn. Sls.	615-870-2080
TX	Austin, Barry Sls.	512-837-3616
TX	Houston, Barry Sls. Co.	713-784-5860
TX	Richardson, Barry Sls. Co.	214-234-0255
UT	Salt Lake City, J. F. Hurlbut Co.	801-973-4443
VA	Fairfax, Sci-Rep	703-385-0600
WA	Seattle, D. Smith Sls.	206-633-3160
WI	Milwaukee, Berndt Assocs.	414-545-8400

STAR MICRONICS, INC., Components Div., 70-D Ethel Rd. W., Piscataway, NJ 08854, Tel: 201-572-9512; Empl.: 120; *Sls. Mgr.:* R. Messer ....3•1056-1059, 1092, 1093

Local Sales Offices & Reps

AZ	Phoenix, MacDonald Assocs.	602-998-1848
CA	Fullerton, Groh Assoc.	714-738-7105
CA	Menlo Pk., G. R. McKnight Co.	408-942-0880
CA	San Diego, Groh Assoc.	714-738-7105
FL	Casselberry, Southern Elctrn. Mktg.	305-695-3334
FL	Fort Lauderdale, Southern Elctrn. Mktg.	
GA	Atlanta, Magaro & Assoc.	404-451-8826
IL	Elk Grove Village, Oasis Sls. Corp.	312-640-1850
IN	Carmel, Shamrock Sls.	317-848-5265
IA	Cedar Rapids, Elctrn. Innovators	319-362-2217
MD	Baltimore, Adcour	301-889-1211
MA	Sharon, Adcour	617-784-8123
MI	Southfield, Component Assoc.	313-557-3232
MN	Eden Prairie, Elctrn. Innovators	612-941-0830
NJ	Sparta, Instr. & Equip.	201-729-4293
NY	Queens, Metropolitan Sls.	212-634-3100
NC	Greensboro, Magaro & Assocs.	919-294-4783
OH	Bedford, A.S.A. Assocs.	216-662-6080
OR	Portland, Controltek Sls.	503-641-0877
TX	Houston, Repmaster-Houston	713-692-8204
TX	Richardson, McCoy Assocs.	214-238-1017
WA	Bellevue, Controltek	206-451-8163

WV	Spokane, Controltek	509-922-2971
WI	Brookfield, Oasis	414-783-6660
EXP	Markham, Lenbrook	416-477-7722

Local Distributors

CA	Costa Mesa, Marvac	714-540-3280
CA	Los Angeles, Elect. Switches	213-660-1301
CA	San Diego, Tauber Elctrns.	619-274-7242
CA	Santa Clara, Waltronics Sls.	408-727-1200
IL	Wheeling, Hawk Elctrns.	312-459-4040
MA	Sharon, Adcour	617-784-8123
MN	Minneapolis, Voyager Elctrns.	612-571-7766
NJ	Sparta, Instrument & Equip.	201-729-4293
NJ	Sparta, Instr. & Equip.	201-447-3525
NJ	Waldwick, Production Supp. & Equip.	201-447-3525
NY	Rockaway Park, Metropolitan Sls.	212-634-3100
OH	Cincinnati, United Radio Inc.	513-761-4030
OR	Portland, United Radio Supp.	503-233-7151
TX	Channelview, R. T. Henry Elctrns.	713-452-4451
TX	Houston, Copper Alarm Supp. Co.	713-868-1794
UT	Dallas, Wholesale Elctrns.	214-824-3001
WA	Bellevue, Solomon Inds.	206-643-5644
EXP	Markham, Ont., Lenbrook Elctrns.	416-477-7722

STAR PORCELAIN, 71 Muirhead Ave., Trenton, NJ 08638, Tel: 609-392-3154; Empl.: 100; *Sls. Mgr.:* Art Hobson

STAR-TRON CORP., 58 Curtis St., Providence, RI 02909, Tel: 401-274-5090, Telex: 929490; FSC No.: 32494; Empl.: 50; *Sls. Mgr.:* Anna Coski

STATEK CORP., 512 N. Main St., Orange, CA 92668, Tel: 714-639-7810, Telex: 67-8394, TWX: 910-593-1355; FSC No.: 51791; Empl.: 100; *Sls. Mgr.:* J. Ownby ...... **1A**•1429-1431

Local Sales Offices & Reps

AL	Huntsville, Mackay Smith & Assoc.	205-539-8000
AZ	Phoenix, Eltron	602-266-2164
CA	El Toro, Martronix	714-855-6397
CA	Mountain View, Weseloh/Swanson & Assocs.	415-961-0565
CA	San Diego, Mesa Engrg. & Sls. Assocs.	619-278-8021
CO	Denver, Elcom	303-337-2300
FL	Madeira Beach, MacKay, Smith & Assoc.	813-393-7144
FL	Orlando, MacKay, Smith & Assoc.	305-277-1513
GA	Norcross, MacKay, Smith & Assoc.	404-449-7444
IL	Northbrook, Raines & Assocs.	312-498-0890
IN	Fort Wayne, M/S Sls. & Assocs.	219-484-1904
IN	Indianapolis, M/S Sls. & Assocs.	317-257-8916
KS	Overland Park, Thomas L. Dowell & Assoc.	913-648-7373
MD	Baltimore, Professional Reps.	301-653-3600
MA	Woburn, Radian Assocs.	617-933-7386
MO	St. Louis, Thomas L. Dowell & Assocs.	913-648-7373
NJ	Bellmawr, TAI Corp.	609-933-2600
NJ	Manhasset, Win-Cor Elect. Sales Corp.	516-627-9474
NY	Syracuse, Pl' Tronics	315-455-7340
NC	Charlotte, MacKay, Smith & Assoc.	704-372-1188
NC	Raleigh, MacKay, Smith & Assoc.	919-851-5000
OK	Tulsa, Norcom	918-832-7747
TX	Austin, Norcom	512-451-2757
TX	Dallas, Norcom	214-386-4888
TX	Houston, Norcom	713-778-0392
UT	Salt Lake City, Elcom	801-532-7940
WA	Redmond, Halbar Assoc.	206-882-0990
WA	Vancouver, Halbar Assoc.	206-696-0170

Local Distributors

AL	Huntsville, Contact Elctrns.	205-881-9321
CA	Irvine, Ryno Elctrns.	714-261-2500
CA	Mountain View, Target Elctrns.	415-961-1170
CA	San Diego, Ryno Elctrns.	619-292-6022
FL	Longwood, Intertec	305-834-7777
IL	Palatine, OHM Elctrns.	312-359-5500
IN	Indianapolis, Mar Elctrns. Inc.	317-875-4510
MD	Columbia, Aztech Elctrns.	301-995-1760
MA	Woburn, First Frequency	617-935-3885
MO	St. Louis, Olive Elctrns.	314-426-4500
NY	Buffalo, Summit Distrs.	716-884-3450
OR	Lake Oswego, Rose Elctrn. Distrg. Co.	503-635-8823
TX	Richardson, Ewing Elctrns. Inc.	214-231-6725
WA	Seattle, Rose Elctrn. Distrbg. Co.	206-721-4997

STATE OF THE ART, INC., 2470 Fox Hill Rd., State College, PA 16801, Tel: 814-355-8004

STATIC INC., Rte. 113 & Mensch Rd., P.O. Box 80, Skippack, PA 19474, Tel: 215-584-9600, Telex: 846079; Empl.: 50; *Sls. Mgr.:* R. J. Hoffman

STAVER CO., INC., 47 Saxon Ave., Bay Shore, NY 11706, Tel: 516-666-8000, TWX: 510-227-6142; Empl.: 140; *Sls. Mgr.:* Arnold Lazarus ...... **1B**•1105

Local Sales Offices & Reps

CA	Woodland Hill, R. H. McDonald & Assocs.	213-348-3766
IL	Lombard, RMP/McBride Corp.	312-932-9090
MA	Scituate, Jack Goss	617-545-6327
MI	Ann Arbor, Elliott Sls.	313-662-4087
MN	St. Louis Park, Lestronix	612-926-8466
NH	Hancock, Eisenbeis Sls.	603-357-4892
NY	East Northport, Levison Sls. Co.	516-266-5020
NY	Manlius, Bowser & Sapecky Assocs.	315-682-8885
NC	Cary, Tom G. Santel	919-467-7595
OK	Tulsa, Jerry Robinson & Assocs.	918-492-0390
OR	Portland, J. J. Backer Co.	503-297-3776
PA	Colmar, Eastern Scientific Mktg.	215-822-0157
PA	Sewickley, T. H. Stewart Co.	412-741-8665
SC	Mauldin, Carl Hart	803-288-2323
TX	Houston, Cunningham Co.	713-461-4197
VA	Portsmouth, F.B.D. Sls.	804-484-3162
WA	Seattle, J. J. Backer Co.	206-285-1300

STD MICROSYSTEMS, 399 Sherman Ave., Palo Alto, CA 94306, Tel: 415-327-6800; *Sls. Mgr.:* Gary Whittaker; *Dist. Mgr.:* Gary Whittaker

STENNING INSTRUMENTS, INC., 671 Enchanted Way, Pacific Palisades, CA 90272, Tel: 213-459-2930; *Sls. Mgr.:* Charles Stenning

STEP ENGINEERING, P.O. Box 61166, Sunnyvale, CA 94088, Tel: 408-733-7837, TWX: 910-339-9506; Empl.: 30; *Sls. Mgr.:* Stan Trumbull

STERLING INSTR., Div. Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040, Tel: 516-328-3300, TWX: 510-223-0642; Empl.: 150

STERLING TRANSFORMER CORP., 510 Driggs Ave., Brooklyn, NY 11211, Tel: 212-782-4200; FSC No.: 97102; Empl.: 45; *Sls. Mgr.:* P. H. Odessey ...... **1A**•2293-2297

Local Sales Offices & Reps

OH	Dayton, George Lessis	513-294-1551

STETTNER ELCTRNS., 6135 Airways Blvd., Chattanooga, TN 37421, Tel: 615-892-0291, TWX: 810-573-5224; FSC No.: 52763; *Sls. Mgr.:* Ralph S. Souders

STEVENS-ARNOLD DIV., Computer Prods., Inc., 7 Elkins St., So. Boston, MA 02127, Tel: 617-268-1170, Telex: 95-1465 STEARCO, TWX: 710-339-0855; FSC No.: 80640; Empl.: 300; *Sls. Mgr.:* John T. Parent ...... **3**•1705, 1717-1724

Refer to Computer Products, Inc., Pompano Beach, Fl for sales offices and representatives and for distributor listings.

STEVENS PRODUCTS, INC., 128 N. Park St., E. Orange, NJ 07019, Tel: 201-672-2140; Empl.: 50; *Sls. Mgr.:* John Thomson

STEWARD, D. M., MFG. CO., P.O. Box 510, Chattanooga, TN 37401, Tel: 615-867-4100, Telex: 558490; Empl.: 185; *Sls. Mgr.:* Arlin Grant

STOCK DRIVE PRODS., Div. of Designatronics, Inc., 55 S. Denton Ave., New Hyde Pk., NY 11040, Tel: 516-328-0200, TWX: 510-223-0642; Empl.: 210

STOELTING CO., 1350 S. Kostner Ave., Chicago, IL 60623, Tel: 312-522-4500; Empl.: 50; *Sls. Mgr.:* D. A. Peterson

STONE CITY PRODUCTS CO., 1206 Seventh Street, Bedford, IN 47421, Tel: 812-275-3373

STORM PRODUCTS CO., 116 Shore Drive, Hinsdale, IL 60521, Tel: 312-323-9121, TWX: 910-651-0850; *Sls. Mgr.:* John W. Holland

STOW LABS., INC., Kane Ind'l. Dr., Hudson, MA 01749, Tel: 617-562-9347, Telex: 94-8330; Empl.: 15

STRATEGIC SYS. DIV. POWER SYS. OPERATIONS, GTE Prods. Corp. Sylvania Sys. Grp., 520 Winter St., Waltham, MA 02254, Tel: 617-466-3000, Telex: 951-953, TWX: 710-290-0376

STREET ELECTRONICS CORP., 1140 Mark Ave., Carpinteria, CA 93013, Tel: 805-684-4593

STROBE, INC., 897 Independence Ave., Mountain View, CA 94043, Tel: 415-969-5130

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STRUTHERS-DUNN, Lamb's Rd., Pitman, NJ 08071, Tel: 609-589-7500, TWX: 510-686-7510; FSC No.: 78290; Empl.: 700; *Sls. Mgr.:* W.L. Capewell; *Dist. Mgr.:* A. B. Kinney ...... **1B**•1477

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AZ	Phoenix, Hecht, Henscher & Assoc.	602-275-4411
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CA	Culver City, DeAngelo, Rothman & Co.	213-827-2202
CA	San Diego, Struthers-Dunn	619-560-9922
CA	Santa Clara, Mollard Mktg.	408-727-2050
CO	Denver, Lindberg Co.	303-758-9033
CT	Bloomfield, Zaslow Sls. Co.	203-242-7781
FL	Miami, Ludlum Assocs.	305-592-6524
FL	Orlando, Ludlum Assocs.	305-894-7761
GA	Tucker, Rep, Inc.	404-938-4358
IL	Glen Ellyn, Rockford Controls Co.	312-469-6016
IA	Bettendorf, BSI, Ltd.	319-355-5623
KS	Wichita, Avionics Engrg.	316-264-6201
LA	Lafayette, Kemp Engrg.	318-269-9452
MI	Southfield, L. H. Dickelman Co.	313-353-8210
MN	Minneapolis, HMR, Inc.	612-831-7400
MO	Maryland Heights, Hitt & Assocs.	314-878-5404
MO	Raytown, E. A. Mais Co.	816-356-0800
NJ	West Caldwell, Grimm, Siegel Assocs.	201-575-9300
NY	Buffalo, H. C. Zang Agency	716-877-3677
NC	Charlotte, J. Rudisill Assocs.	704-377-6901
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OH	Strongsville, Struthers-Dunn	216-572-1333
PA	Pittsburgh, R. F. Clark Co.	412-242-9500
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TN	Memphis, Controls & Power	901-332-0036
TX	Arlington, W. Pat Fralia Co.	817-640-9101
TX	Houston, W. Pat Fralia Co.	713-772-1572
WA	Seattle, Eicher-Richards Co.	206-523-7888

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SUCKLE CORP., 733 Davis St., Dept. EM, Scranton, PA 18505, Tel: 717-346-3871; Empl.: 200; *Sls. Mgr.:* M. H. Brenner ...... **2**•1058

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GA	Lilburn, R. Panyik Assoc.	404-923-3703
NJ	Cherry Hill, T. Cammaroto	609-772-2321
PA	Scranton, J. Castellino	717-346-4097

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Local Sales Offices & Reps

AL	Decatur, Tenn Tech, Inc.	205-350-0630
AZ	Phoenix, Robert E. Lee Assoc.	602-269-6206
CA	Los Angeles, K.C.P. Ent.	213-796-1813
CA	Sunnyvale, Schwerin & Merril, Inc.	408-735-7900
CO	Arvada, Cluff & Assocs.	303-423-9354
CT	Hamden, Impact Sls.	203-281-1331
IL	Downers Grove, Circuit Sls., Inc.	312-964-9090
IN	Indianapolis, Sukup & Cox	317-253-5501
IA	Marion, M-S-B Assoc.	319-377-6261
KS	Shawnee Mission, M-S-B Assoc.	913-432-2131
MD	Laurel, CSDS, Inc.	301-490-3800
MA	Needham, Impact Sls.	617-444-3971
MN	Minneapolis, Milt Westlund Assocs.	612-866-5002
MO	St. Charles, M-S-B Assoc.	314-946-5577
NJ	Medford, Comp. Consultants	609-654-5300
NY	Lynbrook, HLJ Comp-Tech	516-599-2999
NY	Syracuse, Lenard Co.	315-479-9191
OH	Beachwood, Elctrn. Salesmasters, Inc.	216-831-9555
PA	The Fairway Rydal, Espy Sls.	215-576-0780
TX	Austin, T.L. Mktg.	512-453-4586
TX	Dallas, T.L. Mktg.	214-357-1752
WA	Bellevue, Elctrn. Mktg. Grp.	206-746-5915
WI	Mequon, Artmor Ltd.	414-241-4040

Local Distributors

AL	Birmingham, Forbes Distr. Co.	205-251-4104
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AL	Huntsville, RM Elctrns.	205-852-1550
AL	Mobile, Forbes Distr. Co.	205-479-4535
AZ	Phoenix, Arizona Comps.	602-279-9446
AZ	Phoenix, Kachina Elctrn. Dist.	602-269-6201
CA	Burbank, Atwater Elctrns.	818-841-9050
CA	Pasadena, Empire Elctrn. Distrs.	213-681-2700
CA	San Diego, Patane Avionics, Inc.	619-271-9877
CA	San Diego, Sigma Elctrns.	619-565-2000
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Simi Valley, Lee Johnson Sls.	213-346-5412
CA	Torrance, Cypress Elctrns.	213-530-1900
CA	Van Nuys, Mil Conn Dvcs. Inc.	800-824-7885
CA	Van Nuys, Patane Avionics, Inc.	818-988-4455
CA	Ventura, Bond Electro Sls.	805-653-6487
CO	Denver, Integrated Elctrns.	303-292-6121
CO	Denver, Denver Wintronics	303-431-7161
CO	Ragon, Elctrn. Parts	303-744-3601
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FL	Pensacola, Forbes Distr. Co.	904-944-5551
GA	Atlanta, Ack Radio Supp.	404-351-6340
IL	Addison, Lectro Comps.	800-323-2282
IL	Chicago, NEP Elctrns.	312-625-8400
IL	Melrose Pk., Belford Elctrns.	312-865-2400
IL	Wheeling, Hawk Elctrns.	312-459-4030
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, RM Elctrns.	317-247-9701
MA	Canton, Impact Sls.	617-821-1500
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MI	Walled Lake, Ambur Elctrns.	313-669-3710
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NC	Durham, Southeastern Radio Supp.	919-688-8204
NC	Raleigh, Southeastern Radio Supp.	919-828-2311
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OH	Twinsburg, Schuster Elec. Co.	216-425-8134
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UT	Salt Lake City, Kimball Elctrns.	801-328-2075
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WI	Mequon, Lake-View Elctrns.	414-377-8250

SUMITA OPTICAL GLASS MFG. CO., LTD., P.O. Box 521, Millwood, NY 10546, Tel: 914-762-4959; FSC No.: 914-762-7497; *Sls. Mgr.:* Mike Sumita

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SUMMIT CAD CORP., 5222 FM 1960 W100, Houston, TX 77069, Tel: 713-440-1468, Telex: 792831; *Sls. Mgr.:* Gregg Young; *Dist. Mgr.:* Harold Thornton

SUMMIT ELCTRNS., 750 S. Sherman, Richardson, TX 75081, Tel: 214-231-1456; *Sls. Mgr.:* Jack W. Barry .... 3•1784, 1785

Local Sales Offices & Reps

AL	Huntsville, Electro-Mech	205-533-2100
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CA	Agoura, Cal Rep	213-991-1940
CA	Sunnyvale, Sourcetronics	408-773-1931
CA	Woodland Hills, Craig Assocs.	213-887-2444
CO	Broomfield, Wescom Mktg.	303-741-4900
FL	Pompano Beach, Electrocraft	
FL	Winter Park, Electrocraft	305-628-4705
GA	Atlanta, Electro-Mech	404-447-6478
IL	Barrington, Omni Elctrns. Mktg.	312-381-9087
IL	Roselle, Omni Elctrns. Mktg.	312-351-2507
IN	Indianapolis, Wilson Tech. Sls.	317-298-3345
MD	Timonium, Heller Sales	301-252-4780
MA	Braintree, R. F. Duffy & Assocs.	617-848-3550
MI	Detroit, Jack M. Thorpe	313-779-6363
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NY	Smithtown, T & K Sales	516-724-3456
NC	Raleigh, Electro-Mech	919-851-8165
OH	Cleveland, Arthur Baier Co.	216-461-6161
OH	Dayton, Arthur Baier Co.	513-276-4128
OK	Tulsa, Barry Sls.	918-749-7775
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SUMMIT ENGINEERING CORP., Box 938, Bozeman, MT 59715, Tel: 406-587-4511, TWX: 910-975-1950; Empl.: 300; *Sls. Mgr.:* Marty Connor

SUMX CORP., Box 14864, Austin, TX 78761, Tel: 512-835-0330; Empl.: 30

SUNBANK ELCTRNS., 1740 Commerce Way, Paso Robles, CA 93446, Tel: 805-238-2840, TWX: 910-351-5805; FSC No.: 07418; Empl.: 260; *Sls. Mgr.:* Lou F. Holland; *Dist. Mgr.:* Robert Haldeman

Local Sales Offices & Reps

CA	Mission Viejo, Par Mktg.	714-768-6021
CT	Wethersfield, Underwood Sls.	203-563-3046
FL	Altamonte Springs, Gugel-Tuttle-Assocs.	305-788-0845
KS	Leawood, Thunderbird Tech. Sls. & Serv.	913-642-7220
KS	Wichita, Thunderbird Tech. Sls. & Serv.	316-684-3941
MD	Phoenix, Milk-Brown Assocs.	301-628-4848
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MI	Farmington Hills, Elcon Michigan Sls.	313-855-3240
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MO	St. Louis, Thunderbird Tech. Sls.	314-567-6488
NJ	Haddonfield, Mills-Brown	609-429-1005
NJ	Pompton Plains, T. A. Adamo Sls.	201-835-5344
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TX	San Antonio, Edward F. Aymond Co.	512-366-1526
WA	Bellevue, Comtec Mktg. & Sls. Eng.	206-453-1188

SUNDSTRAND DATA CONTROL, Overlake Ind'l. Pk., Redmond, WA 98052, Tel: 206-885-3711, Telex: 15-2308; Empl.: 2000

SUN ELECTRONIC SYSTEMS, INC., 1331 S. Dixie Hwy., Pompano, FL 33060, Tel: 305-785-1155

SUN-FLEX CO., INC., 20 Pimentel Ct., Novato, CA 94947, Tel: 415-883-1221, Telex: 172-208; *Sls. Mgr.:* Frederick Juer; *Dist. Mgr.:* Frederick Juer

SUN RESEARCH INC., Phase-R, Box 210, Old Bay Rd., New Durham, NH 03855, Tel: 603-859-7110, TWX: 510-297-4444; *Sls. Mgr.:* Michael Mathieson

SUNRISE ELECTRONICS, INC., 524 S. Vermont Ave., Glendora, CA 91740, Tel: 818-914-1924, TWX: 910-584-3847; *Sls. Mgr.:* Richard K. Armstrong

Local Sales Offices & Reps

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CA	Inglewood, Basic Sys. Corp.	213-673-4300
CA	San Diego, Basic Sys. Corp.	619-268-8000
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FL	Palm Harbor, Teqspec	813-785-2276
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MO	St. Louis, Engrg. Svcs. Co.	314-997-1515
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NJ	Ridgefield, Rical Assocs.	201-945-5250
NM	Albuquerque, Odyssey I	505-265-6645
NY	Penfield, R. Barthel Entprs., Inc.	716-377-3018
NC	Winston-Salem, Teqspec	919-723-8102
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OH	Englewood, Carter, McCormic & Peirce	513-836-0951
OK	Broken Arrow, Genzel Sales & Assocs.	918-258-8656
PA	Pittsburgh, Carter, McCormic & Peirce	412-372-4415
TN	Morristown, Teqspec	615-587-0980
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TX	Katy, Crockett Southwest Co.	713-578-1836
WA	Redmond, Seattle Telecom & Data	206-883-6336
WI	Milwaukee, Berndt Assocs.	414-545-8400

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SUNSHINE SCI. INSTR., 1810 Grant Ave., Philadelphia, PA 19115, Tel: 215-673-5600; *Sls. Mgr.:* Al Stiles .... 3•1290

SUPEREX ELECTRONICS CORP., 151 Ludlow St., Yonkers, NY 10705, Tel: 914-965-6906, Telex: 13-1584; Empl.: 112; *Sls. Mgr.:* M. Solomon, Mktg

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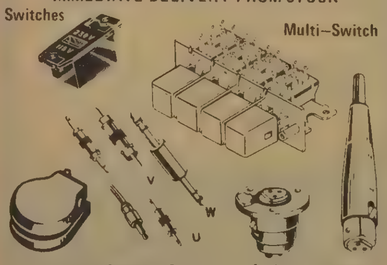

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Local Sales Offices & Reps

CA	Burlingame, W. J. Purdy Co.	415-347-7701
CA	Santa Clara, Superior Elec.	408-748-7772
CA	Woodland Hills, Superior Elec.	818-999-2150
CO	Denver, W. J. Purdy Co.	303-777-1411
FL	Apopka, G. F. Bohman Assocs.	305-886-1882
FL	Boca Raton, Power Solutions	305-368-3922
FL	Ft. Lauderdale, Bredesen & Assocs.	305-566-3289
GA	Atlanta, Jarrett Eng. Sls.	404-256-0378
HI	Honolulu, B. F. Wittenberg Co.	808-833-1602
IL	Glen Ellyn, Superior Elec.	312-858-2960
IA	W. Des Moines, JPS Assoc. Ltd.	515-225-0607
MA	Wellesley Hills, Superior Elec.	617-237-0750
MI	Detroit, Superior Elec.	313-229-2381
NY	Rochester, R. L. Kistler, Inc.	716-436-1940
NY	Rochester, Ross Equip. Co. Inc.	716-271-5660
NY	Smithtown, Superior Elec.	516-361-9177
NC	Charlotte, Superior Elec.	704-535-7777
OH	Medina, Superior Elec.	216-725-8887
PA	Blue Bell, Superior Elec.	215-825-9123
TX	Dallas, Superior Elec.	214-350-1368
VA	Arlington, Gans & Pugh Assoc., Inc.	703-527-3262
WA	Issaquah, Superior Elec.	206-392-8559

SUPERIOR FLUX & MFG. CO., 95 Alpha Pk., Cleveland, OH 44143, Tel: 216-461-3315; Empl.: 5

SUPERIOR MFG. & INSTR., 19-36 38th St., Long Island City, NY 11105, Tel: 212-932-1800, TWX: 710-582-2626; Empl.: 120; *Sls. Mgr.:* C. J. Robison

SUPERTEX, INC., 1225 Bordeaux Dr., P.O. Box 3607, Sunnyvale, CA 94086, Tel: 408-744-0100, TWX: 910-339-9388; *Sls. Mgr.:* Richard Siegel

Local Sales Offices & Reps

AL	Huntsville, Macro Mktg.	205-883-9630
AZ	Scottsdale, SMS & Assocs.	602-998-0831
CA	Los Altos, Ewing-Foley	415-941-4525
CA	San Diego, Earle Assocs.	619-278-5441
CA	Thousand Oaks, Sc Cubed	805-496-7307
CA	Tustin, Sc Cubed	714-731-9206
CO	Denver, Elcom	303-337-2300
CT	Englewood, Ed Glass Assocs.	201-592-0200
FL	Apopka, G. F. Bohman & Assocs.	305-886-1882
IL	Des Plaines, Janus	312-298-9330
IN	Indianapolis, Sai Mktg.	317-241-9276
MA	Burlington, Mill-Bern Assocs.	617-273-1313
MI	Brighton, Sai Mktg.	313-227-1786
MN	Bloomington, Smiley-Scott Assocs.	612-888-5551
NJ	Central Islap, Vera Assocs.	516-582-3795
NJ	Haddonfield, Tritek Sls.	609-429-1551
NY	Liverpool, Precision Sls.	315-451-3480
NY	Pittsford, Precision Sls.	716-381-2820
OH	Centerville, Sai Mktg.	513-435-3181
OH	Shaker Heights, Sai Mktg.	216-751-3633
TX	Austin, OM Sls.	512-452-1838
TX	Dallas, OM Sls.	214-241-3876
UT	Salt Lake City, Elcom, Inc.	801-532-7940
VA	Fairfax, Beacon North	703-591-1300
WA	Mercer Island, Elctrn. Comp. Sls.	206-232-9301
WI	Milwaukee, Janus	414-476-9104

SUPPORT SYSTEMS INTL. CORP., 150 South Second St., Richmond, CA 94804, Tel: 415-234-9090, TWX: 910-382-8130; Empl.: 60; *Sls. Mgr.:* Greg Richey; *Dist. Mgr.:* Greg Richey

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AZ	Phoenix, Howe & Hoew Sls.	602-264-7971
CA	San Diego, Wiley Co.	213-666-1611
CA	Santa Clara, Ross Mktg. Assoc.	408-988-8111
CO	Denver, Moss Mktg.	303-455-7205
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FL	Tamarac, Delmac Sls.	305-726-1330
GA	Marietta, Rick Burns & Assocs.	404-951-1180
HI	Honolulu, Snider Campbell & Sutton Co.	808-941-2400
IL	Park Ridge, Bob Burns & Assoc.	312-823-9360
IN	Carmel, Marketing Engrs.	317-872-5665
IA	Des Moines, Thomas L. Dowell & Assoc.	515-225-1620
KS	Overland Park, Thomas L. Dowell & Assoc.	913-648-7373
MA	Waltham, Unesco/Genex	617-890-1535
MI	Southfield, R. C. Merchant & Co.	313-354-4300
MI	St. Joseph, R. C. Merchant & Co.	616-983-7378
MN	Edina, Mel Foster Tech. Sls.	612-941-9790
MS	Jackson, Welch & Doby Mktg.	601-932-5534
MO	St. Louis, Thomas L. Dowell & Assoc.	314-849-4234
NJ	Cherry Hill, Trinkle Sls.	609-795-4200
NJ	Englewood Cliffs, Masin-Esco	201-569-8868
NM	Albuquerque, Moss Mktg.	505-292-7505
NY	Syosset, Masin-Esco	201-569-8868
NY	Syracuse, Paston-Hunter Co.	315-437-2843
NC	Raleigh, Rick Burns & Assocs.	919-876-2224
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OK	Tulsa, J. Y. Schoonmaker Co.	918-446-0373
TX	Dallas, J. Y. Schoonmaker Co.	214-349-1650
TX	Houston, J. Y. Schoonmaker Co.	713-738-2427
UT	Bountiful, Moss Mktg.	801-292-8660
WA	Bellevue, Comtec	206-453-1188

SWITCHES INC., 949 Stierlin Rd., Mountain View, CA 94043, Tel: 415-962-8649

SYLVANIA CHEMICALS/METALS, Hawes St., Towanda, PA 18848, Tel: 717-265-2121; Empl.: 1400; *Sls. Mgr.:* J.F. Barnyak

SYLVANIA CONNECTOR PRODS. OPER., GTE Prods. Corp., Box 29, Titusville, PA 16354, Tel: 814-589-7071, TWX: 510-692-6763; *Sls. Mgr.:* R. Sanders

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SYLVANIA CONTROL DEVICES, Rte. 35, Standish, ME 04084, Tel: 207-642-4535, TWX: 710-365-0145; Empl.: Over 1,000; *Sls. Mgr.:* J. T. Dougherty; *Dist. Mgr.:* J. T. Dougherty ....**1B•1822**

Local Sales Offices & Reps

AL	Huntsville, Rakes Engrg. & Mktg. Corp.	205-533-3763
CA	Hayward, Pacific Mktg. Inc.	415-887-1620
GA	Atlanta, Rakes Engrg. & Mktg. Corp.	404-447-6937
IL	Arlington Heights, Thermek Inc.	312-577-6900
MA	Hingham, Northeast Reps., Inc.	617-749-8700
MI	Dearborn	313-582-8754
NJ	Haddonfield, G. L. Williams Assocs.	609-428-6060
NJ	Manville, Dynorep Inc.	201-685-0135
NY	Albany, H. C. Johnson Agencies, Inc.	518-459-1239
NY	Buffalo, H. C. Johnson Agencies, Inc.	716-632-7880
NY	Rochester, H. C. Johnson Agencies, Inc.	716-586-0777
NC	Raleigh, Rakes Engrg. & Mktg. Corp.	919-847-5079
OH	Dayton	513-223-6227
OR	Portland, SPS Elctrns.	503-297-6919
PA	Glenshaw, H. C. Johnson Agencies, Inc.	412-961-0414
WA	Redmond, SPS Elctrns.	206-323-4140

SYLVANIA ELECTRONIC, Box 360, Muncy, PA 17756, Tel: 717-546-3191; Empl.: 395; *Sls. Mgr.:* A. M. Serang; *Dist. Mgr.:* S. R. Sisak

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SYLVANIA ELECTRONIC COMPONENTS, Philips ECG Inc., A North American Philips Co., 100 First Ave., Waltham, MA 02254, Tel: 617-890-6107; Empl.: 4213; *Sls. Mgr.:* D. R. Kronenwetter; *Dist. Mgr.:* E. H. Frost ....**1A•2108, 2109**

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CA	Los Angeles	714-953-6735
FL	Tampa	813-446-8602
NJ	Teterboro	201-768-3280
NY	Seneca Falls	315-568-5881
OH	Cleveland	216-331-1088
TX	Dallas	214-239-9370

Local Distributors

AL	Andalusia, Wholesale Elctr. Supps. Co.	205-222-5100
AL	Anniston, Radio Dist. & Sup. Co.	205-236-8654
AL	Birmingham, Forbes Distributing Co.	205-251-4104
AL	Decatur, Forbes Distributing Co.	205-353-4762
AL	Dothan, Carmichael Elctrns. Inc.	205-793-7066
AL	East Gadsden, Radio Dist. & Supp. Co.	205-547-1636
AL	Mobile, Specialty Distributing Co.	205-344-0450
AL	Mobile, Electronic Supp. Co.	205-478-0455
AL	Mobile, Forbes Elctrn. Distrs. Inc.	205-479-4535
AL	Montgomery, Forbes-Godfrey TV Elctrns. Inc.	205-263-0283
AL	Muscle Shoals, Jones Elctrns.	205-383-1241
AL	Opelika, Southern Elctrns. Corp.	205-745-5298
AK	Anchorage, Alaska Elctrn. Supp.	907-563-3774
AK	Juneau, Juneau Elctrns.	907-586-2260
AZ	Phoenix, Parts Elctrn. of AZ	602-258-6476
AZ	Phoenix, Dalis Elctrn. Supp.	602-275-2885
AZ	Phoenix, Elctrn. Parts Co. Inc.	602-277-7281
AZ	Phoenix, Electronic Distrs.	602-955-8303
AZ	Tucson, Inland Elctrn. Supp.	602-889-5301
AZ	Tucson, Elliott Elctrns., Inc.	602-884-7394
AR	El Dorado, Electra Inc.	501-862-4901
AR	Fayetteville, Southern Elctrns. Co.	501-442-6582
AR	Ft. Smith, Wise Wholesale Elctrns.	501-783-8925
AR	Little Rock, Lavender Elctrn. Supp. Inc.	501-372-0248
AR	Little Rock, Southern Elctrns. Co.	501-372-4196
AR	Little Rock, David White Elctrns.	501-376-1391
AR	Little Rock, Carlton Bates Co.	501-562-9100
AR	Paragould, Martin Wholesale Radio Supp.	501-236-6049
AR	Pine Bluff, David White Elctrns.	501-534-0612
AR	Springdale, Wise Wholesale Elctrns.	501-751-4814
AR	Texarkana, Lavender Elctrns. Inc.	501-773-4631
CA	Anaheim, Ball Elctrns.	714-828-1310
CA	Berkeley, Al Lasher Elctrns.	415-843-5915
CA	Concord, Pacific Radio Supp. Inc.	415-682-4700
CA	Downey, Net Elctrns.	213-923-4591
CA	Dublin, Pacific Radio Supp. Inc.	415-829-5960
CA	Eureka, Redwood Elctrn. Supp.	707-443-3107
CA	Fresno, B. J. De Jarnatt Wholesale Co., Inc.	209-268-8544
CA	Fullerton, Orvac Elctrns.	714-871-1020
CA	Garden Grove, Sav-On	714-530-0555
CA	Huntington Park, Martin Distributing Co.	213-582-7111
CA	Los Angeles, Radio Equip. Distrs.	213-668-1100
CA	Modesto, Inland Elctrns.	209-524-7945
CA	Mtn. View, Associated Radio	415-968-1689
CA	Oakland, Cass Elctrns.	415-834-4225
CA	Oakland, Chuck Hurley Elctrns.	415-834-9185
CA	Oxnard, Dow Radio, Inc.	805-486-6353
CA	Pasadena, Dow Radio, Inc.	213-681-3416
CA	Sacramento, Dunlap Elctrns. Inc.	916-442-5801
CA	Sacramento, Popkey Distributing	916-448-8848
CA	Sacramento, Chuck Hurley Elctrns. Inc.	916-927-5891
CA	San Diego, Hurley Elctrns.	619-235-6245
CA	San Francisco, Associated Radio	415-431-0212
CA	San Jose, John E. Schad Inc.	408-275-6484
CA	San Jose, Peninsula Elec. Supp.	408-294-8781
CA	San Luis Obispo, Midstate Wholesale Elctrns.	805-543-2770
CA	San Rafael, Beaver Elctrns.	415-453-1130
CA	Santa Ana, Hurley Elctrns., Inc.	714-971-2203
CA	Santa Rosa, Chuck Hurley Elctrns. Inc.	707-542-5423
CA	South Lake Tahoe, Cal Pine Elctrns.	916-541-3777
CA	Torrance, Cash Elctrns.	213-373-6333
CA	Vallejo, Associated Radio	707-552-2363
CO	Colorado Springs, Walker Colorado Springs Elect.	303-636-1661
CO	Denver, Denver Wintronics	303-934-2406
CO	Denver, Elliott Elctrn. Supp. Inc.	303-778-0333
CO	Denver, Walker Denver Elctrns.	303-935-2401
CO	Grand Junction, Walker Grand Junction Elctrns.	303-242-4435
CO	Greeley, Walker Greeley Elctrns. Co.	303-353-3241
CO	Pueblo, Walker Pueblo Elctrns.	303-542-1924
CT	Hartford, Signal Center, Inc.	203-233-8551
CT	New London, Aikins Elctrn. Supp.	203-442-4406
CT	South Windsor, Sceli Elctrns.	203-289-6853
CT	West Haven, Amerling Co.	203-934-7901
DE	Wilmington, Wholesale Elctrns.	302-656-9988
FL	Bradenton, Leader Elctrns.	813-756-9571
FL	Cocoa, Cape Elctrns.	305-636-6331
FL	Ft. Lauderdale, Vance Baldwin Inc.	305-523-3461
FL	Ft. Lauderdale, Southeastern Elctrns.	305-563-4131
FL	Ft. Myers, Dow Elctrns.	813-334-6577
FL	Ft. Walton Beach, Key Elctrn. Supp.	904-863-2191
FL	Gainesville, Dow Elctrns. Inc.	904-376-3231
FL	Homestead, United Elctrn. Supp. Inc.	305-245-0955
FL	Jacksonville, Mitchell Elctrns.	904-356-8427
FL	Jacksonville, The Bay Co.	904-255-2614
FL	Lakeland, Leader Elctrns.	813-686-8193
FL	Largo, Chester Elctrn. Supp. Co.	813-585-4736
FL	Melbourne, Leader Elctrn. Distributing Inc.	305-254-5274
FL	Miami, Elctrn. Equip. Co., Inc.	305-871-3500
FL	Miami, Walder Elctrn. Distr. Co.	305-379-9393
FL	Miami, Vance Baldwin Inc.	305-693-2921
FL	Miami, Southeastern Wholesalers Inc., D/B/A Herman Elctrns.	305-634-6591
FL	Naples, Joe Coomes Distr. Inc.	813-775-4442
FL	Orlando, Sun Elctrn. Supp. Inc.	305-841-4650
FL	Orlando, Dow Elctrns. Inc.	305-299-2771
FL	Orlando, C & S Elctrn. Supp. Co., Inc.	305-299-4300
FL	Panama City, Central Elctrn. Supp. Co.	904-785-0237
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FL	Pensacola, Pensacola Elctrns.	904-478-3771
FL	Pensacola, Elctrn. Supp. Co.	904-432-6916
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FL	St. Petersburg, Dow Elctrns.	813-525-1131
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FL	Tallahassee, Fouraker Elctrns. Inc.	904-224-5101
FL	Tampa, Leader Elctrns. Distrs.	813-870-3315
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FL	W. Palm Beach, Vance Baldwin Inc.	305-832-5671
FL	W. Palm Beach, Dolphin Elctrn. Supp. Inc.	305-659-7166
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HI	Honolulu, Nylen Brothers Co. Ltd.	808-538-1171
HI	Honolulu, Precision Radio Ltd.	808-537-5291
ID	Boise, Kimball Elctrns.	208-342-3559
ID	Pocatello, Kimball Elctrns.	208-232-2201
IL	Alton, Ebinger Radio Co.	618-462-9783
IL	Aurora, Mainline Supp. Co., Inc.	312-892-9026
IL	Benton, Lampley Radio Co.	618-435-8194
IL	Berwyn, B-B & W Inc.	312-749-1710
IL	Chicago, U. S. Electronics	312-925-4111
IL	Chicago, Howard Elctrn. Sls.	312-254-1777
IL	Chicago, Alpha Elctrns.	312-525-2840
IL	Elgin, Mainline Supp. Co., Inc.	312-697-6746
IL	Evergreen, Beaty Elctrns. Inc.	312-423-5500
IL	Geneva, Melvin Elctrns., Inc.	312-232-8050
IL	Harrisburg, Standard Distrs.	618-252-1478
IL	Jacksonville, Baptist Elctrn. Supp. Co., Inc.	217-243-6464
IL	Joliet, Mainline Supp. Co., Inc.	815-436-3900
IL	Kankakee, S&S Elctrn. Supp. Co.	815-933-5595
IL	Mattoon, Mattoon Radio & TV Supp. Co.	217-235-5457
IL	Moline, Lofgren Distributing Co.	309-764-7436
IL	Niles, Joseph Elctrns. Inc.	312-297-4200
IL	Oak Forest, Melvin Elctrns. Inc.	312-687-5050
IL	Peoria, Warren Radio Co.	309-674-5998
IL	Quincy, Show Me Elctrns.	217-223-9880
IL	Rockford, Midwest Associated	815-962-8036
IL	Rockford, Jay-tronics	815-965-8786
IL	Salem, Laco Elctrns. Inc.	618-548-3150
IL	Springfield, Baptist Elctrn. Supp. Co., Inc.	217-753-0111
IL	Villa Park, Melvin Elctrns., Inc.	312-279-5010
IN	Angola, Lakeland Elctrn. Supp.	219-665-6311
IN	Bedford, Elex Mart Inc.	812-275-5941
IN	Bloomington, Stansifer Radio Co.	812-336-6339
IN	Chesterton, Chesterton Elctrn. Supp.	219-926-2109
IN	Elkhart, Warren Radio Co.	219-295-4205
IN	Evansville, Ohio Valley Sound	812-425-6173
IN	Evansville, Hutch & Son, Inc.	812-425-7201
IN	Ft. Wayne, Pembleton Elctrns.	219-426-1812
IN	Ft. Wayne, Warren Radio Co.	219-426-5344
IN	Gary, Calumet Elctrn. Supp. Inc.	219-887-4961
IN	Gary, B&B Elctrn. Supp.	219-980-8200
IN	Indianapolis, Warren Radio Co.	317-634-5566
IN	Indianapolis, Elctrn. Svc. Parts	317-632-8586
IN	Indianapolis, Graham Elctrns. Supp. Inc.	317-634-8202
IN	Kokomo, Television Radio Distr.	317-457-5942
IN	Logansport, Television Radio Distr., Inc.	219-753-2879
IN	Marion, J&W Elctrns. Inc.	317-662-1114
IN	South Bend, Television Supp., Inc.	219-289-7036
IN	Terre Haute, Mid West Supp.	812-232-0187
IA	Ames, Electronic Supp. Inc.	515-232-7020
IA	Burlington, Union Supp. Co.	319-754-5745
IA	Cedar Rapids, Iowa Radio Supp. Co.	319-393-4510
IA	Council Bluffs, Meyerson Distributing Co.	712-328-2351
IA	Davenport, Warren Radio Co.	319-322-5301
IA	Des Moines, Gifford-Brown of Des Moines	515-243-1257
IA	Des Moines, Mid State Distributing Co.	515-244-7231
IA	Mason City, Mid State Distributing Co.	515-423-8012
IA	Sioux City, Molstad Dist.	712-255-8023
KS	Kansas City, Video Elctrn. Supp. Co.	913-371-5731
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KS	Wichita, RSC Electronics	316-267-5213
KY	Ashland, Electronic Supp. Inc.	606-325-1511
KY	Bowling Green, Randolph, Hale & Meredith	502-885-5357
KY	Hopkinsville, Randolph & Hale	502-885-5327
KY	Lexington, Service Elctrn. Supp.	606-254-5786
KY	Louisville, P. I. Burks & Co.	502-589-3960
KY	Newport, Holub Dist. Co.	606-431-4211
KY	Paducah, Warren Radio Co.	502-442-4367
LA	Alexandria, Elctrn. Svc. Supp.	318-443-8483
LA	Baton Rouge, Menard Elctrns.	504-355-0323
LA	Gretna, Pelican Elctrn. Supp. Inc.	504-361-4187
LA	Houma, Pelican Elctrn. Supp. Inc.	504-868-1285
LA	Lafayette, Lafayette Radio Equip.	318-234-2364
LA	Lafayette, Ralph's of Lafayette	318-233-0105
LA	Lake Charles, Wholesale Radio Equip.	318-439-2431
LA	Marrero, AFG Elctrn. Supply Inc.	504-368-9696
LA	Metairie, Pelican Elctrn. Supp.	504-888-4720
LA	Monroe, Martin Elctrns. Inc.	318-388-4224
LA	Monroe, Tri-State Elctrns.	218-387-9711
LA	New Orleans, Wm. B. Allen, Inc.	504-525-8222
LA	New Orleans, Radio Parts	504-581-5959
LA	New Orleans, Southern Radio Supp. Co.	504-524-2343
LA	Opelousas, Opelousas Radio Equip.	318-942-5702
LA	Shreveport, Elctrn. Supp. of Shreveport	318-227-9080
LA	Shreveport, Indl. Elctrn. Supp. Inc.	318-222-9459
LA	West Monroe, Brooks Supp. of La	318-323-0344
ME	Bangor, Maine Elctrns. Distr. Inc.	207-947-7396
ME	Lewiston, Stark Wholesale Elctrns.	207-784-6979
ME	Portland, LAD Elctrns. Distrs.	207-772-2174
MD	Baltimore, Modern Elctrns.	301-282-5300
MD	Baltimore, Tritronics	301-256-4400
MD	Baltimore, Fairway Elctrns. of MD Inc.	301-247-8383
MD	Frederic, Hankey's Radio Inc.	301-662-1381
MD	Hagerstown, Fairway Elctrns. Inc.	301-791-0200
MD	Kensington, Fairway Elctrns. Inc.	301-933-4420
MD	Salisbury, Standard Elctrns. Inc.	301-749-7593
MD	Towson, Radio Elec. Svc. Co.	301-823-0070
MD	Towson, Baynesville Elctrns.	301-823-0082

MA	Boston, Tee Vee Supp. Co.	617-522-9330
MA	Brockton, Ware Radio Supp. Corp.	617-583-0810
MA	Fall River, E. A. Ross Co.	617-673-0921
MA	Hyannis, Capewide Elctrn. Supp Corp.	617-775-3277
MA	Lawrence, Lawrence Elctrn. Distrs.	617-683-0257
MA	Lowell, Frank P. McCartin Co.	617-454-9101
MA	New Bedford, Burns Elctrn. Supp. Co.	617-998-3344
MA	New Bedford, C. E. Beckman Co.	617-994-9674
MA	North Woburn, Abbott Elctrns. Co.	617-935-2040
MA	Norwood, Morrison Elctrn. Supp.	617-769-7280
MA	Peabody, Tee Vee Supp. Co.	617-531-5777
MA	Quincy, Electronic Dists. Corp.	617-328-7800
MA	Springfield, Signal Electr. Ctr. of Springfield	413-739-3893
MA	Waltham, MIL Elctrns. Inc.	617-891-6730
MA	Worcester, Stark Wholesale Elctrns. Inc.	617-756-7136
MI	Adrian, Wedemeyer Elctrn. Supp. Co.	313-263-2925
MI	Ann Arbor, Wedemeyer Elctrns.	313-665-8611
MI	Battle Creek, Warren Radio Co.	616-965-3338
MI	Bay City, Kinde Distributing	517-892-1594
MI	Dearborn, West Side Radio	313-933-6972
MI	Detroit, Elctrn. Parts Co.	313-891-7400
MI	Detroit, S & S Elctrns.	313-521-0588
MI	Flint, Shand Elctrns.	313-743-8940
MI	Grand Rapids, T & W Elctrns.	616-241-3645
MI	Grand Rapids, Warren Radio Co.	616-456-5385
MI	Kalamazoo, Warren Radio Co.	616-381-4203
MI	Lansing, Wedemeyer Elctrns.	517-489-9047
MI	Livonia, Norwest Elctrns.	313-261-4551
MI	Livonia, RS Electronics	313-525-1155
MI	Madison Hgts., Warren Radio Co.	313-588-3327
MI	Muskegon, Fitzpatrick Electric Supp.	616-722-6621
MI	Owasso, Warren Radio Co.	517-723-5239
MI	Pontiac, Joe Coomes	313-334-1526
MI	Port Huron, Port Elctrns.	313-985-6185
MI	Saginaw, Ryder Distributing	517-799-2411
MI	Traverse City, Traverse City Elctrns.	616-946-5153
MN	Minneapolis, Electronic Center	612-371-5230
MN	Minneapolis, Ness Elctrns. Inc.	612-824-2646
MN	Minneapolis, Stark Elctrn. Supp. Co.	612-332-1325
MN	Rochester, Pace Elctrns. Inc.	507-288-1853
MN	St. Paul, Ness Elctrns.	612-224-5411
MS	Biloxi, Hooper Elctrn. Supp. Co.	601-432-0584
MS	Biloxi, Electronic Parts Co.	601-435-3221
MS	Greenville, Tri-State Elctrns. Co.	601-335-3594
MS	Greenwood, Moor Elctrns.	601-453-4241
MS	Hattiesburg, N & H Elctrn. Distr. Co.	601-582-5571
MS	Jackson, Tri-State Elctrns. Co.	601-355-3431
MS	McComb, Risher Radio Supp. Co.	601-684-3731
MS	Meridian, Hooper Elctrn. Supp. Co., Inc.	601-693-2668
MS	Pascagoula, Hooper Elctrn. Supp. Co.	601-762-9383
MO	Columbia, Show-Me Elctrns.	314-449-2944
MO	Flat River, Show-Me Elctrns.	317-431-4816
MO	Jefferson City, Central Missouri Distributing Co.	314-636-3149
MO	Jefferson City, Show-Me Elctrns.	314-636-2191
MO	Kansas City, Elctrn. Supp. Co.	816-931-0250
MO	Rolla, Show-Me Elctrns.	314-364-1515
MO	Sikeston, Baileys Elect. Supp.	314-471-6142
MO	Springfield, Mason Elect. Supp.	417-865-5542
MO	Springfield, Show-Me Elctrns.	417-869-0752
MO	St. John, Ralph Toler Radio Co.	314-426-3260
MO	St. Louis, Olive Elctrns. Inc.	314-426-4500
MO	St. Louis, Deltronics Distributing Co.	314-725-6060
MT	Billings, Television & Elec. Supp. Co.	406-252-7193
MT	Great Falls, The Source Inc.	406-761-2420
MT	Havre, Northern Elctrns.	406-265-5568
NE	Lincoln, Leuck Radio Co.	402-476-2797
NE	Omaha, Radio Equip. Co.	402-341-7700
NE	Scottsbluff, D&H Elctrns. Supp. Inc.	308-632-2181
NV	Reno, Bennett Elctrn. Supp. Co.	702-322-2127
NV	Reno, Dunlap Elctrns.	702-329-1308
NH	Dover, American Radio Corp.	603-742-6800
NH	Manchester, Stark Wholesale Elect. of N.H. Inc.	603-688-7611
NH	Nashua, Tee Vee Supp. Co.	603-889-4171
NJ	Eatontown, Atkinson & Smith Co.	201-542-2447
NJ	Edison, William Elctrn. Supp. Inc.	201-985-3700
NJ	Hillside, Leader Elctrn. Supp. Corp.	201-354-4200
NJ	Pleasantville, Kearns Elctrn. Prods. Co.	609-646-7010
NJ	Raritan, Masters Elctrn. Supp.	201-725-3583
NJ	Trenton, Service Parts & Supp. Co.	609-393-7135
NM	Albuquerque, Southwest Elctrns.	505-345-8611
NM	Albuquerque, Elctrn. Parts Co.	505-293-6161
NM	Albuquerque, North American Module Corp.	505-345-4546
NM	Albuquerque, US Module	505-345-7968
NM	Farmington, Walker Farmington Elctrns. Inc.	505-327-6356
NM	Hobbs, Trice Wholesale Elctrns.	505-393-5107
NM	Santa Fe, Sepco Inc.	505-982-1621
NY	Amherst, Standard Elctrns. Inc.	716-691-3061
NY	Brooklyn, Mill Elctrns. Supp. Co.	212-336-4575
NY	Brooklyn, Ceco Communications	212-646-6300
NY	Brooklyn, Alpha Elctrns., Inc.	212-633-2800
NY	Buffalo, Goldcrest Elctrn. Supp.	716-885-5878
NY	Buffalo, Genesee Radio Parts Co.	716-873-9661
NY	Centereach, GTE Elctrn. Supp.	516-585-8111
NY	Commack, Spartan Elctrns. Inc.	516-499-9500
NY	Corning, Corning Elctrns., Inc.	607-962-0555
NY	Cortland, Cortland Elctrn. Supp.	607-756-2523
NY	Endicott, Standard Elctrns. Inc.	607-754-3102
NY	Hempstead, Davis Elctrns. Corp.	516-483-9200
NY	Hicksville, Elctrn. City	516-938-8330
NY	Horseheads, Southern Tier Elctrns. Inc.	607-734-4138
NY	Jamaica, All Parts Elctrns. Whlers., Inc.	212-291-3388
NY	Jamestown, Warren Radio Co.	716-484-1141
NY	Johnson City, Goldcrest Elctrns. Supp.	607-797-2389
NY	Kingston, Greylock Elctrn. Distrs.	914-338-5300
NY	Lackawanna, Metromill Distrs. Inc.	716-826-2600
NY	Massapequa, A&P Elctrns. Corp.	516-541-4200
NY	New Hyde Park, Electronic City	516-352-7145
NY	New York, United Teletronic Parts Corp.	212-569-2330
NY	New York, Dale Elctrns. Corp.	212-255-3660
NY	New York, Consolidated Radio Sls.	212-865-4900
NY	Olean, Standard Elctrns. Inc.	716-372-1800
NY	Port Chester, Wise Comps.	914-939-3940
NY	Rochester, Goldcrest Elctrns. Supp.	716-546-8464
NY	Rochester, Masline Elctrns. Inc.	716-546-5373
NY	Rochester, Standard Elctrns. Inc.	716-254-7590
NY	Schenectady, Goldcrest Elctrns. Supp.	518-377-6424
NY	Syracuse, Standard Elctrns. Inc.	315-422-0421
NY	Syracuse, Goldcrest Elctrns. Supp.	315-471-7115
NY	Troy, Troy Television	518-235-1521
NY	Utica, Grapac Elctrns. Co.	315-732-4674
NY	Watertown, Gateway Elctrns.	315-788-7251
NC	Burlington, Womack Elc. Supp.	919-227-7485
NC	Charlotte, United Elctrns. Supp.	704-372-2650
NC	Concord, Mac Victor Elctrns.	704-786-4175
NC	Durham, Knight Elctrns.	919-682-9371
NC	Fayetteville, Brantley Elctrns.	919-868-8038
NC	Fayetteville, Eastern Radio Supp.	919-485-2161
NC	Gastonia, JMT Elctrns.	704-867-4401
NC	Goldsboro, Womack Elctrns.	919-734-3221
NC	Greensboro, Guilford Elctrns.	919-275-1385
NC	Greenville, Pair Elctrns.	919-756-2291
NC	High Point, Mac Victor Elctrns.	919-889-8024
NC	Lumberton, Knight Elctrns.	919-739-2870
NC	Raleigh, Knight Elctrns.	919-833-6417
NC	Sanford, Knight Elctrns.	919-776-4249
NC	Statesville, Mills Elctrns. Inc.	704-872-8949
NC	Wilmington, Buck's Elctrns.	919-392-4262
NC	Winston Salem, Electronic Distributing Inc.	919-723-1097
ND	Fargo, Radio & TV Inc.	701-232-8993
ND	Fargo, S/S Elctrns., Inc.	701-237-5003
OH	Akron, Akron Elctrn. Supp., Inc.	216-762-8818
OH	Akron, Warren Radio Co.	216-434-6668
OH	Akron, Main TV Supp. Co.	216-253-8161
OH	Alliance, Glasska Elctrns.	216-823-5780
OH	Canton, Electronic Ctr. Inc.	216-456-7133
OH	Cincinnati, United Radio Inc.	513-761-4030
OH	Cleveland, Winteradio Elctrn. Supp. Corp.	216-621-9383
OH	Cleveland, Warren Radio Co.	216-888-5225
OH	Columbus, Whitehead's	614-224-1186
OH	Columbus, Thompson Elctrn. Supp., Inc.	614-228-6191
OH	Dayton, Srepco Elctrns. Div. Pioneer Standard Elctrns. Inc.	513-224-0871
OH	Dover, TV Specialties, Inc.	216-364-6678
OH	Elyria, EL-A-Co	216-323-1805
OH	Fremont, J & B Elctrns.	419-332-9334
OH	Lancaster, Electronic Supp. Co.	614-653-9344
OH	Lima, Warren Radio Co.	419-228-1691
OH	Lima, LRP Elctrns., Inc.	419-228-1220
OH	Marion, Mid Ohio Elctrns. Co.	614-382-1101
OH	Newark, Turner Wilson Co.	614-349-7454
OH	Parma, Superior Elctrn. Parts Co.	216-842-7940
OH	Portsmouth, Fullers Sound Elctrn. Supplier	614-353-0965
OH	Toledo, Warren Radio Co.	419-248-3364
OH	Willowick, Euclid Radio Parts Co.	216-585-5115
OH	Youngstown, Ross Radio Co.	216-746-8881
OH	Youngstown, Glen Elctrns.	216-743-1119
OK	Ardmore, Trice Wholesale Elctrns.	405-223-8540
OK	Enid, Trice Wholesale Elctrns.	405-234-6078
OK	Enid, Enid Walker Elctrns.	405-234-2218
OK	Lawton, Walker Lawton Elctrns. Inc.	405-355-0603
OK	Lawton, Trice Wholesale Elctrns.	405-223-8540
OK	McAlester, Trice Wholesale Elctrns.	918-423-6716
OK	Muskogee, Sooner Radio & TV Supp.	918-682-1384
OK	Muskogee, Trice Wholesale Elctrns.	918-682-2457
OK	Oklahoma City, Radio Supp. Co.	405-232-6127
OK	Oklahoma City, Trice Wholesale Elctrns.	405-681-4647
OK	Oklahoma City, Miller-Jackson Co.	405-235-8426
OK	Oklahoma City, Trice Wholesale Elctrns.	405-524-4411
OK	Ponca City, Trice Wholesale Elctrns.	405-762-5621
OK	Tulsa, Trice Wholesale Elctrns.	918-585-5718
OR	Eugene, United Radio Supp., Inc.	503-342-3381
OR	Portland, United Radio Supp., Inc.	503-233-7151
OR	Portland, Radar Elec.	503-232-3404
OR	Salem, JW Elctrns.	503-399-8565
PA	Allentown, A. A. Peters, Inc.	215-434-5237
PA	Altoona, Hollenback Radio Supp.	814-944-6171
PA	Ambridge, Television Parts Co.	412-266-7700
PA	Braddock, M Leff Radio Parts Co.	412-351-5000
PA	Butler, Bacher Elctrns.	412-283-2095
PA	Clifton Heights, Lazar Elctrns.	215-284-2440
PA	Drexel Hill, Kass Elctrn. Distr.	215-449-2300
PA	Elkins Park, AG Radio Inc.	215-886-5100
PA	Erie, J. V. Duncombe Co.	814-454-5278
PA	Erie, Warren Radio Co.	814-454-5285
PA	Harrisburg, Cumberland Elctrns.	717-233-5885
PA	Marcus Hook, Linwood Wholesale	215-485-0777
PA	New Brighton, Television Parts Co., Inc.	412-846-3000
PA	Philadelphia, JEM Elctrns.	215-743-3030
PA	Philadelphia, HBF Elctrns. Inc.	215-338-1100
PA	Philadelphia, Arlen Supply Co.	215-472-3810
PA	Pittsburgh, South Hills Elctrns.	412-341-6200
PA	Pottsville, Moyer Elctrn. Supp. Co., Inc.	717-622-7866
PA	Reading, Barbey Elctrns.	215-376-7451
PA	Scranton, Key Radio & Supp. Co.	717-342-0161
PA	State College, University Elctrns.	814-238-3093
PA	Tarentum, Huston Elctrn. Distrs.	412-224-8002
PA	Wayne, Peak Elctrns. Corp.	215-293-9000
PA	Wilkes-Barre, Wallco Inc. Elctrn. Dist.	717-823-6181
PA	Williamsport, Williamsport Radio Supp.	717-326-1534
RI	Providence, A&J Distrs. Inc.	401-421-0991
RI	Providence, William Dandreta & Co.	401-861-2800
RI	Providence, Hope Elctrn. Supp.	401-521-5600
RI	Woonsocket, Lectronic Supp. Co.	401-762-0131
SC	Charleston, Wholesale Indl. Elctrns.	803-722-2634
SC	Charleston, Wholesale Indl. Elctrns.	803-747-9672
SC	Columbia, Wholesale Indl. Elctrns.	803-256-0746
SC	Columbia, Hesco Inc.	803-254-4575
SC	Florence, J&M Supply Co.	803-662-7281
SC	Greenville, Sawyer Elctrns.	803-235-0438
SC	Greenville, Wholesale Indl. Elctrns.	803-235-8334
SC	Taylors, Cantrell Wholesale	803-268-1194
SD	Watertown, Burghardt Supp. Co.	605-886-5749
TN	Chattanooga, Specialty Distributing Co.	615-267-9460
TN	Columbia, Randolph & Williams	615-388-7566
TN	Cookeville, Randolph & Parks	615-526-6184
TN	Dyersburg, Warren Radio	901-285-3850
TN	Jackson, Lavender Elctrns. Inc.	901-422-6585
TN	Johnson City, L & S Elctrns.	615-926-3021
TN	Kingsport, Radio Elec. Supp. Co.	615-247-8111
TN	Knoxville, Roden Electrical Supp. Co.	615-546-8755
TN	Knoxville, Bondurant Bros. Co.	615-573-9151
TN	Memphis, Warren Radio	901-274-2460
TN	Memphis, Bluff City Elctrns.	901-345-9500
TN	Memphis, Frank G. Uffer Co.	901-725-6743
TN	Morristown, L & S Elctrns.	615-581-7983
TN	Nashville, Curreys Inc.	615-242-4221
TN	Nashville, Randolph & Rice	615-255-5602
TN	Tullahoma, Randolph Vandergriff Inc.	615-455-4531
TX	Abilene, R & R Elctrn. Supp. Co.	915-677-2974
TX	Amarillo, Trice Wholesale Elctrns.	806-372-5668
TX	Amarillo, R & R Elctrn. Supp. Co.	806-374-2866
TX	Austin, C&M Elctrns. Inc.	512-451-6595
TX	Austin, Wholesale Elctrn. Supp. Co.	512-478-9568
TX	Beaumont, Ralph's Indl. Elctrns.	713-833-9443
TX	Beaumont, Covington Distr.	713-835-5392
TX	Beaumont, Buddy's Wholesale Elctrn. Inc.	713-842-5019
TX	Borger, Trice Wholesale Elctrns.	806-274-5281
TX	Bryan, Mid-State Elctrns.	713-779-1226
TX	Corpus Christi, Elctrn. Suppliers Inc.	512-993-1303
TX	Corpus Christi, Leader Elctrn. Supp. Co.	512-884-5527
TX	Dallas, Wholesale Elect. Supp. Co.	214-824-3001
TX	Denison, Denison Radio Supp.	214-465-2336
TX	El Paso, Midland Specialty Co.	915-533-9555
TX	Ft. Worth, Wholesale Elctrn. Supp.	817-336-0461
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Ft. Worth, Byron's Radio & TV Supp.	817-534-5911
TX	Ft. Worth, Trice Wholesale Elctrns.	817-335-9515
TX	Greenville, Lavender Elctrns. Inc.	214-455-4360
TX	Harlingen, Elctrn. Suppliers, Inc.	512-423-5895
TX	Houston, Ralph's Indl. Elctrns.	713-748-4902
TX	Houston, Houston Wholesale	713-644-8320
TX	Houston, Angie Elctrn. Supp. Co.	713-659-8386
TX	Laredo, Guarantee Radio Supp. Co.	512-723-6913
TX	Longview, VIDCO Elctrns. Inc.	214-757-4911
TX	Lubbock, Trice Wholesale Elctrns.	806-747-2888
TX	Lubbock, R & R Elctrns. Supp. Co.	806-765-7727
TX	McAllen, Richards Elctrns.	512-682-6337
TX	McAllen, Rio Radio Supp. Inc.	512-682-5224
TX	Midland, Trice Wholesale Elctrns.	915-563-0866
TX	Paris, Lavender Elctrns. Inc.	214-785-1711
TX	Port Arthur, Diehl Radio & TV Supp.	713-985-8888
TX	Richardson, Trice Wholesale Elctrns.	214-690-4646
TX	San Antonio, Sherman Elctrns.	512-224-1001
TX	San Antonio, M-Tronics Inc.	512-736-2481
TX	Sherman, Lavender Elctrns. Inc.	214-892-9155
TX	Sherman, Trice Wholesale Elctrns.	214-893-7421
TX	Stafford, Harrison Equip. Co.	713-879-2600
TX	Temple, L & M Wholesale Elctrns.	817-778-7679

TX	Texarkana, McCulloch Elctrn. Supp. Co.	214-792-6923
TX	Texas City, Elctrn. Supp. Co.	713-945-4401
TX	Tyler, Lavender Elctrns. Inc.	214-597-6315
TX	Tyler, East Texas Elctrn. Inc.	214-593-8253
TX	Victoria, Lavender Elctrns. Inc.	512-575-4738
TX	Waco, L & M Wholesale Elect.	817-754-4644
TX	Wichita Falls, Trice Wholesale Elctrns.	817-322-2151
TX	Wichita Falls, Wholesale Elect. Supp. Co.	817-723-8106
UT	Provo, Central Utah Elctrns.	801-373-7522
UT	Salt Lake City, Kimball Elctrns.	801-328-2075
VT	Burlington, Greylock Elctrns.	802-863-3100
VT	Rutland, Rutland Elctrn.	802-775-4690
VT	White River Jct., Vermont Appliance	802-295-3143
VA	Alexandria, Certified Elctrns.	703-548-5115
VA	Arlington, Arlington Elctrn. Wholesale	703-524-2412
VA	Charlottesville, Virginia Radio Supp. Co., Inc.	804-296-4184
VA	Danville, Womack Radio Supp. Co., Inc.	804-793-5131
VA	Grundy, Rife Wholesale Inc.	703-935-2188
VA	Lynchburg, Womack Radio Supp. Co., Inc.	804-845-5983
VA	Martinsville, Womack Radio Supp. Co., Inc.	703-638-2327
VA	Norfolk, Radio Parts Dist. Co.	804-461-8095
VA	Portsmouth, Distrs. Inc.	804-399-2446
VA	Richmond, Banner Elctrns. Inc.	804-321-7255
VA	Staunton, Southern Elec. Corp.	703-886-6218
WA	Bellevue, United Radio Supp.	206-451-9393
WA	Bellingham, Seattle Radio Supp.	206-734-3400
WA	Everett, JW Electronics	206-258-4339
WA	Seattle, Pearl Elctrns.	206-622-6200
WA	Seattle, Electronic Supp. Co.	206-632-2222
WA	Seattle, Radar Elec.	206-282-2511
WA	Seattle, Westlake Elctrn. Supp.	206-622-6600
WA	Spokane, Amfac Elec. Supp.	509-534-0611
WA	Tacoma, C & G Elctrns.	206-272-3181
WA	Tumwater, JW Elctrns.	206-943-1071
WA	Yakima, JW Electronics	509-575-1234
WV	Beckley, Halley Elctrns.	304-253-2561
WV	Charleston, Elctrn. Materials	304-325-3638
WV	Fairmont, State Elctrns.	304-366-4520
WV	Morgantown, State Elctrns.	304-292-1641
WV	Morgantown, Electro Distributing Co.	304-296-5637
WI	Appleton, Appleton Radio	414-734-5767
WI	Eau Claire, Indianhead Elctrns.	715-834-3606
WI	Fond du Lac, Fedco Elctrns. Inc.	414-922-6490
WI	Green Bay, G. M. Popkey Co.	414-437-5445
WI	Kenosha, Chester Elctrn. Supp.	414-658-4616
WI	Madison, Superior Elctrn. Parts Co.	608-257-1477
WI	Madison, G. M. Popkey Co.	608-257-2266
WI	Marinette, G. M. Popkey Co.	715-732-0121
WI	Milwaukee, Marmax Sls. Div. of World Prod., Inc.	414-272-4048
WI	Milwaukee, G. M. Popkey Co.	414-444-4730
WI	Racine, Superior Racine, Inc.	414-632-5142
WI	Wausau, G. M. Popkey Co.	715-845-4255
WY	Casper, Walker Casper Elctrn. Co.	307-237-1943

SYLVANIA MINIATURE LIGHTING, W. Main St., Hillsboro, NH 03244, Tel: 603-464-5533, TWX: 710-366-0387; Empl.: 450; *Sls. Mgr.:* Tom Izbicki ....1B•1059-1061

Local Sales Offices & Reps

CA	Laguna Hills, English/Damco	714-837-3801
CA	Sunnyvale, W.W. Posey Co.	408-746-0771
CO	Arvada, Cluff & Assocs.	303-425-6604
CT	No. Haven, Coakley, Boyd & Abbett	800-225-8402
FL	Ft Lauderdale, Hutto, Hawkins, Peregoy	305-971-5750
FL	Maitland, Hutto, Hawkins, Peregoy	305-831-2474
GA	Atlanta, Millar Elctrns.	404-261-6160
IL	Chicago, I.R.I.	312-647-7755
IN	Ft. Wayne, R.O. Whitesell & Assocs.	219-432-5591
IN	Indianapolis, R.O. Whitesell & Assocs.	317-359-9283
KS	Prairie Village, R.W. Kunz	913-648-3535
KY	Louisville, R.O. Whitesell & Assocs.	502-426-7696
LA	Kenner, Cartwright & Bean	504-466-0020
MA	Needham, Coakley, Boyd & Abbett	617-444-5470
MI	Grand Rapids, R.O. Whitesell & Assocs.	616-942-5420
MI	St. Joseph, R.O. Whitesell & Assocs.	616-983-7337
MN	Minneapolis, Stoss & Assocs.	612-925-2757
MO	St. Louis, R.W. Kunz	314-966-4977
NJ	Long Valley, Paul A. Sweeney	201-852-1434
NY	Rochester, Electra Sls.	716-461-5252
NY	Syracuse, Electra Sls.	315-463-1248
NC	Raleigh, Millar Elctrns.	919-787-9585
OH	Cincinnati, R.O. Whitesell & Assocs.	513-521-2290
OH	Cleveland, R.O. Whitesell & Assocs.	216-447-9020
OH	Columbus, R.O. Whitesell & Assocs.	614-888-9396
OH	Dayton, R.O. Whitesell & Assocs.	513-298-9546
OK	Oklahoma City, Erickson Sls.	405-682-2947
OR	Tigard, Electronic Sources Inc.	503-684-0040
PA	Pittsburgh, R.O. Whitesell & Assocs.	412-963-6161
PA	Trevose, P.S.A. Inc.	215-245-0513
TN	Memphis, Cartwright & Bean	901-276-4442
TX	Dallas, Erickson Sales	214-739-5833
TX	Houston, Erickson Sales	713-980-9606
UT	Salt Lake City, Cluff & Assocs.	801-486-7297
WA	Bellevue, Electronic Sources Inc.	206-451-3500
WI	Milwaukee, F.C. DuBois & Assocs.	414-774-3100

SYLVANIA PARTS, 816 Lexington Ave., Warren, PA 16365, Tel: 814-723-2000, 800-221-3333; Empl.: 1880; *Sls. Mgr.:* R. F. Scalise

SYLVANIA SYS. GRP., Comm. Sys. Div., GTE Prods. Corp., 77 A St., Needham Hgts., MA 02194, Tel: 617-449-2000, Telex: 92-2497; *Sls. Mgr.:* Ken Tong

SYMBEX CORP., 72 Corwin Dr., Box 938, Painesville, OH 44077, Tel: 216-354-0925, TWX: 810-425-2256; Empl.: 130 ....2•1586, 1587, 1895

Local Sales Offices & Reps

AL	Huntsville, Elctrn. Sls.	205-533-1735
AZ	Tempe, Elctrn. Dev. and Sls.	602-438-1547
AR	Little Rock, Erickson Sls.	501-225-7379
CA	Anaheim, West Rep.	714-527-2822
CA	Chico, Symbex Corp.	916-891-6410
CA	San Diego, D2 Sls.	619-560-6266
CA	Santa Clara, Symbex Corp.	408-727-5817
CO	Denver, West, Inc.	303-773-8080
CT	Madison, Omni-Rep	203-421-4561
FL	Ft. Lauderdale, Interface Dynamics	305-565-5075
GA	Norcross, Elctrn. Sls.	404-448-6554
IN	Indianapolis, M & L Elctrn. Sls.	317-359-4742
LA	Chalmette, Erickson Sls.	504-271-1976
MD	Baltimore, C.E. Heller Co.	301-256-0245
MA	Burlington, Omni-Rep	617-938-0039
MA	Canton, Symbex Corp.	617-828-8114
MI	Franklin Village, I.E. Hampton & Assocs.	313-851-0820
MI	St. Joseph, I.E. Hampton & Assocs.	616-983-0862
MN	Minneapolis, Parler, Shoap & Assocs.	612-755-6904
MO	Blue Springs, Kathrinus Kelly Baumhauer	816-229-0001
MO	St. Louis, Kathrinus Kelly Baumhauer	314-647-2400
NJ	Englewood, Axelrod, Busch, Sullivan Assoc.	201-871-0020
NJ	Medford, Champion Elctrn. Sls.	609-983-0932
NY	Bainbridge, R.W. Meischer Co.	607-967-7192
NY	Buffalo, R.W. Mitscher Co.	716-633-7970
NY	Pittsford, R.W. Mitscher Co.	716-586-4012
NY	Rochester, R.W. Mitscher Co.	716-227-0839
NY	Syracuse, R.W. Mitscher Co.	315-458-1321
NC	Cary, Elctrn. Sls.	919-467-8486
OH	Painesville, Symbex Corp.	216-354-0925
OH	Rocky River, Norm Case Assocs.	216-333-0400
OK	Oklahoma City, Erickon Sls.	405-682-2947
OR	Falls City, Ecco Mktg.	503-787-3509
PA	Southampton, Symbex Corp.	215-322-8040
TX	Austin, Erickson Sls.	512-244-3068
TX	Dallas, Erickson Sls.	214-739-5833
TX	El Paso, Epec., Inc.	915-593-8481
TX	Euless, Symbex Corp.	817-540-2687
TX	Houston, Erickson Sls.	713-980-9606
UT	Salt Lake City, Meridian West	801-968-4177
WA	Seattle, Ecco Mktg.	206-364-0200
WV	Spokane, Ecco Mktg.	509-924-4410
WI	Colgate, Rep. 1 & Assoc.	414-628-4016

Local Distributors

AZ	Phoenix, Arizona Comps.	602-269-5655
CA	Santa Ana, C.R. Elctrns.	714-556-2040
CT	Danbury, Pilgrim Elctrns	203-792-7274
LA	Shreveport, Indl. Elctrns. Supp.	318-222-9459
MA	Framingham, Now Elctrns.	617-235-9501
MA	Middleboro, Glynn Elctrns.	617-947-4262
MO	St. Charles, Finnigan Elctrns.	314-946-6201
OK	Tulsa, Combined Tech. Comps.	918-582-8242
WA	Seattle, Carlyle Tech. Sls.	206-575-6750
WI	Madison, Schrenk Sls.	608-255-7400
WI	Milwaukee, Marsh Elctrns.	414-475-6000

SYMBICON, 89 Route 101A, Amherst, NH 03031, Tel: 603-673-8898, Telex: 553-059; *Sls. Mgr.:* S. Harrington

SYM-TEK SYS., INC., 3912 Calle Fortunada, San Diego, CA 92123, Tel: 619-569-6800, Telex: 695450; Empl.: 250; *Sls. Mgr.:* Guy Whitlock

Local Sales Offices & Reps

AZ	Phoenix, Scientific Dvs.	602-957-0401
CA	Escondido, Scientific Dvs.	619-480-1287
CA	Los Alamitos, Scientific Dvs.	213-598-7678
CA	San Jose, Scientific Dvs.	408-554-0455
CO	Boulder, Scientific Dvs.	303-449-9466
FL	Longwood, Richard Schoonovier Inc.	305-788-3344
GA	Marietta, More	404-992-5172
MA	Hudson, System Sls.	617-562-9777
NM	Albuquerque, Scientific Devices	505-883-3668
NY	Valley Stream, Levison Sls.	516-266-5020
OH	Brecksville, WRR Assoc.	216-526-2023
TX	Austin, Crockett Southwest	512-250-1776
TX	Dallas, Crockett Southwest	214-251-1776
TX	Houston, Crockett Southwest	713-578-1836

SYMTRON CORP., 2415 E. Charleston Rd., Mountain View, CA 94043, Tel: 415-965-4500, TWX: 910-379-5002; Empl.: 250; *Sls. Mgr.:* Don Atkins ....2•1896

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Glendale, Symtron Corp.	602-978-6595
CA	Glendale, Orion Sls.	213-240-3151
CA	San Diego, Hadden Assoc.	619-565-9444
CA	Simi Valley, Symtron Corp.	213-961-4536
CA	Tustin, Orion Sls.	714-832-9687
CO	Golden, Symtron Corp.	303-642-7656
CT	Norwalk, Wendell & Assocs.	203-846-4377
FL	Casselberry, H.A.I.	305-695-8592
FL	Largo, H.A.I.	813-595-8170
GA	Atlanta, Remco	404-447-6937
IL	Lisle, Symtron Corp.	312-420-8100
MD	Rockville, Mechtronics Sls.	301-340-2130
MN	Eden Prairie, Symtron Corp.	612-934-8318
MO	Grandview, Harris-Hanson Co.	816-763-6200
MO	St. Louis, Harris-Hanson Co.	314-432-3611
NH	Seabrook, Symtron Corp.	603-431-6296
NY	Manhasset, Wincor Elctrn.	516-627-9474
NC	Raleigh, Remco	919-847-5079
OH	Cleveland, Arthur H. Baier	216-461-6161
OR	Portland, Component Tech.	503-292-1518
PA	Hatboro, Electro Rep	215-674-4421
TX	Addison, Centurion Mktg.	214-348-0382
TX	Addison, Symtron Corp.	214-233-8991

SYNERGETICS INTL., INC., 6565 Odell Pl., P.O. Box E, Boulder, CO 80306-1236, Tel: 303-530-2020; *Sls. Mgr.:* Mike Sharkey

SYNERTEK, 3001 Stender Way, Santa Clara, CA 95051

SYNTEL DIV., Tegam, Inc., 7230 North Ridge Rd., Madison, OH 44057, Tel: 216-428-7505; Empl.: 15

SYNTEST CORP., 40 Locke Dr., Marlboro, MA 01752, Tel: 617-481-7827, TWX: 710-390-7659; *Sls. Mgr.:* Curtis P. Hoffman ....3•1094

Local Sales Offices & Reps

CA	Enceno, King Engrg.	213-981-8677
IN	Columbus, Miltronics	812-376-6321
MD	Silver Spring, Source Assoc.	301-431-0587
MA	Waltham, Digital Assocs.	617-899-4300
NY	Canandaigua, Burt Mamula	716-394-5560
PA	Newtown Square, SWR Assoc	215-356-8550
TX	Dallas, Dean Assocs.	214-458-1321

SYNTRONIC INSTRUMENTS, INC., 100 Industrial Rd., Addison, IL 60101, Tel: 312-543-6444, TWX: 910-651-2191; Empl.: 175; *Sls. Mgr.:* Paul Evans

Local Sales Offices & Reps

CA	Los Altos, Frauman Assocs.	415-941-0660
CA	Woodland Hills, Tronics	213-703-7212
CO	Wheatridge, Waugaman Assocs.	303-423-1020
IA	Davenport, Ensco-Rep	319-386-6600
KS	Overland Park, Ensco-Rep	913-381-7557
KS	Wichita, Ensco-Rep	316-683-1070
MA	Norwood, MPS Elctrns.	617-796-8700
MN	Minneapolis, Torkelson Assocs.	612-835-2414
MO	Maryland Heights, Ensco-Rep	314-423-3935
NJ	Fair Lawn, G. D. Harris Assocs.	201-796-5200
NM	Albuquerque, Waugaman Assocs.	505-294-1436
OR	Portland, Rep-West	503-771-1555
PA	W. Conshohocken, Eastern Comps.	215-825-8610
PA	York, Eastern Comps.	717-764-3114
TX	Austin, Space Elctrns.	512-451-3173
TX	Houston, Space Elctrns.	713-266-9245
TX	Irving, Space Elctrns.	214-251-3636
UT	S. Jordan, Waugaman Assocs.	801-254-0570
VA	Manassas, Eastern Comps.	703-471-1025
WA	Seattle, Rep-West	206-283-8351
EXP	NJ, Fairfield, Pantronics	201-575-1177
EXP	NJ, Oradell, S. Ginsbury Ltd.	201-261-3200

SYRACUSE ELCTRNS., P.O. Box 4770, Syracuse, NY 13221, Tel: 315-488-4911, Telex: 937-232; Empl.: 200

SYSCON INTL., INC., 1108 So. High St., So. Bend, IN 46618-1096, Tel: 219-232-3900, 800-348-2993, TWX: 810-299-2523; Empl.: 40; *Sls. Mgr.:* Les Barney

SYSTEMS FURNITURE CO., 2727 Maricopa St., Torrance, CA 90503, Tel: 213-533-1212, TWX: 910-349-7518; *Sls. Mgr.:* Rick Labowitz

SYSTEMS PLUS, 1120 San Antonio Rd., Palo Alto, CA 94303, Tel: 415-969-7047, TWX: 910-373-2096; Empl.: 35

SYSTEMS RESCH. LABS., INC., 2800 Indian Ripple Rd., Dayton, OH 45440, Tel: 513-426-6000, TWX: 810-450-2621; FSC No.: 14590; Empl.: 1000

SYSTONICS, INC., Box 121, Winchester, MA 01890, Tel: 617-729-4439; Empl.: 11

SYSTRON-DONNER INERTIAL DIV., 2700 Systron Dr., Concord, CA 94518, Tel: 415-682-6161, TWX: 910-481-9478; Empl.: 416

SYSTRON-DONNER INSTR. DIV., 2727 Systron Dr., Concord, CA 94518, Tel: 415-676-5000, Telex: 171996, TWX: 910-481-9472; FSC No.: 52542; Empl.: 1400; *Sls. Mgr.:* Howard W. Mette

SYSTRON-DONNER MICROWAVE DIV., 14844 Oxnard St., Van Nuys, CA 91409, Tel: 818-786-1760, TWX: 910-495-1786; Empl.: 160; *Sls. Mgr.:* Richard Valleroy

SYT, 1220 Barranca, El Paso, TX 79935, Tel: 915-593-1234; Empl.: 70; *Sls. Mgr.:* Larry Crum; *Dist. Mgr.:* John Sullivan

SYTEK, INC., 1225 Charleston Rd., Mountain View, CA 94043, Tel: 415-966-7300; *Sls. Mgr.:* Rhonda St. James

TAB BOOKS, Monterey & Pinola Aves., Blue Ridge Summit, PA 17214, Tel: 717-794-2191; Empl.: 175; *Sls. Mgr.:* B. Sites

TACHTRONIC INSTRUMENTS, INC., New Ulm, MN 56073, Tel: 507-354-3105

TADIRAN BATTERIES, See Plainview Elctrns.

TAFA INC., Dow Rd., Bow, NH 03301, Tel: 603-224-9585, Telex: 94-3424; Empl.: 50; *Sls. Mgr.:* Rick Mitchner; *Dist. Mgr.:* Leon Grant

TA INSTR. CASE CO., 4625 Alger St., Los Angeles, CA 90039, Tel: 213-242-8855, TWX: 910-497-4780; Empl.: 60; *Sls. Mgr.:* Jackie Garrison; *Dist. Mgr.:* Jackie Garrison .... **2**•1059

Local Sales Offices & Reps

AL	Huntsville, Intl. Sci. Instrs.	205-533-6880
AZ	Phoenix, Tri-Fab Sls.	602-265-3341
CA	Mountain View, Connolly & Co.	415-967-6988
CO	Littleton, Omega Ltd.	303-798-7040
CT	Hartford, Sturgeon Co.	203-249-7800
FL	Ft. Lauderdale, Tech-Rep Assocs.	305-968-7792
FL	Melbourne Beach, Tech-Rep Assocs.	305-725-4655
FL	St. Petersburg, Tech-Rep Assoc.	813-577-2779
IL	Chicago, Aktron Corp.	312-658-3538
IN	Ft. Wayne, Aktron Corp.	219-747-3650
IA	Davenport, Ensco-Iowa	319-386-6600
KS	Overland Pk., Ensco-Kansas	913-381-7557
KS	Wichita, Ensco Wichita	316-683-1070
MD	Lanham, Data Sys. Mktg.	301-577-3700
MA	Boston, Sturgeon Co.	617-444-6603
MO	St. Louis, Ensco-Rep	314-423-3935
NJ	Ridgewood, Balloou Inc.	201-444-6990
NM	Albuquerque, C. T. Carlberg Assocs.	505-888-3883
NY	New York, Ballou	212-964-4640
NY	Rochester, Gis Lason Sls.	716-454-4741
PA	Blue Bell, Macron Dynamics	215-643-0400
TX	Arlington, Bell Comps.	817-461-5303
WA	Bellevue, Caruso & Northcutt	206-454-9699

TAKEDA RIKEN IND., 1-32-1 Asahi-cho Nerima-ku, Tokyo 176, Japan, Tel: 930-4111, Telex: 272-2140; Empl.: 800; *Sls. Mgr.:* Hiroshi Yasui

T&B/ANSLEY CORP., Sub. Thomas & Betts, 920 Route 202, Raritan, NJ 08869, Tel: 201-685-1600; Empl.: 250; *Dist. Mgr.:* Roland Kolu

TANO CORP., 4301 Poche Ct., New Orleans, LA 70129, Tel: 504-254-3500, TWX: 810-951-5229; Empl.: 390; *Sls. Mgr.:* T. M. Lowrey, Energy Control Sys.;M. A. Cushman, Marine Sys.

TANSITOR ELCTRNS., West Rd., Bennington, VT 05201, Tel: 802-442-5473, TWX: 710-360-1782; FSC No.: 05079; Empl.: 200; *Sls. Mgr.:* Tom Moore; *Dist. Mgr.:* Tom Moore

TAPECON, INC., 10 Latta Rd., Rochester, NY 14612, Tel: 716-621-8400; Empl.: 80

TAPESWITCH CORP. OF AMERICA, 100 Schmitt Blvd., Farmingdale, NY 11735, Tel: 516-694-6312, Telex: 14-4611; Empl.: 100 .... **1B**•1753

TAPPAN WIRE & CABLE, 256 Oak Tree Rd., Tappan, NY 10983, Tel: 914-359-9300; Empl.: 10; *Sls. Mgr.:* S. Grant

TASKER SYSTEMS, 20131 Sunburst St., Chatsworth, CA 91311, Tel: 213-341-3010, TWX: 910-494-1214; FSC No.: 09017; Empl.: 250; *Sls. Mgr.:* Gary B. Etzler

TAUBER ELCTRNS. INC., 4901 Morena Blvd., Bldg. 314, San Diego, CA 92117, Tel: 619-274-7242; Empl.: 12; *Dist. Mgr.:* Doug Bennett .... **3**•1433

Local Sales Offices & Reps

AL	Huntsville, Macro-Marketing	205-883-9630
AZ	Phoenix, MacDonald & Assocs.	602-998-1848
CA	Fallbrook, Martronix	619-728-7678
CA	Fullerton, Hawk Assocs.	714-773-4152
CA	Northridge, Tauber-Dreyer Assocs.	818-993-0048
CA	San Jose, Al E. Dusseau	408-226-4375
CA	Sunnyvale, GFA Sales	408-738-4751
IL	Wheeling, Ed Joyner & Co.	312-520-1200
OK	Tulsa, Cunningham Comps. Corp.	918-492-0390
OR	Portland, Frank Jackson Assocs.	503-292-2638
TX	Dallas, Cunningham Comps. Corp.	214-233-4303
TX	Houston, Cunningham Comps. Corp.	713-451-4197
WA	Redmond, Frank Jackson Assocs.	206-881-7277

TAURUS CORP., Academy Hill, P.O. Box 278, Lambertville, NJ 08530, Tel: 609-397-2390 .... **3**•1095

Local Sales Offices & Reps

CA	Pasadena, Sci. Sls.	213-793-1244
FL	Clearwater, Brennan Assoc.	813-446-5006
OH	Wickliffe, W. J. Brauer	216-943-0601

TAU-TRON INC., 27 Industrial Ave., Chelmsford, MA 01824, Tel: 617-256-9013, Telex: 951-952; Empl.: 200; *Sls. Mgr.:* Herbert K. Clark

TAYLOR ELECTRONICS, 401 West Orion, Tempe, AZ 85283, Tel: 602-838-4523; *Sls. Mgr.:* Junius Taylor .... **3**•1786

T-BAR INCORPORATED, Switching Components Div., P.O. Box T, 141 Danbury Rd., Wilton, CT 06897, Tel: 203-834-8227, Telex: 68 19 129, TWX: 710 479 3216; *Sls. Mgr.:* Bill Kruppenbacher .... **3**•1308

Local Sales Offices & Reps

AL	Huntsville, CSR Elctrns.	205-533-2444
CA	Arcadia, Van Gott & Assocs.	213-445-9728
CA	Palo Alto, Horne Electro Sls.	415-494-6777
CT	Wilton, T-Bar, Inc.	203-834-8227
FL	St. Petersburg, Tech-Rep Assocs.	813-577-2779
GA	Atlanta, CSR Elctrns.	404-396-3720
MD	Silver Spring, Carwithen Assocs.	301-589-9040
NY	Mount Vernon, Sonkin Assocs.	914-668-9809
NC	Raleigh, CSR Elctrns.	919-878-9200
TX	Richardson, McCoy Assocs. Co.	214-238-1017

Local Distributors

CA	Chatsworth, Integrated Elctrns.	213-998-2200
IL	Chicago, Newark Elctrns.	312-638-4411
MA	Hingham, Sager Elctrl. Supp. Co.	617-749-6700
NY	Hauppauge, JACO Elctrns.	516-273-5500
TX	Fort Worth, Allied Elctrns.	817-336-5401

TDJ CO., INC., 1154 Morena Blvd., San Diego, CA 92110, Tel: 619-276-5920; Empl.: 6; *Sls. Mgr.:* R. Scherr .... **2**•1060, 1061

TDK CORPORATION OF AMERICA, 4711 Golf Rd., Skokie, IL 60076, Tel: 312-679-8200 .... **1A**•1189, 1281, 1567, 1630, 2300; **2**•1798, 1799; **3**•1061, 1787

Local Sales Offices & Reps

AL	Birmingham, Robert Warnock Co.	205-879-0576
CA	Cupertino, Thresum Assoc.	408-996-9889
CA	Irvine, English-Damco	714-751-8054
CA	Torrance, TDK Corp. of America	213-539-6631
FL	St. Petersburg, Tech. Rep. Assoc.	813-577-2779
ID	Meridian, Intermountain Techn.	208-888-5708
IL	Palatine, Technology Sls.	312-991-6600
IN	Indianapolis, TDK Corp. of America	317-872-0370
MA	Westwood, Comp. Rep. Assoc.	617-329-3454
MN	Bloomington, Smiley-Scott Assoc.	612-888-5551
NJ	Mount Laurel, Comtek Inc.	609-235-8505
NY	East Syracuse, Nycom Inc.	315-437-8343
NY	Port Washington, TDK Corp. of America	516-625-0100, Ext. 2300
NC	Raleigh, Zucker Assoc.	919-782-8433
OH	Cincinnati, Luebbe Sls. Co.	512-871-4211
TN	Knoxville, Insul-Reps	615-691-7586
TX	Richardson, Logic I Sls.	214-234-0765
WA	Seattle, Harry Levinson Co.	206-285-5622

TEAC CORP. OF AMERICA, Indl. Prod. Div., 7733 Telegraph Rd., Montebello, CA 90640, Tel: 213-726-0303, Telex: 67-7014; Empl.: 200; *Sls. Mgr.:* Al Astor; *Dist. Mgr.:* Al Astor

TEC, 2727 N. Fairview, Box 5646, Tuscon, AZ 85703, Tel: 602-792-2230, TWX: 910-952-1377; Empl.: 400; *Sls. Mgr.:* Barry Hamilton; *Dist. Mgr.:* Barry Hamilton

TECA, THERMOELECTRIC COOLING AMERICA CORP., 448 N. Halsted St., Chicago, IL 60622, Tel: 312-666-1600; Empl.: 50 .... **2**•1805

TECCOR ELCTRNS., P.O. Box 619009, Dallas, TX 75261-9009, Tel: 214-252-7651, Telex: 79-1600, TWX: 910-860-5068; Empl.: 700; *Sls. Mgr.:* Gerry Wiley; *Dist. Mgr.:* Don Davis .... **1A**•2110, 2111

Local Sales Offices & Reps

AL	Huntsville, Interep Assocs.	205-533-1730
AZ	Tempe, System Sls. of Ariz.	602-829-9338
CA	San Diego, Sr Electronics	619-560-8330
CA	San Jose, Quantum Coefficient	408-942-1070
CA	Torrance, O'Donnell Assocs.	213-539-9664
CO	Aurora, Electrodyne	303-695-8903
CT	Cheshire, Scientific Comps.	203-272-2963
FL	Clearwater Beach, Perrott Assocs.	813-443-5214
FL	Orlando, Perrott Assocs.	305-298-7748
FL	Sunrise, Perrott Assocs.	305-792-2211
GA	Norcross, Interep Assocs.	404-449-8680
IL	Arlington Heights, MSI	312-956-1000
IN	Fort Wayne, Robert O. Whitesell & Assoc.	219-432-5591
IN	Indianapolis, Robert O. Whitesell & Assoc.	317-359-9283
IN	Kokomo, Robert O. Whitesell & Assoc.	317-457-9127
IA	Cedar Rapids, Dy-Tronix	319-377-8275
KY	Louisville, Robert O. Whitesell & Assoc.	502-426-7696
MD	Towson, C. H. Newson & Assocs.	301-296-2292
MA	Walpole, JEF Components	617-668-6695
MI	Detroit, Rathsburg Assocs.	313-882-1717
MN	Minneapolis, Electric Comp. Sls.	612-933-2594
MO	Bridgeton, Dy-Tronix	314-731-5799
MO	Independence, Dy-Tronix	816-373-6600
NM	Albuquerque, Sys. Sls. of Arizona Inc.	505-881-8877
NY	Canandaigua, Bensman/Upstate Assocs.	716-396-2498
NY	Jamaica, S-J Assocs.	212-291-3232
NY	Johnson City, Bensman/Upstate Assoc.	607-722-2242
NC	Raleigh, J & B Sales	919-772-3546
OH	Cincinnati, Robert O. Whitesell & Assoc.	513-521-2290
OH	Cleveland, Robert O. Whitesell & Assoc.	216-447-9020
OH	Columbus, Robert O. Whitesell & Assoc.	614-888-9396
OH	Dayton, Robert O. Whitesell & Assoc.	513-298-9546
OK	Tulsa, Bonser Philhower Sls.	918-496-3236
PA	Flourtown, C. H. Newson & Assocs.	215-248-3377
PA	Glenside, CMS Marketing	215-885-5106
PA	Pittsburgh, Robert O. Whitesell & Assoc.	412-963-6161
TX	Austin, Bonser Philhower Sls.	512-458-3569
TX	Houston, Bonser Philhower Sls.	713-495-3115

TX	Richardson, Bonser Philhower Sls.	214-234-8438
UT	Salt Lake City, Electrodyne	801-486-3801
WA	Redmond, Quadra Sls.	206-883-3550
WI	Wauwatosa, Larsen Assocs.	414-258-0529

Local Distributors

AL	Huntsville, RM Electronics	205-852-1550
AZ	Phoenix, Tri-Tek	602-995-9352
AZ	Tempe, Anthem Elctrns.	602-244-0900
AZ	Tempe, Bell Inds.	602-966-7800
CA	Burlingame, Rose Elctrns. Dist.	415-348-2740
CA	Chatsworth, Integrated Elctrns.	213-998-2200
CA	Chatsworth, Anthem Elctrns.	213-700-1000
CA	Irvine, Integrated Elctrns.	714-540-5600
CA	San Diego, Anthem Elctrns.	619-279-5200
CA	San Jose, Anthem Elctrns.	408-946-8000
CA	San Leandro, Electro Comp Dist.	415-352-5210
CA	Santee, Mouser Elctrns.	619-449-2220
CA	Tustin, Anthem Elctrns.	714-730-8000
CO	Englewood, Anthem Elctrns.	303-790-4500
CO	Lakewood, Active Comp. Technlg.	303-233-4431
CO	Wheatridge, Bell Inds.	303-424-1985
CT	East Haven, JV Electronics	203-469-2321
CT	Hamden, Almo Elctrns.	203-288-6556
CT	Orange, Milgray Elctrns.	203-795-0711
FL	Longwood, Intertec Distr.	305-834-7777
FL	Winterpark, Milgray Elctrns.	305-647-5747
IL	Hoffman Estates, Inter Comp	312-843-2040
IL	Lombard, RM Electronics	312-932-5150
IL	Rosemont, Advent Elctrns.	312-298-4210
IN	Ft. Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, RM Electronics	317-247-9701
IN	Indianapolis, Advent Elctrns.	317-872-4910
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Cedar Rapids, Advent Elctrns.	319-363-0221
KS	Overland Park, Milgray Elctrns.	913-236-8800
LA	Baton Rouge, Indl. Elctrns. Supply	504-926-0513
LA	Shreveport, Indl. Elctrns. Supply	318-222-9459
MD	Rockville, Milgray Elctrns.	301-468-6400
MD	Rockville, Almo Elctrns.	301-251-1161
MD	Savage, Pyttronic Inds.	301-792-0780
MA	Burlington, Milgray Elctrns.	617-272-6800
MA	Burlington, Zeus Comps.	617-273-0750
MA	Woburn, ACI Elctrns.	617-935-7230
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MI	Wyoming, RM Electronics	616-531-9300
MN	Minneapolis, Stark Elctrns.	612-332-1325
NE	Lincoln, Scott Elctrns.	402-466-8221
NJ	Camden, Gen. Radio Supply	609-964-8560
NJ	Marlton, Milgray Elctrns.	609-983-5490
NM	Albuquerque, Bell Inds.	505-292-2700
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Freeport, Milgray Elctrns.	516-546-5600
NY	Jamaica, Archer Indl. Dist.	212-291-3232
NY	Port Chester, Zeus Comps.	914-937-7400
NY	Rochester, Summit Distrs.	716-334-7376
NY	Rochester, Simcona Elctrns.	716-328-3230
NC	Greensboro, Hammond Elctrns.	919-275-6391
NC	Winston-Salem, Almo Elctrns.	919-760-0432
OH	Cincinnati, Graham Elctrns.	513-772-1661
OH	Cleveland, CAM/Ohio Indl. Elctrn.	216-461-4700
OH	Cleveland, Milgray Elctrns.	216-447-1520
OH	Columbus, Graham Elctrns.	614-895-1590
OH	Dayton, Stotts Friedman	513-298-5555
OR	Portland, Radar Elc. Co.	503-232-3404
PA	Enola, Almo Elctrns.	717-732-3681
PA	Mc Kean, Advacom	814-476-7774
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
PA	Philadelphia, Almo Elctrns.	215-698-4000
PA	Pittsburgh, Almo Elctrns.	412-931-5990
PA	Pittsburgh, CAM/RPC Indl. Elctrns.	412-782-3770
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Chatanooga, Techni-Tronics	615-875-5449
TN	Nashville, Graham Elctrns.	615-242-2682
TX	Austin, Active Comp. Technlg.	512-452-5254
TX	Dallas, Active Comp. Technlg.	214-980-1888
TX	Dallas, RM Electronics	214-235-3100
TX	El Paso, ERA Elctrns.	915-592-4126
TX	Houston, Active Comp. Technlg.	713-496-4000
UT	Salt Lake City, Bell Inds.	801-972-6969
WA	Bellevue, Integrated Elctrns.	206-455-2727
WA	Redmond, Anthem Elctrns.	206-881-0850
WA	Seattle, Radar Elec. Co.	206-282-2511
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	New Berlin, RM Electronics	414-784-4420

TECHCON SYSTEMS INC., 1059 E. Bedmar St., Carson, CA 90746, Tel: 213-603-8888; Empl.: 25; *Sls. Mgr.:* S. L. Morse

TECH-ETCH INC., 45 Aldrin Rd., Plymouth, MA 02360, Tel: 617-747-0300; Empl.: 125; *Sls. Mgr.:* P. A. Thomas

TECH LABS., INC., Bergen & Edsall Blvds., Palisades Pk., NJ 07650, Tel: 201-944-2221; FSC No.: 83332; Empl.: 31 .... 1B•1754, 1755

Local Sales Offices & Reps

CA	Granada Hills, C & W Comp. Sls.	213-368-4032
CA	Palo Alto, Mollard Mktg.	415-961-0456
CT	New Preston, NBS Assoc.	203-868-0501
GA	Atlanta, Grady Duckett Sls.	404-451-3529
IL	Glenview, Crimson Engrg. Co.	312-470-0024
KS	DeSoto, Midtec Assocs.	913-441-6565
MI	Jackson, N. Scroggs Co.	517-750-1170
MO	Florissant, Midtec Assocs.	314-837-5200
NJ	Haddonfield, Gray Assocs.	609-429-5300
NJ	Upper Saddle River, Bob Cameron, Inc.	201-825-1304
NY	Huntington Station, Haner Assocs.	516-242-7855
NY	Pittsford, Net Sls.	716-467-4538
OH	Cincinnati, Patco	513-931-3311
PA	Pittsburgh, VerHill Assocs.	412-241-5202
TX	Dallas, Southwest Elctrns.	214-690-9881
TX	Houston, Southwest Elctrns.	713-729-1670
WA	Seattle, SPS Elctrns.	206-323-4140

TECHMAR CORP., 2232 S. Cotner Ave., Los Angeles, CA 90064, Tel: 213-478-0046, 800-TECHMAR; Empl.: 12; *Sls. Mgr.:* Karena Bennetto .... 2•1062, 1063

TECH MATERIALS, 5 Wellington Rd., Lincoln, RI 02865, Tel: 401-333-1700, TWX: 710-384-0600; Empl.: 150; *Sls. Mgr.:* C.B. Harlan

TECHNAR INC., 205 N. 2nd Ave., Arcadia, CA 91006, Tel: 818-445-1143; *Sls. Mgr.:* James Rhodes

TECHNIC, INC., Box 965, Providence, RI 02901, Tel: 401-781-6100, Telex: 927514; Empl.: 100; *Sls. Mgr.:* A. A. Amtos

TECHNICAL DEVICES, 560 Alaska Ave., Torrance, CA 90503, Tel: 213-618-8437; FSC No.: 04772; Empl.: 21; *Sls. Mgr.:* J. Cochran; *Dist. Mgr.:* J. Cochran

TECHNICAL PANELS, INC., 9162 La Rosa Dr., Temple City, CA 91780, Tel: 213-285-3105; Empl.: 13; *Sls. Mgr.:* Janlyn Prendic; *Dist. Mgr.:* Douglas Welch

Local Sales Offices & Reps

AZ	Scottsdale, TC Elctrn. Sls. Inc.	602-994-5153
CA	Temple City, HMC, Inc.	213-285-0485
MO	Ellisville, Larco Sls.	314-394-7141

TECHNICAL RESEARCH & MFG., INC., R.F.D. #10, Manchester, NH 03103, Tel: 603-627-6000, TWX: 710-220-6765; Empl.: 25; *Sls. Mgr.:* A. Marin .... 1B•1014

Local Sales Offices & Reps

AZ	Mesa, RLS Instrs.	602-892-9329
CA	Los Angeles, RF Assoc./L.A.	213-478-1586
CA	Palo Alto, RF Assoc./P.A.	415-494-3331
CO	Greeley, Howard Assocs.	303-426-3499
CT	Norwalk, Neal Cockerham Assocs.	203-853-2618
CT	Stamford, Ashworth & Assocs.	203-968-0656
FL	Orlando, Gra-Mar	305-894-3351
IL	Chicago, Electro-Tech	312-588-4535
MA	Lowell, Matrix Sales	617-458-2096
MA	Reading, Geder Assocs.	617-544-3105
MO	Grandview, R. R. Burton and Assoc.	816-763-5385
NM	Las Cruces, Sierra Tech. Grp.	505-524-8092
NY	Guilderland, Nu-Tekneex	716-741-9138
NY	My Vernon, Friedman-Smith	914-664-4866
NY	White Plains, SCA Intl.	914-761-1042
PA	Lancaster, Electro-Rep	914-664-4866
TX	Arlington, N & W Sls.	817-461-4443
TX	Dallas, Texas Avionics	214-368-3566
VA	Fairfax, Beacon North	703-591-1300
VA	Fairfax, Schibley Assoc.	703-591-3008

TECHNIPOWER, A PENRIL CO., P.O. Box 222, Commerce Pk., Danbury, CT 06810, Tel: 203-748-7001, TWX: 710-456-9280; FSC No.: 13850; Empl.: 135; *Sls. Mgr.:* Ivan Bourgoin; *Dist. Mgr.:* Gerard F. Voity .... 1A•2301, 3•1789

Local Sales Offices & Reps

Power Supply Product Line

TX	Houston, Scientific Sls. Co.	713-460-9170
TX	Richardson, Scientific Sls. Co.	214-231-6541

Variac Product Line

TX	Houston, Scientific Sls. Co.	713-460-9170
TX	Richardson, Scientific Sls. Co.	214-231-6541

Local Distributors

Variac Product Line Only

CA	Hollywood, Yale Radio Elctrn.	213-465-3186, 800-421-4144
CA	Los Angeles, Cal-State Elctrns.	213-933-8187
CA	Oakland, N. A. D'Arcy	415-638-7773
CA	Santa Ana, Action Elctrns.	714-547-5169
CT	Old Saybrook, M.L. Elctrns.	203-388-9718
IL	Chicago, Delta Tech. Prods. Co.	312-478-1134
MD	Baltimore, Philadelphia Elctrns.	800-638-4784
MA	Woburn, Abbott Elctrns. Co.	617-935-2040
MI	Dearborn, Indl. Temperature & Control	313-278-2210
MN	St. Paul, Gopher Elctrns. Co.	612-483-3322
MO	St. Louis, Olive Elctrns.	314-426-4500
NY	Amsterdam, Adirondack Radio Supp.	518-842-8350
NY	Rockville Centre, Midway Indl. Elctrns.	516-764-2400
NC	Charlotte, Jenkins Elec. Co.	704-392-7371
OH	Dayton, Esco Inc.	513-226-1133
OK	Oklahoma City, Inotek	405-495-4620
OK	Tulsa, Inotek	918-622-8570
PA	Philadelphia, Phila. Elctrns.	215-568-7400
TX	Dallas, Inotek	214-243-8370
TX	Ft. Worth, Inotek	817-831-2126
TX	Houston, Inotek	713-688-4494
TX	San Antonio, Inotek	512-654-7811

TECHNIQUES, INC., 235 Jackson St., Englewood, NJ 07631, Tel: 201-569-5900; Empl.: 60

TECHNISERV INC., 1560 Teaneck Rd., Teaneck, NJ 07666, Tel: 201-837-0032; *Sls. Mgr.:* L. G. Mansoor

TECHNI-TOOL, 5 Apollo Rd., Box 368, Plymouth Meeting, PA 19462, Tel: 215-825-4990, Telex: 834-763; Empl.: 40

Local Sales Offices & Reps

CA	W. Covina, Electra-Tec	213-964-9772
FL	Ft. Pierce, Hyber-Sem	305-464-0461
IL	Wauconda, Champion & Assoc.	312-526-3700
KS	De Soto, Midtec Assocs.	913-441-6565
LA	Kenner, EDS Assocs.	504-466-7475
MD	Wheaton, Brimberg Sls.	301-946-2670
MA	Hudson, Data Rep	617-481-0333
MI	Detroit, Qualitron Co.	313-534-1511
MO	Florissant, Midtec Assocs.	314-837-5200
NJ	Butler, Genl. Techn.	201-492-1292

TECHNITROL, 1952 E. Allegheny, Philadelphia, PA 19134, Tel: 215-426-9105, Telex: 834245; FSC No.: 90095; Empl.: 350; *Sls. Mgr.:* G. Shilling .... 1A•1568-1574; 1B•1015-1017

Local Sales Offices & Reps

AL	Huntsville, Murcota	205-539-8476
AZ	Scottsdale, SMS & Assoc.	602-998-0831
CA	San Rafael, Wright Assocs.	415-457-9940
CA	Torrance, Detomasi & Grupp, Inc.	213-327-1775
IL	Wauconda, Cudahy Sls.	312-526-2484
MD	Baltimore, Callas Elctrns.	301-744-7711
MA	Newton, Normell Assoc.	617-969-5478
NY	Fairport, TAC Assoc.	716-425-1070
NY	Jericho, J. Square Mktg.	516-935-3200
NY	Syracuse, Tac Sls.	315-637-9861
NC	Winston-Salem, Murcota	919-722-9445
OH	Galion, Retronics	419-468-4568
PA	Easton, The Kendon Co.	215-253-3100
PA	Pittsburgh, Robert Kneip	412-823-0169
TX	Austin, Elctrns. Mktg. Assoc.	512-837-0893
TX	Grapevine, Elctrns. Mktg. Assoc.	817-481-7502
TX	Houston, Elctrns. Mktg. Assoc.	713-498-8120
WA	Redmond, General Technlg., Inc.	206-881-6456

TECHNO, INC., 14 Crandall Ave., Pompton Lakes, NJ 07442, Tel: 201-839-0740; Empl.: 10; *Sls. Mgr.:* Fredric S. Miller

TECHNO-COMPONENTS CORP., 7803 Lemona, Van Nuys, CA 91405, Tel: 818-781-1642, TWX: 910-495-2015; FSC No.: 17826; Empl.: 135; *Sls. Mgr.:* Vivian Meranda .... 1A•1939, 2064, 2065

Local Sales Offices & Reps

AZ	Scottsdale, Argus Sls.	602-949-0873
CA	Costa Mesa, Balzer-Wolf Assocs.	714-751-3001

CA	Cupertino, F & F Assocs.	408-446-2349
CA	Sherman Oaks, Clemick-Neenan & Assoc.	818-990-3150
CO	Westminster, Western Region Mktg.	303-430-8883
FL	Casselberry, S-A Assocs.	305-695-6010
GA	Roswell, Edco Sls.	404-587-1886
IL	Crystal Lake, Oak Switch Sys.	815-459-5000
IN	Fort Wayne, Denton Mktg.	219-627-5515
KS	Wichita, Baka Corp.	316-682-8411
MD	Baltimore, Pro Rep	301-653-3600
MA	Newton, Gerber Sls.	617-969-2620
MN	Minnetonka, Gibb Elctrns.	612-935-4600
NJ	Haddonfield, Mills-Brown	609-429-1005
NY	N. Syracuse, Advanced Comps.	315-699-2671
NY	New Hyde Park, R. P. Luce & Co.	516-437-4550
OH	Centerville, E.M.A.	513-433-2800
TX	Bedford, W. Pat Fralia Co.	817-640-9101

Local Distributors

CA	Chatsworth, Shelley Elctrns.	818-998-3333
CA	El Monte, Marshall Elctrns.	213-686-0141
CA	Fullerton, Carden Elctrns.	714-526-7882
CA	San Fernando, Petell Elctrns.	818-365-9841
FL	Tampa, Impala Elctrns.	813-885-4747
MD	Columbia, Aztech Elctrns.	301-995-1760
MA	Burlington, TLC Inc.	617-273-0140
NJ	Oakland, Gordon/Horne	201-337-5200
NY	Farmingdale, Command Elctrns.	516-293-1212
NY	N. Syracuse, ANDCO	315-699-2660
OH	Centerville, I.P.D.	513-435-2086
OH	Dayton, Televox	513-294-4499
TX	Ft. Worth, TTI	817-831-0441
TX	Ft. Worth, Patco Supply	817-429-8596

TECHNOLOGY DYNAMICS inc.

TECHNOLOGY DYNAMICS, 91 E. Carver Ave., Westwood, NJ 07675, Tel: 201-664-7636; Empl.: 36; *Sls. Mgr.:* James Logan .... **3**•1790-1795

Local Sales Offices & Reps

FL	De Barg, DJE Assocs., Inc.	305-668-6827
MA	Westboro, RJC Assocs.	617-366-0399

TECHNOLOGY PRODS., INC., 8900 Eton Ave., Canoga Park, CA 91304, Tel: 213-998-8555; FSC No.: 8K984; *Sls. Mgr.:* N. Lerman

TECHSONICS, Halfway, OR 97834, Tel: 503-742-7475; Empl.: 6

TECH SPRAY, INC., Box 949, Amarillo, TX 79105, Tel: 806-372-8523, Telex: 738450; Empl.: 25; *Sls. Mgr.:* R. G. Russell; *Dist. Mgr.:* Jack Swanson

TCI

TECHTROL CYCLONETICS, INC., 815 Market St., New Cumberland, PA 17070, Tel: 717-774-2746, TWX: 510-650-7003; FSC No.: 4P572; Empl.: 18; *Sls. Mgr.:* James M. Griffith .... **1A**•1432, 1433

Local Sales Offices & Reps

CA	San Carlos, Westronics Assoc.	415-592-1417
CA	Signal Hill, Thorson Co.	213-595-0361
FL	Clearwater, Brennan Assoc.	813-446-5006
MD	Ellicott City, Nelson Elctrns. Inc.	301-747-7887
MA	Topsfield, R F Assoc.	617-887-9762
NY	Brooklyn, Pensky Assocs.	212-763-4936
PA	Ambler, W & M Assocs.	215-643-4119
TX	Dallas, Airep Elctrns.	214-349-4360

TECKNIT® a TWP company

TECKNIT (EASTERN FACILITY), 129 Dermody St., Cranford, NJ 07016, Tel: 201-272-5500, Telex: 6853079 TCKNT, TWX: 710-996-5961; FSC No.: 07700; Empl.: 300; *Sls. Mgr.:* Robert Bjornsen (East);James L. Fletcher (West) .... **2**•1588-1591, 1916-1923

Local Sales Offices & Reps

AZ	Tempe, Tempe Assoc.	602-829-1901
CA	Granada Hills, C & W Comp. Sls.	213-368-4032
CA	San Diego, Cerco	619-274-1901
CA	Santa Barbara, Tecknit (Western Facility)	809-963-5811
CA	Santa Clara, Nova-Tronix	408-727-9530
CO	Boulder, Comp. Prod. Sls.	303-530-2800
CO	Westminster, Tecknit	303-428-9169
FL	Boca Raton, Lawrence Assocs.	305-368-7373
FL	Clearwater, Lawrence Assocs.	813-584-8110
FL	Fern Park, EIR	305-830-9600
FL	N. Lauderdale, EIR, Inc.	305-830-9600
FL	West Melbourne, Lawrence Assocs.	305-724-8294
IL	Arlington Hgts., Diethert/Angel	312-593-7600
IL	Chicago, Industrial Reps.	312-647-7755
IN	Eden Prairie, Elctrn. Innovators	612-941-0830
IA	Davenport, Ensco-Rep Inc.	319-386-6600
KS	Overland Park, Ensco-Rep Inc.	913-381-7557
KS	Wichita, Ensco-Rep Inc.	316-683-1070
MD	Pikesville, White & Co.	301-484-5400
MA	Waltham, Com-Sale	617-890-0011
MI	Lavonia, Lowell-Wendt Mktg. Co.	313-464-2722
MN	Eden Prairie, Elctrn. Innovators Inc.	612-941-0830
MN	St. Paul, Repco	612-642-2828
MO	Maryland Heights, Ensco-Rep Inc.	314-423-3935
NH	Hudson, EMC Sales	603-889-5751
NJ	N. Plainfield, Brady Co.	201-753-7988
NJ	Union, Meridian Entprs.	201-687-6220
OH	Columbus, McFadden Sls.	614-459-1280
OH	Dayton, Jay Engrg.	513-253-2151
OH	N. Royalton, Jay Engrg.	216-237-4235
TX	Austin, P. J. Scanlon & Co.	512-258-7717
TX	Dallas, P. J. Scanlon	214-231-4661
TX	Houston, P. J. Scanlon & Co.	713-370-4908
WA	Vancouver, Ray Over Sls.	206-695-6179

TECMAR, INC., 6225 Cochran Rd., Solon, OH 44139, Tel: 216-349-0600; Empl.: 400; *Sls. Mgr.:* Carolyn Alpert

TECNETICS, Box 910, Boulder, CO 80306, Tel: 303-442-3837, TWX: 910-940-3246; Empl.: 225; *Sls. Mgr.:* V.L. Garrison

TECOM INDS., 21526 Osborne St., Canoga Pk., CA 91304, Tel: 213-341-4010, Telex: 69 8476; FSC No.: 59850001; Empl.: 94; *Sls. Mgr.:* Chester E. Rowley

Tecron

TECRON INDUSTRIAL PRODS., Crown Intl., Inc., 1718 W. Mishawaka Rd., Elkhart, IN 46517, Tel: 219-294-5571, Telex: 810-294-2160; Empl.: 300; *Sls. Mgr.:* Howard King .... **3**•1022-1025, 1306, 1307

Local Sales Offices & Reps

CA	Mountain View, IFM Inc.	415-961-2828
CA	Thousand Oaks, HTEC	805-492-2889
CT	Woodbridge, Electronic Marketing Assoc.	203-397-1461
FL	Tampa, Applied Science Mktg.	813-870-0664
IL	Chicago, Berndt Assocs.	312-283-0713
IA	Cedar Rapids, MAI Assocs.	319-396-8030
MI	Livonia, Lowell-Wendt Mktg. Co.	313-464-2722
MN	St. Paul, Skor	612-426-1160
NJ	Wayne, Ramapo, Inc.	201-839-6767
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	Syracuse, Labtronics Inc.	315-455-7314
OH	Brecksville, Audio Mktg. Assoc.	216-526-2426
PA	King of Prussia, Freedman-Malta Assoc.	215-337-9211
WA	Bellevue, Showalter Instrs., Inc.	206-746-7970

TED CORP., 11415 Johnson Dr., Shawnee Mission, KS 66203, Tel: 913-631-6211; FSC No.: 05209; Empl.: 48

TEDEA USA

TEDEA USA, 7800 Deering Ave., Canoga Park, CA 91304, Tel: 818-884-8818, Telex: 67-3382, TWX: 910-494-1951; Empl.: 10; *Sls. Mgr.:* Tony Smalarz .... **1B**•1878; **3**•1172

Local Sales Offices & Reps

AZ	Tempe, Trembly Assocs.	602-967-2058
CA	Carlsbad, Elotek Sys.	714-438-4856
CA	Palo Alto, Gado Instr. Sls.	415-961-2222
GA	Atlanta, Physimetrics	404-955-0155
IL	Hinsdale, I & C Sales	312-323-8201
KS	Shawnee Mission, Tech. Sls. Assocs.	913-888-3330
MA	Lexington, Jodan Technology	617-862-2354
MI	Trenton, I & C Sales	313-671-1320
MN	Minneapolis, CMI	612-566-6930
MO	St. Louis, Tech. Sls. Assocs.	314-725-5361
NJ	Hillsdale, C B Assocs.	201-664-6230
NM	Albuquerque, Trembly Assocs.	505-266-8616
OH	Cincinnati, I & C Sales	513-772-3101
PA	Bethayres, Control Instr. Sls.	215-676-1808
WA	Bellevue, Westerberg & Assocs.	206-453-8881
WA	Bothell, Pacific N.W. Controls Inc.	206-821-0448

TEGAM, 7230 N. Ridge Rd., Madison, OH 44057, Tel: 216-428-7505; Empl.: 25

TEGAL SCIENTIFIC, INC., Box 5905, Concord, CA 94524, Tel: 415-827-1054; *Sls. Mgr.:* L. Rigali

TEKA PRODS., 45 Salem, Providence, RI 02907, Tel: 401-785-4110, TWX: 710-582-4946; Empl.: 28; *Sls. Mgr.:* Jim Mills; *Dist. Mgr.:* Jim Mills

TEKNATIONAL INDS., INC., 430 S. Clinton Ave., Rochester, NY 14620, Tel: 716-232-1291; FSC No.: 24227; Empl.: 15; *Sls. Mgr.:* J. D. Hochheimer

TEKTITE CORP., 4756 Platt Rd., Ann Arbor, MI 48104, Tel: 313-971-9379; *Sls. Mgr.:* Jose Padilla

TEKTONE SOUND & SIGNAL, 1331 S. Killian Dr., Lake Park, FL 33403, Tel: 305-844-2383, Telex: 51-3438; FSC No.: 59-1500771; Empl.: 50; *Sls. Mgr.:* Carlos Mira; *Dist. Mgr.:* Carlos Mira

TEKTRONIX, INC., P.O. Box 500, V3-314, Beaverton, OR 97077, Tel: 800-547-1512, Oregon only 800-452-1877, TWX: 910-467-8708; FSC No.: 80009; Empl.: 20000 .... **3**•1376, 1377

Local Sales Offices & Reps

AL	Huntsville	205-881-2912
AZ	Phoenix	602-268-8861
CA	Concord	415-254-5353
CA	Irvine	714-660-8080
CA	San Diego	619-292-7330
CA	Santa Clara	408-496-0800
CA	Woodland Hills	213-999-1711
CO	Englewood	303-799-1000
CT	Milford	203-877-1494
DC	Gaithersburg	301-948-7151
FL	Ft. Lauderdale	305-973-9300
GA	Atlanta	404-449-4770
IL	Chicago	312-259-7580
IN	Indianapolis	317-545-2351
KS	Overland Park	913-341-3344
LA	New Orleans	504-466-4445
MD	Baltimore	301-628-6400
MA	Boston	617-861-6800
MI	Detroit	313-478-5200
MN	St. Paul	612-484-8571
MO	St. Louis	314-429-7707
NJ	Woodbridge	201-636-8616
NM	Albuquerque	505-265-5541
NY	Albany	518-458-7291
NY	Long Island	516-364-9060
NY	Rochester	716-424-5800
NC	Raleigh	919-782-5624
OH	Cleveland	216-243-8500
OH	Dayton	513-859-3681
OK	Oklahoma City	405-943-8127
OR	Tigaro	503-620-9100
PA	Pittsburgh	412-244-9800
TN	Knoxville	615-690-6422
TX	Houston	713-933-3000
TX	San Antonio	512-496-1161
UT	Salt Lake City	801-486-1091
VA	Arlington	703-920-7770
WA	Seattle	206-575-0180

TELAUTOGRAPH, 8700 Bellanca Ave., Los Angeles, CA 90045, Tel: 213-641-3690, TWX: 910-328-6117; Empl.: 300

TELCOM INC., 8027 Leesburg Pike, Vienna, VA 22180, Tel: 703-893-7700, Telex: 89-2321; Empl.: 125; *Sls. Mgr.:* D. Desmond

TELCO PRODUCTS CO., 44 Sea Cliff, Glen Cove, NY 11542, Tel: 516-759-0300; Empl.: 34

TELEBYTE TECHNOLOGY, INC., Remark Datacom Div., 4 Sycamore Dr., Woodbury, NY 11797, Tel: 516-423-3232, TWX: 510-226-0449; Empl.: 10; *Sls. Mgr.:* Curt DeForest

TELECOMMUNICATIONS DEVICES, 2320 Wisconsin Ave., Downers Grove, IL 60515, Tel: 312-971-3460, TWX: 910-695-3222; Empl.: 45; *Sls. Mgr.:* Joel Peterson;Chuck Pokonosky; *Dist. Mgr.:* Theresa Kanaga

Local Distributors

AL	Birmingham, American Elctrns.	205-254-3280
OH	Cleveland, Pruit Energy Sources	216-566-1545
OH	Harrisburg, Cumberland Elctrns.	717-232-5999
OH	Solon, Repco	216-248-8900
TN	Knoxville, Bondurant Bros.	615-573-9151

TELECOMMUNICATIONS TECHNIQUES CORP., 444 N. Frederick Ave., Gaithersburg, MD 20877, Tel: 301-258-5011, Telex: 908736; Empl.: 66; *Sls. Mgr.:* John Farrell

Local Sales Offices & Reps

AZ	Scottsdale, Barnhill Assocs.	602-947-7841
CA	La Crescenta, Beckrep	818-957-1111
CA	Mountain View, CSS Telecommunications	415-964-4335
CO	Englewood, Barnhill Assocs.	303-779-3600
FL	Indian Harbour Beach, General Technlg.	305-777-1133
GA	Atlanta, General Technlg.	404-433-0350
IL	Arlington Heights, Dytec/Central	312-394-3380
IN	Noblesville, Gerhard & Assocs.	317-877-3710
KS	Lenexa, Dytec/South	913-888-0215
LA	Baton Rouge, Barnhill Assocs.	504-924-6826
MD	Silver Spring, GT Assocs.	301-949-8060
MI	Northville, Gerhard & Assocs.	313-348-6560
MN	Edina, RAE Assocs.	612-941-3221
MO	Maryland Heights, Dytec/South	314-569-2990
NH	Concord, Concord Coms.	603-224-8602
NJ	Union, Friedman Assocs.	201-946-6200
NM	Albuquerque, Barnhill Assocs.	505-299-7658
NC	Greensboro/High Point, General Technlg.	919-883-6523
OH	Cleveland Heights, Gerhard & Assocs.	216-382-5838
OH	Columbus, Gerhard & Assocs.	614-488-9751
OH	Dayton, Gerhard & Assocs.	513-435-7696
OR	Milwaukee, Control Q	503-654-9295
PA	Pittsburgh, Gerhard & Assocs.	412-241-6250
TX	Austin, Barnhill Assocs.	512-451-0217
TX	Houston, Barnhill Assocs.	713-688-9971
TX	Murray, Barnhill Assocs.	801-262-3000
TX	Richardson, Barnhill Assocs.	214-231-2573
WA	Redmond, Control Q	206-881-7440

TELECTRO SYS., 96-18 43rd Ave., Corona, NY 11368, Tel: 212-651-8900; Empl.: 75; *Sls. Mgr.:* H. Sussman

TELEDYNE AEROSPACE SYS., 1007 E. 10th St., Fairmont, MN 56031, Tel: 507-235-3355, 507-235-9712, 507-238-9494, TWX: 910-565-2120; FSC No.: 24600; Empl.: 150; *Sls. Mgr.:* Robert L. Johnson

Local Sales Offices & Reps

AL	Huntsville, Lew Wright	205-536-7961
CO	Denver, Donohue Sls. Co.	303-458-6384
NJ	Neshanic Station, J & L Assocs.	201-369-3791
TX	Dallas, R. D. Spooner Co.	214-357-6636
VA	Shipman, R.P. Assocs	804-263-5981

TELEDYNE ANSONIA, Riverside Dr., Ansonia, CT 06401, Tel: 203-735-9311, Telex: 963408; *Sls. Mgr.:* James Cutler

TELEDYNE CAMERA SYS., 131 N. Fifth Ave., Arcadia, CA 91006, Tel: 213-359-6691, Telex: 675-423; FSC No.: 14440; Empl.: 96; *Sls. Mgr.:* D. Mathews

TELEDYNE-CRYSTALONICS, 147 Sherman St., Cambridge, MA 02140, Tel: 617-491-1670, TWX: 710-320-1196; FSC No.: 12498; Empl.: 185; *Sls. Mgr.:* A. H. Pauk; *Dist. Mgr.:* W. J. Kilgarriff

TELEDYNE/GEOTECH, 3401 Shiloh Rd., Garland, TX 75041, Tel: 214-271-2561, Telex: 73-2394; FSC No.: 99019; Empl.: 440

TELEDYNE GURLEY, 514 Fulton St. P.O. Box 88, Troy, NY 12181, Tel: 518-272-6300, TWX: 710-443-8156; *Sls. Mgr.:* G. S. Gordon

TELEDYNE INET, 2750 W. Lomita Blvd., Torrance, CA 90509, Tel: 213-325-5040, Telex: 67-7228; Empl.: 600

TELEDYNE KINETICS, 410 S. Cedros Ave., Solana Beach, CA 92075, Tel: 619-755-1181, TWX: 910-322-1135; Empl.: 80

TELEDYNE MECCA, Box 36393, Houston, TX 77036, Tel: 713-772-2811, TWX: 913-881-7039; Empl.: 75; *Sls. Mgr.:* T. G. Roach

TELEDYNE MICRONETICS, 7155 Mission Gorge Rd., San Diego, CA 92120, Tel: 619-583-3525, TWX: 910-335-2085; Empl.: 120; *Sls. Mgr.:* S. Amarillas

TELEDYNE MICROWAVE, 1290 Terra Bella Ave., Mountain View, CA 94043, Tel: 415-968-2211, TWX: 910-379-6939; FSC No.: 24022; Empl.: 325

TELEDYNE PHILBRICK, Allied Dr. Rte 128, Dedham, MA 02026, Tel: 617-329-1600, TWX: 710-348-6726; Empl.: 250

TELEDYNE RELAYS, 12525 Daphne Ave., Hawthorne, CA 90250, Tel: 213-777-0077, TWX: 910-321-4610; *Sls. Mgr.:* Tom Garland; *Dist. Mgr.:* Charles Fein

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Arcom Sls.	602-947-5745
CA	San Jose, Teledyne Relays	408-996-9944
CO	Denver, Quorum 3	303-696-8480
CT	Stratford, G. Rosen Co.	203-375-5456
FL	Clearwater, Hutto, Hawkins & Peregoy	813-797-4447
FL	Ft. Lauderdale, Hutto, Hawkins & Peregoy	305-971-5750
FL	Maitland, Hutto, Hawkins & Peregoy	305-831-2474
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Glen Ellyn, Teledyne Relays	312-858-1090
IN	South Bend, Schillinger Asso.	219-282-4570
IA	Cedar Rapids, Stan Clothier Co.	319-395-0245
KS	Olathe, C-Tron	913-829-0073
MD	Towson, Arbotek Assocs.	301-825-0075
MA	Framingham, G. Rosen Co.	617-879-5505
MN	Minneapolis, S. Clothier Co.	612-944-3456
MO	St. Louis, R. F. Carlson Co.	314-961-4485
NJ	Cranford, Teledyne Relays	201-272-0020
NM	Albuquerque, Reptronix	505-292-1718
NY	Mount Vernon, Friedman-Smith Elctrns.	914-664-4866
NY	Syracuse, I.A. Hotze Co.	315-479-6641
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Dayton, J.C. Hofstetter Co.	513-296-1010
OH	Medina, J.C. Hofstetter Co.	216-241-4880
OR	Beaverton, B & P Sls.	503-641-3486
PA	Hickory, J. C. Hofstetter Co.	412-356-2305
PA	Pennsauken, Vantage Sls.	609-663-6660
TX	Austin, Kruvand Assocs.	512-441-6777
TX	Dallas, Kruvand Asso.	214-691-4592
TX	Houston, Kruvand Asso.	713-780-9710
UT	Salt Lake City, Quorum 3	801-943-9227
WA	Renton, B & P Asso.	206-454-6571

Local Distributors

AL	Huntsville, Pioneer Elctrns.	205-837-9300
AZ	Phoenix, Wyle	602-249-2232
AZ	Tempe, Time-Arizona	602-967-2000
CA	Anaheim, Time-Anaheim	714-937-0911
CA	El Segundo, Wyle Dist. Grp.	213-322-8100
CA	Irvine, Wyle Dist. Grp.	714-863-9953
CA	Rancho Cordova, Wyle	916-638-5282
CA	San Diego, Wyle Dist. Grp.	619-565-9171
CA	Santa Clara, Wyle Dist. Grp.	408-727-2500
CA	Sunnyvale, Time-N. Cal.	408-734-9888
CA	Torrance, Time-West	213-320-0880
CO	Englewood, Time-Colorado	303-850-7701
CO	Thornton, Wyle Dist. Grp.	303-457-9953
CT	Orange, Milgray/Conn.	203-795-0711
FL	Altamonte Springs, Pioneer Elctrns.	305-834-9090
FL	Dana, Summit	305-920-6253
FL	Ft. Lauderdale, Time-Florida	305-974-4800
FL	Winter Pk., Milgray/Fla.	305-647-5747
GA	Atlanta, Milgray	404-393-9666
GA	Atlanta, Electro-Air-Georgia	404-351-3545
GA	Norcross, Pioneer	404-448-1711
IL	Elk Grove Village, Pioneer/Chicago	312-437-9680
IN	Indianapolis, Pioneer/Indianapolis	317-849-7300
KS	Overland Pk., Milgray/Kansas City	913-236-8800
MD	Columbia, Time-Maryland	301-964-3090
MD	Gaithersburg, Pioneer/Wash.	301-921-0660
MD	Rockville, Milgray/Wash.	301-468-6400
MA	Burlington, Milgray/New England	617-272-6800
MA	Woburn, Time-New England	617-935-8080
MI	Livonia, Pioneer/Mich.	313-525-1800
MN	Minnetonka, Pioneer	612-935-5444
MO	St. Louis, Time-Mid West	314-391-6444
NJ	Marlton, Milgray/Delaware Valley	609-983-5010
NY	Buffalo, Summit Dist.	716-887-2800
NY	Freeport, Milgray Elctrns.	516-420-9800
NY	Hauppauge, Time-NY	516-273-0100
NY	Pittsford, Milgray	716-385-9330
NY	Rochester, Summit Dist.	716-334-8110
NC	Charlotte, Pioneer	704-527-8188
OH	Cleveland, Milgray/Cleveland	216-447-1520
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Dayton, Pioneer/Dayton	513-236-9900
OR	Hillsboro, Wyle Dist. Grp.	503-640-6000
PA	Broomall, Time-Mid Atlantic	215-359-1200
PA	Horsham, Pioneer/Delaware Valley	215-674-4000
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
TX	Austin, Pioneer	512-835-4000
TX	Dallas, Electro-Air-Southwest	214-385-0566
TX	Dallas, Pioneer Std.	214-386-7300
TX	Houston, Kierulff Elctrns.	713-530-7030
TX	Houston, Pioneer Elctrns.	713-988-5555
TX	Richardson, Wyle-Dallas	214-235-9953
UT	Salt Lake City, Wyle Dist. Grp.	801-974-9953
WA	Bellevue, Electro-Air-Northwest	206-641-3640
WA	Bellevue, Wyle Dist. Grp.	206-453-8300

TELEDYNE ROTOLITE, 150 Mt. Bethel Rd., Warren, NJ 07060, Tel: 201-647-1040, TWX: 710-986-3017; *Sls. Mgr.:* Ted Killeen

TELEDYNE SEMICONDUCTOR, 1300 Terra Bella Ave., Mountain View, CA 94040, Tel: 415-968-9241, TWX: 910-379-6494; FSC No.: 15818; Empl.: 2000; *Sls. Mgr.:* Ralph Granchelli

TELEDYNE WESTERN WIRE & CABLE, 2425 E. 30th St., Los Angeles, CA 90051, Tel: 213-587-7103, Telex: 67-7110; Empl.: 250; *Sls. Mgr.:* W. Drolet, Jr.; *Dist. Mgr.:* M. Ibrahim

TELEFUNKEN, See AEG Telefunken

TELEMET, 185 Dixon Ave., Amityville, NY 11701, Tel: 516-842-2300, TWX: 510-227-9850; Empl.: 60

TELERAM COMMUNICATIONS, 2 Corporate Park Dr., White Plains, NY 10604, Tel: 914-694-9270, Telex: 64-6658; Empl.: 50; *Sls. Mgr.:* R. R. Ansell

PAPER TAPE READERS AND READER / PUNCH COMBINATIONS.

- READER ■ READER / PUNCH
- SERIAL INTERFACE (RS 232 AND CURRENT LOOP)
- PARALLEL INTERFACE
- RACK MOUNTED ■ TABLE MOUNTED

TELETERMINAL CORPORATION
PAPER TAPE READERS / PUNCHES
GREENLAND, NH 03840
603/431-1200

TELETERMINAL CORP., Greenland, NH 03840, Tel: 603-431-1200; Empl.: 13

TELETYPE, 5555 Touhy Ave., Skokie, IL 60076, Tel: 312-982-2000, Telex: 25-4051, TWX: 910-223-3611; FSC No.: 5815; Empl.: 6,000; *Sls. Mgr.:* D. M. Printz

TELEVIDEO SYS., INC., 1170 Morse Ave., Sunnyvale, CA 94086, Tel: 408-745-7760, TWX: 910-338-7633; *Sls. Mgr.:* Steve Tatum (VDT Div.); Chuck Kempton (Sys. Div.)

TELEVISION EQUIP. ASSOCS., Box 393, So. Salem, NY 10590-0393, Tel: 914-763-8893, TWX: 710-575-2600; Empl.: 10

TELEVISION MICROTIME, INC., 1280 Blue Hills Ave., Bloomfield, CT 06002, Tel: 203-242-4242, TWX: 710-425-2390; Empl.: 80

TEL LABS, inc.

TEL LABS, INC., 154 Harvey Rd., Londonderry, NH 03053, Tel: 603-625-8994, TWX: 710-220-1844; FSC No.: 94322; Empl.: 225 .... 1A•1941-1943

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrn. Sls.	205-881-5031
AZ	Phoenix, MR Engrg. Sls. Co.	602-956-4670
CA	La Mirada, Select Elec.	714-739-8891
CA	Mountain View, Serra Assoc.	415-964-4300
CO	Aurora, Sage Sales	303-750-3501
FL	Clearwater, Beacon Elec. Sls.	813-796-2378
FL	Ft. Lauderdale, Beacon Elec. Sls.	305-491-1054
FL	Maitland, Beacon Elec. Sls.	305-647-3498
FL	Melbourne, Beacon Elec. Sls.	305-724-8010
GA	Atlanta, Beacon Elec. Sls.	404-256-9640
IL	Downers Grove, Richmar Elec. Corp.	312-968-0118
IN	West Lafayette, Richmar Elec. Corp.	317-846-6383
MD	Randallstown, Precision Mktg.	301-521-5353
MA	Topsfield, RFC Assoc.	617-887-8545
MN	Osseo, Gaffney Sls. Co.	612-425-5484
NJ	Clifton, Ossmann	201-778-8888
NY	Rochester, Ossmann Comps.	716-424-4460
NY	Syracuse, Ossmann Comp.	315-455-6611
NC	Greensboro, Beacon Elec. Sls.	919-275-9997
NC	Raleigh, Beacon Elec. Sls.	919-787-0330
OH	Akron, Augnat Assoc.	216-535-4396
OH	Dayton, Augnat Assoc.	513-298-1507
OK	Tulsa, ION Assoc.	918-664-0186
OR	Aloha, Caruso & Northcutt	503-624-1606
PA	Ardmore, Precision Mktg.	215-649-6301
PA	Pittsburgh, Augnat Assoc.	412-281-8283
TN	Johnson City, Beacon Elec. Sls.	615-282-2421
TX	Austin, ION Assoc.	512-458-2108
TX	Grand Prairie, ION Assoc.	214-647-8225
TX	Houston, ION Assoc.	713-681-6266
UT	Salt Lake City, Sage Sales	801-467-5451
WA	Bellevue, Caruso & Northcutt	206-454-9699
WI	Butler, Richmar Elec. Corp.	414-781-1730

PAPER TAPE READERS AND READER / PUNCH COMBINATIONS.

- READER
- READER/PUNCH
- SERIAL INTERFACE (RS 232 AND CURRENT LOOP)
- PARALLEL INTERFACE
- RACK MOUNTED
- TABLE MOUNTED

TELETERMINAL CORPORATION
PAPER TAPE READERS / PUNCHES
GREENLAND, NH 03840
603/431-1200

TELONIC/BERKELEY, 2825 Laguna Canyon Rd., Laguna Beach, CA 92652, Tel: 714-494-9401, Telex: 182720; FSC No.: 04423; Empl.: 75; *Sls. Mgr.:* H. Elmes .... 1A•1777

Local Sales Offices & Reps

AZ	Phoenix, RLS Instrs.	602-892-9329
CA	Agoura Hills, Relcon	818-991-4221
KS	Overland Park, Advanced Tech. Sls.	913-642-6675
OH	Cincinnati, Delta Sls. Engrg.	513-271-5444
WA	Bellevue, SDR Squared	206-747-9424

TELPAR, INC., P.O. Box 796, 4132 Billy Mitchell Rd., Addison, TX 75001, Tel: 214-233-6631, Telex: 73-2561; Empl.: 28; *Sls. Mgr.:* Wm. Konrad .... 3•1096

TELTONE, 10801-120 Ave. NE, Kirkland, WA 98033, Tel: 206-827-9626, TWX: 910-449-2862; Empl.: 450; *Sls. Mgr.:* D. E. Johnson; *Dist. Mgr.:* Mike Arndt

TEMESCAL, 2850 Seventh St., Berkeley, CA 94710, Tel: 415-841-5720, TWX: 910-366-7366; Empl.: 300

TEMPIL DIV., Big Three Inds., Hamilton Blvd., S. Plainfield, NJ 07080, Tel: 201-757-8300, Telex: 138-662; Empl.: 38; *Sls. Mgr.:* A. P. Jeanguenin

TEMPO INSTRUMENT, INC., 87 Modular Ave., Commack, NY 11725, Tel: 516-694-4400, TWX: 510-224-6421; FSC No.: 07031; Empl.: 120

TEMPOSONICS, 131 East Ames Ct, Plainview, NY 11803, Tel: 516-349-1950, TWX: 510-226-3787; *Sls. Mgr.:* W. Brenner

TEMPTRONIC CORPORATION

TEMPTRONIC, 55 Chapel St., Newton, MA 02158, Tel: 617-969-2501, Telex: 200-119; Empl.: 95; *Sls. Mgr.:* H. P. Mierop

Local Sales Offices & Reps

AZ	Scottsdale, Allen Assocs.	602-994-1305
CA	Santa Clara, Comtronics	408-773-9800
CO	Boulder, Specialty Sls.	303-444-0954
FL	West Palm Beach, PSA, Inc.	305-689-0575
IN	Kokomo, AW, Inc.	317-453-7671
KS	De Soto, Gary Yantis	913-441-6565
MD	Laurel, ARA Electrn. of VA	301-953-1733
MA	Boston, TEC Systems	617-834-4663
MI	Milford, Technical Sls. Assoc.	313-363-1427
MN	St. Paul, Dytec-North Inc.	612-645-5816
MO	Florissant, Midtec Assocs.	314-837-5200
NM	Albuquerque, Allen Assoc.	505-345-4245
NY	New City, RMC Assocs.	914-634-0054
NY	Rochester, Scientific Devices of N. Y.	716-334-2445
NC	Durham, PSA Inc.	919-832-3896
OH	Dayton, Tech. Sls. Assoc.	513-222-1892
OH	Lyndhurst, Technical Sls. Assoc.	216-461-0826
OR	Beaverton, Systems Specialists	503-641-7771
PA	Willow Grove, Harry Nash Assoc.	215-657-2213
TX	Austin, Alphatech	512-458-9179
UT	Salt Lake City, Specialty Sls. Co.	801-561-0222
VA	Richmond, ARA Electrn. of UA	804-285-9309
WA	Mukilteo, System Specialists	206-355-0404

TENCOR INSTR., 2400 Charleston Road, Mountain View, CA 94043, Tel: 415-969-6767; *Sls. Mgr.:* Barry Hart

TENNELEC, 601 Turnpike, Oak Ridge, TN 37830, Tel: 615-483-8405, TWX: 810-572-1018; Empl.: 50

Tenney ENGINEERING, INC.

TENNEY ENGRG., 109 Springfield Rd., Union, NJ 07083, Tel: 201-686-7870, TWX: 710-985-4725; Empl.: 204; *Sls. Mgr.:* Jerome Perlstein .... 3•1181

Local Sales Offices & Reps

AL	Huntsville, Equipment Sales Co., Inc.	205-536-5399
AZ	Phoenix, Jayson Co.	602-867-1964
CA	Sunnyvale, Equip. Sls.	408-739-8011
CA	Van Nuys, Environment Assocs.	213-997-3791
CO	Englewood, Tenney Engrg.	303-798-0955
CT	Hamden, Equip. Sls.	203-281-4578
FL	Altamonte Springs, Equip. Sls.	305-339-2972
FL	Coral Springs, Equip. Sls.	305-781-3522
IL	Des Plaines, Marsland Assocs.	312-298-2620
IN	Indianapolis, Marsland Assocs.	317-293-5437
MD	Wheaton, Brimberg Sls.	301-946-2670
MA	Lowell, Equip. Sls. Co.	617-459-7000
MI	Warren, Dietrich & Assoc.	313-751-4990
MO	Blue Springs, Tenney Engrg., Inc.	816-229-7667
NJ	Mt. Laurel, Dittco	609-235-4565
NJ	Union, Richard Wenke	201-686-7870
NY	Fayetteville, M. P. Andrews	315-637-3144
NC	Raleigh, Equip. Sls.	919-872-8376
OH	Cleveland, Dietrich & Assocs.	216-781-1855
OH	Dayton, Dietrich & Assoc.	513-223-6042
PA	Pittsburgh, Dietrich & Assoc.	412-892-2992
TX	Garland, Carey, McMahill & Zerbe Co.	214-681-1414
TX	Houston, Carey, McMahill & Zerbe Co.	713-771-1500
WA	Redmond, Tenney Engrg., Inc.	206-885-2054
WI	New Berlin, Marsland Assocs., Inc.	414-786-6611

TENOR, 17020 W. Rogers Dr., New Berlin, WI 53151, Tel: 414-782-3800, Telex: 26-706; Empl.: 30; *Sls. Mgr.:* P. Yoblin; *Dist. Mgr.:* P. Yoblin

TENSOLITE, Old Post Rd., Rte. 9A, Buchanan, NY 10511, Tel: 914-737-5600, TWX: 710-573-2341; Empl.: 350; *Sls. Mgr.:* David Yellin

TENSOR, Box 14843, Austin, TX 78761, Tel: 512-251-4131; Empl.: 15

TEN-TEC, Industrial Park, Sevierville, TN 37862, Tel: 615-453-7172, Telex: 261337 ACTAUR; Empl.: 110; *Sls. Mgr.:* Daniel Tomcik

TEPRO OF FLORIDA, 2608 Enterprise Rd., Clearwater, FL 33575, Tel: 813-796-1044; FSC No.: 15915; Empl.: 97; *Sls. Mgr.:* Roger C. Mayo; *Dist. Mgr.:* Olga G. Sumner

TERADO, 1068 Raymond Ave., St. Paul, MN 55108, Tel: 612-646-2868; Empl.: 17; *Sls. Mgr.:* Don Munson; *Dist. Mgr.:* Fred Munson

TERADYNE, INC., 183 Essex St., Boston, MA 02111, Tel: 617-482-2700, TWX: 710-321-1055; Empl.: 3200; *Sls. Mgr.:* D. O'Connell

TERADYNE CONNECTION SYS., 44 Simon St., Nashua, NH 03060, Tel: 603-889-5156, TWX: 710-228-1431; FSC No.: 31413; Empl.: 1,400; *Sls. Mgr.:* D. Murphy

TERMINAL DATA CORP., 11878 Coakley Circle, Rockville, MD 20852, Tel: 301-881-7655; Empl.: 12

TERMINAL SYS., See A & B Technical Services

TERRA TECHNLG. CORP., 3860 148th Ave. N.E., Redmond, WA 98052, Tel: 206-883-7300, Telex: 15-2070; *Sls. Mgr.:* Irl Davis

TEST & MEASUREMENT SYSTEMS, INC., 349 Cobalt Way, Ste. 301, Sunnyvale, CA 94086, Tel: 408-720-8877, Telex: 297584 TEAM UR; *Sls. Mgr.:* George Stoeppel

TESTLINE, See Fairchild Test Sys. Grp., Testline Instrs.

TESTOTERM, P.O. Box 111509, Nashville, TN 37211, Tel: 615-834-5082, Telex: 55-5112

TEST PROBES, INC., Box 2113, La Jolla, CA 92038, Tel: 619-459-4197, Telex: 697192; *Sls. Mgr.:* Hal Wardein; *Dist. Mgr.:* Hal Wardein ....3•1379

Local Distributors

AL	Huntsville, W. A. Brown Instrs.	205-883-8860
AZ	Phoenix, Metermaster	602-243-4111
CA	Hayward, Allied Elctrns.	415-487-5250
CA	Irvine, Western Elctrn. Supp.	714-751-3941
CA	Los Angeles, Metermaster	213-685-7340
CA	Los Angeles, Allied Elctrns.	213-725-7111
CO	Englewood, Beta Distrs.	303-779-4494
CT	Monroe, Connecticut Cal Labs	203-261-9518
FL	Fort Lauderdale, Allied Elctrns.	305-486-0500
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IL	Berkeley, Cadre Technical Reps.	312-449-3900
IN	Indianapolis, Baehr, Greenleaf & Assoc.	317-842-6204
IA	Cedar Rapids, PMR, Inc.	319-362-9177
KS	Overland Park, PMR, Inc.	913-381-0004
KS	Wichita, PMR, Inc.	316-684-4141
MD	Rockville, Mechtronics Sls.	301-340-2130
MA	Burlington, QPL Electronics	617-229-2424
MA	Clinton, F.J. Coleman Co.	617-368-0116
MI	Livonia, Lowell-Wendt Mktg. Co.	313-464-2722
MN	Bloomington, E.S.A.	612-884-8291
MO	Maryland Hgts., PMR, Inc.	314-569-1220
NM	Albuquerque, Lindberg Co.	505-881-1006
NY	Rochester, Electra Sls. Corp.	716-461-5252
NY	Syracuse, Electra Sls. Corp.	315-463-1248
NC	Charlotte, D.G.W., Inc.	704-334-7090
NC	Winston-Salem, D.G.W., Inc.	919-768-7166
OH	Columbus, Baehr, Greenleaf & Assoc.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assoc.	513-439-0724
OH	Lakewood, Baehr, Greenleaf & Assoc.	216-221-9030
OK	Oklahoma City, Ammon & Rizos	405-942-2552
OR	Tigard, Elctrn. Sources	503-684-0040
PA	Glenside, Griffin Co.	215-576-0110
PA	Pittsburgh, Baehr, Greenleaf & Assoc.	412-765-2330
TN	Knoxville, 20th Century Mktg.	615-966-3608
TX	Austin, Ammon & Rizos Co.	512-454-5131
TX	Dallas, Ammon & Rizos	214-233-5591
TX	Houston, Ammon & Rizos	713-781-6240
UT	Salt Lake City, Lindberg Co.	801-969-2400
WA	Bellevue, Elctrn. Sources	206-643-0400

Local Distributors

AZ	Scottsdale, Copper State Cable	602-272-1383
CA	Los Angeles, Radio Hardware	213-679-3381
CA	San Jose, RFI Electronics	408-298-5406
CA	Santa Ana, Republic Elctrn. Sls.	714-540-5703
CT	E. Hartford, E.J. Stephens	203-568-1927
FL	Ft. Lauderdale, KSM Elctrns.	305-971-5900
FL	Orlando, Cablematic	305-293-5729
MD	Beltsville, Vertex Elctrns.	301-937-0180
MD	Gaithersburg, Pioneer/Wash.	301-948-0710
NJ	Passaic, Seacoast Elec. Supp.	201-779-5151
NY	Farmingdale, Vertex Elctrns.	516-293-9880
NY	Freeport, Mil-Spec Wire & Cable	516-546-5454
NY	Port Washington, Restart Elctrns.	516-883-3500
NY	Rochester, Simcona Elctrns.	716-328-3230
PA	Folcroft, Delphi Elctrns.	215-534-3900
PA	Montgomeryville, Pyttronics Inds.	215-643-2850
TX	Garland, Vonn Wire & Cable	214-494-0355

TITAN TRANSFORMER CO., 134 Coolidge Ave., Watertown, MA 02172, Tel: 617-923-1200

TITCHENER, E. H., & CO., 1 Titchener Pl., Binghamton, NY 13902, Tel: 607-772-1161, TWX: 510-252-1985; Empl.: 235

TMC SYSTEMS (ARIZ.) INC., See Dale Electronics, Inc.

Distributor

TNR TECHNICAL INC., Saft & Gould/Portable Battery Div., 63 Marine St., Farmingdale, NY 11735, Tel: 516-249-3777; *Sls. Mgr.:* Wayne Thaw p.762

TOBE DEUTSCHMANN LABS., INC., 550 Turnpike St., Canton, MA 02021, Tel: 617-828-3366, Telex: 92-4427; FSC No.: 21966; Empl.: 40; *Sls. Mgr.:* T. Deutschumann, Jr.

TODD PRODUCTS
POWER SUPPLIES

TODD PRODS. CORP., 50 Emjay Blvd., Brentwood, NY 11717, Tel: 516-231-3366, TWX: 510-227-4905; Empl.: 200; *Sls. Mgr.:* F. Sposato .... 3•1798-1801

Local Sales Offices & Reps

AL	Huntsville, R. W. Mitscher Co.	205-882-6050
AZ	Phoenix, PLS Assocs.	602-246-6614
CA	Brea, Masco	714-529-0866
CA	Oceanside, Todd Prods. West	619-439-6073
CA	Sunnyvale, Qualtech	408-732-4800
CO	Englewood, PLS Assocs.	303-773-1218
CT	Weston, Northeast Reps.	203-866-6030
FL	Largo, Electrocraft	813-530-4749
GA	Lawrenceville, R. W. Mitscher Co.	404-923-3239
IL	Palatine, Kingston Comps.	312-359-7990
MA	Hingham, Northeast Reps.	617-749-8700
MI	Union Lake, Imtech	313-363-7129
MN	Minneapolis, R. K. Sales Assocs.	612-786-5713
MO	St. Louis, AME Sls.	314-965-1779
NH	Nashua, Northeast Reps.	603-880-8199
NJ	Marlton, BGR Assocs.	609-983-1020
NJ	Ridgefield, Rical Assocs.	201-945-5240
NM	Albuquerque, PLS Assocs.	505-345-5501
NY	Charlotte, R. W. Mitscher Co.	704-598-8644
NY	E. Syracuse, Nycom	315-437-8343
NC	Raleigh, R. W. Mitscher Co.	919-848-0941
OH	Akron, Imtech, Inc.	216-666-1185
OH	Dayton, Imtech, Inc.	513-278-6507
PA	Pittsburgh, Imtech, Inc.	412-344-0844
TN	Johnson City, R. W. Mitscher Co.	615-929-7258
TX	Austin, J. Clay Co.	512-346-7340
TX	Dallas, J. Clay Co.	214-350-1281
UT	Midvale, PLS Assocs.	801-566-0671
VA	McLean, Creative Mktg. Assocs.	703-442-9100
WA	Bellevue, Venture Elctrns.	206-454-4594

TODD SYSTEMS, 50 Ash St., Yonkers, NY 10701, Tel: 914-963-3400; Empl.: 45; *Sls. Mgr.:* S. Edwards .... 1A•2308-2311

Local Distributors

AL	Mobile, Irving Ripps Supp.	205-432-3068
CA	San Francisco, Aris Co.	415-433-2021
CA	San Francisco, Delray Distr.	415-397-5855
FL	Miami, Southeastern Wholesalers	305-634-6591
FL	Miami, Electronic Equip.	305-871-3500
FL	Miami, Graybar Elec.	305-325-0910
GA	Savannah, Southern Supp.	912-234-6646
IL	Chicago, Broadway Sls.	312-897-8688
IL	Chicago, Irv. Wolfson Co.	312-267-7828
LA	New Orleans, Trestman Sls.	504-522-9387
MD	Bethesda, Albee Sales	301-897-8088
MD	Bethesda, Empire Elec. Supp.	301-656-3300
NY	Bronx, Rim Elctrns.	212-295-4300
NY	L.I.C., H.L. Dalis Elctrns.	212-361-1100
NY	New York City, Rosetta Elec.	212-247-6430
OH	Lima, Lima Elec. Parts	419-227-7327
PA	Philadelphia, Phila. Elctrns.	215-568-7400
PA	Philadelphia, H & Z Sls.	215-WA2-2500
TX	Houston, Mermaid Sight & Sound	713-921-5613
TX	Houston, Benjamin Distr.	713-923-5334
TX	Houston, Applebaum & Co.	713-695-5866
TX	Houston, Western Sls.	713-869-6671

TX	Houston, Central Supp.	713-224-0033
VA	Norfolk, H. Belkov Co.	804-625-2491
WA	Seattle, Pearl Elctrns.	206-622-6200

TOHOKU METAL INDS., 5-8, 2-Chome, Kitaaoyama Minato-Ku, Tokyo, Japan, Tel: Tokyo 03-402-6161, Telex: 242 2695 TOKIN J; Empl.: 2000; *Sls. Mgr.:* H. Ishihara; *Dist. Mgr.:* T. Ikeda

TOKO AMERICA, INC., 5520 W. Touhy Ave., Skokie, IL 60077, Tel: 312-677-3640, Telex: 230-724372; *Sls. Mgr.:* Greg Dugan .... 1A•1282, 1575, 1631

Local Sales Offices & Reps

AL	Madison, Kathy Leverock	205-837-9350
AZ	Scottsdale, Semi-Systems Arizona, Inc.	602-991-1151
CA	Cupertino, Toko America Inc.	408-996-7575
IL	Chicago, Esco Assocs.	312-763-0800
IL	Skokie, Ultech Assocs.	312-674-3820
IL	Skokie, Toko America Inc.	312-674-3640
MI	Troy, Zimmerman & Sons	313-879-1150
VA	Lynchburg, M&S Mfg.	804-528-0681

TOKYO ELEC. CO., LTD., 1-1 Nishiki-Cho, Kanda, Chiyoda-Ku, Tokyo, 101, Japan, Tel: (03) 292-1011, Telex: 0222-3575, TWX: S

TOPAZ ELECTRONICS, 9192 Topaz Way, San Diego, CA 92123-1164, Tel: 619-279-0831, TWX: 910-335-1526; FSC No.: 06049; Empl.: 450; *Sls. Mgr.:* Ruxton Tucker; *Dist. Mgr.:* Chuck Roberts

TOPFLIGHT, 160 East 9th Ave., York, PA 17404, Tel: 717-843-9901, TWX: 510-657-4849; Empl.: 250; *Sls. Mgr.:* James Danser

TORAD COIL CO., INC., 283 Linden Rd., Wayne, NJ 07470, Tel: 201-835-6195; *Sls. Mgr.:* Dan Gupta

TORELCO INC., 14 Paine Ave., P.O. Box 108, Irvington, NJ 07111, Tel: 201-374-8641; Empl.: 20; *Sls. Mgr.:* Stewart H. Cook

Local Sales Offices & Reps

MA	Norwood, MacInnis Co.	617-762-8090

TORIN CORP., 100 Franklin Drive, Torrington, CT 06790, Tel: 203-482-4422, Telex: 962-456, TWX: 710-439-2343; Empl.: 1300; *Sls. Mgr.:* Robert S. Sobolewski

Toroid

TOROID CORP. OF MARYLAND, 6000 Laurel-Bowie Rd., Bowie, MD 20715-4037, Tel: 301-464-2100, TWX: 710-826-0414; *Sls. Mgr.:* Egil Angeid .... 1A•2312, 2313

TOROTEL PRODUCTS INC.

TOROTEL PRODS. INC., 13402 S. 71 Hwy., Grandview, MO 64030, Tel: 816-761-6314, TWX: 910-777-7037; Empl.: 275; *Sls. Mgr.:* H. Foland .... 1A•1283-1297, 2314-2320

Local Sales Offices & Reps

AL	Huntsville, L & D Inc.	205-837-1469
AL	Westlake, OH, JN Bailey & Assocs.	216-892-1513
AZ	Tempe, Gassner & Clark Co.	602-968-9037
CA	Redwood City, Hickey Industrial Sls.	415-368-3849
CA	San Diego, California Elctrn. Mktg.	619-692-3551
CA	Santa Ana, Calif. Elctrn. Mktg.	714-835-2702
CO	Broomfield, Ramark	303-469-1758
GA	Atlanta, L & D Inc.	404-455-3483
IL	Schaumburg, Gassner & Clark	312-882-8608
IA	Hiawatha, Gassner & Clark Co.	319-393-5763

KS	Overland Park, AME Sls.	913-262-3971
MD	Towson, Dickison Sls. Co.	301-823-0923
MA	Weston, J. J. Goode Assocs.	617-235-3900
MO	St. Charles, AME Sls.	314-947-0333
NY	Clinton, Advanced Comps.	315-853-6438
NY	Endicott, Advanced Comps.	607-785-3191
NY	Manhasset, Win-Cor Elec. Sls.	516-627-9474
NY	Rochester, Advanced Comps.	716-544-7017
NY	Scottsville, Advanced Comps.	716-889-1429
NY	Syracuse, Advanced Comps.	315-699-2671
NC	Greensboro, L & D Inc.	919-292-3201
NC	Raleigh, L & D Inc.	919-876-5301
OH	New Lebanon, J. N. Bailey Assoc.	513-687-1325
OH	Westlake, JN Bailey & Assocs.	216-892-1513
PA	Birchrunville, Jadelectronic Assocs.	215-296-3800
PA	Philadelphia, Jadelectronics	215-455-0664
TN	Seymour, L & D, Inc.	615-577-1549
TX	Austin, Oeler & Menelaides	512-453-0275
TX	Dallas, Oeler & Menelaides	214-361-8876
TX	Houston, Oeler & Menelaides	713-772-0730

TOROTRON, 230 E. 7th St., Mt. Vernon, NY 10550, Tel: 914-664-2050; Empl.: 14; *Sls. Mgr.:* Lee Abramson **3•**1311

TORQ CORP., 32 W. Monroe St., Bedford, OH 44146, Tel: 216-232-4100; Empl.: 135

TORRINGTON CO., 59 Field St., Torrington, CT 06790, Tel: 203-482-9511; *Sls. Mgr.:* N. W. Couch

TORWICO ELCTRNS. INC., Rte. 70, Lakewood, NJ 08701, Tel: 201-364-1800, TWX: 710-723-8343; Empl.: 240 **1A•**2322, 2323

Local Sales Offices & Reps

CA	El Cajon, KCE Corp.	619-588-1198
CA	Menlo Park, Long and Assocs.	415-327-1300
FL	Orlando, Gra-Mar	305-894-3351
IN	Noblesville, Patco & Assocs.	317-877-5986
IA	Davenport, Ensco Rep	319-386-6600
KS	Overland Park, Ensco Rep	913-381-7557
KS	Wichita, Ensco Rep	316-683-1070
MD	Riderwood, W. S. Warrington & Assoc.	301-823-8759
MA	Hingham, N.E. Reps.	617-749-8700
MO	Maryland Heights, Ensco Rep	314-423-3935
NJ	Marlton, BGR Assocs.	609-983-1020
NY	Albany, H. C. Johnson	518-459-1239
NY	Buffalo, H. C. Johnson	716-632-7880
NY	Great Neck, Trionic	516-466-2300
NY	Rochester, H. C. Johnson	716-586-0777
OH	Copley, Eljay Assoc.	216-666-3774
OR	Portland, Abacus Sls.	503-777-8111
PA	Glenshaw, H. C. Johnson	412-961-0414
TX	Irving, Kite Elctrns. Sls. Co.	214-438-9336

TOSHIBA CORPORATION, See General Products Corp.

TOWNSEND INDUSTRIES, 51 Carl Rd., Orange, CT 06477, Tel: 203-795-0241, TWX: 710-465-1898; *Sls. Mgr.:* Charles Dorsa

TOYO COMM. EQUIP. CO., LTD., No. 8 Nori Bldg., 20-4, Nichi-Shimbashi, 3-Chome Minato-Ku, Tokyo 105, Japan, Tel: 03-436-2180, Telex: 02423115 Toyocoj.; Empl.: 1800; *Sls. Mgr.:* T. Nagai

TRACEWELL ENCLOSURES, 7032 Worthington Galenda Rd., Columbus, OH 43085, Tel: 614-846-6175, 800-848-4525; Empl.: 30 **2•**1065-1067

TRA-CON, INC., 55 North St., Medford, MA 02155, Tel: 617-391-5550; Empl.: 35

Local Sales Offices & Reps

CA	Sunnyvale, K. R. Anderson Co.	408-736-6730
GA	Augusta, Southeastern Ind. Sls.	404-724-0715
IN	Indianapolis, Emmtronics Supp. & Engr., Inc.	317-899-2333
NY	Hamburg, W. J. Ferenczy Assocs.	716-648-4193
PA	Philadelphia, Air-Draulics	215-457-1940
TX	Richardson, C. J. Garvey Co.	214-234-3371
UT	Salt Lake City, Technology Mktg., Inc.	801-363-3303
VA	Roanoke, Cox Sls. Co.	703-345-2636
WA	Mukilteo, Krippner & Assoc.	206-743-3579
WI	Milwaukee, Ellsworth Systems	414-352-1230

TRACOR INSTRUMENTS, 6500 Tracor La., Bldg. 27, Austin, TX 78721, Tel: 512-929-2051, TWX: 910-874-1366; Empl.: 7800; *Sls. Mgr.:* Harry L. Thomas; *Dist. Mgr.:* Will Hoover

TRACOR PAKTRONICS, 2441 Northeast Pkwy., Ft. Worth, TX 76106, Tel: 817-625-2311, Telex: 758-273; Empl.: 10; *Sls. Mgr.:* Harold Whittenton

TM TRAK. MICROWAVE
A TECH-SYM CORPORATION

TRAK MICROWAVE CORP., 4726 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, Tel: 813-884-1411, Telex: 52-827, TWX: 810-876-9140; FSC No.: 12855; *Sls. Mgr.:* Thomas L. Roberts **1A•**1778-1783

TRAK MICROWAVE, 735 Palomar Ave., Sunnyvale, CA 94086, Tel: 408-735-9660, TWX: 910-339-9309; FSC No.: 29111; *Sls. Mgr.:* Thomas L. Roberts **1A•**1783

TRAK SYSTEMS, Div. TRAK Microwave Corp., 4722 Eisenhower Blvd., Dept. E4, Tampa, FL 33614, Tel: 813-884-1411, Telex: 52-827, TWX: 810-876-9140; FSC No.: 11165; *Sls. Mgr.:* Thomas L. Roberts **3•**1097-1102

Local Sales Offices & Reps

AL	Huntsville, Magaro & Assocs.	205-882-0827
AZ	Phoenix, Jim Smith Assocs.	602-267-0981
CA	Mountain View, Pacific Tech. Mktg.	415-969-3010
CA	San Diego, L. L. Stoakes, Inc.	619-452-1600
CO	Denver, W. H. Howard Assocs.	303-426-3499
FL	Sarasota, Bass Assocs.	813-922-9538
GA	Atlanta, Magaro & Assocs.	404-451-8862
IN	Ft. Wayne, TX Sales	219-489-4447
MD	Ashton, Blackwood Assocs.	301-924-2858
MA	Cochituate, High-Tech Sls., Inc.	617-653-3838
NM	Albuquerque, Jim Smith Assocs.	505-265-3406
NC	Greensboro, Magaro & Assocs.	919-294-4783
PA	Huntingdon Valley, Rabal Assocs.	215-947-4825
TX	Arlington, J. T. Houston Assocs.	817-265-2931
EXP	CT, Stamford, Dage Corp.	203-324-3123

TRANSAMERICA DELAVAL, Gems Sensors Div., Cowles Rd, Plainville, CT 06062-9990, Tel: 203-677-1311, Telex: 99-306; Empl.: 203; *Sls. Mgr.:* M. W. Brown; *Dist. Mgr.:* M. W. Brown

TRANS AMERICAN TRANSFORMER, 142 Peconic Ave., Medford, NY 11763, Tel: 516-654-1880; Empl.: 23; *Sls. Mgr.:* Joe Latimer **1A•**2325

Local Sales Offices & Reps

CT	Washington, Tri-Com Assocs.	203-563-2241
FL	Melbourne, Reynolds & Assocs., Inc.	305-259-7000
GA	Acworth, Reynolds & Assocs., Inc.	404-451-9558
MA	Burlington, Tri-Com Assocs.	617-272-8163
NC	Winston-Salem, Reynolds & Assocs.	919-725-6196
PA	Philadelphia, Technical Instr. Sls. Co.	215-836-2222

TRANSCO PRODS., 4241 Glencoe Ave., Marina del Rey, CA 90291, Tel: 213-822-0800, Telex: 65-2448, TWX: 910-343-6469; Empl.: 400; *Sls. Mgr.:* T. G. Katter

Local Sales Offices & Reps

CA	Marina del Rey, Michael Robinson	213-822-0800
CA	San Jose, Jon Walker	408-244-6150
CA	San Juan Capistrano, Bruce Ridill	714-643-0506
GA	Marietta, John Underhill	404-977-5819
MD	Ellicott City, VPI, Inc.	301-461-2525
MA	Acton, Rollie Merrick	617-275-1247
MO	Ellisville, Hi Grant Wilson	314-227-0737
NY	Bayside, R. L. Diamond Inc.	212-423-7330
PA	Dresher, Joseph Belcher	215-886-4806
TX	Richardson, Ronald B. Patton	214-669-1951
WA	Bellevue, Poggi Assocs., Inc.	206-454-2026

TRANSDUCERS and SYSTEMS

TRANSDUCERS AND SYSTEMS INC., A Prime Technology Company, Twin Lakes Rd., P.O. Box 185, N. Branford, CT 06471, Tel: 203-481-5721, TWX: 710-452-3092; Empl.: 60; *Sls. Mgr.:* J. L. Jamieson **1B•**1880

Local Sales Offices & Reps

CA	Huntington Beach, Transducer Sys.	714-840-5357
CA	Palo Alto, Gado Instr. Sls.	415-961-2222
CT	Washington, Tri-Com Assocs.	203-563-2241
FL	Indian Rocks Beach, PAR Assocs.	813-596-8841
GA	Atlanta, PAR Assocs.	404-391-9117
IL	Des Plaines, Marsland Assocs.	312-298-2620
IA	Cedar Rapids, Marsland Assocs.	319-396-8030
MA	Burlington, Tri-Com Assocs.	617-272-8163
MI	Mt. Clemens, O'Hara Assocs.	313-791-7140
MN	Minneapolis, Marsland Assocs.	612-545-4481
MO	St. Louis, Marsland Assocs.	314-991-1399
NY	Binghamton, TAE-REP	607-772-6952
NY	Fishkill, TAE-REP	914-896-6966
NY	Rochester, TAE-REP	716-586-8710
OH	Dayton, RIXAN Assocs.	513-278-4216

TRANSDUCER SYSTEMS, INC., 1510 Delp Dr., Kulpsville, PA 19443, Tel: 215-256-4611, Telex: 846078; Empl.: 310 **1B•**1879

Local Sales Offices & Reps

CA	Burbank, J. D. Hannam & Assocs.	213-846-9378
CA	Santa Clara, Nelson Elctrn. Sls.	408-980-1950
MI	Madison Heights, L. C. Nyman & Co.	313-543-6520
MN	Mendota, GII Sls.	612-454-3086
OH	Chagrin Falls, K. F. Nauerz Co.	216-338-8450
OH	Cleveland, Staffco	216-331-5100

Transduktor®

TRANSDUKTOR INC., 600 Steamboat Rd., Greenwich, CT 06830, Tel: 203-661-5726, Telex: 996491 SID; *Sls. Mgr.:* Carl A. Svensson **1A•**2326-2328

TRANSENE, Rte. 1, Rowley, MA 01969, Tel: 617-948-2501; Empl.: 21; *Sls. Mgr.:* J. Doucette

TRANSFORMATION ELCTRNS. CORP., 170 Wilbur Pl., Bohemia, NY 11716, Tel: 516-563-1117, TWX: 510-222-0972; *Sls. Mgr.:* Ken Isabelle;David Baum **3•**1802

Local Sales Offices & Reps

CA	Pasadena, EMI	213-795-7193
CA	Sunnyvale, Schwerin & Merrill	408-735-7900
CO	Englewood, Elctrn. Comp. Sys.	303-781-5904
FL	Longwood, Boetto Corp.	305-331-1771
GA	Norcross, New South Mktg. Ltd.	404-449-1140
IL	Downers Grove, Splon Assocs.	312-963-7011
KS	Kansas City, BC Elctrns.	913-342-1211
MD	Pikesville, Imagitron Sls. Co.	800-638-3592
MA	Wakefield, Kentronics	617-246-0245
MN	Minneapolis, Bohlig & Assocs.	612-698-6921
TN	Morristown, New South Mktg. Ltd.	615-646-0154
TX	Arlington, Hite Elctrn. Sls. Co.	817-265-2912
WA	Bellevue, Elctrn. Mktg. Grp.	206-746-5915
WI	Brookfield, Sumer, Inc.	414-784-6641

TRANSFORMER DESIGN, INC., 78th & Clinton, Milwaukee, WI 53223, Tel: 414-358-5300

TRANSISTOR DEVICES, 274 S. Salem St., Randolph, NJ 07869, Tel: 201-361-6622; Empl.: 350; *Sls. Mgr.:* J. A. Gilson **3•**1312, 1313

Local Sales Offices & Reps

CA	Costa Mesa, FLW Inc.	714-751-7512
CA	Los Altos, Cain-White Co.	415-948-6533
GA	Atlanta, Magaro & Assocs.	404-252-6609
IL	Elmhurst, Scott Assocs.	312-279-5681
MD	Ellicott City, Dyna-Rep Co.	301-992-4350
MA	Lexington, E. F. Delfino, Inc.	617-862-1118
NJ	Ridgewood, Hansen Assocs.	201-652-7055
NY	North Syracuse, Advance Components	315-699-2671
OH	Medina, McShane Inc.	216-725-4568
OR	Hillsboro, Controlek Sls.	503-640-8444
PA	Fort Washington, GCM Inc.	215-646-7535
TX	Lewisville, J. Hughes Co.	817-430-1683
VA	Alexandria, Dyna-Rep Co.	703-354-1222
EXP	NY, New York, Singer Prods.	212-432-1400

TRANSKINETIC SYS., 110 Shawmut Rd., Canton, MA 02021, Tel: 617-828-3000; Empl.: 7

TRANSMAGNETICS, 210 Adams Blvd., Farmingdale, NY 11735, Tel: 516-293-3100, TWX: 510-224-6420; FSC No.: 17755; Empl.: 40; *Sls. Mgr.:* Fred Haber **3•**1170, 1171

Local Sales Offices & Reps

CA	Santa Clara, Industrial Modules, Inc.	408-988-1911
TX	Bellaire, Seaton Corp.	713-731-2649
TX	Carrollton, Seaton Corp.	214-380-0414

TRANSMET CORP., 4290 Perimeter Dr., Columbus, OH 43228, Tel: 614-276-5522, 800-245-5253, TWX: 810-482-1016; *Sls. Mgr.:* Ronald A. Crossman; *Dist. Mgr.:* Robert M. Simon

TRANS-MET ENGRG., 601 S. Palm St., La Habra, CA 90631, Tel: 213-691-2266; Empl.: 25; *Sls. Mgr.:* Robert J. Powers

TRAN-SPECTRA, INC., Rte. 1-Box 27A, Greenfield, TN 38230, Tel: 901-235-2218; Empl.: 50; *Sls. Mgr.:* D. Cole

TRANS-TECH, 12 Meem Ave., Gaithersburg, MD 20760, Tel: 301-948-3800, Telex: 898-303, TWX: 710-828-0549; FSC No.: 14591; Empl.: 74; *Sls. Mgr.:* Blair W. Stiles; *Dist. Mgr.:* Blair W. Stiles

TRANS-TECH, INC., Alpha Inds., Inc., 20 Sylvan Rd., Woburn, MA 01801, Tel: 617-935-5150, Telex: 949436, TWX: 710-396-1236; FSC No.: 17540; *Sls. Mgr.:* Blair Stiles

TRANS-TEK, P.O. Box 338, Rte. 83, Ellington, CT 06029, Tel: 203-872-8351, Telex: 99207; FSC No.: 27109; Empl.: 35; *Sls. Mgr.:* William R. Padin

TRAN-TEC, Box 1044, Columbus, NE 68601, Tel: 402-564-2748; Empl.: 46; *Sls. Mgr.:* Cliff Schroeder

Local Sales Offices & Reps

CA	Redwood City, Woodworth Co.	415-365-0252
CA	Tustin, Sierra-Pacific Engrg. Co.	714-731-3411
CO	Golden, Pierce-Robbins Assocs.	303-399-6618
FL	Winter Park, Russell Assocs.	813-526-1134
GA	Atlanta, Russell Assocs.	404-225-8422
IN	Indianapolis, Scott Elctrns, Inc.	317-897-9976
IA	Cedar Rapids, Ard Sls. Co.	319-366-8733
MD	Bel Air, Russell Assocs.	301-879-9180
MA	Wakefield, H.C. Jappe Co.	617-245-9359
NJ	Fair Haven, Russell Assocs.	201-747-0600
NY	Bay Shore, Russell Assocs.	516-666-6500
NY	Cazenovia, Naylor Electric Co.	315-655-8174
OH	Cleveland, D. Steffen & Assocs.	216-461-8333
TX	Dallas, Russell Assocs.	214-699-0383
WA	Bellevue, Russell Assocs.	206-455-3694

TRAN-TROL CO., 2525 N. Alvernon Way, C-6, Tucson, AZ 85712, Tel: 602-795-8008

TRENDATA/STANDARD MEMORIES, 3400 W. Segerstrom, Santa Ana, CA 92704, Tel: 714-540-3605, TWX: 910-595-1596; Empl.: 200; *Sls. Mgr.:* M.S. Efron

TRENT, INC., 201 Leverington Ave., Philadelphia, PA 19127, Tel: 215-482-5000; Empl.: 55

TRIAD POWER SYSTEMS, 10362 Miller Road, Dallas, TX 75238, Tel: 214-341-8700; FSC No.: 214-341-1804; *Sls. Mgr.:* Jack Conn

Local Sales Offices & Reps

ME	Acton, Array Prods., Inc.	617-263-1128
MD	Bethesda, Powell-Pendergraph	301-656-4535
MI	Detroit, Datacenter Power	313-592-1082
NY	Piermont, Elctrl. Information Svcs.	914-359-4909
OK	Oklahoma City, Computer Power of Oklahoma	405-521-1163
OK	Tulsa, Computer Power of Oklahoma	918-252-5406
PA	Willow Grove, Powell-Pendergraph	215-657-0330
TX	Houston, SGA & Assocs., Inc.	713-688-6159
TX	San Antonio, Environmental & Power Sys. Inc.	512-699-0684
VA	Richmond, Powell-Pendergraph	804-270-1400

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TRIAD-UTRAD, 1124 E. Franklin St., Huntington, IN 46750, Tel: 219-356-6500, TWX: 810-333-1532; Empl.: 750; *Dist. Mgr.:* Dave N. Miller .... **1A**•2330-2337; **3**•1918, 1919

Local Sales Offices & Reps

AK	Anchorage, H.J. Lang & Assocs.	907-279-5741
AZ	Phoenix, Steve Fisher Assocs.	602-247-7865
AR	Little Rock, J. Y. Schoonmaker Co.	501-375-2168
CA	Chino, Tracy Elec. Sls.	714-591-4736
CA	Santa Clara, Logan Sls.	408-496-0660
CO	Denver, West Inc.	303-692-0131
CT	Guilford, A&M Elctrn. Reps.	203-453-1612
FL	Maitland, Hutto-Hawkins-Peregoy	305-831-2474
GA	Atlanta, Effective Mktg. Force	404-948-6023
HI	Honolulu, Hawaii Elctrn. Svc.	808-845-8207
IL	Wilmette, J. Wasserman Assocs.	312-256-3566
KS	Overland Park, T.L. Dowell, Inc.	913-648-7373
LA	Little Rock, J. Y. Schoonmaker	501-375-2168
MA	Needham, A&M Elctrn. Reps.	617-444-8170
MN	Minneapolis, Elec. Comp. Sls.	612-933-2594
MO	St. Louis, T.L. Dowell, Inc.	314-849-4234
NJ	Medford, Champion Elctrn. Sls.	609-654-0475
NY	Rochester, Marchese, Marsey, Barden	716-544-4300
NY	Rockville Centre, Schmitt Industrial Mktg.	516-486-3510
OH	Cincinnati, F.E. Kahsar Sls.	513-922-3133
OH	Hudson, F.E. Kahsar Sls.	216-650-1089
OK	Tulsa, J.Y. Schoonmaker	918-936-1423
OR	Portland, J.J. Backer Co.	503-297-3777
OR	Salem, J. J. Backer Co.	503-362-0717
TX	Dallas, J. Y. Schoonmaker Co.	214-349-1650
WA	Seattle, J.J. Backer Co.	206-285-1300
EXP	Westbury, N.Y., Minthorne Int'l.	516-546-4700

Local Distributors

AL	Birmingham, Forbes Distributing	205-251-4104
AZ	Phoenix, Dalis Elctrn. Supply	602-275-2885
AR	Little Rock, Carlton Bates Co.	501-562-9100
CA	Glendale, R. V. Weatherford	213-849-3451
CA	Mountain View, Abacus Elctrns.	415-961-1500
CA	Palo Alto, Zack Elctrns.	415-326-5432
CA	Riverside, Elctrn. Supply	714-683-7300
CO	Denver, Integrated Elctrns.	303-534-6121
FL	Ft. Lauderdale, Peerless Radio Corp. of Florida	305-973-4141
GA	Atlanta, Ack Radio Supply	404-351-6340
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Inds.	312-982-9210
IN	Lafayette, CWY Elctrns.	317-448-1611
IA	Cedar Rapids, Deeco, Inc.	319-365-7551
KY	Louisville, P. I. Burks Co.	502-589-3960
LA	New Orleans, William B. Allen Co.	504-525-8222
MD	Rockville, Capitol Radio Whls.	301-881-2270
MA	Burlington, Marshall Wilshire Elctrns.	617-272-8200
MA	Wilmington, Cronin Elctrns.	617-449-0500
MI	Grand Rapids, S-F Elctrns.	616-459-0216
MI	Livonia, R. S. Elctrns.	313-525-1155
MN	St. Paul, Gopher Elctrns.	612-483-4450
MO	St. Louis, Olive Industrial Elctrn.	314-426-4500
NE	Lincoln, Scott Elctrn. Supp. Corp.	402-466-8221
NH	Hudson, C & H Elctrns.	603-882-1133
NJ	Camden, General Radio Supp.	215-922-7037
NJ	Springfield, Route Elctrns.	201-379-7710
NM	Albuquerque, Electronic Parts Co.	505-293-6161
NY	Hauppauge, Broadline Elctrn. Distr.	516-231-4100
NY	Rochester, Simcona	716-328-3230
NY	Rockville Centre, Midway Indl. Elctrns.	516-764-2400
NY	Rome, Rome Elctrns.	315-337-5400
NC	Greensboro, Hammond Elctrns.	919-275-6391
OH	Cleveland, Pioneer Standard Elctrns.	216-587-3600
OH	Dayton, Pioneer/Dayton	513-236-9900
OK	Tulsa, Combined Technlgs.	918-582-8242
OR	Portland, United Radio Supply	503-233-5346
PA	Philadelphia, Almo Electronics	215-698-4000
RI	Warwick, W. H. Edwards Elctrns.	401-781-8000
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Memphis, Bluff City Elctrns.	901-345-9500
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Houston, Altair Co.	713-462-3029
UT	Provo, Omega Elctrns.	801-375-4664
WA	Seattle, Almac	206-643-9992
WI	New Berlin, RM/Wisconsin	414-784-4420

TRI-COM, INC., 7304 Grove Rd., Frederick, MD 21701, Tel: 301-694-6666, Telex: 64828 TRICOM; Empl.: 35; *Sls. Mgr.:* Marc Vivori

TRIDAK, 1120 Federal Rd., Brookfield, CT 06804, Tel: 203-775-1287, TWX: 710-456-1372; Empl.: 20; *Sls. Mgr.:* Alan Boucher; *Dist. Mgr.:* F.C. Herot

TRI-DATA CORP., 505 E Middlefield Rd., Mountain View, CA 94043, Tel: 415-969-3700, Telex: 910-379-6978; Empl.: 173

TRILOG, 17391 Murphy Ave., Irvine, CA 92714, Tel: 714-549-4079, TWX: 910-595-2798; Empl.: 35; *Sls. Mgr.:* Jack Rice

TRIMM, INC., Div. of Newton Instr. Co., 400 W. Lake St., Box 489, Libertyville, IL 60048, Tel: 312-362-3700; Empl.: 90; *Dist. Mgr.:* H. Lewis

TRIM-TRONICS, INC., 67 Albany St., Cazenovia, NY 13035, Tel: 315-655-9528, TWX: 710-541-1530; Empl.: 20; *Sls. Mgr.:* James E. Dowd

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Local Sales Offices & Reps

AZ	Phoenix, Bill Earl & Assocs.	602-994-3813
CA	N. Hollywood, Bert Moore & Assocs.	818-877-5455
CA	San Rafael, Wright Assocs.	415-457-9940
FL	Tampa, J. R. Controls	813-961-9478
IL	Chicago, Jerry Golten Co.	312-792-1991
IN	Ft. Wayne, Walter W. Bieberich	219-432-2537
IN	New Albany, Walter W. Bieberich	812-945-3187
LA	Metairie, Automation Supplies	504-831-2183
MA	Hopkinton, Berkshire Elctrns.	617-435-9356
MI	Sturgis, Kesler Assocs.	616-651-7619
MO	St. Louis, Hill & Co.	314-432-1136
NJ	Burlington, V.D.E. Elctrn. Sls.	609-387-9331
NY	Rochester, V.D.E. Elctrn. Sls.	716-473-5015
OH	Cincinnati, Stegman Blaine Mktg.	513-729-1969
OH	Vandalia, Stegman Blaine Mktg.	513-890-7975

TRIO LABS., 80 Dupont St., Plainview, NY 11803, Tel: 516-349-0400, TWX: 510-221-1861; FSC No.: 00638; Empl.: 60; *Sls. Mgr.:* John Crawford

TRIO-TECH INTL., 2040 N. Lincoln St., Burbank, CA 91504, Tel: 818-846-9200, Telex: 194811; Empl.: 266

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Local Sales Offices & Reps

AZ	Phoenix, Shefler-Kahn	602-257-9015
CA	Burlingame, Polach & Bensinger	415-697-2525
CA	Costa Mesa, Berman-Gravley, Inc.	714-549-2122
CO	Arvada, Cluff & Associates	303-423-9354
CO	Aurora, R & R Instrmn.	303-364-8325
FL	Lighthouse Pt., Jack Krutek & Assocs.	305-941-6544
FL	Maitland, Jack Krutek & Assocs.	305-628-4837
GA	Atlanta, Millar Elctrns.	404-261-6160
IL	Berkeley, G. Petitt Co.	312-449-8000
IN	Ft. Wayne, W. Bieberich	219-432-2537
IN	New Albany, W. Bieberich	812-945-3187
KS	Olathe, SPS Associates Ltd	913-764-4460
MD	Baltimore, Sunshine Sci. Inst.	301-661-5900
MD	Reisterstown, Massey Assoc.	301-833-2039
MI	Grosse Point Woods, A & D Elctrn. Sls.	313-884-1956
MN	Minneapolis, Hei-Lite Sls.	612-861-6051
NJ	Englewood Cliffs, Masin Esco	201-569-8868
NY	Hauppauge, Masin Esco	516-273-3500
NY	Rochester, Marchese, Marsey & Barden	716-544-4300
NC	Charlotte, Brownell-Electro Inc.	704-597-1270
NC	Raleigh, Millar Elctrns.	919-787-9564
OH	Centerville, Dolfuss-Root	513-433-6776
OH	Strongsville, Dolfuss-Root	216-238-0300
OR	Portland, J.J. Backer	503-297-8744
PA	Bridgeville, Dolfuss-Root	412-221-4420
PA	Trevose, PSA	215-245-0513
RI	Lincoln, Adams-McGregor	401-726-1300
RI	West Warwick, Adams McGregor Inc.	401-822-0896
TX	Dallas, Forner Sls.	214-241-2166
WA	Seattle, J.J. Backer	206-285-1300

Local Distributors

AL	Birmingham, Brownell-Electro	205-322-3374
AL	Mobile, Brownell-Electro	205-479-8581
AZ	Phoenix, Metermaster Div.	602-243-4111
CA	Glendale, Western Elctrn. Supp.	213-245-1226
CA	Irvine, Meter Craft/Larson	714-261-7135
CA	Los Angeles, Metermaster Div.	213-685-4340
CA	Los Angeles, E.I.L. Instrs.	213-685-7020
CA	Palo Alto, Metermaster Div.	415-968-0313
CA	San Diego, Metermaster Div.	619-560-4841
CA	Santa Clara, Dynametron	408-727-6531
CA	Santa Clara, Fisher/Brownell	408-988-6041
CO	Denver, Meter-master	303-722-5766
CT	Middletown, E. I. L. Instruments	203-346-6646
FL	Hialeah, Kimball Elctrn. Lab.	305-822-5792
FL	Miami, Brownell-Electro	305-591-3215
FL	Orlando, Brownell-Electro	305-843-6770
GA	Atlanta, Brownell-Electro	404-762-5181
GA	Atlanta, Process Measurement Control	404-696-7481
HI	Honolulu, Kems, Inc.	808-845-6402
IL	Bridge View, E.I.L. Instrs.	312-430-2292
IL	Elk Grove Village, Metermaster	312-593-8650
IL	Elk Grove Village, Meter-Makers	312-439-5050
IL	Oak Park, Pacific Indicator	312-261-1330
IN	Evansville, Electro-Lab Svcs.	812-423-5211
IN	Indianapolis, E.I.L. Instrs.	317-545-1373
KS	Overland Park, Brooks Elec.	913-648-3131
KY	Louisville, E. I. L. Instr.	502-454-3432
LA	New Orleans, Indl. Instr. Works	504-733-8355
MD	Gaithersburg, Pioneer/Instrumentation	301-921-0660
MD	Savage, Pyttronic	301-792-0780
MD	Sparks, E.I.L.	301-771-4800
MA	Burlington, E. I. L. Instr.	617-272-9450
MA	Waltham, Calibron	617-894-6440
MI	Ferndale, Ram Meter	313-398-6767
MN	Minneapolis, Instr. Control	612-871-2514
MO	St. Louis, ISL Corporation	314-535-5760
NJ	Belleville, Marshall Inst.	201-751-1190
NJ	N. Caldwell, Hosica Labs	201-256-7724
NY	Clarence, Trott Elctrns.	716-634-8500
NY	L.I.C., Metermod Instr.	212-726-4850
NC	Charlotte, Brownell-Electro	704-597-1270
NC	Raleigh, Brownell-Electro Inc.	919-876-6524
NC	Raleigh, Meter-Meterics, Div. of I.T.R.	919-872-5456
NC	Raleigh, Speed Instr. Div. Owen-Barbot	919-876-4919
OH	Cleveland, Pioneer/Instrumentation	216-587-3600
OH	Cleveland, Weschler Elec.	216-238-2550
OH	Dayton, Pioneer/Dayton	513-236-9900
OK	Tulsa, Tri-State Instr.	918-836-0286
PA	Philadelphia, Sunshine Sci.	215-673-5600
PA	Pittsburgh, E.I.L.	412-731-5230
PA	Pittsburgh, CAM/RPC	412-963-1885
TN	Knoxville, Brownell-Electro	615-966-3441
TN	Memphis, Instrument Repair Service	901-278-0762
TN	Memphis, Brownell-Electro	901-795-8487
TN	Nashville, Brownell-Electro	615-889-8230
TX	Beaumont, Straughn Elec.	409-838-4563
TX	Dallas, Ultra Instr.	214-357-0297
TX	Garland, Metermaster	214-271-5671
TX	Houston, Meters & Instrs.	713-644-1631
TX	Houston, Quality Instr.	713-524-0528
TX	Odessa, Whitlock Instr.	915-337-3412
VA	Richmond, Meter Metrics (I.T.R.)	804-275-1431
WA	Seattle, E&L Instrs. Inc.	206-762-0880
WA	Seattle, Eicher-Richards	206-523-7888
WI	Milwaukee, E-M Instrs.	414-272-7799

TRIPP-LITE, 500 No. Orleans, Chicago, IL 60610, Tel: 312-329-1777; Empl.: 80; *Sls. Mgr.:* Priscilla Galgan; *Dist. Mgr.:* Priscilla Galgan

TRI-STAR ELCTRNS., INC., 362 Main Street #2, Venice, CA 90291, Tel: 213-823-5779, Telex: 182058 Tristarel Vnce, TWX: 910-343-7448; FSC No.: 5935, 5999, 5120, 5280; *Sls. Mgr.:* Tom Magdalik

TRITON MFG. CO., P.O. Box 361, East Haddam, CT 06423, Tel: 203-838-4666, Telex: 955439; FSC No.: 54195; *Sls. Mgr.:* Jack Spangler

TRI-TRONICS CO. INC., 13420 Wright Cir., Tampa, FL 33624, Tel: 813-855-4453; Empl.: 27; *Sls. Mgr.:* Robert A. Warner

TRIVEX, 3180 Redhill Ave., Costa Mesa, CA 92626, Tel: 714-546-7781, TWX: 910-595-2589; Empl.: 180; *Sls. Mgr.:* R. Martin

TRO DYNE CORP., 900 Corporate Dr., Mahwah, NJ 07430, Tel: 201-529-1800, TWX: 710-988-2138; FSC No.: 17346; Empl.: 55; *Sls. Mgr.:* T. Mazzaccaro

TROMPETER ELECTRONICS, INC., 8936 Comanche, Chatsworth, CA 91311, Tel: 818-882-1020, TWX: 910-494-1210; FSC No.: 14949; Empl.: 95; *Sls. Mgr.:* Paul Cox; *Dist. Mgr.:* E. Fischle

Local Sales Offices & Reps

AL	Huntsville, Currie, Peak and Frazier	205-536-1506
AZ	Phoenix, Aztec Entprs.	602-944-9185
CA	Los Angeles, Trompeter Elctrns.	818-882-1020
CA	Menlo Park, Long & Assocs.	415-327-1300
CO	Littleton, Aztec Entprs.	303-795-0250
CT	Wethersfield, Underwood Sls.	203-563-3046
FL	Orlando, Currie, Peak & Frazier	305-855-0843
GA	Norcross, Currie, Peak & Frazier	404-449-7662
IL	Wheeling, Engineering Prods	312-537-4860
IN	Indianapolis, Engrg. Prods. Assoc.	317-894-7156
IA	Iowa City, Engineering Prods. Assoc.	319-354-5344
MD	Silver Spring, Sel-Tronics	301-589-3391
MA	Lowell, Underwood Sls.	617-256-8191
MN	Edina, Engineering Prods. Assoc.	612-835-9022
NJ	Elmwood Park, L & M Assoc. Eng. Rep.	201-797-0441
NM	Albuquerque, Aztec Entprs.	505-262-1688
NY	Binghamton, T.A.E. Rep.	607-772-6952
NY	New York, L & M Assocs. Eng. Rep.	212-243-6155
NY	Rochester, T A E Reps.	716-586-8710
NC	Greensboro, Currie, Peak & Frazier	919-373-0380
OH	Cleveland, Geotronix	216-526-2535
OH	Trotwood, Geotronix	513-854-5939
PA	Andalusia, L & M Assocs.	215-245-6658
TX	Lewisville, Milestek	214-436-1597
UT	Ogden, Aztec Entprs.	801-621-1655
WA	Lynnwood, Blum & Assocs.	206-775-6656

TRUE DATA, 17092 Pullman St. #B, Irvine, CA 92714, Tel: 714-979-4842, TWX: 910-595-1917; Empl.: 37

TRULINE CORP., P.O. Box 1469, Visalia, CA 93279, Tel: 209-625-3237; *Sls. Mgr.:* Charlie Torres

TRW CAPACITOR DIV., 301 West "O" St., Ogallala, NE 69153, Tel: 308-284-3611, TWX: 910-620-0321; *Sls. Mgr.:* Dennis Lienemann; *Dist. Mgr.:* Ron Hollmann ......**1A**•1191-1199

Local Sales Offices & Reps

AL	Huntsville, TRW/ECG	205-533-7600
AZ	Scottsdale, TRW/ECG	602-994-0441
CA	Los Angeles, ISDS	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, ISDS	619-571-1544
CA	Santa Ana, ISDS	714-973-2162
CA	Woodland Hills, ISDS	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Ft. Lauderdale, TRW/ECG	305-772-3000

FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Ft. Wayne, R. O. Whitesell & Assocs.	219-432-5591
IN	Indianapolis, R. O. Whitesell & Assocs.	317-359-9283
IN	Kokomo, R. O. Whitesell & Assocs.	317-457-9127
IA	Cedar Rapids, C. H. Horn & Assoc.	319-393-8703
KS	De Soto, Midtec Assoc.	913-441-6565
KY	Louisville, R. O. Whitesell & Assocs.	502-426-7696
MD	Columbia, TRW/ECG	301-964-9110
MA	Framingham, TRW/ECG	617-620-0625
MI	Grand Rapids, R. O. Whitesell & Assocs.	616-942-5420
MI	Southfield, R. O. Whitesell & Assocs.	313-559-5454
MI	St. Joseph, R. O. Whitesell & Assocs.	616-983-7337
MN	Minneapolis, TRW/ECG	612-854-6616
MO	St. Louis, John G. Macke Co.	314-432-2830
NE	Panama, Norris Stricker	402-788-2700
NY	Rochester, TRW/ECG	716-425-3775
NC	Greensboro, TRW/ECG	919-852-4676
OH	Cincinnati, R. O. Whitesell & Assocs.	513-521-2290
OH	Cleveland, R. O. Whitesell & Assocs.	216-447-9020
OH	Columbus, R. O. Whitesell & Assocs.	614-888-9396
OH	Dayton, R. O. Whitesell & Assocs.	513-298-9546
OR	Tigard, TRW/ECG	503-620-5032
PA	Bala Cynwyd, TRW/ECG	215-667-3400
PA	Pittsburgh, R. O. Whitesell & Assocs.	412-963-6161
TN	Greeneville, R. O. Whitesell & Assocs.	615-639-6154
TX	Austin, Technig. Sls. Co.	512-346-9940
TX	Dallas, TRW/ECG	214-248-8000
TX	El Paso, TRW/ECG	915-594-8259
TX	Houston, TRW/ECG	713-772-5541
UT	Salt Lake City, Straube Assocs.	801-263-2640
VA	Richmond, TRW/ECG	804-288-8334
WA	Bellevue, TRW/ECG	206-641-9996
WI	Brookfield, TRW/ECG	414-784-7773

Local Distributors

AL	Huntsville, Hall-Mark Elctrns.	205-837-8700
AZ	Phoenix, Hall-Mark Elctrns.	602-243-6601
AZ	Phoenix, R. V. Weatherford Co.	602-272-7144
AZ	Tempe, Arrow Elctrns.	602-968-4800
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Gardena, Bell Inds.	213-515-1800
CA	Glendale, R. V. Weatherford Co.	213-849-3451
CA	San Diego, Hall-Mark Elctrns.	619-268-1201
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Sunnyvale, Hall-Mark Elctrns.	408-773-9990
CA	Sunnyvale, Bell Inds.	408-734-8570
CO	Aurora, Arrow Elctrns.	303-696-1111
CO	Denver, R. V. Weatherford Co.	303-428-6900
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Clearwater, Hall-Mark Elctrns.	813-530-4543
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Ft. Lauderdale, Hall-Mark Elctrns.	305-971-9280
FL	Orlando, Hall-Mark Elctrns.	305-855-4020
FL	Palm Bay, Arrow Elctrns.	305-725-1480
GA	Norcross, Hall-Mark Elctrns.	404-447-8000
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Bensenville, Hall-Mark Elctrns.	312-860-2678
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
KS	Lenexa, Hall-Mark Elctrns.	913-888-4747
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Columbia, Hall-Mark Elctrns.	301-988-9800
MA	Norwood, Gerber Radio Supp. Co.	617-769-6000
MA	Woburn, Hall-Mark Elctrns.	617-935-9777
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MN	Bloomington, Hall-Mark Elctrns.	612-854-3223
MN	Edina, Arrow Elctrns.	612-830-1800
MO	Maryland Hgts., Hall-Mark Elctrns.	314-291-5350
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Cherry Hill, Hall-Mark Elctrns.	609-424-7300
NJ	Fairfield, Hall-Mark Elctrns.	201-575-4415
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Marlton, Arrow Elctrns.	609-596-8000
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Rochester, Arrow Elctrns.	716-427-0300
NC	Charlotte, Elctrns. Mktg. Corp.	704-394-6195
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Raleigh, Hall-Mark Elctrns.	919-872-0712
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Columbus, Elctrn. Mktg.	614-299-4161
OH	Solon, Arrow Elctrns.	216-248-3990
OH	Solon, Hall-Mark Elctrns.	216-349-4632
OH	Westerville, Hall-Mark Elctrns.	614-891-4555
OK	Tulsa, Hall-Mark Elctrns.	918-665-3200
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Philadelphia, Phila. Elctrn.	215-568-7400
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Austin, Hall-Mark Elctrns.	512-258-8848
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Dallas, Hall-Mark Elctrns.	214-341-1147
TX	Houston, Arrow Elctrns.	713-530-4700
TX	Houston, Hall-Mark Elctrns.	713-781-6100
UT	Salt Lake City, Arrow Elctrns.	801-539-1135
WA	Seattle, R. V. Weatherford Co.	206-575-1340
WI	Oak Creek, Hall-Mark Elctrns.	414-761-3000
WI	Oak Creek, Arrow Elctrns.	414-764-6600

TRW/CINCH-GRAPHIK, 200 S. Turnbull Canyon Rd., City of Industry, CA 91744, Tel: 213-333-1201, TWX: 910-584-1861; *Sls. Mgr.:* James Kirby

TRW CONNECTOR DIV., TRW Electronic Components Grp., 1501 Morse Ave., Elk Grove Village, IL 60007, Tel: 312-981-6000, TWX: 910-222-1796; *Sls. Mgr.:* B. Walthall; *Dist. Mgr.:* Jim Hartranft Jr. ....2•1613-1715

Local Sales Offices & Reps

AL	Huntsville, TRW/ECG	205-533-7600
AZ	Scottsdale, TRW/ECG	602-994-0441
CA	Los Angeles, IS DS	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, IS DS	619-571-1544
CA	Santa Ana, IS DS	714-973-2162
CA	Woodland Hills, IS DS	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Ft. Lauderdale, TRW/ECG	305-772-3000
FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Fort Wayne, R. O. Whitesell & Assocs.	219-432-5591
IN	Indianapolis, R. O. Whitesell & Assocs.	317-359-9283
IN	Kokomo, R. O. Whitesell & Assocs.	317-457-9127
IA	Cedar Rapids, C. H. Horn & Assocs.	319-393-8703
KS	De Soto, Midtec Assocs.	913-441-6565
KY	Louisville, R. O. Whitesell & Assocs.	502-426-7696
MA	Framingham, TRW/ECG	617-620-0625
MI	Grand Rapids, R. O. Whitesell & Assocs.	616-942-5420
MI	Southfield, R. O. Whitesell & Assocs.	313-559-5454
MI	St. Joseph, R. O. Whitesell & Assocs.	616-983-7337
MN	Minneapolis, TRW/ECG	612-854-6616
MO	St. Louis, J. G. Macke Co.	314-432-2830
NM	El Paso, Straube Assocs.	915-594-8259
NY	Fairport, TRW/ECG	716-425-3775
NC	Greensboro, TRW/ECG	919-852-4676
OH	Cincinnati, R. O. Whitesell & Assocs.	513-521-2290
OH	Cleveland, R. O. Whitesell & Assocs.	216-447-9020
OH	Columbus, R. O. Whitesell & Assocs.	614-888-9396
OH	Dayton, R. O. Whitesell & Assocs.	513-298-9546
OR	Tigard, TRW/ECG	503-620-5032
PA	Bala Cynwyd, TRW/ECG	215-667-3400
PA	Pittsburgh, R. O. Whitesell & Assocs.	412-963-6161
TN	Greeneville, R. O. Whitesell & Assocs.	615-639-6154
TX	Austin, TRW/ECG	512-345-2331
TX	Dallas, TRW/ECG	214-248-8000
TX	El Paso, TRW/ECG	915-594-8259
TX	Houston, TRW/ECG	713-772-5541
UT	Salt Lake City, Straube Assocs.	801-263-2640
VA	Richmond, TRW/ECG	804-288-8334
WA	Bellevue, TRW/ECG	206-641-9996
WI	Brookfield, TRW/ECG	414-784-7773

Local Distributors

AL	Huntsville, Hall-Mark Elctrns.	205-837-8700
AL	Huntsville, Hamilton/Avnet Elctrns.	205-837-7210
AZ	Phoenix, Hall-Mark Elctrns.	602-243-6601
AZ	Phoenix, Kierulff Elctrns.	602-243-4101
AZ	Phoenix, R. V. Weatherford Co.	602-272-7144
AZ	Tempe, Fisher-Brownell	602-967-1464
AZ	Tempe, Arrow Elctrns.	602-968-4800
AZ	Tempe, Hamilton/Avnet Elctrns.	602-231-5100
AR	Ft. Smith, Carlton Bates Co.	501-646-8201
AR	Little Rock, Carlton Bates Co.	501-562-9100
CA	Alhambra, Fisher-Brownell	213-289-0255
CA	Anaheim, R. V. Weatherford Co.	714-634-9600
CA	Chatsworth, Arrow Elctrns.	213-700-8668
CA	Costa Mesa, Avnet Elctrns.	714-754-6088
CA	Costa Mesa, Hamilton Electro Sls.	714-641-4100
CA	Culver City, Hamilton Electro Sls.	213-558-2121
CA	El Segundo, Hallmark Elctrns.	213-643-9101
CA	Glendale, R. V. Weatherford Co.	213-849-3451
CA	Los Angeles, Newark Elctrns.	213-671-7066
CA	Los Angeles, Kierulff Elctrns.	213-725-0325
CA	Newport Beach, Arrow Elctrns.	714-851-8961
CA	Palo Alto, Kierulff Elctrns.	415-968-6292
CA	Pomona, R. V. Weatherford Co.	714-623-1261
CA	Riverside, Elctrn. Supp.	714-787-9220
CA	Sacramento, Hamilton/Avnet Elctrns.	916-920-3150
CA	San Diego, Fisher-Brownell	619-560-8545
CA	San Diego, Hall-Mark Elctrns.	619-268-1201
CA	San Diego, Hamilton/Avnet Elctrns.	619-571-7510
CA	San Diego, Kierulff Elctrns.	619-278-2112
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	San Diego, R. V. Weatherford Co.	619-695-1700
CA	San Francisco, Zack Radio Supp.	415-626-1444
CA	Santa Clara, Fisher-Brownell	408-988-6041
CA	Santa Clara, Wyle Dist. Grp.	408-727-2500
CA	Sunnyvale, Hall-Mark Elctrns.	408-773-9990
CA	Sunnyvale, Hamilton/Avnet Elctrns.	408-743-3355
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Tustin, Kierulff Elctrns.	714-731-5711
CO	Denver, Kierulff Elctrns.	303-371-6500
CO	Denver, Newark Elctrns.	303-757-3351
CO	Denver, Arrow Elctrns.	303-758-2100
CO	Denver, Integrated Elctrn.	303-292-6121
CO	Englewood, Hall-Mark Elctrns.	303-790-1662
CO	Englewood, R. V. Weatherford Co.	303-770-9762
CO	Englewood, Hamilton/Avnet Elctrns.	303-779-9998
CO	Thornton, Wyle Dist. Grp.	303-457-WYLE
CT	Danbury, Hamilton/Avnet Elctrns.	203-797-2800
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Ft. Lauderdale, Kierulff Elctrns.	305-463-4940
FL	Ft. Lauderdale, Hall-Mark Elctrns.	305-971-9280
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Ft. Lauderdale, Hamilton/Avnet Elctrns.	305-971-2900
FL	Largo, Lodan Elctrns.	813-586-2851
FL	Orlando, Hall-Mark Elctrns.	305-855-4020
FL	Palm Bay, Arrow Elctrns.	305-725-1480
FL	St. Petersburg, Kierulff	813-576-1966
FL	St. Petersburg, Hamilton/Avnet Elctrns.	813-576-3930
GA	Norcross, Kierulff Elctrns.	404-447-5252
GA	Norcross, Hall-Mark Elctrns.	404-447-8000
GA	Norcross, Hamilton/Avnet Elctrns.	404-447-7507
GA	Norcross, Arrow Elctrns.	404-449-8252
HI	Honolulu, Precision Radio Ltd.	808-537-5291
IL	Bensenville, Hamilton/Avnet Elctrns.	312-860-7780
IL	Bensenville, Hall-Mark Elctrns.	312-860-3800
IL	Champaign, Klaus Radio	217-356-1896
IL	Chicago, Electronic Connector	312-767-2200
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Chicago, Bell Elctrns.	312-982-9210
IL	Elk Grove Village, Kierulff Elctrns.	312-640-0200
IL	Elk Grove Village, Pioneer/Chicago	312-437-9680
IL	La Salle, Klaus Radio	815-223-7400
IL	Palatine, Ohm Elctrns.	312-359-5500
IL	Peoria, Klaus Radio	309-691-4840
IL	Quincy, Klaus Radio	217-223-7560
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Ft. Wayne, Graham Elctrn.	219-423-3422
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IN	Indianapolis, Hamilton/Avnet Elctrns.	317-844-9333
IN	Indianapolis, Graham Elctrns.	317-634-8202
IN	Indianapolis, Pioneer/Ind.	317-849-7300
IA	Cedar Rapids, Arrow Elctrns.	319-395-7230
IA	Cedar Rapids, DEECO, Inc.	319-365-7551
IA	Eldridge, Klaus Radio	319-285-8484
KS	Lenexa, Hall-Mark Elect.	913-888-4747
KS	Overland Park, Hamilton/Avnet Elctrns.	913-888-8900
LA	Baton Rouge, Indl. Elctrn. Supp.	504-926-0513
LA	Lafayette, Ralph's of Lafayette	318-234-4507
LA	Shreveport, Indl. Elctrn. Supp.	318-222-9459
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Baltimore, Hall-Mark Elctrns.	301-796-9300
MD	Columbia, Powell Elctrn.	301-621-4070
MD	Columbia, Hamilton/Avnet Elctrns.	301-995-3500
MD	Gaithersburg, Pioneer/Washington	301-948-0710
MD	Rockville, Capitol Radio Whlsrs.	301-881-2270
MD	Timonium, Zebra Elctrns.	301-252-6576
MA	Billerica, Kierulff Elctrns.	617-935-5134
MA	Hingham, Sager Elec. Supp.	617-749-6700
MA	Norwood, Gerber Radio Supp.	617-329-2400
MA	Woburn, Hall-Mark Elctrns.	617-935-9777
MA	Woburn, Arrow Elctrns.	617-933-8130
MA	Woburn, Hamilton/Avnet Elctrns.	617-935-9700
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Ann Arbor, Wedemeyer Elec. Supp.	313-665-8611
MI	Grand Rapids, Hamilton/Avnet Elctrns.	616-243-8805
MI	Livonia, Pioneer/Michigan	313-525-1800
MI	Livonia, R.S. Elect. Corp.	313-525-1155
MI	Livonia, Hamilton/Avnet Elctrns.	313-522-4700
MI	Oak Park, Newark Elctrns.	313-967-0600
MN	Bloomington, Hall-Mark Elect.	612-854-3223
MN	Edina, Kierulff Elctrns.	612-941-7500
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minneapolis, Newark Elctrns.	612-331-6350
MN	Minnetonka, Hamilton/Avnet Elctrns.	612-932-0600
MN	St. Paul, Gopher Elctrns.	612-483-3322
MO	Earth City, Hamilton/Avnet Elctrns.	314-344-1200
MO	Maryland Hgts., Kierulff Elctrns.	314-739-0855
MO	Maryland Hgts., Hall-Mark Elect.	314-291-5350
MO	St. Louis, Arrow Elctrns.	314-567-6888
MO	St. Louis, Olive Indl. Elctrns.	314-426-4500
NE	Lincoln, Scott Elctrn. Supp.	402-466-8221
NE	Omaha, Scott Elctrn. Supp.	402-734-6750
NH	Manchester, Arrow Elect.	603-668-6968
NJ	Cherry Hill, Hall-Mark Elctrns.	609-424-0880
NJ	Cherry Hill, Hamilton/Avnet Elctrns.	609-424-0100

NJ	Fairfield, Hall-Mark Elctrns.	201-575-4415
NJ	Fairfield, Kierulff Elctrns.	201-575-6750
NJ	Fairfield, Hamilton/Avnet Elctrns.	201-575-3390
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Hanover, State Elec. Parts Corp.	201-887-2550
NJ	Marlton, Arrow Elctrns.	609-596-8000
NJ	Moorestown, Arrow Elect.	609-235-1900
NM	Albuquerque, Intl. Elctrns.	505-345-8127
NM	Albuquerque, Hamilton/Avnet Elctrns.	505-765-1500
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Binghamton, Harvey Elctrns.	607-748-8211
NY	Buffalo, Summit Dist.	716-884-3450
NY	East Syracuse, Hamilton/Avnet Elctrns.	315-437-2641
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Hauppauge, Jaco Elect.	516-273-5500
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Lynbrook, Peerless Radio	516-593-2121
NY	Melville, Hamilton/Avnet Elctrns.	516-454-6060
NY	Rochester, Arrow Elctrns.	716-275-0300
NY	Rochester, Simcona Elctrns. Corp.	716-328-3230
NY	Rochester, Hamilton/Avnet Elctrns.	716-475-9130
NY	Rochester, Rochester Radio Supp.	716-454-7800
NY	Ronkonkoma, Hall-Mark Elctrns.	516-737-0600
NY	Ronkonkoma, Conco Elctrns. Corp.	516-467-8200
NC	Cary, Powell Elctrns.	919-467-1212
NC	Greensboro, Kierulff Elctrns.	919-852-9440
NC	Greensboro, Hammond Elec. of Carolina	919-275-6391
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Raleigh, Hamilton/Avnet Elctrns.	919-829-8030
NC	Raleigh, Hall-Mark Elect.	919-872-0712
NC	Winston-Salem, Arrow Elect.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Cincinnati, Hall-Mark Elctrns.	513-563-5980
OH	Cincinnati, Hughes Peters, Inc.	513-351-2000
OH	Cleveland, Newark Elctrns.	216-447-8860
OH	Cleveland, Hamilton/Avnet Elctrns.	216-831-3500
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Columbus, Elctrns. Mktg. Corp.	614-299-4161
OH	Columbus, Hughes Peters, Inc.	614-294-5351
OH	Dayton, Hamilton/Avnet Elctrns.	513-433-6010
OH	Dayton, Stotts-Friedman	513-298-5555
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Highland Hgts., Hall-Mark Elctrns.	216-473-2907
OH	Solon, Hall-Mark Elctrns.	216-349-4632
OH	Solon, Arrow Elctrns.	216-248-3990
OH	Westerville, Hall-Mark Elctrns.	614-891-4555
OK	Oklahoma City, Trice Wholesale Elctrns.	405-524-4411
OK	Tulsa, Hall-Mark Elctrns.	918-665-3200
OR	Lake Oswego, Hamilton/Avnet Elctrns.	503-635-8157
OR	Portland, Kierulff Elctrns.	503-641-9150
OR	Tigard, Arrow Elctrns.	503-684-1690
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Philadelphia, Almo Elctrns. Corp.	215-698-4000
PA	Philadelphia, Powell Elctrns.	215-365-1900
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
PA	Pittsburgh, CAM/RPC	412-782-3770
PA	Wayne, Peak Elect.	215-293-9000
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Austin, Hall-Mark Elect.	512-258-8848
TX	Austin, Hamilton/Avnet Elctrns.	512-837-8911
TX	Dallas, Kierulff Elctrns.	214-343-2400
TX	Dallas, Intl. Elctrns.	214-233-9323
TX	Dallas, R. V. Weatherford Co.	214-980-1110
TX	Dallas, Hall-Mark Elctrns.	214-341-1147
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	El Paso, Intl. Elctrns.	915-778-9761
TX	Garland, Newark Elctrns.	214-494-5911
TX	Houston, Hamilton/Avnet Elctrns.	713-780-1771
TX	Houston, R. V. Weatherford Co.	713-688-7406
TX	Houston, Hall-Mark Elctrns.	713-781-6100
TX	Irving, Hamilton/Avnet Elctrns.	214-659-4111
TX	Richardson, Fisher Brownell	214-235-3177
TX	Stafford, Harrison Equip.	713-879-2729
TX	Stafford, Arrow Elctrns.	713-491-4100
UT	Salt Lake City, Kierulff Elctrns.	801-973-6913
UT	Salt Lake City, Arrow Elctrns.	801-539-1135
UT	Salt Lake City, Hamilton/Avnet Elctrns.	801-972-4300
UT	Salt Lake City, Standard Supp. Co.	801-486-3371
WA	Bellevue, Arrow Elctrns.	206-643-4800
WA	Bellevue, Hamilton/Avnet Elctrns.	206-643-3950
WA	Bellevue, Wyle Dist. Grp.	206-453-8300
WA	Bellevue, Almac/Stroum Elctrns.	206-643-9992
WA	Seattle, R. V. Weatherford Co.	206-243-6340
WA	Tukwila, Kierulff Elctrns.	206-575-4420
WI	Madison, Arrow Elctrns.	608-273-4977
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Milwaukee, Elctrn. Expeditors	414-228-8100
WI	New Berlin, Hamilton/Avnet Elctrns.	414-784-4510
WI	Oak Creek, Hall-Mark Elctrns.	414-761-3000
WI	Oak Creek, Arrow Elctrn.	414-764-6600

TRW CYLINDRICAL CONNECTOR DIV., TRW Electronic Components Grp., 8821 Science Center Dr., Minneapolis, MN 55428, Tel: 612-537-1010, TWX: 910-576-2748; *Sls. Mgr.:* Gene Schmidt; *Dist. Mgr.:* Gene Schmidt .... 2•1716-1735

Local Sales Offices & Reps

AL	Huntsville, TRW/ECG	205-533-7600
AZ	Scottsdale, TRW/ECG	602-994-0441
CA	Los Angeles, ISDS	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, ISDS	714-571-1544
CA	Santa Ana, ISDS	714-973-2162
CA	Woodland Hills, ISDS	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Ft. Lauderdale, TRW/ECG	305-772-3000
FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Ft. Wayne, R. O. Whitesell & Assocs.	219-432-5591
IN	Indianapolis, R. O. Whitesell & Assocs.	317-359-9283
IN	Kokomo, R. O. Whitesell & Assocs.	317-457-9127
IA	Cedar Rapids, C. H. Horn & Assocs.	319-393-8703
KS	De Soto, Midtec Assocs.	913-441-6565
KY	Louisville, R. O. Whitesell & Assocs.	502-426-7696
MA	Framingham, TRW/ECG	617-620-0625
MI	Grand Rapids, R. O. Whitesell & Assocs.	616-942-5420
MI	Southfield, R. O. Whitesell & Assocs.	313-559-5454
MI	St. Joseph, R. O. Whitesell & Assocs.	616-983-7337
MN	Minneapolis, TRW/ECG	612-854-6616
MO	St. Louis, J. G. Macke Co.	314-432-2830
NY	Rochester, TRW/ECG	716-424-2830
NC	Greensboro, TRW/ECG	919-852-4676
OH	Cincinnati, R. O. Whitesell & Assocs.	513-521-2290
OH	Cleveland, R. O. Whitesell & Assocs.	216-447-9020
OH	Columbus, R. O. Whitesell & Assocs.	614-888-9396
OH	Dayton, R. O. Whitesell & Assocs.	513-298-9546
OR	Tigard, TRW/ECG	503-620-5032
PA	Bala Cynwyd, TRW/ECG	215-667-3400
PA	Pittsburgh, R. O. Whitesell & Assocs.	412-963-6161
TN	Greeneville, R. O. Whitesell & Assocs.	615-639-6154
TX	Austin, TRW/ECG	512-345-2331
TX	Dallas, TRW/ECG	214-248-8000
TX	El Paso, TRW/ECG	915-594-8259
TX	El Paso, Straube Assocs.	915-594-8259
TX	Houston, TRW/ECG	713-772-5541
UT	Salt Lake City, Straube Assocs.	801-263-2640
VA	Richmond, TRW/ECG	804-288-8334
WA	Bellevue, TRW/ECG	206-641-9996
WI	Brookfield, TRW/ECG	414-784-7773

Local Distributors

CA	Brea, Aeroflite	714-773-4251
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Newport Beach, Arrow Elctrns.	714-851-8961
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CO	Denver, Arrow Elctrns.	303-758-2100
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Palm Bay, Arrow Elctrns.	305-725-1480
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Chicago, Electronic Connector	312-767-2200
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IA	Cedar Rapids, Arrow Elctrns.	319-395-7230
MD	Baltimore, Arrow Elctrns.	301-247-5200
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MN	Edina, Arrow Elctrns.	612-830-1800
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Rochester, Arrow Elctrns.	716-275-0300
NY	Ronkonkoma, Conco	516-467-8200
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Solon, Arrow Elctrns.	216-248-3990
PA	Monroeville, Arrow Elctrns.	412-856-7000
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Dallas, Hall-Mark	214-341-1147
TX	Houston, Hall-Mark	713-781-6100
TX	Stafford, Arrow Elctrns.	713-491-4100
UT	Salt Lake City, Arrow Elctrns.	801-539-1135
WA	Bellevue, Arrow Elctrns.	206-643-4800
WI	Madison, Arrow Elctrns.	608-273-4977
WI	Oak Creek, Arrow Elctrns.	414-764-6600

TRW, Dynalco Controls Div., 5200 NW 37th, P.O. Box 8187, Ft. Lauderdale, FL 33310, Tel: 305-739-4300, Telex: 514833; Empl.: 125; *Sls. Mgr.:* Kurlin Wilson; *Dist. Mgr.:* Joe Stephens

TRW ELECTRONIC COMPONENTS GRP., 2525 E. El Segundo Blvd., El Segundo, CA 90245, Tel: 213-536-0600

TRW FIBER OPTIC PRODS., CONNECTOR DIV., TRW Elctrn. Comps. Grp., 401 N. Broad St., Philadelphia, PA 19108, Tel: 215-922-8900, TWX: 710-670-2286; *Sls. Mgr.:* James Finnerfock .... 2•1693, 1694

TRW INDUCTIVE PRODUCTS DIV., 150 Varick St., New York, NY 10013, Tel: 212-255-3500, TWX: 710-581-2722; Empl.: 325; *Sls. Mgr.:* A. Profeta .... 1A•1298-1305, 1642, 2338-2363

Local Sales Offices & Reps

AL	Huntsville, TRW/ECG	205-533-7600
AZ	Scottsdale, TRW/ECG	602-994-0441
CA	Los Angeles, Integrated Sls.	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, Integrated	619-571-1544
CA	Santa Ana, Integrated	714-973-2162
CA	Woodland Hills, Integrated Sls.	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Fort Lauderdale, TRW/ECG	305-772-3000
FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Fort Wayne, R.O. Whitesell Assoc.	219-432-5591
IN	Indianapolis, R.O. Whitesell Assoc.	317-359-9283
IN	Kokomo, R.O. Whitesell Assoc.	317-457-9127
IA	Cedar Rapids, C.H. Horn & Assocs.	319-393-8703
KS	DeSoto, Midtec Assocs.	913-441-6565
KY	Louisville, R.O. Whitesell Assoc.	502-426-7696
MD	Columbia, TRW/ECG	301-964-9110
MA	Framingham, TRW/ECG	617-620-0625
MI	Grand Rapids, R.O. Whitesell Assoc.	616-942-5420
MI	Southfield, R.O. Whitesell Assoc.	313-559-5454
MI	St. Joseph, R.O. Whitesell Assoc.	616-983-7337
MN	Minneapolis, TRW/ECG	612-854-6616
MO	St. Louis, John G. Macke Co.	314-432-2830
NJ	Rowayton, TRW/ECG	203-853-4466
NM	El Paso, S.W. Sales	915-594-8259
NY	Fairport, TRW/ECG	716-425-3775
NY	Rowayton, Conn., TRW/ECG	203-853-4466
NC	Greensboro, TRW/ECG	919-852-4676
OH	Cincinnati, R.O. Whitesell Assoc.	513-521-2290
OH	Cleveland, R. O. Whitesell Assoc.	216-447-9020
OH	Columbus, R.O. Whitesell Assoc.	614-888-9396
OH	Dayton, R.O. Whitesell Assoc.	513-298-9546
OR	Portland, TRW/ECG	503-620-5032
PA	Bala Cynwyd, TRW/ECG	215-667-3400
PA	Pittsburgh, R.O. Whitesell Assoc.	412-963-6161
TN	Greeneville, R.O. Whitesell Assoc.	615-639-6154
TX	Austin, Technology Sls. Co.	512-345-2331
TX	Dallas, TRW/ECG	214-248-8000
TX	El Paso, S.W. Sls.	915-594-8259
TX	Houston, TRW/ECG	713-772-5541
UT	Salt Lake City, Straube Assocs.	801-263-2640
VA	Richmond, TRW/ECG	804-288-8334
WA	Bellevue, TRW/ECG	206-641-9996
WI	Brookfield, TRW/ECG	414-784-7773
EXP	PR, Rio Piedras, Elctrn. Sls. Assocs.	809-769-2911

Local Distributors

AZ	Tempe, Arrow	602-968-4800
CA	Chatsworth, Arrow	213-701-7500
CA	El Segundo, Hall-Mark	213-643-9101
CA	Garden Grove, Bell	714-220-0681
CA	San Diego, Arrow	619-565-4800
CA	San Diego, Weatherford	619-695-1700
CA	San Diego, Hall-Mark	619-268-1201
CA	San Jose, Hall-Mark	408-946-0900
CA	San Jose, Irvine	714-540-5600
CA	Sunnyvale, Arrow	
CA	Sunnyvale, Weatherford	408-738-8694
CO	Denver, Weatherford	303-428-6900
CT	Wallingford, Arrow	203-265-7741
FL	St. Petersburg, Hall-Mark	813-576-8691
IL	Schaumburg, Arrow	312-397-3440
IN	Indianapolis, Pioneer/Indiana	317-849-7300
IN	Indianapolis, Arrow	317-243-9353
MD	Columbia, Hall-Mark	301-988-9800
MD	Gaithersburg, Pioneer/Washington	301-921-0660
MA	Hall-Mark, Woburn	617-935-9777
MN	Minneapolis, Newark	612-331-6350
NJ	Cherry Hill, Hall-Mark	609-424-7300
NJ	Fairfield, Hall-Mark	201-575-4415
NJ	Fairfield, Arrow	201-575-5300
NJ	Malton, Arrow	609-596-8000
NM	Albuquerque, International Elctrns.	505-345-8127
NY	Rochester, Newark	716-473-6600
NC	Charlotte, Pioneer/Carolina	704-527-8188
NC	Hall-Mark, Arrow	919-872-0712
NC	Raleigh, Arrow	919-876-3132

OH	Centerville, Arrow	513-435-5563
OH	Valley View, Newark	216-447-8860
OH	Westerville, Hall-Mark	614-891-4555
OR	Tigard, Arrow	503-684-1690
TX	Addison, Weatherford	214-931-7333
TX	Austin, Arrow	512-835-4180
TX	Austin, Hall-Mark	512-258-8848
TX	Dallas, Hall-Mark	214-341-1147
TX	El Paso, International Elctrns.	915-598-3406
TX	Garland, Newark	214-487-8144
WA	Bellevue, Arrow	206-643-4800

TRW LSI PRODUCTS, PO Box 2472, La Jolla, CA 92038, Tel: 619-457-1000, Telex: 697957, TWX: 910-335-1571; Empl.: 400; *Sls. Mgr.:* Doug Turnage; *Dist. Mgr.:* Ron Courtois

TRW MICROWAVE, 825 Stewart Dr., Sunnyvale, CA 94086, Tel: 408-732-0880, TWX: 910-339-9207; FSC No.: 21847; Empl.: 600; *Sls. Mgr.:* J. Moore

TRW MOTOR DIVISION, Industrial/Commerical Products, Napierfield Road, Postal Route 6, Box M-30A, Dothan, AL 36303, Tel: 205-983-3542, Telex: 810-744-1000; *Sls. Mgr.:* Dave Hall .... **1B**•1120

TRW MOTOR DIV. (MILITARY), 2275 Stanley Ave., Dayton, OH 45404, Tel: 513-228-3171, Telex: 288-224, TWX: 810-459-1642; Empl.: 580; *Sls. Mgr.:* Bill Pelfrey; *Dist. Mgr.:* Tom Coyle ....**1B**•1186-1204; **2**•1852, 1853

Local Sales Offices & Reps

AL	Huntsville, TRW/ECG	205-533-7600
AZ	Scottsdale, TRW/ECG	602-994-0441
CA	Los Angeles, Integrated Sls.	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, Integrated Sls.	619-571-1544
CA	Santa Ana, Integrated Sls.	714-973-2162
CA	Woodland Hills, Integrated Sls.	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Ft. Lauderdale, TRW/ECG	305-772-3000
FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Ft. Wayne, R. O. Whitesell & Assocs.	219-432-5591
IN	Indianapolis, R. O. Whitesell & Assocs.	317-359-9283
IN	Kokomo, R. O. Whitesell & Assocs.	317-457-9127
IA	Cedar Rapids, C. H. Horn & Assocs.	319-393-8703
KS	De Soto, Midtec Assoc.	913-441-6565
KY	Louisville, R. O. Whitesell & Assocs.	502-426-7696
MD	Baltimore, TRW/ECG	301 964-9110
MA	Framingham, TRW/ECG	617-620-0625
MI	Grand Rapids, R. O. Whitesell & Assocs.	616-942-5420
MI	Southfield, R. O. Whitesell & Assocs.	313-559-5454
MI	St. Joseph, R. O. Whitesell & Assocs.	616-983-7337
MN	Minneapolis, TRW/ECG	612-854-6616
MO	St. Louis, John G. Macke Co.	314-432-2830
NY	Fairport, TRW/ECG	716-425-3775
NC	Greensboro, TRW/ECG	919-852-4676
OH	Cincinnati, R. O. Whitesell & Assocs.	513-521-2290
OH	Cleveland, R. O. Whitesell & Assocs.	216-447-9020
OH	Columbus, R. O. Whitesell & Assocs.	614-888-9396
OH	Dayton, R. O. Whitesell & Assocs.	513-298-9546
OR	Tigard, N. R. Schultz Co.	503-620-5032
PA	Bala Cynwyd, TRW/ECG	215-667-3400
PA	Pittsburgh, R. O. Whitesell & Assocs.	412-963-6161
TN	Greeneville, R. O. Whitesell & Assocs.	615-639-6154
TX	Austin, Technlg. Sls.	512-346-9940
TX	Dallas, TRW/ECG	214-248-8000
TX	El Paso, TRW/ECG	915-594-8259
TX	Houston, TRW/ECG	713-772-5541
UT	Salt Lake City, Straube Assocs.	801-263-2640
VA	Richmond, TRW/ECG	804-288-8334
WA	Bellevue, TRW/ECG	206-641-9996
WI	Brookfield, TRW/ECG	414-784-7773

Local Distributors

AL	Huntsville, Hamilton/Avnet Elctrns.	205-837-7210
AL	Huntsville, Arrow Elctrns.	205-882-2730
AL	Huntsville, Hallmark Elctrns.	205-837-8700
AZ	Phoenix, Hallmark Electronics	602-243-6601
AZ	Tempe, Fisher Brownell	602-967-1464
AZ	Tempe, Arrow Elctrns.	602-968-4800
AZ	Tempe, Hamilton/Avnet Elctrns.	602-231-5100
CA	Alhambra, Fisher Brownell	213-289-0255
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Chatsworth, Avnet Elctrns.	213-700-2600
CA	Costa Mesa, Avnet Elctrns.	714-754-6111
CA	Culver City, Hamilton/Avnet Elctrns.	213-558-2252
CA	El Segundo, Hallmark Elctrns.	213-643-9101
CA	Sacramento, Hamilton/Avnet Elctrns.	916-925-2216
CA	San Diego, Hallmark Elctrns.	619-268-1201
CA	San Diego, Fisher Brownell	619-560-8545
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	San Diego, Hamilton/Avnet Elctrns.	619-571-7510
CA	San Jose, Hallmark Elctrns.	408-946-2575
CA	Santa Clara, Fisher Browell	408-988-6041
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Sunnyvale, Hallmark Elctrns.	408-946-0900
CA	Sunnyvale, Hamilton/Avnet Elctrns.	408-743-3355
CA	Tustin, Arrow Elctrns.	714-838-5422
CO	Aurora, Arrow Elctrns.	303-696-1111
CO	Englewood, Hallmark Elctrns.	303-790-1662
CO	Englewood, Hamilton/Avnet Elctrns.	303-740-1000
CT	Danbury, Hamilton/Avnet Elctrns.	203-797-2800
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Clearwater, Hallmark Elctrns.	813-530-4543
FL	Ft. Lauderdale, Hamilton/Avnet Elctrns.	305-971-2900
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Ft. Lauderdale, Hallmark Elctrns.	305-971-9280
FL	Orlando, Hallmark Elctrns.	305-855-4020
FL	Palm Bay, Arrow Elctrns.	305-725-1480
FL	St. Petersburg, Hamilton/Avnet Elctrns.	813-576-3930
FL	Winter Park, Hamilton/Avnet Elctrns.	305-628-3888
GA	Norcross, Hamilton/Avnet Elctrns.	404-447-7507
GA	Norcross, Hallmark Elctrns.	404-447-8000
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Bensenville, Hamilton/Avnet Elctrns.	312-860-7700
IL	Bensenville, Hallmark Elctrns.	312-860-3800
IL	Elk Grove Village, Pioneer/Chicago	312-437-9680
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Carmel, Hamilton/Avnet Elctrns.	317-844-9333
IN	Indianapolis, Arrow Elctrns.	317-243-9353
IN	Indianapolis, Pioneer/Indiana	317-849-7300
KS	Lenexa, Hallmark Elctrns.	913-888-4747
KS	Overland Park, Hamilton/Avnet Elctrns.	913-888-8900
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Bethesda, Arrow Elctrns.	301-564-3000
MD	Columbia, Hallmark Elctrns.	301 988-9800
MD	Columbia, Hamilton/Avnet Elctrns.	301-995-3500
MA	Woburn, Hallmark Elctrns.	617-935-9777
MA	Woburn, Arrow Elctrns.	617-933-8130
MA	Woburn, Hamilton/Avnet Elctrns.	617-273-7500
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MI	Grand Rapids, Hamilton/Avnet Elctrns.	616-243-8805
MI	Livonia, Pioneer/Michigan	313-525-1800
MI	Livonia, Hamilton/Avnet Elctrns.	313-522-4700
MN	Bloomington, Hallmark Elctrns.	612-854-3223
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minnetonka, Pioneer/Twin Cities	612-935-5444
MN	Minnetonka, Hamilton/Avnet Elctrns.	612-932-0600
MO	Earth City, Hamilton/Avnet Elctrns.	314-344-1200
MO	Maryland Heights, Hallmark Elctrns.	314-291-5350
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-688-6968
NJ	Cherry Hill, Hallmark Elctrns.	609-424-7300
NJ	Cherry Hill, Hamilton/Avnet Elctrns.	609-424-0100
NJ	Fairfield, Hamilton/Avnet Elctrns.	201-575-3390
NJ	Fairfield, Hallmark Elctrns.	201-575-4415
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Marlton, Arrow Elctrns.	609-596-8000
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NM	Albuquerque, Hamilton/Avnet Elctrns.	505-765-1500
NY	E. Syracuse, Hamilton/Avnet Elctrns.	315-437-2641
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Hauppauge, Arrow Elctrns.	516-231-1000
NY	Hauppauge, Hamilton/Avnet Elctrns.	516-434-7421
NY	Liverpool, Arrow Elctrns.	315-652-1000
NY	Rochester, Hamilton/Avnet Elctrns.	716-475-9130
NY	Rochester, Arrow Elctrns.	716-427-0300
NY	Ronkonkoma, Hallmark Elctrns.	516-737-0600
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Raleigh, Hallmark Elctrns.	919-872-0712
NC	Raleigh, Hamilton/Avnet Elctrns.	919-878-0819
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Cincinnati, Hallmark Elctrns.	513-563-2980
OH	Cleveland, Hamilton/Avnet Elctrns.	216-831-3500
OH	Cleveland, Pioneer/Cleveland	216-587-3600
OH	Dayton, Pioneer/Dayton	513-236-9900
OH	Dayton, Hamilton/Avnet Elctrns.	513-443-0610
OH	Solon, Arrow Elctrns.	216-248-3990
OH	Solon, Hallmark Elctrns.	216-349-4632
OH	Westerville, Hallmark Elctrns.	614-891-4555
OK	Tulsa, Hallmark Elctrns.	918-665-3200
OR	Lake Oswego, Hamilton/Avnet Elctrns.	503-635-8157
OR	Tigard, Arrow Elctrns.	503-684-1690
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Pittsburgh, Pioneer/Pittsburgh	412-782-2300
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Austin, Hallmark Elctrns.	512-258-8848
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Dallas, Hall-Mark Elctrns.	214-343-5000
TX	Houston, Hamilton/Avnet Elctrns.	713-780-1771
TX	Houston, Hallmark Elctrns.	713-781-6100
TX	Houston, Arrow Elctrns.	713-530-4700
TX	Irving, Hamilton/Avnet Elctrns.	214-659-4111
TX	Richardson, Fisher Brownell	214-235-3177
UT	Salt Lake City, Hamilton/Avnet Elctrns.	801-972-2800
WA	Bellevue, Hamilton/Avnet Elctrns.	206-643-3950
WA	Bellevue, Arrow Elctrns.	206-643-4800
WI	New Berlin, Hamilton/Avnet Elctrns.	414-784-4510
WI	Oak Creek, Arrow Elctrns.	414-764-6600
WI	Oak Creek, Hallmark Elctrns.	414-761-3000

TRW OPTOELECTRONICS DIV., 1201 Tappan Circle, Carrollton, TX 75006, Tel: 214-323-2200, TWX: 910-860-5958; *Sls. Mgr.:* Ron Komatz; *Dist. Mgr.:* Robert Linker .... **1B**•1235 -1252

Local Sales Offices & Reps

AL	Huntsville, TRW/ECG	205-533-7600
AZ	Scottsdale, TRW/ECG	602-994-0441
CA	Los Angeles, Integrated Sys. & Device Sls.	213-478-0183
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, Integrated Sys. & Device Sls.	619-571-1544
CA	Santa Ana, Integrated Sys. & Device Sls.	714-973-2162
CA	Woodland Hills, Integrated Sys. & Device Sls.	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Ft. Lauderdale, TRW/ECG	305-772-3000
FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Ft. Wayne, Robert O. Whitesell	219-432-5591
IN	Indianapolis, Robert O. Whitesell	317-359-9238
IN	Kokomo, Robert O. Whitesell	317-457-9127
IA	Cedar Rapids, C. H. Horne & Assocs.	319-393-8703
KS	DeSoto, MIDTEC Assocs.	913-441-6565
KY	Louisville, Robert O. Whitesell	502-426-7696
MD	Columbia, TRW/ECG	301-964-9110
MA	Framingham, TRW/ECG	617-620-0625
MA	Maynard, Byrne Assoc.	617-897-3131
MI	Farmington Hills, TRW/ECG	313-478-7210
MI	Grand Rapids, Robert O. Whitesell	616-942-5420
MI	Southfield, Robert O. Whitesell	313-559-5454
MI	St. Joseph, Robert O. Whitesell	616-983-7337
MN	Minneapolis, TRW/ECG	612-854-6616
MO	St. Louis, John G. Macke Co.	314-432-2830
NM	Albuquerque, S. W. Sales	505-883-1388
NY	Fairport, TRW/ECG	716-425-3775
NC	Greensboro, TRW/ECG	919-852-4676
OH	Cincinnati, Robert O. Whitesell	513-521-2290
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CA	Santa Ana, Integrated Sls.	714-973-2162
CA	Woodland Hills, Integrated Sls.	213-883-7130
CO	Westminster, Straube Assocs.	303-426-0890
CT	Rowayton, TRW/ECG	203-853-4466
FL	Ft. Lauderdale, TRW/ECG	305-772-3000
FL	Orlando, TRW/ECG	305-857-3650
GA	Norcross, TRW/ECG	404-447-6154
IL	Chicago, TRW/ECG	312-693-7730
IN	Ft. Wayne, R. O. Whitesell & Assocs.	219-432-5591
IN	Indianapolis, R. O. Whitesell & Assocs.	317-359-9283
IN	Kokomo, R. O. Whitesell & Assocs.	317-457-9127
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MI	St. Joseph, R. O. Whitesell & Assocs.	616-983-7337
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AZ	Phoenix, Kierulff	602-243-4101
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Local Sales Offices & Reps

CA	Culver City, Sodaro	213-478-7733

TTS-TELECOM TERMINAL SYSTEMS, 3877 Grandview Blvd., Los Angeles, CA 90066, Tel: 213-390-9494, Telex: 182405, TWX: 910-343-6453; Empl.: 18; *Sls. Mgr.:* L. Winters

TUCKER ELCTRNS., Box 461060, Garland, TX 75046, Tel: 214-348-8800, 800-527-4642, Telex: 79-1726; Empl.: 45; *Sls. Mgr.:* Clay Aclin

TUNGSTONE BATTERIES, INC., 18 Billings St., Sharon, MA 02067, Tel: 617-784-2000, Telex: 951908; Empl.: 8; *Sls. Mgr.:* J. McMahon

TURNER DESIGNS, 2247 Old Middlefield Way, Mountain View, CA 94043-2489, Tel: 415-965-9800; Empl.: 16; *Sls. Mgr.:* John Griffin

Local Sales Offices & Reps

CA	Garden Grove, Advanced Digital Grp.	714-897-0319
CA	Santa Clara, MANCO	408-496-6611
CO	Wheat Ridge, Active Component Technlg.	303-422-9229
MD	Baltimore, Rep-Tron, Inc.	301-799-7490
MA	North Reading, Martindale Assocs.	617-942-0514
NY	Fayetteville, Martin P. Andrews	315-637-5291
TX	Addison, Active Component Technlg.	214-980-1888
TX	Austin, Active Component Technlg.	512-452-5254

TUSONIX

TUSONIX, INC., 7741 N. Business Park Drive, P.O. Box 37144, Tucson, AZ 85740-7144, Tel: 602-744-0400, Telex: 102-299640, TWX: 310-299640; FSC No.: 59660; *Sls. Mgr.:* Robert H. Jones; *Dist. Mgr.:* John Hohlrich .... **1A**•1201-1207

Local Sales Offices & Reps

AZ	Tucson, Tusonix, Inc.	602-744-0400
CA	N. Hollywood, Tusonix	818-509-0449
CA	Redwood City, James S. Heaton Co.	415-367-9000
FL	Winter Park, Tusonix	305-647-2936
IA	Cedar Rapids, J.R. Sls. Engrg.	319-393-2232
MA	Andover, Richard Purinton Inc.	617-475-7055
NY	Rochester, Tusonix, Inc.	716-328-4070
NC	Greensboro, Tusonix	919-292-4286
OR	Portland, Components West	503-643-5588
WA	Renton, Components West	206-271-5252

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
AZ	Tempe, Powell Elctrns.	602-967-7538
AZ	Tempe, Arrow Elctrns.	602-968-4800
CA	Chatsworth, Arrow Elctrns.	213-701-7500
CA	Costa Mesa, Powell Elctrns.	714-754-1717
CA	Inglewood, Newark Electrns.	213-678-0441
CA	San Diego, Arrow Elctrns.	619-565-4800
CA	Sunnyvale, Powell Elctrns.	408-739-4321
CA	Sunnyvale, Arrow Elctrns.	408-745-6600
CA	Tustin, Arrow Elctrns.	714-838-5422
CO	Aurora, Arrow Elctrns.	303-696-1111
CO	Denver, Newark Elctrns.	303-423-7941
CT	Wallingford, Arrow Elctrns.	203-265-7741
FL	Dania, Summit	305-920-6253
FL	Ft. Lauderdale, Arrow Elctrns.	305-776-7790
FL	Ft. Lauderdale, Newark Elctrns.	305-587-2372
FL	Ft. Lauderdale, Powell Elctrns.	305-979-5000
FL	Palm Bay, Arrow Elctrns.	305-725-1480
GA	Norcross, Arrow Elctrns.	404-449-8252
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Schaumburg, Arrow Elctrns.	312-397-3440
IN	Indianapolis, Arrow Elctrns.	317-243-9353
MD	Baltimore, RESCO	301-529-0500
MD	Baltimore, Arrow Elctrns.	301-247-5200
MD	Beltsville, RESCO	301-937-9100
MD	Beltsville, Powell Elctrns.	301-937-4030
MA	Westborough, Powell Elctrns.	617-366-6100
MA	Woburn, Arrow Elctrns.	617-933-8130
MI	Ann Arbor, Arrow Elctrns.	313-971-8220
MN	Edina, Arrow Elctrns.	612-830-1800
MN	Minneapolis, Newark Electrns.	612-331-6350
MO	St. Louis, Arrow Elctrns.	314-567-6888
NH	Manchester, Arrow Elctrns.	603-668-6968
NJ	Englewood, Powell Elctrns.	201-894-0800
NJ	Fairfield, Arrow Elctrns.	201-575-5300
NJ	Moorestown, Arrow Elctrns.	609-235-1900
NM	Albuquerque, Arrow Elctrns.	505-243-4566
NY	Bohemia, Key Comps.	516-567-7500
NY	Buffalo, Summit	716-884-3450
NY	Hauppauge, Arrow Elctrns.	315-652-1000
NY	Hauppauge, Fairmont Elctrns. Sls.	516-231-3313
NY	Liverpool, Arrow Elctrns.	516-694-6800
NY	Melville, Arrow Elctrns.	516-694-6800
NY	Rochester, Summit	716-334-8110
NY	Rochester, Arrow Elctrns.	716-275-0300
NC	Gary, Powell Elctrns.	919-467-1212
NC	Raleigh, RESCO	919-781-5700
NC	Raleigh, Arrow Elctrns.	919-876-3132
NC	Winston-Salem, Arrow Elctrns.	919-725-8711
OH	Centerville, Arrow Elctrns.	513-435-5563
OH	Solon, Arrow Elctrns.	216-248-3990
OK	Tulsa, Altair	918-252-5781
PA	Monroeville, Arrow Elctrns.	412-856-7000
PA	Philadelphia, Powell Elctrns.	215-365-1900
TX	Austin, Arrow Elctrns.	512-835-4180
TX	Dallas, Arrow Elctrns.	214-386-7500
TX	Houston, Arrow Elctrns.	713-530-4700
TX	Houston, Altair	713-462-3029
TX	Irving, Powell Elctrns.	214-350-4186
TX	Richardson, Altair	214-231-5166
WA	Bellvue, Arrow Elctrns.	206-643-4800
WI	Oak Creek, Arrow Elctrns.	414-764-6600

TUSTIN ELCTRNS. CO., 1431 E. Saint Andrews Pl., Santa Ana, CA 92705, Tel: 714-549-0391; FSC No.: 7025-0010; *Sls. Mgr.:* Saul Tunkelrott

TWP, INC., 2133 4th St., Berkeley, CA 94710, Tel: 415-548-4434, Telex: 717-267; Empl.: 10; *Sls. Mgr.:* R. Moreno

TYCO INSTR. DIV., See Data Instrs.

TYTON CORP., Box 23055, 7930 N. Faulkner Rd., Milwaukee, WI 53223, Tel: 414-355-1130, TWX: 910-262-3094; *Sls. Mgr.:* Tom Bednar

Local Sales Offices & Reps

CA	Encinitas	619-692-3144
CA	Manhattan Beach	714-581-3334
CA	Palmdale	818-343-3527
CO	Denver	303-447-2141
FL	Lake Mary	305-323-0120
GA	Smyrna	404-433-8818
IL	Homewood	312-964-6225
IL	Plano	312-964-6225
IN	Noblesville	317-872-9573
MA	Sekonk	617-376-2166
MI	Holly	313-647-7399
MI	Ypsilanti	313-647-7399
MO	Grandview	314-344-9237
NJ	Middletown	201-671-7034
NY	E. Islip	516-277-6098
NY	Liverpool	315-422-7539
NC	Charlotte	704-376-5269
OH	Elyria	216-888-2800
PA	Drexel Hill	215-853-3330
TN	Nashville	615-747-5888
TX	Dallas	214-253-6611
TX	Humble	713-525-1713
WA	Alderwood Manor	206-622-3195
WI	Milwaukee	414-355-1130

UBER GRAFIC INSTRS., Box 4, Palo Alto, CA 94302, Tel: 415-327-4732; Empl.: 2

UCE, INC., 24 Fitch St., Norwalk, CT 06855, Tel: 203-838-7509; Empl.: 20; *Sls. Mgr.:* Richard Eicher

UID SWITCHES INC., Sub. of ITW, 6615 W. Irving Park Rd., Chicago, IL 60634, Tel: 312-282-4040, Telex: 4330130, TWX: 910-221-0275; *Sls. Mgr.:* R. Schmidt; *Dist. Mgr.:* R. Scrivner

ULTRA CARBON, Box X-747, Bay City, MI 48707, Tel: 517-894-2911, TWX: 810-265-1222; Empl.: 200; *Sls. Mgr.:* R. J. Anthony

ULTRONIX, INC., P.O. Box 1090, Grand Junction, CO 81502, Tel: 303-242-0810, TWX: 910-929-6965; FSC No.: 05347; Empl.: 220; *Sls. Mgr.:* Gerald Krebill; *Dist. Mgr.:* Gerald Krebill ....**1A**•1992-1999

Local Sales Offices & Reps

AL	Huntsville, Remco	205-533-3763
AZ	Phoenix, Howe & Howe Sls.	602-264-7971
CA	Anaheim, Westrep	714-527-2822
CA	San Diego, Westrep	619-276-0751
CA	Santa Clara, Westrep	408-988-8833
CO	Denver, West Inc.	303-692-0131
FL	Orlando, Donato & Assocs.	305-352-0727
FL	Palm Harbor, Donato & Assocs.	813-785-3327
GA	Atlanta, Remco	404-447-6937
IL	Elk Grove Village, Parcom	312-228-6360
IN	Ft. Wayne, Giesting & Assocs.	219-486-1912
IA	Cedar Rapids, Stan Clothier Co.	319-395-0245
KS	Parker, S. W. Wollard Co.	913-893-6552
MD	Beltsville, Applied Engrg. Consultants	301-792-2211
MA	Newton Upper Falls, Anchor Engrg.	617-964-6205
MI	Coloma, Giesting & Assoc.	616-468-4200
MI	Novi, Giesting & Assoc.	313-348-3811
MN	Minneapolis, S. Clothier Co.	612-944-3456
MO	St. Louis, Abrams & Assoc.	314-569-0447
NJ	Cherry Hill, Danco Corp.	609-424-5590
NY	Jericho, J-Square Mktg.	516-935-3200
NY	Rochester, Apex Assocs.	716-254-6050
NC	Raleigh, Remco	919-847-5079
OH	Cincinnati, Giesting & Assoc.	513-521-8800
OH	Mentor, Giesting & Assocs.	216-942-3407
PA	Pittsburgh, Giesting & Assocs.	412-963-0727
TX	Austin, O. M. Sls.	512-452-1838
TX	Dallas, O. M. Sls.	214-241-3876
TX	Houston, O. M. Sls.	713-789-4426
UT	Salt Lake City, West Inc.	801-466-5739
WA	Bellevue, Vantage Corp.	206-455-3460
WA	Kent, R & R Assoc.	206-251-5396
EXP	CT, Stamford, Dage Corp.	203-324-3123

Local Distributors

CA	Chatsworth, IEC/JACO	213-998-2200
CA	North Hollywood, T.T.I., Inc.	213-982-0201
CA	Orange, IEC/JACO	714-540-5600
CA	Sacramento, IEC/JACO	916-424-5297
CA	San Fernando, Petell Electronics	213-365-3984
CA	San Jose, IEC/JACO	408-263-1100
CO	Denver, IEC/JACO	303-292-6121
FL	Orlando, Hammond Elctrns.	305-849-6060
FL	Orlando, T.T.I-2	305-859-1000
FL	Tampa, Impala Elctrns.	813-885-4747
IL	Chicago, IEC/JACO	312-843-2040
MD	Columbia, Azteck Elctrns.	301-995-1760
MA	Burlington, TLC Elctrns.	617-273-0140
MA	Woburn, T.T.I., Inc.	617-938-8800
NY	Bohemia, T.T.I., Inc.	516-567-1500
NY	Farmingdale, SAI, Inc.	516-293-2710
NY	Hauppauge, JACO	516-273-5500
NY	Valley Stream, L&S Elctrns.	800-645-2235
OH	Dayton, Electro-Line	513-461-5683
TX	Fort Worth, Allied Elctrns.	817-336-5401
TX	Fort Worth, T.T.I., Inc.	800-433-7092
UT	Salt Lake City, IEC/JACO	801-298-1868
WA	Bellevue, Integrated Elctrns. Corp.	206-455-2727
WA	Kent, Shannon Ltd.	206-763-0545
WA	Seattle, IEC/JACO	206-455-2727

ULVAC NORTH AMERICA, P.O. Box 890, Kennebunk, ME 04043, Tel: 207-985-7169, TWX: 510-299-0007; Empl.: 600; *Sls. Mgr.:* C. Carman

UNARCO-ROHN, See UNR-Rohn

UNDERWRITERS SAFETY DEVICE, An Allied Co., 7300 W. Wilson Ave., Chicago, IL 60656, Tel: 312-867-4600, TWX: 910-221-3474; Empl.: 200; *Sls. Mgr.:* J. A. VanCura; *Dist. Mgr.:* R. S. Heyne

UNGAR, Div. Eldon Inds., Inc., 100 W. Manville St., Compton, CA 90224-6005, Tel: 213-774-5950, Telex: 4720750 Eldon; FSC No.: 78976; Empl.: 140; *Sls. Mgr.:* George Mellevold

Local Sales Offices & Reps

AZ	Scottsdale, R.F. Rich & Assoc.	602-941-1475
CA	Gardena, Ungar Sls. Assocs.	213-538-2811
CA	Hawthorne, Eldon Inds.	213-642-7716
CA	Los Altos, Ewing-Foley	415-941-4525
CO	Colorado Springs, MID-MTI-REP	303-598-1369
CT	Woodstock, Neff Co.	203-974-1281
FL	Lauderdale Lakes, Seacom Sls.	305-486-0260
HI	Compton, Ungar	213-774-5950
IL	Chicago, Restronics	312-960-1205
IN	Indianapolis, Robert Milsk Co.	317-842-3400
KS	Kansas City, Thomas L. Dowell & Assoc.	913-648-7373
MA	Boston, Neff Co.	617-582-4216
MI	Southfield, R. Milsk Co.	313-354-3310
MN	Minneapolis, Restronics	612-941-9135
MO	St. Louis, Thomas L. Dowell & Assocs.	314-849-4234
NJ	Marlton, Fahy Mktg. Assocs.	609-983-2366
NY	Oceanside, Bittan Assocs.	516-678-6222
TX	Houston, Rich Sls.	713-695-9240
TX	Rockwall, Rich Sls.	214-257-0761
WA	Seattle, Sproul & Assoc.	206-789-3300
EXP	Inglewood, Eldon Industries, Inc.	213-642-7716

UNHOLTZ-DICKIE CORP., 6 Brookside Dr., Wallingford, CT 06492, Tel: 203-265-3929, Telex: 643802; Empl.: 49

unibox® PACKAGING SYSTEM

UNIBOX, Div. of Amerex, P.O. Box 2815, Riverside, CA 92516, Tel: 714-686-1400; *Sls. Mgr.:* Roger Orton ....**2**•1005

UNICO, 3725 Nicholson Rd., Franksville, WI 53126-0505, Tel: 414-886-5678, TWX: 910-271-2385; Empl.: 175; *Sls. Mgr.:* A. L. Engle

UNICORN ENGRG. CO., Membrane Keyboard Div., 6201 Harwood Ave., Oakland, CA 94618, Tel: 415-428-1626; *Sls. Mgr.:* Steve Gensler

UNICORP, 291 Cleveland St., Orange, NJ 07050, Tel: 201-674-1700; FSC No.: 04729; Empl.: 50; *Sls. Mgr.:* B. Levine ....**2**•1868

Local Sales Offices & Reps

CT	Milford, Todino Engrg. Sls.	203-874-6643
CT	Stamford, George Reiss	203-348-0007
FL	Melbourne Beach, Brennan Assoc.	305-724-0854
IL	Palatine, Claeson Assocs.	312-359-7230
IN	Indianapolis, M&L Elctrn. Sls.	317-359-4742
MA	Needham Hgts., Todino Engrg. Sls.	617-444-7925
MI	Farmington, Amtech Rep.	313-474-8300
MN	Bloomington, Termatech	612-854-2001
OR	Portland, Frank Jackson Assocs.	503-292-2638
TX	Richardson, Precision Techn. Assocs.	214-234-8071
TX	Round Rock, Precision Techn. Assocs.	512-250-0201
WA	Seattle, Frank Jackson Assocs.	206-523-6300

UNIFORM TUBES, Collegeville, PA 19426, Tel: 215-539-0700, Telex: 84-6428, TWX: 510-660-6107; FSC No.: 93306; Empl.: 400; *Sls. Mgr.:* Lloyd Deery

UNILATOR TECHNICAL CERAMICS INC., 6290 Sunset Blvd., Ste. 1126, Los Angeles, CA 90028, Tel: 213-463-5618, TWX: 910 321-2903; *Sls. Mgr.:* Norman R. Sutherland

Local Sales Offices & Reps

AL	Lake Guntersville, Kelley Sys.	205-582-8677
AZ	Tempe, Qualtech	602-967-4655
CA	Los Angeles, Yarbrough Sls. Co.	213-254-5101
FL	Tampa, APM Assocs.	813-886-2457
IL	La Grange Park, Bierhaus Sls.	312-354-5100
KS	Wichita, Electro Mechanical Assocs.	316-682-9433
MD	Baltimore, Stitzer Assocs.	301-823-2600
MA	Waltham, Carlisle Tech. Sls.	617-890-1456
MI	Union Lake, Ashby Assocs.	313-363-1100
MO	Bridgeton, Electro Mechanical Assocs.	314-291-8661
NH	Amherst, Carlisle Tech. Sls.	603-673-4690
NJ	Ridgewood, Ballou Inc.	212-964-4640
NM	Albuquerque, Qualtech	505-243-5605
NY	Rochester, R. P. Kennedy Co.	716-271-6322
OH	Dayton, Ashby Assocs.	513-252-5627
OH	Lyndhurst, Ashby Assocs.	216-461-0826
PA	Paoli, Stitzer Assocs.	215-644-5500
TX	Richardson, Eagle Mktg. Inc.	214-238-5383
WI	Elm Grove, Bierhaus Sls.	414-784-5212

UNIMAX SWITCH CORP., Ives Rd., Wallingford, CT 06492, Tel: 203-269-8701, Telex: 96-3485, TWX: 710-476-1397; FSC No.: 80207; Empl.: 300; *Dist. Mgr.:* Richard Brache ....**1B**•1756

Local Sales Offices & Reps

AZ	Phoenix, Mercury Engrg. Sls., Inc.	602-244-0123
CA	Brea, M. A. Stolaroff Co.	714-529-0866
CA	Los Altos, Ewing-Foley	415-941-4525
CA	Los Angeles, M. A. Stolaroff Co.	213-295-7781
CA	Santee, M. A. Stolaroff Co.	
CA	Simi Valley, M. A. Stolaroff Co.	
CO	Englewood, CompuTech Marketing	303-773-2981
CT	Ansonia, Zaslow Sls.	203-735-9581
CT	Bloomfield, Zaslow Sls.	203-242-7781
FL	Tampa, J. R. Controls	813-961-9478
IL	Lisle, Wasson-Gallagher	312-963-5954
IN	Ft. Wayne, O. H. Bromberg & Assocs.	219-744-1636
KY	Louisville, O. H. Bromberg & Assocs.	502-245-8916
LA	Metairie, Automation Supps.	504-831-2183
MD	Silver Spring, NKA, Inc.	301-585-6141
MD	Silver Spring, L. G. White & Co.	301-434-1555
MA	Northboro, Zaslow Sls.	617-393-8150
MA	Waltham, Zaslow Sls.	617-894-8393
MA	Watertown, Zaslow Sls. Co.	617-823-8118
MI	Grosse Pointe Park, Greiner Assoc.	313-499-0188
MN	Minneapolis, Jos-Co. Sls. Engrg.	612-861-3343
MO	Creve Coeur, Hill & Co.	314-432-1136
NH	Londonderry, Zaslow Sls.	603-432-8907
NJ	West Caldwell, Grimm, Siegel Assoc.	201-575-9300
NY	Ballston Lake, Nycom	518-899-4104
NY	E. Syracuse, Nycom	315-437-8343
NY	Williamsville, Nycom	
NC	Winston-Salem, L. G. White & Co.	919-725-3612
OH	Cincinnati, O. H. Bromberg & Assocs.	513-771-9333
OH	Dayton, O. H. Bromberg & Assocs.	513-434-8788
OH	Medina, J. C. Hofstetter Co.	216-241-4880
PA	Broomall, White-Whiddett	215-353-6343
PA	Hickory, J. C. Hofstetter Co.	412-356-2305
SC	Greenville, Sunbelt Sls.	803-877-0771
SC	Greenville, L. G. White & Co.	803-271-0630
TN	Taft, Sunbelt Sls.	615-425-6164
TX	Arlington, W. Pat Fralia Co.	817-640-9101
VA	Richmond, L. G. White & Co.	804-740-7093
WA	Mercer Island, J. H. Andersen	206-232-0484

Local Distributors

AL	Decatur, Forbes Distr. Co.	205-353-4762
AL	Montgomery, Southern Controls	205-277-5030
AZ	Phoenix, Continental Light & Supp.	602-263-6000
AZ	Phoenix, Electro Comps.	602-258-2665
AR	Fort Smith, Southern Elec.	501-646-5500
CA	Belmont, Lodan Elctrns.	415-592-4600
CA	Belmont, Arndt Elctrns.	415-592-6718
CA	Covina, Selecta Switch	213-915-3409; 213-967-4123
CA	Fountain Valley, Components Ctr.	213-582-0667
CA	Gardena, California Switch & Signal	213-538-9830

CA	Los Angeles, Master Distrs.	213-829-4956
CA	Riverside, Electronic Supp.	714-683-7300
CA	Sacramento, Dunlap Elctrns.	916-442-5801
CA	Santa Clara, Cypress Elctrns.	408-727-7080
CA	Santa Monica, Master Distrs.	213-452-1229; 213-829-4656
CA	Van Nuys, Pacific Switch	213-873-4802
CO	Denver, Fistell's Elec. Supp.	303-629-1312
CT	East Haven, J.V. Elctrns.	203-469-2321
CT	Manchester, Economy Elec. Supp.	203-646-2830
CT	W. Hartford, Atlantic Switch Controls	203-525-6907
FL	Hialeah, Atlas Elec. Supp.	305-885-8941
FL	Lakeland, Switch Controls	813-644-7564
FL	Largo, Lodan Elctrns.	813-586-2851
FL	Miami, Electronic Equip.	305-871-3500
IL	Arlington Hgts., LoDan	312-398-5311
IL	Chicago, Newark Elctrns.	312-638-4411
IL	Lombard, R.M. Elctrns.	312-932-5150
IL	Wheaton, Connectrix	312-653-1460; 800-323-9431
IA	West Des Moines, Ramco	515-225-6933
KY	Louisville, Main Elect. Equip.	502-587-6511
LA	Marrero, AFG Elctrns.	504-386-9696
LA	New Orleans, William B. Allen Supp.	504-525-8222
ME	Portland, Rockingham Elect. Supp.	207-772-4614
MA	Hingham, Sager Elec. Supp.	617-749-6700
MI	Augusta, Great Lakes Elctrns.	616-731-4156
MI	St. Claire Shores, Specialties Mfg. Co.	313-771-2700
MN	Minneapolis, Joel Co.	612-545-5669
MO	Maryland Hgts., Western Extralite	314-432-4560
NJ	Fair Lawn, Relay Specialities	201-797-3313
NJ	Mt. Laurel, Jerseyswitch	609-778-8190
NJ	Paterson, Feldman Brothers Elec. Supp.	201-742-7330
NY	Bohemia, Key Comps.	516-567-7500
NY	Buffalo, Summit Distrs.	716-884-3450
NY	Geneva, Gersh	315-789-4505
NY	Hempstead, Elctrn. Equip.	516-538-5510
NY	Rochester, Summit Elctrns.	716-334-8110
NY	Sodus, AED Distrs.	315-483-6561
NY	Woodside, Switches Unltd.	212-478-5000
NC	Charlotte, Dixie Elctrns.	704-377-4348
NC	Winston-Salem, Kirkman Elect.	919-722-9131
OH	Cincinnati, Cartessa Corp.	513-385-7700
OH	Cincinnati, Rilco	513-231-3400
OH	Columbus, Ohio Switch	614-885-0319
OK	Tulsa, Radio, Inc.	918-587-9123
OR	Portland, Johnstone	503-231-4833
PA	Philadelphia, Herbach & Rademan	215-426-1700
PA	Pittsburgh, Alder-tronics	412-821-5565
SC	Columbia, Dixie Elctrns.	803-779-5332
TX	Dallas, Texaswitch	214-357-1768
TX	El Paso, Ideal Indl. Elctrn. Supp.	915-779-6647
TX	San Antonia, Purvis Bearing	512-299-1010
TX	Waco, Purvis Bearing	
TX	Waco, Hargis Co.	817-754-5667
VA	Alexandria, Techn. Distrs.	703-971-8979
VA	Roanoke, Peoples Elctrn. Supp.	703-342-8933
WI	Mequon, Taylor Elec.	414-241-4321

EVEREADY ENERGIZER®

UNION CARBIDE CORPORATION

UNION CARBIDE CORPORATION, Battery Prods. Div., Old Ridgebury Rd., Danbury, CT 06817, Tel: 203-794-5300 .... 3•1434, 1435

Local Sales Offices & Reps

CA	San Francisco	415-765-1000
CT	Danbury, Military & Govt. App. Only	203-794-7547
GA	Norcross	404-446-2400
IL	Itasca	312-773-3444
NJ	Saddle Brook	201-845-5400
OH	Middleburg Hgts.	216-826-4444
TX	Dallas	214-241-9100

UNION CARBIDE CORP., ELCTRNS. DIV., Component Dept., Box 5928, Greenville, SC 29606, Tel: 803-963-6348, Telex: 57-0496, TWX: 810-287-2536; FSC No.: 31433; *Sls. Mgr.:* C. E. Volpe; *Dist. Mgr.:* J. A. Bruorton .... 1A•1096-1118

Refer to Kemet, Union Carbide Corp., Elctrns. Div. for sales office information and for distributor listings.

UNION CARBIDE CORPORATION, Elctrns. Div., Crystal Prods. Dept., 9320 Chesapeake Dr., Ste. 104, San Diego, CA 92123, Tel: 619-279-4500, Telex: 695-465; Empl.: 125; *Sls. Mgr.:* J. J. Beeman

UNION ETCHANTS INTL., INC., 8-10 Green St., Bldg. G, Woburn, MA 01801, Tel: 617-935-8878

UNIQUE OPTICAL CO., Diversified Optical Corp., P.O. Box 585, Farmingdale, NY 11735, Tel: 516-420-0288, TWX: 510-224-6598

UNITED CHEMI-CON

UNITED CHEMI-CON

UNITED CHEMI-CON INC., 9801 W. Higgins Rd., Rosemont, IL 60018, Tel: 312-696-2000, Telex: 28-3557, TWX: 910-253-2964; Empl.: 50; *Sls. Mgr.:* Joe Tanney .... 1A•1208, 1209

Local Sales Offices & Reps

AL	Huntsville, R. D. Whitesell	205-883-5110
AZ	Scottsdale, Thorson Desert States, Inc.	602-998-2444
CA	Culver City, DeAngelo, Rothman Co.	213-827-2202
CA	Mountain View, Straube Assocs.	415-969-6060
CA	San Diego, De Angelo, Rothman Co.	619-758-8129
CO	Westminster, Straube Assocs. Mountain States, Inc.	303-426-0890
FL	Altamonte Springs, Semtronic Assocs., Inc.	305-831-8233
FL	Clearwater, Semtronic Assocs., Inc.	813-461-4675
FL	Ft. Lauderdale, Semtronic Assocs., Inc.	305-731-2484
ID	Boise, Cascade Comps., Inc.	208-343-9886
KY	Louisville, R. D. Whitesell	502-426-7696
MD	Baltimore, Pro-Rep, Inc.	301-653-3600
MA	Lexington, John E. Boeing Co., Inc.	617-862-2500
MN	Bloomington, Twist Co.	612-835-2120
NJ	Medford, Mack McCoy Inc.	609-953-0770
NM	Albuquerque, Straube Assocs. Mountain States, Inc.	303-426-0890
NY	Jamaica, S-J Assocs., Inc.	212-291-3232
NY	Pittsford, Franklin Sls. Corp.	716-248-8251
OH	Cincinnati, Makin Assoc.	513-871-2424
OH	Cleveland, Makin & Assocs.	216-921-0080
OH	Columbus, Makin Assoc.	513-871-2424
OK	Tulsa, ION Assocs., Inc.	918-664-0186
OR	Portland, Earl & Brown	503-245-2283
PA	Dowington, Jack McCoy Inc.	215-363-0350
TN	Greeneville, R. D. Whitesell	615-639-6154
TX	Austin, ION Assocs., Inc.	512-346-7160
TX	Grand Prairie, ION Assocs., Inc.	214-647-8225
TX	Houston, ION Assocs., Inc.	713-977-4354
UT	Salt Lake City, Straube Assocs. Mountain States, Inc.	801-263-2640
WA	Seattle, Earl & Brown	206-284-1121
WI	Wauwatosa, Twist Co.	414-782-2670

Local Distributors

AL	Huntsville, Contact Elctrn. Inc.	205-881-9321
CA	Mountain View, Cornett Elctrns.	415-969-5420
CA	San Diego, Cetec Elctrns.	619-278-5020
CA	San Jose, Cetec Elctrns.	408-263-7373
CA	Santa Ana, National Electro Sls.	714-541-6184
CA	Santa Ana, Projections Unltd., Inc.	714-641-1472
CA	Santa Clara, Intl. Standard Comps., Inc.	408-496-0411
CA	South Gate, Cetec Elctrns.	213-773-6521
CA	Van Nuys, National Electro Sls.	213-781-0505
FL	Orlando, Hammond Elctrns., Inc.	305-849-6060
GA	Norcross, Hammond Elctrns., Inc.	404-524-7502
IL	Northbrook, Classic Comps. Supp., Inc.	312-272-9650
MA	Hopkinton, Interface Elctrns. Corp.	617-435-6858
MA	Middleboro, Glynn Elctrns.	617-947-4262
MN	Minneapolis, The Joel Co.	612-545-5669
NJ	Clifton, J-Mar Elctrns., Inc.	201-772-6400
NC	Greensboro, Hammond Elctrns., Inc.	919-275-6391
OR	Lake Oswego, Bell Inds.	503-241-4115
PA	Exton, VSH	215-876-8654
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
SC	Greenville, Hammond Elctrns., Inc.	803-233-4121
TX	Austin, Captronics, Inc.	512-459-4328
TX	Dallas, Captronics, Inc.	214-340-3592
WA	Bellevue, Bell Inds.	
WI	New Berlin, Classic Comps. Supp., Inc.	414-786-5300

UNITED DETECTOR TECH., 12525 Chadron Ave., Hawthorne, CA 90250, Tel: 213-978-0516, Telex: 18-2458; FSC No.: 50486; Empl.: 200; *Sls. Mgr.:* Michael Feeney; *Dist. Mgr.:* Al Seck

UNITED ELEC. CONTROLS, 85 School St., Watertown, MA 02172, Tel: 617-WA6-1000, Telex: 92 2445; Empl.: 420; *Dist. Mgr.:* Susan Janes

UNITED FOAM PLASTICS, 172 E. Main St., Georgetown, MA 01833, Tel: 617-352-2200, TWX: 710-347-0315; FSC No.: 55900; Empl.: 163

Local Sales Offices & Reps

CT	Pawcatuck	203-599-1242
FL	Orlando	305-843-7075
GA	Fairburn	404-964-5888
NJ	Somerset	201-560-9550

UNITED SOLDER WRAP INC., 2608 Electronic La., Ste 509, Dallas, TX 75220, Tel: 214-350-4978, Telex: 79-1535; Empl.: 80; *Sls. Mgr.:* Perry L. Gross

UNITED STATES CRYSTAL CORP., 3605 McCart St., Ft. Worth, TX 76110, Tel: 817-921-3014, TWX: 910-893-4084; FSC No.: *; Empl.: 75

UNITED STATES TESTING CO., INC., 1415 Park Ave., Hoboken, NJ 07030, Tel: 800-631-3096, 201-792-2400, Telex: 126493, TWX: 219504; FSC No.: 93282; *Sls. Mgr.:* R. Donohue

UNITED TECHNOLOGIES, Terminal Prods., 1230 Sabine St., Huntington, IN 46750, Tel: 219-356-2700, Telex: 23-2461, TWX: 810-332-1519; Empl.: 465

UNITED WIRE & CABLE, 425 Shrewsbury St., Worcester, MA 01604, Tel: 617-757-3872, TWX: 710-340-0635; FSC No.: 51348; Empl.: 10; *Sls. Mgr.:* T. P. Andrews

UNIT INDS., 1140 E. Valencia Dr., Fullerton, CA 92631, Tel: 714-871-4161; Empl.: 40

UNITRACK DIV., Calabro Inds., Inc., Goshen Corp. Pk., P.O. Box 1927, 1372 Enterprise Dr., West Chester, PA 19380, Tel: 215-692-0800, TWX: 510-663-0000; Empl.: 25 .... 2•1068

Local Sales Offices & Reps

AZ	Phoenix, Finn-Pat Co.	602-954-0301
CA	Agoura, Robert A. Borden	213-991-1940
CA	Sunnyvale, Ruby Sls.	408-224-0881
CO	Aurora, Delltron Co.	303-373-0300
FL	Coral Springs, H.A., Inc.	305-752-7520
GA	Atlanta, Magaro & Assoc.	404-252-6609
IL	Des Plaines, Lincoln, Hodges & Assoc.	312-297-3810
IN	Ft. Wayne, Aktron Corp.	219-747-3650
MA	Northboro, Henik Assoc.	617-393-3127
MI	Grand Rapids, C.A. Geer Co.	616-534-9449
MN	St. Paul, Countrymen Assoc.	612-645-9151
MO	Blue Springs, Chesco	816-229-1404
NJ	Lebanon, Churchill Assocs.	201-735-8971
NY	Melville, Jarms	516-752-0404
NY	Syracuse, Lenard Co.	315-479-9191
OH	Akron, Augnat Assocs.	216-273-1211
PA	King of Prussia, Rivco January	215-265-5211
TX	Houston, Milco Mktg.	713-946-2841
TX	Richardson, Air Quip/Robleyco	214-234-3285
VA	Herndon, Eastern Comps.	703-471-1025
WA	Bellevue, Eltech	206-643-4330

Local Distributors

CA	Los Angeles, El-Com	213-404-2961
CO	Denver, Integrated Elctrns.	303-534-6121
MA	Northboro, Papi Supp.	617-393-3127
MA	Woburn, Rush Indus.	617-935-2400
MI	Grand Rapids, S-F Elctrn. Supp. Co.	616-459-0216
NC	Winston-Salem, Kirkman Elctrns.	919-724-0541
OH	Dayton, ESCO	513-226-1133
TX	Richardson, Air Quip/Robleyco	214-234-3285

UNITRODE CORP., 5 Forbes Rd., Lexington, MA 02173, Tel: 617-861-6540, Telex: 95-1064, TWX: 710-326-6509; Empl.: 2,000; *Sls. Mgr.:* Frederick Myers; *Dist. Mgr.:* John Flannery .... 1A•1681-1683

UNITRODE CORP., Capacitor Div., 11494 Sorrento Valley Road, San Diego, CA 92121, Tel: 619-453-8020

Unitron
INCORPORATED

UNITRON INC., 2826 W. Kingsley Rd., Dept. G, Box 472159, Garland, TX 75041, Tel: 214-271-4531, Telex: 73-0644; FSC No.: 6130; Empl.: 95; *Sls. Mgr.:* R. L. Beutel .... 3•1831, 1832

Local Sales Offices & Reps

CA	Sunland, Unitron (Jim Crevier)	818-352-7348
GA	Byron, Unitron (Joe Joiner)	912-956-2866
PA	Landsdowne, Unitron (Douglas S. Feisler)	215-622-4811

UNITRONIX CORP., 197 Meister Ave., Somerville, NJ 08876, Tel: 201-231-9400, Telex: 833184; Empl.: 35; *Sls. Mgr.:* Frank Zimmer; *Dist. Mgr.:* Joseph Murawski

Local Sales Offices & Reps

FL	Winter Park, Unitronix Corp.	305-671-9600
NJ	Somerville, Unitronix Corp.	201-231-9400

UNIVERSAL AD-YU ELCTRNS., INC., 2517 E. Norwich St., Milwaukee, WI 53207, Tel: 414-482-4100; FSC No.: 90101; Empl.: 10

UNIVERSAL CAPACITORS, See TRW/Capacitor Div.

UNIVERSAL ELECTRONICS INC., 3475 A. Victor St., Santa Clara, CA 95050, Tel: 408-970-0455, Telex: 3719249 UNIVESAL; FSC No.: 94-2845455; *Sls. Mgr.:* Paul Shieh

UNIVERSAL INSTRS., P.O. Box 825, Binghamton, NY 13902, Tel: 607-775-1102, TWX: 510-252-1990; Empl.: 1,600

UNIVERSAL INSTRS. CORP., MECHANIZED ELCTRN. ASSEMBLY (MEA) DIV., See Mechanized Elctrn. Assembly Div., Universal Instrs. Corp.

UNIVERSAL MFG. CO., INC., 1168 Grove St., Irvington, NJ 07111, Tel: 201-374-9800, TWX: 710-995-4647; Empl.: 70; *Sls. Mgr.:* M. Mayer

UNIVERSAL SHIELDING CORP., 20 W. Jefryn Blvd., Deer Park, NY 11729, Tel: 516-667-7900, Telex: 221213 TTC UR; Empl.: 35

UNIVERSAL VOLTRONICS, 27 Radio Circle Dr., Mt. Kisco, NY 10549, Tel: 914-241-1300, TWX: 710-571-2142; Empl.: 135; *Sls. Mgr.:* Bob Pampin .... 3•1803

Local Sales Offices & Reps

FL	Winter Park, McMahan Assocs.	305-645-0463
IL	Chicago, Ropek, Cahill & Vogt	312-631-0070
MI	Detroit, EQS	313-961-3042
MN	Minneapolis, R.J. Sls.	612-866-3661
NM	Albuquerque, Fry Gates Co.	505-262-1525
NY	Commack, RC Engrg. Sls.	516-543-3325
OH	Chesterland, EQS	216-729-2222
OH	Dayton, EQS	513-294-2476
PA	Audubon, Holmes Assocs.	215-666-0636
TX	Richardson, Spectra Sls.	214-234-3600

UNIVERSITY COMPUTING CO., UCC Tower Exchange Park, Dallas, TX 75235, Tel: 214-688-7100, TWX: 910-861-4990; Empl.: 700 (U.S.), 900 (Europe)

UNIVERSITY SOUND, 9500 W. Reno, Oklahoma City, OK 73126, Tel: 405-354-5311, Telex: 748-510

UNIVERSITY SOUND, Altec Corp., 1250 N. Red Gum St., Anaheim, CA 92806, Tel: 714-632-7117, Telex: 655415; Empl.: 200; *Sls. Mgr.:* G. H. Rilling

UPSYSTEMS, INC., 15737 Garfield Ave. Bldg. #18, Paramount, CA 90723, Tel: 213-634-0621, TWX: 910-346-7814; FSC No.: 3698; *Sls. Mgr.:* Howard Pendleberry

URBAN ELCTRNS., P. O. Box 456, Dover, MA 02030, Tel: 617-329-4068, TWX: 710-325-1579; Empl.: 50; *Sls. Mgr.:* G. Urban

U S CAPACITOR CORP., See U S Microtek Components

DIGITAL

U.S. DIGITAL, 12371 Kensington Rd., Los Alamitos, CA 90720, Tel: 213-594-0094 .... 1B•1881

Local Distributors

MA	Waltham, SSC Instrmn. Inc.	
Intl	UK, Bedford, Control Transducers, Ltd.	

USECO DIV., Litton Inds, 13536 Saticoy St, Van Nuys, CA 91409, Tel: 213-786-9388, TWX: 910-495-1700; Empl.: 250

U.S. INSTR. RENTALS, 2988 Campus Dr., San Mateo, CA 94403, Tel: 415-572-6600; Empl.: 300; *Sls. Mgr.:* David G. Fletcher

U S MICROTEK COMPONENTS CORPORATION, 11144 Penrose St., Sun Valley, CA 91352, Tel: 818-767-6770, TWX: 910-498-4998; FSC No.: 59942; Empl.: 180; *Sls. Mgr.:* Donald F. Hosmer .... 1A•1211

Local Sales Offices & Reps

AZ	Tucson, Clemick & Assocs.	602-749-4003
CA	Cupertino, F & F Assocs.	408-446-2349
CA	San Diego, Clemick-Neenan & Assoc.	619-268-8540
CA	Sherman Oaks, Clemick-Neenan & Assoc.	818-990-3150
CO	Denver, High Plains Mktg.	303-751-7150
FL	Coral Springs, EPM Corp.	305-755-5387
FL	Orlando, EPM Corp.	305-425-6149
GA	Roswell, Edco Sls.	404-587-1886
IL	Schaumburg, Gassner & Clark	312-882-8608
IA	Marion, MSB Assocs. Inc.	319-377-6261
KS	Shawnee Mission, MSB Assocs. Inc.	913-532-2131
MA	Needham, Hatch Assocs.	617-444-3310
MN	Bloomington, Merrill Franklin Co.	612-854-9446
MO	St. Charles, MSB Assocs. Inc.	314-946-5577
NY	Cazenovia, S. T. Woolard	315-655-8145
NY	Commack, Kaelber & Mack	516-499-2924
OH	Cleveland, Baehr, Greenleaf & Assocs.	216-221-9030
OH	Columbus, Baehr, Greenleaf & Assocs.	614-486-4046
OH	Dayton, Baehr, Greenleaf & Assocs.	513-439-0724
OR	Hillsboro, Gentech	503-640-6324
PA	Broomall, Sapinosa Assocs.	215-353-7267
TX	Austin, OM Sales Co., Inc.	512-452-1838
TX	Dallas, OM Sales Co., Inc.	214-241-3876
TX	Houston, OM Sales Co., Inc.	713-789-4426
UT	Salt Lake City, High Plains Mktg.	801-968-9456
WA	Redmond, Gentech	206-881-6456

U.S. SCIENTIFIC INSTRS., 61 North Beacon St., Boston, MA 02134, Tel: 617-787-2411; Empl.: 50; *Sls. Mgr.:* S. Eric Kondi

U.S. TERMINALS, 7502 Camargo Rd., Cincinnati, OH 45243, Tel: 513-561-8145, TWX: 810-461-2290; FSC No.: 12615; *Sls. Mgr.:* G.L. Stepp

Local Sales Offices & Reps

AZ	Phoenix, Gramer & Co.	602-995-9455
FL	Melbourne, Jerry Williams, Inc.	305-259-7700
IL	Chicago, L-Tec, Inc.	312-773-2900
IA	Cedar Rapids, J.R. Sls. Engrg., Inc.	319-393-2232

U.S. TOYO FAN CORPORATION

U.S. TOYO FAN CORP., 4915 Walnut Grove Ave., San Gabriel, CA 91776, Tel: 213-287-5297, TWX: 910-589-1540; Empl.: 20; *Sls. Mgr.:* R. L. Rosenthal; *Dist. Mgr.:* R. L. Rosenthal .... 2•1854, 1855

Local Sales Offices & Reps

AL	Huntsville, Par Mktg.	205-837-6534
AZ	Tempe, Delta Elctrn. Sls.	602-224-1601
CA	San Diego, Noo Rep Tech Sls.	619-483-4861
CA	San Gabriel, U.S. Toyo Fan Corp.	213-287-5297
CA	Santa Clara, U.S. Toyo Fan Corp.	408-984-2618
CO	Denver, Troy Sls./Wintronics	303-934-2406
FL	Clearwater, WMM Assoc.	813-442-3913
GA	Marietta, Par Mktg.	404-953-4168
ID	Boise, Quest Mktg.	208-343-9969
IL	Elk Grove, Martec Assoc.	312-956-8090
KS	DeSoto, Midtec Assoc.	913-441-6565
MA	Westboro, Tech. Mktg. Svcs. Co.	617-366-6655
MN	Osseo, Gaffney Sls. Co.	612-425-5484
MO	Florissant, Midtec Assoc.	314-837-5200
NH	Windham, Tech. Mktg. Svcs. Co.	603-434-2716
NJ	Madison, Livera-Polk Assoc.	201-377-3220
NY	Cooperstown, Fitzelle Assoc.	607-547-9333
NY	Glen Head, Livera-Polk Assoc.	516-759-9300
NC	Raleigh, Par Mktg.	919-872-2726
OH	Cleveland, Geotronix	216-526-2535
OH	Trotwood, Geotronix	513-854-5939
OR	Beaverton, Quest Mktg.	503-644-8077
PA	Horsham, Dalbrook Corp.	215-441-8380
TX	Richardson, Zonk Assoc.	214-238-7651
WA	Renton, Quest Mktg.	206-223-1541

Local Distributors

AZ	Phoenix, Aero-Space Southwest	602-861-1785
CA	Fremont, Terminal Sls. Corp.	415-656-7722
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Santa Ana, Pacesetter Elctrns.	714-557-7131
CA	Torrance, Cypress Elctrns.	213-530-1900
CA	Tustin, Added Value Elctrns. Distrib.	714-730-5848
CO	Denver, Wintronics	303-934-2406
FL	Longwood, Intertec Comps.	305-834-7777
IL	Elk Grove, Martec Assoc.	312-956-8090
MA	Westboro, TMSC Elctrns. Supp.	617-366-8462
NV	Las Vegas, Kiesub Corp.	702-733-3888
NJ	Collingswood, Index	609-429-4055
NJ	Middleville, Allegri Comps.	201-383-0086
NY	Elmsford, Multimeterics	914-347-3666
NY	Glen Head, Livera-Polk Assoc.	516-759-9300
OH	Cleveland, Alpha Distr. Corp.	216-526-3716
OR	Beaverton, Hansen Elctrns.	503-642-4455
TX	Dallas, Cypress Elctrns.	214-869-1435
TX	Richardson, Zec Sales	214-238-7651
WA	Kent, Shannon Ltd.	206-763-0545

USUS, INC., UCSD Pascal Sys. User's Society, P.O. Box 1148, La Jolla, CA 92038

UTE MICROWAVE, 3500 Sunset Ave., Asbury Park, NJ 07712, Tel: 201-922-1009, Telex: 13-2461; FSC No.: 23261; Empl.: 20

Local Sales Offices & Reps

AZ	Phoenix, Sigma Eng. Sls.	602-997-1822
CA	Goleta, Thorson Co.	805-964-8751
CA	Palo Alto, R-V Assocs.	415-967-5994
FL	Melbourne, EMS Assocs.	305-724-1027
MA	Wakefield, Nerem	617-245-4426
NY	Commack, Richman Sls.	516-543-5532
OH	Dayton, Fred Ohmer Assocs.	513-434-1454
TX	Dallas, Airep Elctrns.	214-349-4360
VA	Annandale, Q.T. Elctrn.	703-941-4242
EXP	FL, Boca Raton, Microwave Intl. Corp.	305-391-7475

UTI INSTRUMENTS CO., 325 N. Mathilda Ave., Sunnyvale, CA 94086, Tel: 408-738-3301, TWX: 910-339-9546; Empl.: 80; *Sls. Mgr.:* Jim Nicholson

UVP, INC., 5100 Walnut Grove Ave., P.O. Box 1501, San Gabriel, CA 91778, Tel: 818-285-3123, Telex: 688-461; Empl.: 100; *Sls. Mgr.:* Paul Gilchrist

VACO PRODS., 1510 Skokie Blvd., Northbrook, IL 60062, Tel: 312-564-3300, TWX: 910-686-0658; Empl.: 250; *Sls. Mgr.:* Fred Grede

VACTRONIC LAB. EQUIP., 65 Brightside Ave., E. Northport, NY 11731, Tel: 516-AN1-2660; Empl.: 18

VALHALLA SCIENTIFIC, 7576 Trade St., San Diego, CA 92121, Tel: 619-578-8280, Telex: 181750 VALHALLA SDG; Empl.: 30; *Sls. Mgr.:* Kerry Clark

VALIDYNE ENGRG. CORP., 8626 Wilbur Ave., Northridge, CA 91324, Tel: 818-886-2057, Telex: 65-1303; Empl.: 200; *Sls. Mgr.:* Max J. Kopp

VALLEY ELECTROMAGNETICS CORP., P.O. Box 557, Crystal Lake, IL 60014, Tel: 815-459-3080, Telex: 72-2417

VALLEY ELECTROMAGNETICS, P.O. Box 131, Spring Valley, IL 61362, Tel: 815-664-2348; Empl.: 70; *Sls. Mgr.:* G. Adair

VALOR ELECTRONICS, INC., 2950 Airway Ave., Bldg. C-5, Costa Mesa, CA 92626, Tel: 714-540-9261, TWX: 910-595-2480; FSC No.: 15003; *Sls. Mgr.:* T. N. Kasabali

VALPEY-FISHER, 75 South St, Hopkinton, MA 01748, Tel: 617-435-6831, Telex: 94-8332; Empl.: 160; *Sls. Mgr.:* Donald Elliott .... 1A•1434-1436

Local Sales Offices & Reps

AL	Huntsville, Montgomery Mktg.	205-830-0498
AZ	Scottsdale, Verein Corp.	602-948-3571
CA	Carlsbad, Addem	714-695-2050
CA	Cupertino, F & F Assocs.	408-446-2349
CA	Orange, ETA/Cen-Tec Sales Corp.	714-998-9241
CT	Hamden, Impact Sls.	203-281-1331
FL	Altamonte Springs, WMM Assocs.	305-831-4530
FL	Clearwater, WMM Assocs.	813-422-3913
FL	Davie, WMM Assocs.	305-581-7036
FL	Indialantic, WMM Assocs.	305-773-1157
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Chicago, Indl. Reps.	312-647-7755
IN	Ft. Wayne, Dillon Sls.	219-486-1868
KS	Overland Park, Jones Mktg. Co.	913-649-3020
MA	Canton, Impact Sls.	617-821-1500
NJ	Cherry Hill, Danco Elctrns	609-424-5590
NM	Albuquerque, Reptronix, Ltd.	505-881-8001
NY	Hicksville, J. Square Mkt	516-935-3200
NY	Rochester, Eiss Assocs.	716-328-3000
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Rocky River, Norm Case Assoc.	216-333-0400
TX	Austin, Sundance Sls.	512-250-0320

TX	Plano, Sundance Sales	214-867-0592
TX	Stafford, Sundance Sls.	713-499-9671
WA	Blaine, O.E.M. Sls. Inc.	206-621-7249
WI	Milwaukee, Indl. Reps.	414-259-0965

VALTEC, Sub. of U.S. Philips, 99 Hartwell St., West Boylston, MA 01583, Tel: 617-835-6082, Telex: 92-0355; FSC No.: 8N865; Empl.: 220; *Sls. Mgr.:* Pieter M. deBruijn

VAMISTOR CORP., 115 Industrial Park, Sevierville, TN 37862, Tel: 615-453-0001, Telex: 810-570-4931; Empl.: 49; *Sls. Mgr.:* George Hebner; *Dist. Mgr.:* George Hebner

VANGUARD ELCTRNS. CO., 1480 W. 178th St., Gardena, CA 90248, Tel: 213-323-4100, TWX: 910-346-7067; FSC No.: 03550; Empl.: 250; *Sls. Mgr.:* T. A. Crawford; *Dist. Mgr.:* T. A. Crawford .... **1A•1276**

Local Sales Offices & Reps

AZ	Tempe, Piper Sales	602-949-0048
FL	Coral Springs, EPM Corp.	305-752-0054
IL	Franklin Park, Dekotech	312-455-5100
IN	Ft. Wayne, TX Sls., Indiana	219-489-4447
IA	Cedar Rapids, S&O Sls.	319-393-1845
MA	Lexington, JESCO	617-863-1598
MA	Topsfield, R. F. Assoc.	617-887-9762
MN	St. Paul, Murnco	612-484-8200
NJ	Wayne, SHL Assoc.	201-790-1714
NY	Cazenovia, ST Woolard Co.	315-655-8145
TX	Dallas, Tritex	214-350-1927

Local Distributors

MD	Baltimore, Radio Elec. Service Co.	301-823-0070

VANGUARD RELAY CORP., 225 Cortland St., Lindenhurst, NY 11757, Tel: 516-226-5000; *Sls. Mgr.:* B. S. Gilman

VI VANN INSTRUMENTS

VANN INSTRUMENTS, 1200 Schofield La., Farmington, NM 87401, Tel: 505-326-7557; *Sls. Mgr.:* Michael E. Vann .... **3•1316**

VARIAN ASSOCS., Indl. Equip. Grp., 611 Hansen Way, Palo Alto, CA 94303, Tel: 415-493-4000, TWX: 910-373-1731; Empl.: 1500

VARIAN ASSOCS., Instr. Grp., 611 Hansen Way, Palo Alto, CA 94303, Tel: 415-493-4000, TWX: 910-373-1731

VARIAN ASSOCIATES, INC., Microwave Tube Div., 611 Hansen Way, Palo Alto, CA 94303, Tel: 415-493-4000, Telex: 910-373-1731; *Sls. Mgr.:* Frank Rich

VARIAN CANADA, INC., 45 River Drive, Georgetown, ON , Canada, Tel: 416-877-0161

VARIAN DATA MACHINES, See Sperry Univac, Mini-Comp. Opers.

VARO, INC., Electron Devices Div., 2203 W. Walnut St., Garland, TX 75040, Tel: 214-272-3561, TWX: 910-860-5093; FSC No.: 27777; Empl.: 250; *Sls. Mgr.:* Lon Hodge

VARO SEMICONDUCTOR, INC., 2800 W. Kingsley Dr., Garland, TX 75046, Tel: 214-271-8511, TWX: 910-860-5178; Empl.: 550; *Sls. Mgr.:* Charlie Merz; *Dist. Mgr.:* Mike Hawkins .... **1A•2112**

Local Sales Offices & Reps

AL	Huntsville, Rep, Inc.	205-881-9270
AZ	Scottsdale, SMS & Assocs.	602-998-0831
CA	Los Angeles, Corcoran Assocs.	213-823-4589
CA	Sunnyvale, W. W. Posey Co.	408-746-0771
CO	Parker, Technology Mktg. Assocs.	303-841-3435
CT	North Haven, Comp Rep Assocs.	203-239-9762
FL	Orlando, OEM Mktg. Corp.	305-299-1000
GA	Tucker, Rep. Inc.	404-938-4358
IL	Chicago, D. Dolin Sales Co.	312-286-6200
IN	Frankfort, C-S Electronic Sls.	317-659-1874
KS	Overland Park, Electri-Rep	913-649-2168
MD	Baltimore, Professional Rep.	301-653-3600
MD	Towson, DG Representatives	301-583-1360
MA	Westwood, Comp Rep Assocs.	617-329-3454
MI	Farmington, Amtech Reps.	313-474-8300
MN	Minneapolis, Electric Comp. Sls.	612-933-2594
MO	St. Louis, Electri-Rep	314-878-8209
NY	Great Neck, Cooper-Simon & Co.	516-487-1142
NY	Ithaca, Bob Dean, Inc.	607-257-1111
NC	Raleigh, Rep, Inc.	919-851-3007
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OK	Oklahoma City, Ammon & Rizos Co.	405-942-2552
OR	Hillsboro, Western Tech. Sls.	503-640-4621
PA	Huntingdon Valley, Knowles Assocs.	215-322-7100
PA	Pittsburgh, J. C. Hofstetter Co.	412-356-2305
TN	Jefferson City, Rep, Inc.	615-475-9012
TX	Austin, Ammon & Rizos Co.	512-454-5131
TX	Dallas, Ammon & Rizos Co.	214-644-5591
TX	Houston, Ammon & Rizos Co.	713-781-6240
UT	Salt Lake City, Technology Mktg. Assocs.	801-364-3296
WA	Bellevue, Western Tech. Sls.	206-641-3900
WA	Spokane, Western Tech. Sls.	509-922-7600
WI	Milwaukee, D. Dolin Sales Co.	414-482-1111

Local Distributors

AL	Huntsville, Resistacap	205-883-4270
AZ	Tempe, Bell Inds.	602-966-7800
AZ	Tempe, Anthem Elctrns.	602-244-0900
CA	Chatsworth, Anthem Elctrns.	213-700-1000
CA	Garden Grove, Bell Inds.	714-220-0681
CA	Gardena, Bell Inds.	213-515-1800
CA	Hayward, Allied Elctrns.	415-487-5250
CA	San Diego, Bell Inds.	619-268-1277
CA	San Diego, Anthem Elctrns.	619-279-5200
CA	San Jose, Anthem Elctrns.	408-946-8000
CA	Sunnyvale, Bell Inds.	408-734-8570
CA	Tustin, Anthem Elctrns.	714-730-8000
CO	Denver, Integrated	303-292-6121
CO	Wheat Ridge, Bell Inds.	303-424-1985
CT	Hamden, Allied Elctrns.	203-248-8900
CT	Orange, Milgray Elctrns.	203-795-0711
FL	Winterpark, Milgray Elctrns.	305-647-5747
GA	Atlanta, Milgray Elctrns.	404-393-9666
IL	Elgin, Allied Elctrns.	312-697-8200
IL	Elk Grove Village, Pioneer Std.	312-437-9680
IL	Palatine, OHM Elctrns.	312-359-5500
IL	Peoria, Klaus Radio	309-691-4840
IN	Fort Wayne, Graham Elctrns.	219-423-3422
IN	Indianapolis, Graham Elctrns.	317-634-8202
IA	Cedar Rapids, Deeco	319-365-7551
KS	Overland Park, Milgray Elctrns.	913-236-8800
MD	Rockville, Milgray Elctrns.	301-468-6400
MA	Burlington, J. V. Elctrns.	617-273-4300
MA	Burlington, Milgray Elctrns.	617-272-6800
MI	Wyoming, RM Elctrns.	616-531-9300
MN	Minnetonka, Pioneer Std.	612-935-5444
NJ	Marlton, Milgray Elctrns.	609-983-5010
NY	Buffalo, Summit Distrs.	716-887-2800
NY	Farmingdale, Milgray Elctrns.	516-391-3000
NY	Pittsford, Milgray Elctrns.	716-385-9330
NC	Greensboro, Hammond Elctrns.	919-275-6391
OH	Cincinnati, Graham Elctrns.	513-772-1661
OH	Cleveland, Milgray Elctrns.	216-447-1520
OH	Cleveland, Pioneer Std.	216-587-3600
OH	Dayton, Pioneer Std.	513-236-9900
OH	Dayton, Stotts Friedman	513-298-5555
OR	Lake Oswego, Bell Inds.	503-241-4115
PA	Pittsburgh, Pioneer Std.	412-782-2300
SC	Greenville, Hammond Elctrns.	803-233-4121
TN	Memphis, Bluff City Elctrns.	901-345-9500
TX	Dallas, Pioneer Std.	214-386-7300
TX	Fort Worth, Allied Elctrns.	817-336-5401
TX	Houston, Altair Co.	713-462-3029
TX	Richardson, Altair Co.	214-231-5166
UT	Salt Lake City, Standard Supply	801-486-3371
UT	Salt Lake City, Bell Inds.	801-972-6969
WA	Bellevue, Bell Inds.	206-747-1515
WA	Seattle, Priebe Elctrns.	206-682-8242
WI	Milwaukee, Marsh Elctrns.	414-475-6000
WI	Waukesha, Bell Inds.	414-547-8879

VARTA BATTERIES, INC., 150 Clearbrook Rd., Elmsford, NY 10523, Tel: 914-592-2500, Telex: 996-548; *Sls. Mgr.:* Dominick Isola .... **3•1436**

Local Sales Offices & Reps

AL	Huntsville, 20th Century Mktg.	205-533-9281
CO	Denver, Moss Mktg.	303-455-7205
IL	Palatine, Technology Sls.	312-991-6600
KS	Shawnee Mission, K & M Sls.	913-262-1444
NY	Glen Head, Livera-Polk	201-377-3239
PA	Broomall, TCA Assocs.	215-353-2022

Local Distributors

CA	La Mirada, Energy Devices	213-921-8775
GA	Atlanta, Falcon Batteries	404-953-3500
IL	Downers Grove, Telecommunications Dvcs.	312-971-3460
MA	Sharon, Adcour	617-784-8123
NY	Commack, Brentronics	516-499-5155

VECTOR CABLE CO., 555 Industrial Rd., Sugarland, TX 77478, Tel: 713-240-9196

VECTOR ELECTRONIC CO., INC., 12460 Gladstone Ave., Dept. EP, Box 4336, Sylmar, CA 91342, Tel: 818-365-9661, TWX: 910-496-1539; FSC No.: 82893; Empl.: 140; *Sls. Mgr.:* F. L. Hill .... **2•**1069, 1094, 1095; **3•**1117

VECTROL, Division of Westinghouse Elec. Corp., 110 Douglas Rd, Oldsmar, FL 33557, Tel: 813-855-4621, Telex: 803784; Empl.: 120; *Sls. Mgr.:* G. Lierman

VECTRONICS MICROWAVE CORP., 276 Lincoln Blvd., Middlesex, NJ 08846, Tel: 201-356-2377, Telex: 833560; FSC No.: 32846; *Sls. Mgr.:* John G. Vogler

Local Sales Offices & Reps

CA	N. Hollywood, Crown Elctrns.	818-877-3550
IL	Palatine, R-Tek, Inc.	312-991-4404
MA	Woburn, Microwave Comp. Mktg.	617-273-3106
NJ	Moorestown, Stern Assocs.	609-234-0661
TX	Garland, Tesco Elctrn. Sls. Co.	214-681-1376
VA	Fairfax, Schibley Assocs.	703-591-3008

VECTRON LABS., 166 Glover Ave., Norwalk, CT 06850, Tel: 203-853-4433, TWX: 710-468-3796; FSC No.: 27802; Empl.: 275; *Sls. Mgr.:* Larry Jawitz .... **1A•**1438-1442

Local Sales Offices & Reps

AZ	Phoenix, Fetty/Schoenduve	602-241-9009
CA	El Segundo, Fetty/Schoenduve	213-322-4991
CA	Mountain View, Fetty/Schoenduve	415-962-8330
CA	San Diego, Fetty/Schoenduve	619-292-5136
CO	Parker, Techn. Mktg. Assocs.	303-841-3435
CT	Cheshire, Meco	800-225-3409
FL	Melbourne, Saber Assocs.	800-432-6288
FL	Pensacola, Saber Assocs.	800-327-0853
GA	Atlanta, Saber Assocs.	800-327-0853
IL	Bannockburn, Heth, Inc.	312-295-8440
IN	Indianapolis, Ihrig Assocs.	317-783-7630
KS	OLATHE, C-Tron Inc.	913-829-0073
LA	Metairie, Automation Supplies	504-831-2183
MA	Reading, Meco	617-944-6660
MI	Detroit, R. P. Urban Assocs.	313-535-2355
MI	Grand Rapids, R. P. Urban Assocs.	616-245-0511
MN	Burnsville, Heth, Inc.	612-435-7876
MO	St. Louis, AME Sales	314-965-1779
NJ	Woodcliff Lake, F & F Assoc.	201-391-6792
NM	Albuquerque, J. Smith & Assocs.	505-265-3406
NY	Great Neck, F & F Assoc.	516-482-4080
NY	Syracuse, Rep Tech	315-437-2845
NC	Clayton, Saber Assocs.	800-327-0853
NC	North Hills, Saber Assocs.	800-327-0853
OH	Englewood, A. Nace Co.	513-836-0931
OH	Richfield, A. Nace Co.	216-659-7178
PA	Newtown Sq., SWR Assocs.	215-356-8550
PA	Pittsburgh, A. Nace Co.	412-922-7225
SC	W. Columbia, Saber Assocs.	800-327-0853
TX	Dallas, Texas Avionics	214-363-6324
UT	Salt Lake City, Techn. Mktg. Assocs.	801-364-3296
VA	Springfield, Tech-Reps	703-569-6868
WA	Seattle, Datacom	206-285-2525

VEECO INSTRS. INC., 370 San Aleso Ave., Sunnyvale, CA 94086, Tel: 408-733-3700, TWX: 910-339-9263; Empl.: 95; *Sls. Mgr.:* T. McKee

VEECO INSTRUMENTS INC., Terminal Dr., Plainview, NY 11803, Tel: 516-349-8300; *Sls. Mgr.:* Tony Carrozzo

VEEDER-ROOT, 70 Sargeant St., Hartford, CT 06102, Tel: 203-527-7201, Telex: 9-9219; Empl.: 1200; *Sls. Mgr.:* J. R. Garrison; *Dist. Mgr.:* K. Boyle

VEETRONIX, INC., Sub. Reach Electronics, Box 480, Lexington, NE 68850, Tel: 308-324-4600; Empl.: 25; *Sls. Mgr.:* Robert M. Wallace .... **1B•1757**

Local Sales Offices & Reps

CA	Arcadia, Van Gott & Assocs., Inc.	213-445-9728
CA	San Jose, Ruby Sls.	408-224-0881
CO	Denver, Moss Mktg.	303-455-7205
CT	Bethany, The Rep. Corp.	203-393-0024
MA	Wellesly, Reps. Corp.	617-237-6476
NM	Albuquerque, Moss Mktg.	505-292-7505
PA	Albrightsville, Centurion Linear	717-722-0166
UT	Bountiful, Moss Mktg.	801-292-8660

VEGA PRECISION LABS., 800 Follin La., Vienna, VA 22180, Tel: 703-938-6300, Telex: 89-2521; Empl.: 350; *Sls. Mgr.:* W. E. Kinsley

Local Sales Offices & Reps

CA	Camarillo	805-484-8584
FL	Ft. Walton Beach	904-863-2994

VELONEX, DISPLAY PRODS., 560 Robert Ave., Santa Clara, CA 95050, Tel: 408-727-7370, TWX: 910-338-0114; Empl.: 60; *Sls. Mgr.:* Douglas Greenwood ....3•1359

Local Sales Offices & Reps

AL	Huntsville, Pen-Tech	205-881-9298
AZ	Phoenix, R. A. Mayes Co.	602-279-5243
CA	Los Altos, Hoeke-Reeser	415-941-4080
CA	Pasadena, Beckrep	213-957-1111
CO	Denver, R. A. Mayes Co.	303-893-2264
FL	Melbourne, Saber Assoc.	305-724-0920
GA	Griffin, Saber Assoc.	404-228-2084
IL	Chicago, K. W. Meyers Co.	312-882-4808
IN	Indianapolis, K. W. Meyers Co.	317-243-6681
MD	Rockville, Electronic Mktg.	301-744-7700
MA	Needham, Addelco	617-444-4554
MN	Minneapolis, K. W. Meyers Co.	612-920-7080
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	Smithtown, PAF Assoc.	516-360-0940
OH	Medina, McShane, Inc.	216-725-4568
TX	Dallas, R. A. Mayes Co.	214-235-3043
TX	Houston, R. A. Mayes Co.	713-783-3856
WA	Lynnwood, Indl. Electhics	206-775-3516
WI	Brookfield, K. W. Meyers Co.	414-784-3790

VELONEX, INSTR. DIV., 560 Robert Ave., Santa Clara, CA 95050, Tel: 408-727-7370, TWX: 910-338-0114; Empl.: 60 ....3•1359

Local Sales Offices & Reps

AZ	Phoenix, R. A. Mayes Co.	602-279-5243
CA	S. Pasadena, Beckrep	213-957-1111
CA	Sunnyvale, Kousen Sls.	408-249-5858
CO	Denver, R. A. Mayes Co.	303-893-2264
DC	Washington, Electronic Mktg.	301-881-5300
FL	Orlando, Saber Assocs.	305-869-8417
GA	Atlanta, Saber Assocs.	404-945-1398
IL	Schaumberg, K. W. Meyers Co.	312-882-4808
IN	Indianapolis, K. W. Meyers Co.	317-243-6681
MD	Baltimore, Electronic Mktg.	301-744-7700
MA	Needham, Addelco	617-444-4754
MI	Detroit, Hocker Assocs.	313-549-3910
MN	Minneapolis, K. W. Meyers Co.	612-920-7080
NJ	Bloomingdale, Eastern Metro	201-492-1747
NM	Albuquerque, R. A. Mayes Co.	505-292-2330
NY	Plainview, Eastern Metro Assocs.	516-931-1414
NC	Clayton, Saber Assocs.	919-553-5564
OH	Cleveland, Hocker Assocs.	216-235-6504
OH	Dayton, Hocker Assocs.	513-298-8638
PA	Plymouth Meeting, Electronic Mktg.	215-828-7400
TX	Houston, R. A. Mayes Co.	713-783-3856
TX	Richardson, R. A. Mayes Co.	214-235-3043
WA	Lynnwood, Indl. Elctrn.	206-775-3516

VEMALINE PRODS. DIV., 487 Jefferson Blvd., Warwick, RI 02886, Tel: 401-739-7600, Telex: 927573; FSC No.:08730; Empl.:30; *Sls. Mgr.:* Paul Vamvaketis; *Dist. Mgr.:* Paul Vamvaketis

VENABLE INDUSTRIES, INC., 3555 Lomita Blvd., Torrance, CA 90505, Tel: 213-539-2522, Telex: 752421; Empl.: 20; *Sls. Mgr.:* Wayne H. Tuttle; *Dist. Mgr.:* Shelley Scott

VENT-RAK DIV., P.O. Box 39100, Indianapolis, IN 46239-9632, Tel: 317-897-7000, Telex: 27-2169; Empl.: 150; *Sls. Mgr.:* J. Bradford ....2•1034, 1035

Local Sales Offices & Reps

AZ	Phoenix, Synder Eng.	602-279-2010
CA	Fullerton, Groh Assocs.	714-964-7105
CA	Mountain View, G. C. Woempner Co.	415-964-5454
CO	Boulder, R. F. Mayo Assoc.	303-499-2155
CT	North Haven, Coakley, Boyd & Abbett	203-481-2828
FL	Maitland, J. Krutek & Assoc.	305-628-4837
FL	North Miami, J. Krutek & Assoc.	305-941-6544
IL	Glencoe, Howard Benjamin Assoc.	312-835-0150
IN	Noblesville, Century Elctrns.	317-849-2026
KS	Shawnee Mission, Lowell-Kangas & Assoc.	913-631-3515
MA	Needham, Coakley, Boyd & Abbett	617-444-5470
MI	Plymouth, J. Plass Assoc.	313-455-8262
MN	Bloomington, Northport Engrg.	612-854-5556
MO	St. Louis, Lowell-Kangas & Assoc.	314-821-4050
NH	Plaistow, Coakley, Boyd & Abbett	617-444-5470
NJ	Mountainside, H. G. Richter	201-233-4615
NY	Fayetteville, H. G. Richter	315-637-6713
OH	Cincinnati, Comp.	513-866-0661
OH	Cleveland, Comp.	216-243-9200
OK	Tulsa, Advance Tech. Sls.	918-664-0482
PA	Doylestown, Monteiro & Assoc.	215-345-5855
PA	Pittsburgh, Components	412-824-1600
TX	Austin, Advance Tech. Sls.	512-459-1351
TX	Dallas, Advance Tech. Sls.	214-340-1300
TX	Houston, Advance Tech. Sls.	713-440-3888
WA	Olympia, Bergford & Assoc.	206-866-2001
EXP	IN, Indianapolis, General Devices Co.	317-897-7000

VENUS

VENUS SCIENTIFIC, INC., 399 Smith St., Farmingdale, NY 11735, Tel: 516-293-4100, TWX: 510-224-6492; Empl.: 450; *Sls. Mgr.:* Jack Reilly ....3•1805

Local Sales Offices & Reps

AZ	Scottsdale, Venus Scientific Inc.	602-991-9684
MA	Norwood, MPS Electronics Inc.	617-769-8700

VERBATIM CORP., 323 Soquel Way, Sunnyvale, CA 94086, Tel: 408-245-4400, Telex: 940-692, TWX: 910-339-9381; Empl.: 1800; *Sls. Mgr.:* S.P. Cochran; *Dist. Mgr.:* Earl Liebich

VERMONT AUTOMATION CO., INC., 18 Morse Dr., Essex Junction, VT 05452, Tel: 802-879-7571; Empl.: 7; *Sls. Mgr.:* J. Littlefield

VERMONT PRECISION RESISTOR, Box 1170, Stowe, VT 05672, Tel: 802-253-8567; Empl.: 5

VERMONT RESCH. CORP., Precision Pk., N. Springfield, VT 05150, Tel: 802-886-2256, TWX: 710-363-6533; Empl.: 175; *Sls. Mgr.:* Richard Simmons

Local Sales Offices & Reps

CA	Encinitas	619-942-5820
IL	Northfield	312-441-5811
PA	Lansdale	215-362-6440
VT	North Springfield	802-886-2256

VERNAY LABORATORIES, INC., S. College St., Yellow Springs, OH 45387, Tel: 513-767-7261; Empl.: 600; *Sls. Mgr.:* Alex Le Pera

VERNITECH, 300 Marcus Blvd., Deer Pk., NY 11729, Tel: 516-586-5100, TWX: 510-227-6079; Empl.: 250; *Sls. Mgr.:* S. Wexler ....1A•2066, 2067; 1B•1019, 1206, 1207, 1882, 1883; 3•1934

Local Sales Offices & Reps

AL	Huntsville, Remco	205-883-9260
AZ	Fountain Hills, Halbar Assocs.	602-837-2464
CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Parker, Techn. Mktg. Assoc.	303-841-3435
CT	Cheshire, Selmark Assocs.	203-272-8764
FL	Maitland, MYR Assocs.	305-724-0350
GA	Atlanta, Remco	404-447-6937
IL	Glencoe, Howard Benjamin Assocs.	312-835-0150
IA	Cedar Rapids, Dytronix	319-377-8275
MD	Baltimore, R.P. Luce & Co.	301-752-8200
MA	Millis, Selmark Assocs.	617-376-2914
MA	Norwell, Bordewieck Eng. Sls.	617-659-4915
MI	Farmington Hills, C.P.&P. Inc.	313-477-7700
MN	St. Paul, Vikeland Sls.	612-645-4747
MO	Bridgeton, Dytronix	314-731-5799
MO	Independence, Dytronix	816-373-6600
NH	Concord, Selmark Assocs.	603-623-5774
NJ	Cherry Hill, Lanson Assocs.	609-424-4670
NM	Albuquerque, Technology Mktg.	505-265-5661
NY	Endicott, Tech-Mark	607-748-7473
NY	Melville, Comtronic Engrg. Sls.	516-249-0505
NY	Pittsford, Net Sls. Co.	716-467-4538
NC	Raleigh, Remco	919-847-5079
OH	Dayton, Rixan Assocs.	513-278-4216
OH	Dayton, George Lessis	513-294-1551
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OR	Beaverton, Halbar Assocs.	503-226-0451
PA	Philadelphia, R.P. Luce & Co.	215-884-8365
TX	Bellaire, Seaton Corp.	713-731-2649
TX	Dallas, Seaton Corp.	214-380-0414
UT	Sandy, TMA, Inc.	801-254-6410
VA	Powhatan, R.P. Luce & Co.	804-598-4804
WA	Redmond, Halbar Assocs.	206-882-0990
WA	Seattle, G.M. Gillette & Assoc.	206-284-3344
WA	Vancouver, Halbar Assocs.	206-696-0170

VERNITRON CORP., Control Comps. Div., 1601 Precision Park La., San Diego, CA 92073, Tel: 619-428-5581, TWX: 910-322-1862; *Sls. Mgr.:* S. W. Silverman ....1B•1208, 1209

Local Sales Offices & Reps

AZ	Fountain Hills, Halbar Assocs.	602-837-2464
CA	Glendale, Halbar Assocs.	213-246-8263
CA	San Mateo, Halbar Assocs.	415-349-4700
CO	Parker, Techn. Mktg. Assocs.	303-841-3435
CT	North Haven, Kitchen & Kutchin	203-239-0212
FL	Ft. Lauderdale, Electrocomp Assocs.	305-491-4141
FL	St. Petersburg, Electrocomp Assocs.	813-327-9677
IL	Glencoe, Howard Benjamin Assocs.	312-835-0150
MD	Baltimore, Callas Elctrns.	301-744-7711
MA	Burlington, Kitchen & Kutchin	617-229-2660
MI	Lathrup Village, R. C. Nordstrom Co.	313-559-7373
MN	Edina Prairie, Techco Ltd.	612-929-9497
NJ	Cherry Hill, Lanson Assocs.	609-424-4670
NJ	Harrington Park, Metro Tech. Sls.	201-768-8495
NY	Fairport, NET Sls.	716-467-4538
NY	Jericho, Metro Tech. Sls.	516-935-3330
OH	Dayton, Rixan Assocs.	513-222-0011
TX	Dallas, M. Kruvand Co.	214-691-4592
TX	Houston, Kruvand Assocs.	713-780-9710
WA	Redmond, Halbar Assocs.	206-882-0990

VERNITRON ELEC. COMPS., See Beau Prods. Div.

VERNITRON PIEZOELECTRIC DIV., 232 Forbes Rd., Bedford, OH 44146-5478, Tel: 216-232-8600, TWX: 810-427-2274; Empl.: 120; *Sls. Mgr.:* William K. Dorn ....1A•1437

Local Sales Offices & Reps

CA	Fullerton, GRU Assocs.	714-738-0903

VERSALOGIC, 87070 Dukhobar Rd., Eugene, OR 97402, Tel: 503-485-8575

VERTEL INC., P.O. Box 535, 125 Ellsworth St., Clifton, NJ 07012, Tel: 201-472-1331, TWX: 710-989-7021; *Sls. Mgr.:* Ron Byer

VERTOX CO., 9252 Garden Grove Blvd. #22, Garden Grove, CA 92644, Tel: 714-530-4541, Telex: 678401 TAB IRIN; FSC No.: 53688; *Sls. Mgr.:* Steve Hacker

VIABLE SYSTEMS INC., Box 438, Needham, MA 02192, Tel: 617-449-4570; Empl.: 15

VIBRAC, 1 Columbia Dr., Amherst, NH 03031, Tel: 603-882-6777; Empl.: 35; *Sls. Mgr.:* R. Searle

VIBRA-METRICS, 385 Putnam Ave., Hamden, CT 06517, Tel: 203-288-6158, TWX: 710-465-0169; Empl.: 25

Local Sales Offices & Reps

AZ	Scottsdale, Dave Menegay Assocs.	602-994-9591
CA	Long Beach, Saber Enterprises	213-595-5646
CA	Palo Alto, Gado Instr. Sls.	415-961-2222
CO	Boulder, Measurement Consulltants	303-449-7506
CT	Hamden, JBL Assoc.	203-281-3161
FL	Ft. Lauderdale, Elctrn. Devices & Controls	305-974-2500
IL	Chicago, Comtel-Midwest	312-539-4838
IN	Indianapolis, Comtel Corp.	317-253-1681
IA	Cedar Rapids, Comtel Corp.	319-377-9434
KS	Shawnee Mission, Comtel Corp.	913-722-1030
MD	Rockville, Farrel Assocs.	301-424-9460
MA	Bedford, Claflin Assocs.	617-275-7428
MI	Southfield, Comtel Instrs.	313-358-2505
MN	Wayzata, Comtel Corp.	612-476-1551
MO	St. Louis, Comtel Corp.	314-991-5363
NJ	Basking Ridge, Blejwas Assocs.	201-221-1440
NM	Albuquerque, Measurement Conslts.	505-265-6471
NY	Baldwinsville, Oshex Assocs., Inc.	315-635-6027
NC	Raleigh, Lee-Carolinas	919-848-8818
OH	Cleveland, Comtel Instrs.	216-442-8080
OH	Dayton, Comtel Instrs.	513-298-7573
OH	Hilliard, Comtel Instrs.	614-876-8305
PA	Pittsburgh, Comtel Instrs.	412-922-5720
TN	Knoxville, Mace Instr. Co.	615-938-3773
TX	Richardson, Scientific Sls. Co.	214-231-6541
UT	Salt Lake City, Measurement Consltts.	801-364-3174
WA	Bellevue, Scientific Devices-NW	206-747-5169
WI	New Berlin, Comtel Corp.	414-544-6042

VIBRATION INSTRS. CO., 1614 Orangethorpe Way, Anaheim, CA 92801, Tel: 714-879-6085, Telex: 692433; FSC No.: 32102; Empl.: 21; *Sls. Mgr.:* L. Rothberg

VIBRO-METER CORP., 1 Progress Rd., Billerica, MA 01821, Tel: 617-663-7322, Telex: 948145, TWX: 710-320-1872; FSC No.: 617-667-1944; Empl.: 50; *Sls. Mgr.:* Carl Nicolino ....1B•1885

Local Sales Offices & Reps

AL	Huntsville, Currie, Peak & Frazier	205-536-1506
AK	Anchorage, Arctic Technlg.	907-277-6418
AK	Anchorage, Harry J. Lang & Assocs.	907-279-5741
CA	Costa Mesa, FLW Inc.	714-751-7512
CA	San Carlos, W. I. Carsons & Assocs.	415-591-8616
CA	San Diego, FLW Inc.	619-277-0993
CT	North Haven, Pat Jenks Assocs.	203-239-6201
FL	Maitland, Meagher & Assocs.	305-645-3063
HI	Honolulu, EMC Corp.	808-836-1138
IL	Cary, J.E.M. Entprs.	312-639-1770
IN	Indianapolis, Loren Green Assocs.	317-293-9827
MD	Towson, MRT Co.	301-685-7425
MA	Woburn, Pat Jenks Assocs.	617-938-0488
MI	Mt. Clemens, R. J. O'Hara Assocs.	313-791-7140
MN	St. Paul, Resource Technlg.	612-644-3064
MO	St. Louis, Ozark Elctrn. Mktg.	314-423-7200
NJ	Cedar Grove, KLS Assoc.	201-785-4450
NY	Dewitt, D. B. Assocs.	315-446-0220
NC	Greensboro, Currie, Peak & Frazier	919-373-0380
OH	Columbus, R.D. Cloon Assoc.	614-459-2890
PA	Radnor, Roberts Engrg. Sls.	215-688-6526
TX	Dallas, Griffin Sls.	214-234-5013
WA	Monroe, Envirotest	206-794-6640

VICLAN, 7373A Engineers Rd., San Diego, CA 92138, Tel: 619-292-1411, TWX: 910-335-1264; FSC No.: 51959; Empl.: 250; *Sls. Mgr.:* Bob Goodman

VICON INDS., 125 E Bethpage Rd., Plainview, NY 11803, Tel: 516-293-2200, Telex: 144581; Empl.: 320

VICTOREEN, INC., Component Div., 10101 Woodland Ave., Cleveland, OH 44104, Tel: 216-795-8200, TWX: 810-421-8287 ....**1A**•2000-2003

Local Sales Offices & Reps

AZ	Tuscon, Shelley Elctrns.	602-622-2226
CA	Chatsworth, Shelley Elctrns.	818-998-3333
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Jose, Shelley Elctrns.	415-969-1820
CO	Boulder, Shelley Elctrns.	303-442-2718
MD	Gaithersburg, Axis Elctrns.	800-368-2815
MA	Boston, Precision Sls.	617-969-4905
MA	Newton, Precision Sls.	617-969-0594
OH	Cleveland, Pruitt Energy Sources	216-566-1545
WA	Edmonds, EDCO Sls.	206-776-8922

Local Distributors

AZ	Tuscon, Shelley Elctrns.	602-622-2226
CA	Chatsworth, Shelley Elctrns.	818-998-3333
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Jose, Shelley Elctrns.	415-969-1820
CO	Boulder, Shelley Elctrns.	303-442-2718
MD	Gaithersburg, Axis Elctrns.	800-368-2815
MA	Boston, Precision Sls.	617-969-4905
OH	Cleveland, Pruitt Energy Sources	216-566-1545
WA	Edmonds, EDCO Sls.	206-776-8922

VICTOR ELEC. WIRE & CABLE, 618 Main St., W. Warwick, RI 02893, Tel: 401-821-1700, SALES 401-821-7800, Telex: 952122, TWX: 710-382-1534; Empl.: 900; *Sls. Mgr.:* E. M. Colasanto

VICTOR WIRE & CABLE CORP., 3601 Holdrege Ave., Los Angeles, CA 90016, Tel: 213-870-9933; Empl.: 30

VICTORY ENGRG. CORP., Victory Rd., Springfield, NJ 07081, Tel: 201-379-5900, TWX: 710-983-4430; Empl.: 300; *Sls. Mgr.:* J. Bacek

VIDAIRE ELCTRNS., 150 Buffalo Ave., Freeport, NY 11520, Tel: 516-623-6696; Empl.: 20

VIDCO, P.O. Box 25452, Portland, OR 97225, Tel: 503-292-4104; Empl.: 4; *Sls. Mgr.:* Tom Inloes

VIDEO AUTOMATION SYSTEMS, Upper Shad Rd., Pound Ridge, NY 10576, Tel: 914-764-4613; Empl.: 5

VIDEO LOGIC CORP., 597 No. Mathilda Ave., Sunnyvale, CA 94086, Tel: 408-245-8622, Telex: 35-7400

VIDEO MONITORS, INC., 3833 N. White Ave., Eau Claire, WI 54703, Tel: 715-834-7785; *Sls. Mgr.:* J. Carpentier

VIKING CONNECTORS, 21001 Nordhoff St., P.O. Box 2379, Chatsworth, CA 91311, Tel: 818-341-4330, TWX: 910-494-2094; FSC No.: 05574; Empl.: 500; *Sls. Mgr.:* Bob Ploudre ....**2**•1737

Local Sales Offices & Reps

AZ	Scottsdale, Southwest Mktg. Sys.	602-998-0831
CA	Los Gatos, Landia Sls. Grp.	415-490-5651
CA	Milpitas, Viking Connectors	408-943-0888
CA	San Diego, La Playa Co.	619-223-6580
CA	Tarzana, Viking Connectors	818-881-9980
CO	Castle Rock, Romulus Elctrns.	303-688-5753
FL	Casselberry, Elctrn. Mktg. Corp.	305-339-7070
FL	Lake Worth, Elctrn. Mktg. Corp.	305-969-0097
GA	Stone Mtn., Mountain Electro Prods.	404-469-0603
HI	Honolulu, Indl. Elctrns.	808-533-6095
ID	Boise, N. R. Schultz Co.	208-377-8686
IL	Lisle, W G Controls	312-963-5954
IL	Palatine, Viking Connectors	312-934-1278
IN	Indianapolis, C C Elctrns.	317-255-1508
KS	Merriam, Midwest Techl. Sls.	913-236-8557
KS	Wichita, Midwest Techl. Sls.	316-262-7240
KY	Louisville, KW Elctrn. Sls.	502-451-1860
MD	Phoenix, Chesapeake Mktg. Assoc.	301-628-4848
MA	Brockton, Forsberg Sls.	617-522-6300
MA	Wakefield, Viking Connectors	617-245-4110
MI	Livonia, Elctrn. Salesmasters	313-591-2433
MN	Minneapolis, D E Beck-Hats Assoc.	612-835-3610
MN	Minneapolis, Viking Connectors	612-925-9889
MN	St. Charles, Midwest Techl. Sls.	314-441-1012
NJ	Wayne, G. T. Assocs.	201-694-6040
NY	Syracuse, Leonard D. Allen, Inc.	315-437-8387
NC	Durham, Mountain Electro Prods.	919-286-7737
OH	Benchwood, Elctrn. Salesmasters	216-831-9555
OH	Dayton, KW Elctrn. Sls.	513-890-2150
OH	Shaker Heights, KW Elctrn. Sls.	216-491-9177
OH	Worthington, KW Elctrn. Sls.	614-888-0483
OR	Beaverton, N. R. Schultz Co.	503-643-1644
PA	Allison Park, KW Elctrn. Sls.	412-487-4300
PA	New Cumberland, La Playa Co.	717-938-2439
PA	Prospect Park, Elf Sls.	215-534-3340
TX	Arlington, Pro-Comp Sls.	817-640-4336
TX	Dallas, Viking Connectors	214-680-9931
WA	Bellevue, N. R. Schultz Co.	206-454-0300
WA	Seattle, La Playa Co.	206-524-1111
PR	Rio Piedras, Klamco Elctrns.	809-752-6169

Local Distributors

AL	Huntsville, Hall-Mark Elctrns.	205-837-8700
AZ	Phoenix, Sterling Elctrns.	602-258-4531
AZ	Phoenix, Sterling Elctrns.	602-268-2122
AZ	Tempe, Richey Western	602-894-9251
AZ	Tempe, Time Elctrns.	602-967-2000
AZ	Tempe, Acacia Sls.	602-894-2874
CA	Anaheim, Time Elctrns.	714-937-0911
CA	Belmont, LoDan Elctrns.	415-592-4600
CA	Citrus Heights, Hall-Mark Elctrns.	916-722-8600
CA	Irvine, Acacia Sls.	714-660-0834
CA	Los Angeles, Richey Western	213-820-3777
CA	San Diego, Richey Western	619-271-4511
CA	San Diego, Acacia Sls.	619-565-4365
CA	Santa Clara, Richey Western	408-727-7411
CA	Sun Valley, Richey Western	213-768-3800
CA	Sunnyvale, Acacia Sls.	408-745-7200
CA	Torrance, Time Elctrns.	213-320-0880
CO	Englewood, Hall-Mark Elctrns.	303-694-1662
CO	Lakewood, Acacia Sls.	303-232-2882
CT	New Canaan, Richey Western	203-972-1458; 203-972-1165
CT	Stratford, Utronics	203-378-4201
CT	Wallingford, Sterling Elctrns.	203-265-9535
FL	Clearwater, Hall-Mark Elctrns.	813-530-4543
FL	Ft. Lauderdale, Time Elctrns.	305-974-4800
FL	Ft. Lauderdale, Hall-Mark Elctrns.	305-971-9280
FL	Largo, LoDan Elctrns.	813-595-5811
FL	Orlando, Hall-Mark Elctrns.	305-855-4020
GA	Atlanta, Electro Air Corp.	404-351-3545
GA	Norcross, Hall-Mark Elctrns.	404-447-8000
IL	Arlington Hgts., LoDan Elctrns.	312-398-5311
IL	Bensenville, Hall-Mark Elctrns.	312-860-3800
IN	Indianapolis, MAR Elctrns.	317-875-4510
IN	Indianapolis, MAR Elctrns.	317-875-4510
KS	Lenexa, Hall-Mark Elctrns.	913-888-4747
LA	Metarie, Sterling Elctrns.	504-887-7610
MD	Columbia, Time Elctrns.	301-964-3090
MD	Columbia, Hall-Mark Elctrns.	301-988-9800
MA	North Chelmsford, Pilgrim Elctrns.	617-251-8746
MA	Waltham, Sterling Elctrns.	617-894-6200
MA	Woburn, Time Elctrns.	617-935-8080
MI	Livonia, LWC Dists.	313-464-7700
MN	Bloomington, Hall-Mark Elctrns.	612-854-3223
MN	Minneapolis, Indl. Comps.	612-831-2666
MO	Maryland Heights, Hall-Mark Elctrns.	314-291-5350
MO	St. Louis, Time Elctrns. Mid-West	314-391-6444
NJ	Bellmawr, Mid Atlantic Elctrns.	609-931-5303
NJ	Cherry Hill, Hall-Mark Elctrns.	215-355-7300
NJ	Fairfield, Hall-Mark Elctrns.	201-575-4415
NJ	Perth Amboy, Sterling Elctrns.	201-442-8000
NM	Albuquerque, Betatron	505-344-2381
NM	Albuquerque, Sterling Elctrns.	505-884-1900
NY	Buffalo, Summit Dists.	716-887-2800
NY	Hauppauge, Time Elctrns.	516-273-0100
NY	Plainview, Landmark Elctrns.	516-293-7441
NC	Raleigh, Hall-Mark Elctrns.	919-872-0712
OH	Cincinnati, Hall-Mark Elctrns.	513-563-5980
OH	Dayton, Electro Line, Inc.	513-461-5683
OH	Solon, Hall-Mark Elctrns.	216-349-4632
OH	Westerville, Hall-Mark Elctrns.	614-891-4555
OK	Tulsa, Hall-Mark Elctrns.	918-665-3200
OK	Tulsa, Sterling Elctrns.	918-663-2410
OR	Beaverton, Acacia Sls.	503-646-3377
PA	Broomall, Time Elctrns.	215-359-1200
TX	Austin, Sterling Elctrns.	512-836-1451
TX	Austin, Hall-Mark Elctrns.	512-258-8848
TX	Dallas, Hall-Mark Elctrns.	214-343-5000
TX	Dallas, Sterling Elctrns.	214-243-1600
TX	Dallas, Target Elctrns.	214-788-0761
TX	Houston, Sterling Elctrns.	713-627-9800
TX	Houston, Hall-Mark Elctrns.	713-781-6100
VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Bellvue, Electro Air	206-641-3640
WA	Seattle, Richey Western	206-575-1910
WI	Oak Creek, Hall-Mark Elctrns.	414-761-3000

VIKING ELECTRONICS, Industrial St., Hudson, WI 54016, Tel: 715-386-8861; Empl.: 24; *Sls. Mgr.:* Bill Wiese

VIKING LABS., INC., 440 Bernardo Ave., Mountain View, CA 94043, Tel: 415-969-5500, TWX: 910-379-6555; Empl.: 90; *Sls. Mgr.:* Jack Eagan, Prod. Reliability; *Dist. Mgr.:* M. J. Marchman, Comp. Test

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Distributor

VILLARREAL ELECTRONICS, Box 43A, RD 2, South Rd., Millbrook, NY 12545, Tel: 914-677-3447 ....**2**•1064

V.I.P. INDS. INC., 246 Knickerbocker Ave., Paterson, NJ 07503, Tel: 201-345-5800; *Sls. Mgr.:* John M. Sonatore

VIRGINIA PANEL, 1400 New Hope Rd., Waynesboro, VA 22980, Tel: 703-949-8376, TWX: 710-839-0406; Empl.: 225; *Sls. Mgr.:* Jeff Stowers

VIRGINIA PLASTICS CO., P.O. Box 4577, Roanoke, VA 24015-0577, Tel: 703-985-3811, TWX: 710-870-0440; FSC No.: 59608; Empl.: 120; *Sls. Mgr.:* Charles Bogese ....**2**•1738-1740, 2151

Local Sales Offices & Reps

AZ	Tempe, General Comps. Grp.	602-829-8124
CA	Granada Hills, C&W Comps.	213-368-4032
CA	San Jose, Pitts Sls. Assocs.	408-252-6177
CO	Parker, Mikro Sls. Co.	303-841-4131
CT	Middletown, Gerber Sls.	203-347-3000
CT	Old Saybrook, Gerber Sls.	203-388-4386
FL	Ft. Lauderdale, APM Assocs.	305-565-0056
FL	Longwood, APM Assocs.	305-869-6831
FL	Merritt Island, APM Assocs.	305-453-4322
FL	Tampa, APM Assocs.	813-886-2457
GA	Stone Mountain, H & H Mktg.	404-296-9830
IL	Palatine, Claeson Assocs.	312-359-7230
MD	Silver Spring, Carwithen Assocs.	301-589-9040
MA	Newton, Gerber Sls.	617-969-2620
MN	Minneapolis, Northstar Comps.	612-553-1888
NJ	Haworth, Kay Sls.	201-384-3261
NY	Syracuse, Canavan-Scanlon Assocs.	315-437-1271
PA	Southampton, Campbell Assocs.	215-322-6630
TX	Houston, AID Elctrns.	713-955-6204
TX	Irving, Aid Elctrns.	214-259-4761

Local Distributors

MA	Newton, Atlantic Comps.	617-969-2620
MN	Minneapolis, K&H Elctrn. Distributing	612-553-1312

VIRTIS CO., Rte. 208, Gardiner, NY 12525, Tel: 914-255-5000, Telex: 926474; Empl.: 92; *Sls. Mgr.:* J. D. Schmidt

VISHAY
...to be precise®

VISHAY RESISTIVE SYS. GRP., 63 Lincoln Hwy., Malvern, PA 19355, Tel: 215-644-1300, TWX: 510-668-8944; Empl.: 500 .... **1A**•2004-2015, 2070

Local Sales Offices & Reps

AL	Huntsville, Montgomery Marketing	205-830-0498
AZ	Phoenix, Compass Mktg. & Sls.	602-266-5400
CA	Cupertino, Vishay Resistive Sys. Grp.	408-730-1292
CA	La Habra, Vishay Resistive Sys. Grp.	714-738-1581
CO	Denver, Comps. Sls. Inc.	303-759-1666
CT	North Haven, Comp Rep Assocs.	203-239-9762
FL	Altamonte Springs, Semtronic Assocs.	305-831-8233
FL	Clearwater, Semtronic Assocs.	813-461-4675
FL	Ft. Lauderdale, Semtronic Assocs.	305-731-2404
GA	Norcross, Montgomery Mktg.	404-447-6124
IL	Elk Grove Village, Oasis Sls. Corp.	312-640-1850
IN	Carmel, Shamrock Elctrn. Sls.	317-848-5265
MD	Lutherville, J. A. Dougherty Sls. Co.	301-321-7890
MA	Westwood, Comp Rep Assocs.	617-329-3454
MI	Bloomfield Hills, Enco Mktg.	313-642-0203
MN	St. Paul, Proud Inds.	612-646-9428
NJ	Flanders, K & R Engrg. Sls. Co.	201-584-5235
NY	E. Syracuse, L-Mar Assocs.	315-437-7779
NY	Rochester, L-Mar Assocs.	716-544-8000
NC	Cary, Montgomery Mktg.	919-467-6319
OH	Aurora, EMA, Inc.	216-562-6104
OH	Centerville, EMA, Inc.	513-433-2800
TX	Dallas, Vishay Resistive Sys. Grp.	214-245-7306
TX	Houston, Vishay Resistive Sys. Grp.	713-550-0568
WA	Bellevue, SDR^2	206-747-9424
WI	Brookfield, Oasis Sls. Corp.	414-782-6660
EXP	Mayaguez, Comp Rep Assocs.	809-832-9529

Local Distributors

AZ	Tempe, Shelley Elctrns.	602-894-2058
CA	Chatsworth, Shelley Elctrns., Inc.	213-998-3333
CA	Los Alamitos, Semi-Dice, Inc.	213-594-4631
CA	North Hollywood, TTI, Inc.	213-982-0201
CA	San Diego, Shelley Elctrns., Inc.	619-453-7133
CA	San Jose, Shelley Elctrns., Inc.	408-942-9111
CA	San Jose, TTI, Inc.	408-943-9155
CA	Santa Clara, Semi-Dice, Inc.	408-980-9777
CO	Boulder, Shelley Elctrns., Inc.	303-442-2718
FL	Orlando, TTI, Inc.	305-859-1000
FL	Tampa, Impala Elctrns., Inc.	813-885-4747; 800-237-7777
IL	Palatine, Ohm Elctrns.	312-359-5500
MD	Beltsville, RESCO/Washington	301-937-9100
MD	Whitemarsh, RESCO/Baltimore	301-529-0500; 800-638-1242
MA	Canton, Semi-Dice, Inc.	617-821-0070
MA	Framingham, Cavalier Comps., Inc.	617-875-2000
MA	Woburn, TTI, Inc.	617-938-8800
NJ	Fairfield, CHPS, Inc.	201-882-0997
NJ	Flanders, VKR Svcs., Inc.	201-584-5235; Outside NJ 800-631-9362
NY	Bohemia, TTI, Inc.	516-567-1500
NY	Farmingdale, Command Elctrns. Corp.	516-293-1212
OH	Dayton, Micro Mil Div.	513-434-8231
PA	Royersford, Hybrid Service Lab	215-948-6880
TX	Fort Worth, TTI, Inc.	817-831-0441
TX	Houston, The Cunningham Co.	713-468-3882

VIZ

AUTHORIZED DISTRIBUTORS

RAG ELECTRONICS, INC.

WEST
21418 Parthenia Street
Canoga Park, CA 91304
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EAST
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VISHAY-MANN, Vishay Resistive Systems Group, 63 Lincoln Hwy., Malvern, PA 19355, Tel: 215-644-1300, Telex: 510-668-5812 ...**1A**•2014, 2015

Please refer to sales representatives listed under Vishay Resistive Systems Group

Please see distributors listed under Vishay Resistive Systems Group.

VISHAY ANGSTROHM, 1 Precision Pl., Hagerstown, MD 21740, Tel: 301-739-8722, TWX: 710-853-6834; FSC No.: 17745; Empl.: 250; *Sls. Mgr.:* John Kinnaw; *Dist. Mgr.:* Jeff Reed ....**1A**•2011-2013

VISION ENGRG. INC., 570 Danbury Rd., New Milford, CT 06776, Tel: 203-355-3776, Telex: 643769; Empl.: 15; *Sls. Mgr.:* R. N. Gable

VISTAR CORP., 13740 McCormick Dr., Tampa, FL 33625, Tel: 813-855-6611; Empl.: 25; *Sls. Mgr.:* J. Looney ....**3**•1317

Local Sales Offices & Reps

AL	Huntsville, Synergetic Reps.	205-882-1691
CT	North Haven, Pat Jenks Assocs.	203-239-6201
FL	Largo, Synergetic Reps.	813-586-2871
GA	Lawrenceville, Synergetic Reps.	404-963-0968
IL	Rolling Meadows, Commodore I	312-394-5441
MD	Silver Springs, Sel-Tronics	301-589-3391
MA	Woburn, Pat Jenks Assocs.	617-938-0488
NY	Port Chester, Radiation Elctrns.	914-937-2300
NY	Syracuse, Labtonics, Inc.	315-455-7314
NC	Greensboro, Synergetic Reps.	919-272-9303
OH	Euclid, Bradcor Elctrns. Co.	216-261-0888
OR	Portland, Scientific Devices	503-292-6934
PA	Mechanicsville, John Bell Assocs.	215-794-7075
TX	Richardson, Scientific Dvcs.	214-231-8106
WA	Bellevue, Scientific Dvcs.	206-747-5169

VISUAL COMMUNICATIONS CO., P.O. Box 986, El Segundo, CA 90245, Tel: 213-822-4727; Empl.: 9; *Sls. Mgr.:* J. Savage ....**1B**•1106-1108

Local Sales Offices & Reps

AL	Huntsville, Remco	205-553-3763
AZ	Phoenix, Bob Anderson Co.	602-266-2070
CA	Mountain View, Westech Sls.	415-961-1422
CA	San Diego, Harvey King Inc.	619-566-5252
CA	Torrance, Assoc Reps.	213-328-6708
FL	Melbourne, Beacon Elctrns.	305-724-8010
GA	Atlanta, Remco	404-447-6937
IL	Elmhurst, Utronix Sls.	312-834-1100
MA	Peabody, Eastern Natl. Assoc.	617-535-5536
MI	Jenison, R. C. Nordstrom & Co.	616-457-5762
MI	Lathrup Village, R. C. Nordstrom & Co.	313-559-7373
MN	Eden Prairie, Bohlig & Assoc.	612-944-8404
NY	New York, Robert Smith Assocs.	212-541-4885
NY	Plainview, Robert Smith Assocs.	516-681-3155
NY	Spring Valley, Robert Smith Assocs.	914-354-6067
NC	Raleigh, Remco	919-847-5079
OH	Dayton, Dynel Co.	513-434-6467
PA	Philadelphia, Rayco Sls.	215-757-1899
TX	Austin, J. B. Guenther	512-472-3825
TX	Dallas, J. B. Guenther	214-691-8500
TX	Houston, J. B. Guenther	713-974-0383
VA	Fairfax, Beacon No.	703-591-1300
VA	Forest, Beacon North	804-239-8486
WA	Redmond, Elctrn. Mktg. Grp.	206-882-0962
EXP	CT, Litchfield, Intrade	203-567-5901

Local Distributors

AL	Huntsville, Component Distr.	205-883-7501
AZ	Tempe, Anjon Entprs.	602-894-1332
AR	Little Rock, Component Distr.	501-227-6278
CA	Costa Mesa, Orange County Comps.	714-979-3597
CA	Los Angeles, Electric Switch	213-660-1310
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Torrance, WBC Electro Supp.	213-328-6871
CO	Englewood, Industrial Elctrns. Inc.	303-694-9444
FL	Ft. Lauderdale, Component Distr.	305-971-4950
GA	Norcross, Component Distrs.	404-441-3320
MA	Lynn, Land Elctrn. Supp.	617-592-2220
MI	Grand Rapids, S. F. Elctrns. Supp.	616-459-0216
MN	Blaine, Chris Elctrn. Distr.	612-757-6341
NJ	Bellmawr, Midatlantic Elctrns.	609-931-5303
NY	Elmsford, Ancar Elctrn. Supp.	914-592-7100
NY	Plainview, Plainview Elctrns.	516-249-6677
NC	Raleigh, Component Distr.	919-834-9465
OH	Aurora, IPD	216-562-8113
OH	Centerville, IPD	513-435-2086
TX	Houston, Solid State Elctrns.	713-772-8483
TX	Irving, Solid State Elctrns.	214-438-5700
VA	Falls Church, Component Distr.	703-241-8227
WA	Redmond, Paccom	206-883-9200
EXP	CT, Litchfield, Intrade	203-567-5901

VISUAL INFO. INSTITUTE, Box 33, Xenia, OH 45385, Tel: 513-376-4361; FSC No.: 27432; Empl.: 45

Local Sales Offices & Reps

CA	San Diego, DRF Assocs.	619-292-9431
CA	San Diego, Perspective Meas.	619-278-8931
CA	San Jose, Fox Marketing	408-984-2221
CO	Bailey, Scientific Sys.	303-838-4615
FL	Melbourne, EME III, Inc.	305-259-2711
GA	Decatur, EME II, Inc.	404-325-0165
MA	Clemsford, Meritron Corp.	617-250-1774
NC	High Point, EME, Inc.	919-869-3335
VA	Williamsburg, EME IV, Inc.	804-253-0171

VITEK ELCTRNS., 4 Gladys Ct., Edison, NJ 08817, Tel: 201-287-3200; *Sls. Mgr.:* Joe Griffin

VITRAMON N.A., P. O. Box 544, Bridgeport, CT 06601, Tel: 203-268-6261, TWX: 710-450-3640; Empl.: 606; *Sls. Mgr.:* Paul Davis; *Dist. Mgr.:* S Judt

VIZ TEST EQUIPMENT, Div. VIZ Mfg., 335 E. Price St., Philadelphia, PA 19144, Tel: 215-844-2626, TWX: 710-670-2626; Empl.: 500

Local Sales Offices & Reps

CA	N. Hollywood, MCS Marketing	213-980-1188
CA	Sunnyvale, W. W. Posey	408-746-0771
CO	Denver, Mountain Reps.	303-623-0972
FL	Ft. Lauderdale, Unirep, Inc.	305-587-7481
GA	Roswell, Henry W. Phillips Co.	404-992-3070
IL	Park Ridge, Bob Burns & Assoc.	312-775-1233
IN	Carmel, Midwest Reps. & Assoc.	317-844-4555
MD	Columbia, Par-Nell Sls. Co.	301-992-5454
MA	Milford, Jonel Sls.	617-478-4650
MI	Ferndale, Hilltronics	313-398-5556
MN	White Bear Lake, Yore Co.	612-770-9760
MO	Raytown, Marty Taraski Sls. Co.	816-358-1442
NJ	Fort Lee, TMC Sls. Corp.	201-944-8340
NY	Grand Island, L. J. McTaggart Assocs.	716-773-9222
OH	Cincinnati, John O. Olson Co.	513-574-7711
OR	Portland, Joseph V. Belusko	503-222-4279
PA	Langhorne, Par-Nell Sls. Co.	215-750-0380
PA	Pittsburgh, John O. Olson Co.	412-341-8391
TX	Dallas, Crockett Sls. Co.	214-350-3377

VLSI TECHNOLOGY, INC., 1101 McKay Dr., San Jose, CA 95131, Tel: 408-942-1810, Telex: 278807; Empl.: 450; *Sls. Mgr.:* Ronald C. Kasper

Local Sales Offices & Reps

CA	San Jose	408-942-1810
IL	Arlington Heights	312-358-8000
MA	Burlington	617-229-6555
TX	Dallas	214-231-6716

VOICE IDENTIFICATION, Box 714, Somerville, NJ 08876, Tel: 201-526-3408; Empl.: 7

VOICE MACHINE COMMS., INC., KTI, 1000 S. Grand Ave., Santa Ana, CA 92705, Tel: 714-541-0454; *Sls. Mgr.:* Rod Runge; *Dist. Mgr.:* Rod Runge

VOLITION SYSTEMS, P.O. Box 1236, Del Mar, CA 92014, Tel: 619-481-2286, Telex: 695000 COMEX SDG; Empl.: 7; *Sls. Mgr.:* Joe Caporaletti

VOLTAGE MULTIPLIERS, INC., 8711 W. Roosevelt Ave., Visalia, CA 93291, Tel: 209-651-1402, Telex: 176-559; FSC No.: 60211; Empl.: 40; *Sls. Mgr.:* Ken Haag ....**1A**•2113

Local Sales Offices & Reps

AZ	Phoenix, High Voltage Sls., Inc.	602-861-9043
CA	Milpitas, Voltage Multipliers, Inc.	408-946-1254

CA	Tarzana, High Voltage Sls.	213-881-9194
CO	Castle Rock, Romulus Elctrns., Ltd.	303-688-5127
GA	Stone Mountain, Mountain Electro Prods., Inc.	404-469-0603
IL	Arlington Heights, M. J. Petersen & Assoc., Ltd.	312-577-8200
IN	Fort Wayne, Walter W. Bieberich, Inc.	219-432-2537
MD	Glen Burnie, Macrotech Assoc., Ltd.	301-437-5588
MA	Chelmsford, Encotronics	617-256-4207
MO	St. Louis, Robert J. Ruzicka Co.	314-353-7378
NY	Hicksville, J-Square Mktg., Inc.	516-935-3200
NY	Rochester, Robert F. Lamb Co. Inc.	716-323-1250
NY	Syracuse, Robert F. Lamb Co. Inc.	315-455-2469
OH	Dayton, L. D. Bruno Co.	513-434-1847
OK	Tulsa, Cunningham Comps. Corp.	918-492-0390
OR	Portland, Electronic Comp. Sls.	503-245-2342
PA	Washington Crossing, DVS Co.	215-493-4642
TX	Dallas, Cunningham Comps. Corp.	214-233-4303
TX	Houston, Cunningham Comps. Corp.	713-461-4197
WA	Mercer Island, Electronic Comp. Sls.	206-232-9301

VOLTAMPERE CORP., 146 Horton Ave., Lynbrook, NY 11563, Tel: 516-887-9443; FSC No.: 7U805; Empl.: 10

VOLTARC TUBES, 176 Linwood Ave., Fairfield, CT 06430, Tel: 203-255-2633, Telex: 96-4337; Empl.: 180; *Sls. Mgr.:* Albert H. Katz

VOLTEX, 3460 Great Neck Rd., Amityville, NY 11701, Tel: 516-842-2772; Empl.: 55; *Sls. Mgr.:* S. Vogel .... **3**•1806

Local Sales Offices & Reps

CT	Milford, Cumming Assocs.	203-878-3946
MA	Randolph, Bengal Assocs.	617-961-4120
NJ	Oxford, Malin Assocs.	201-689-7398
NM	Albuquerque, RLS Instrs. Co.	505-293-7931
NY	Fulton, Jones Sudders, Inc.	315-598-3838

VOLTRONICS, West St., P.O. Box 366, E. Hanover, NJ 07936, Tel: 201-887-1517, TWX: 710-986-8253; FSC No.: 18736; Empl.: 70; *Sls. Mgr.:* Richard J. Newman

VOTAN, 4487 Technology Dr., Fremont, CA 94538, Tel: 415-490-7600; *Sls. Mgr.:* Robert Russo

VRN INTERNATIONAL
a Division of Vernitron Corp
Manufacturers of precision potentiometers, trimmers and dip switches

VRN INTERNATIONAL, Div. Vernitron, 2801 72nd St. N., Box 44000, St. Petersburg, FL 33743, Tel: 813-347-2181, Telex: 68105306, TWX: 810-863-0357; Empl.: 550; *Sls. Mgr.:* R. Fumr; *Dist. Mgr.:* R. Fumr .... **1A**•2068, 2069; **3**•1067

Local Sales Offices & Reps

AL	Brownsboro, JHU Assoc.	205-536-7455
AZ	Tempe, System Sls. of Az.	602-829-9338
CA	Alhambra, MW Riedel & Co.	213-283-7694
CA	Cupertino, Thresum Assoc.	408-996-9889
CA	San Diego, D2 Sls.	619-560-6266
CO	Boulder, Front Range Mktg.	303-443-4780
CT	Stratford, Gerald Rosen Co.	203-375-5456
FL	Boca Raton, Lawrence Assoc.	305-368-7373
FL	Clearwater, Lawrence Assoc.	813-584-8110
GA	Atlanta, JHU Assoc.	404-634-1000
IL	Downers Grove, Circuit Sls.	312-964-9090
IN	Fort Wayne, Ro Whitesell & Assoc.	219-432-5591
IN	Indianpolis, Ro Whitesell & Assoc.	317-359-9283
IN	Kokomo, Ro Whitesell & Assoc.	317-457-9127
KS	Merriam, MTS	913-236-8557
KY	Louisville, Ro Whitesell & Assoc.	502-426-7696
MA	Framingham, Gerald Rosen Co.	617-879-5505
MI	Grand Rapids, Ro Whitesell & Assoc.	616-942-5420
MI	Southfield, Ro Whitesell & Assoc.	313-559-5454
MI	St. Joseph, Ro Whitesell & Assoc.	616-983-7337
MN	Minneapolis, PSI	612-944-8545
NM	Albuquerque, Sys. Sls. of Alb.	505-881-8877
NY	Buffalo, Quality Comps.	716-837-5430
NY	Great Neck, Mos Assoc.	516-487-3966
NY	Manlius, Quality Comps.	315-682-8885
NC	Greensboro, JHU Assoc.	919-852-9097
OH	Cincinnati, Ro Whitesell & Assoc.	513-521-2290
OH	Cleveland, Ro Whitesell & Assoc.	216-447-9020
OH	Columbus, Ro Whitesell & Assoc.	614-888-9396
OH	Dayton, Ro Whitesell & Assoc.	513-298-9546
OK	Broken Arrow, Genzel Sls.	918-258-8656
OR	Tigard, Elctrn. Sources	503-684-0040
PA	Broomall, LD Lowery	215-528-5170
PA	Hummelstown, LD Lowery	717-533-7095
PA	Pittsburg, Ro Whitesell & Assoc.	412-963-6161
TN	Talbott, JHU Assoc.	615-581-4141
TX	Austin, TL Mktg.	512-453-4586
TX	Dallas, TL Mktg.	214-357-1752
UT	Salt Lake City, Front Range Mktg.	801-364-6481
VA	Charlottesville, LD Lowery	804-973-6672
VA	Lanexa, LD Lowery	804-966-5455
WA	Bellevue, Elctrn. Sources	206-451-3500

Local Distributors

CA	Chatsworth, IEC/JACO	213-998-2200
CA	Gardena, Bell Inds.	213-515-1800
CA	Manhattan Beach, Prime Electro Prods.	213-772-1724
CA	San Diego, Bell Inds.	619-268-1277
CA	San Fernando, Petell Elec.	213-365-9841
CA	San Jose, Cypress Elctrns.	408-945-8400
CA	Sunnyvale, Bell Inds.	408-734-8570
CO	Denver, Denver-Wintronics	303-431-7161
CT	Norwalk, Cobra Comps.	203-847-6442
CT	Wallingford, Sager Elctrl. Supp.	203-265-4600
FL	Ft. Lauderdale, Dielco	305-973-8700
FL	Ft. Lauderdale, NRC Elctrns.	305-772-4500
FL	Orlando, TTI Inc.	305-849-1000
FL	Tampa, Impala Elctrns.	813-885-4747
IL	Addison, Lectro Comps.	312-543-1680
IL	Chicago, Bell Inds.	312-982-9210
IA	Cedar Rapids, Deeco	319-365-7551
ME	Woburn, TTI Inc.	617-938-8800
MD	Rockville, M S Elctrns.	301-340-6400
MA	Hingham, Sager Elctrl. Supp.	617-749-6700
MI	Farmington Hills, Advent Elctrns.	313-477-1650
MN	Minneapolis, Aero-Space	612-884-4725
MN	Minneapolis, Merit Elctrns.	612-546-5383
NJ	East Hanover, State Elctrns.	201-887-2550
NJ	New Brunswick, Brothers Elctrns.	201-238-2200
NJ	Whippany, Tonar Ind.	201-884-1400
NY	Bohemia, TTI Inc	516-567-1500
NY	E. Syracuse, Add Elctrns. Corp.	315-437-0300
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Farmingdale, Command Elctrns. Corp.	516-293-1212
NY	Hauppauge, Jaco Elctrns.	516-273-5500
NY	Hauppauge, Fairmont Elec. Sls.	516-231-3313
NY	Huntington Station, Sherburn Elctrns.	516-231-4300
NY	Rochester, Rochester Radio Supp.	716-454-7800
NY	Valley Stream, L & S Elctrns.	516-561-2474
NC	Charlotte, Elctrns. Mktg.	704-394-6195
OH	Columbus, Elctrns. Mktg.	614-299-4161
OH	Dayton, Bell Micro-Mil	513-434-8231
OK	Tulsa, Radio	918-587-9123
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
PA	Philadelphia, TRW Elctrn. Supp.	215-923-8230
PA	Philadelphia, Philadelphia Elctrns.	215-568-7400
TX	Ft. Worth, TTI Inc.	817-831-0441
VA	Charlottesville, Virginia Radio	804-296-4184
WA	Bellevue, Bell Inds.	206-747-1515
WA	Seattle, Robert E. Priebe Co.	206-682-8242
WI	Milwaukee, Marsh Elctrns.	414-475-6000

VTM MICROWAVES, INC., 4975 W. 80 Ave., Westminster, CO 80030, Tel: 303-426-6866; Empl.: 15

V-TRON ELCTRNS. CORP., 84 Fountain St., Pawtucket, RI 02860, Tel: 401-728-6140; Empl.: 250; *Sls. Mgr.:* Richard E. French

VU-DATA, 7122 Convoy Ct., San Diego, CA 92111, Tel: 619-279-6572, TWX: 910-335-1586; FSC No.: 34160; Empl.: 15

WABASH, First & Webster Sts., Wabash, IN 46992, Tel: 219-563-3111, TWX: 810-333-1533; Empl.: 400; *Sls. Mgr.:* Stan Kalin

WABASH RELAY & ELCTRNS., First & Webster Sts., Wabash, IN 46992, Tel: 219-563-3191, TWX: 810-290-2722; Empl.: 250; *Sls. Mgr.:* David L. Snodgrass .... **1B**•1478, 1479

Local Sales Offices & Reps

AL	Huntsville, 20th Century Mktg.	205-533-9281
AZ	Phoenix, M/R Engrg. Sls. Co.	602-956-4670
CA	Glendale, Halbar	213-246-8263
CA	San Mateo, Halbar	415-349-4700
CO	Aurora, Mountain View Mktg.	303-360-9641
DE	Medford, Comp. Conslt.	609-654-5300
FL	Ft. Lauderdale, APM Assocs.	305-565-0056
FL	Longwood, APM Assocs.	305-869-6831
FL	Tampa, APM Asocs.	813-886-2457
GA	Stone Mountain, 20th Century Mktg.	404-292-7088
IL	Arlington Hgts., M. J. Petersen Assocs.	312-577-8200
IN	Fort Wayne, M/S Sales	219-484-1904
KS	De Soto, Midtec Assoc.	913-441-6565
MD	Glen Burnie, Macrotech Assocs. Ltd.	301-437-5588
MA	Andover, Crawford Assocs.	617-470-2122
MI	Novi, Lektronics	313-349-3304
MN	Edina, PWC Inc.	612-831-5999
MO	Florissant, Midtec Assoc.	314-837-5200
NJ	Watchung, Dolan Assocs.	201-753-2671
NY	Penfield, Upstate Comp. Sls.	716-381-6070
NC	Raleigh, Tingen Tech. Sls.	919-781-1100
OH	Dayton, KW Elctrn. Sls.	513-890-2150
OH	Shaker Heights, KW Elctrn. Sls.	216-491-9177
OH	Worthington, KW Elctrn. Sls.	614-888-0483
PA	Medford, Comp. Consultants	609-654-5300
TN	Knoxville, 20th Century Mktg.	615-690-1618
TX	Dallas, Stevens Sls. Co.	214-350-2476
VA	Glen Burnie, Macrotech Assocs. Ltd.	301-437-5588
WA	Redmond, Halbar Assocs. Inc	206-882-0990
WA	Vancouver, Halbar Assocs.	206-696-0170

Local Distributors

IL	Elk Grove Village, Nu-Way Elctrn. Distrs.	800-323-7957

WABER ELECTRIC, See SGL Waber Electric.

WADSWORTH ELEC., 20 W. 11th St., Covington, KY 41011, Tel: 606-431-0900; *Sls. Mgr.:* D. W. Phillips

WAGNER ELECTRIC CORP., Tung-Sol Div., 100 Misty Lane, Parsippany, NJ 07054, Tel: 201-386-9300

WAGO CORP., 6657 N. Sidney Pl., Milwaukee, WI 53209-3217, Tel: 414-352-1035, Telex: 260123; *Sls. Mgr.:* Michael A. Lane

WAHL INSTRUMENTS, INC., 5750 Hannum Ave., Culver City, CA 90230, Tel: 213-822-6144, TWX: 910-343-6867; Empl.: 48

WALDES KOHINOOR, 47-16 Austel Pl., Long Island City, NY 11101, Tel: 212-392-3100, Telex: 126-829; Empl.: 450

WALDOM ELCTRNS., 4301 W. 69th St., Dept. EEM, Chicago, IL 60629, Tel: 312-585-1212, Telex: 25-4604; FSC No.: 92219; Empl.: 143; *Sls. Mgr.:* E. R. Beutler

WALKER SCIENTIFIC, Rockdale St., Worcester, MA 01606, Tel: 617-852-3674, Telex: 92-0489; Empl.: 83; *Sls. Mgr.:* B. Langley

WALL, A. T., CO., 55 Service Ave., Warwick, RI 02886, Tel: 401-739-0740, TWX: 710-382-1535; Empl.: 75; *Sls. Mgr.:* Carl Gibbs; *Dist. Mgr.:* R. Huntsman

WALL-ABLE MANUFACTURING CORP., 1800 N. Clybourn Ave., Chicago, IL 60614, Tel: 312-440-1000; Empl.: 100; *Sls. Mgr.:* Dennis O'Brien .. **2**•1742, 1743

Local Sales Offices & Reps

IL	Wheeling, AL&W Sls. Co.	312-541-9080
MA	Norwell, Carl Morris & Assoc.	617-659-2968
NY	Dobbs Ferry, L. J. Valle, Inc.	914-693-5089

WALL INDS., 2 Franklin, Lawrence, MA 01840, Tel: 617-688-1287; Empl.: 55; *Sls. Mgr.:* Mark P. Aiello

WALL LENK, Box 3349, Dept. EEM-71, Kinston, NC 28501, Tel: 919-527-4186; Empl.: 60; *Sls. Mgr.:* Richard W. Cooper

Local Sales Offices & Reps

CA	Laguna Hills, Kendall Mktg.	714-581-9951
CO	Aurora, S.O.S. Mktg.	303-366-7667
FL	Tampa, SRT Mktg.	813-884-4805
GA	Stone Mountain, Advanced Elctrns. Equip.	404-289-6100
IN	Noblesville, R & D Electronics	317-849-2026
MA	Rochdale, Robert L. May Assoc.	617-885-4370
MI	Brighton, A. P. Assocs.	313-229-6550
MN	Minneapolis, John Anderson Co.	612-823-6459
MO	Kansas City, W. D. Burt & Assoc.	816-931-2384
NY	Guilderland, The Solder Pot	518-355-1829
NC	Raleigh, South States Mktg.	919-781-3220
TX	Houston, Natl. Mktg. Assoc.	713-460-0989
UT	Ogden, Johnson Co.	801-393-1202

WAMCO, INC., 11555-A Coley River Cir., Fountain Valley, CA 92708, Tel: 714-545-5560, Telex: 678-459; *Sls. Mgr.:* Gordon R. Calvert; *Dist. Mgr.:* Sheila A. Sherman

WARD LEONARD ELEC., 31 South St., Mt. Vernon, NY 10550, Tel: 914-664-1000, TWX: 710-562-0144; FSC No.: 63743; Empl.: 600; *Dist. Mgr.:* Barry Daly

WARREN COMMS., 101 Okner Pkwy., Livingston, NJ 07039, Tel: 201-992-6200, Telex: 139-384, TWX: 710-994-4852; Empl.: 200; *Sls. Mgr.:* William Vandertulip

Local Sales Offices & Reps

CA	Santa Ana, Comm. Prods.	714-730-1220
NJ	Glen Ridge, Michael Ostella	201-429-9377

Local Distributors

AZ	Phoenix, Dortan Enterprises	602-944-2947
CA	Los Angeles, M. A. Stolaroff Co.	213-295-7781
CA	San Diego, Masco Inc.	619-234-6905
CA	San Francisco, Blach & Bensinger	415-697-2525
FL	Indian Rocks Bch., Tech-Reps Assocs.	813-577-2779
IL	S. Elgin, R. K. Elctrns.	312-695-8552
MN	Minneapolis, HMR, Inc	612-831-7400
NJ	Westfield, Erich Maertz, Inc.	201-232-4643
NY	Rochester, R. P. Kennedy Co.	716-271-6322
TX	Carollton, Seaton Corp.	214-380-0414
VA	Alexandria, TDI	703-971-8982

WARREN-KNIGHT INSTR. CO., Warren Inds., Inc., 2045 Bennett Rd., Philadelphia, PA 19116, Tel: 215-464-9300; Empl.: 50; *Sls. Mgr.:* Richard M. Marron

WAVETEK ROCKLAND SCI., 245 Livingston St., Northvale, NJ 07647, Tel: 201-767-7100, TWX: 710-991-9619; Empl.: 200; *Sls. Mgr.:* Howard Siegerman

WASATCH HIGH VOLTAGE, P.O. Box 9027, Salt Lake City, UT 84109, Tel: 801-466-9561; Empl.: 9; *Sls. Mgr.:* T. J. Bruzenak

Local Sales Offices & Reps

CA	Encino, King-way Assocs.	213-788-4124

WATERS MFG., Longfellow Ctr., Wayland, MA 01778, Tel: 617-358-2777, Telex: 948441; Empl.: 125; *Sls. Mgr.:* Ralph Pietro

WATKINS-JOHNSON CO., 3333 Hillview Ave., Palo Alto, CA 94304, Tel: 415-493-4141, Telex: 34-8415, TWX: 910-373-1253; FSC No.: 14482; Empl.: 2800

WATKINS-JOHNSON CO., Stewart Div., 440 Mount Herman Road, Scotts Valley, CA 95060, Tel: 408-438-2100

WATT-CLOCK CORP., P.O. Box 697, Stratford, CT 06497, Tel: 203-378-2500; Empl.: 5; *Sls. Mgr.:* M. Dee

WAVECOM, 9036 Winnetka Ave., Northridge, CA 91324, Tel: 818-882-3010, TWX: 910-493-2172; FSC No.: 28979; Empl.: 93

WAVELINE, Box 718, W. Caldwell, NJ 07006, Tel: 201-226-9100, TWX: 710-734-4324; FSC No.: 00443; Empl.: 95; *Sls. Mgr.:* R. A. Powell

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrn. Assocs.	205-881-5031
AZ	Scottsdale, Territorial Mktg.	602-994-8665
CA	Mt. View, Pacific Technical Mktg.	415-969-3010
CA	Tarzana, Midwin & Olifson	213-996-9093
FL	Ft. Lauderdale, Beacon Elctrn.	305-491-1054
FL	Maitland, Beacon Elctrn. Assn.	305-647-3498
GA	Atlanta, Beacon Elctrn.	404-256-9640
KY	Ft. Mitchel, GW. Thelen	606-341-8181
MD	Glen Arm, Hodgins Assocs.	301-592-7047
MA	Needham Hgts., O'Sullivan & Murphy	617-449-4141
NY	Hartsdale, Spectrum Sls.	914-472-8600
NY	Skaneateles, Robtron	315-685-5731
NC	Raleigh, Beacon Elctrns.	919-780-0330
OH	Medina, GW Thelen	216-723-1293
TX	Arlington, N&W Sls.	817-461-4443
WA	Seattle, Rep-West	206-283-8351
EXP	NJ, Oradell, Sylvan Ginsbury	201-261-3200

WAVETEK INDIANA, INC., 5808 Churchman, Beech Grove, IN 46107, Tel: 317-787-3332, TWX: 810-341-3226; FSC No.: 34280; Empl.: 900; *Sls. Mgr.:* Dick Koerner .... **1A•1784, 1785; 3•1318**

Local Sales Offices & Reps

AL	Huntsville, W. A. Brown Instrs.	205-883-8660
AZ	Scottsdale, Barnhill Assoc.	602-947-7841
CA	Redondo Beach, Ward/Davis	213-973-7772
CA	San Diego, Ward/Davis	619-292-1000
CA	Santa Clara, Ward/Davis	408-245-3700
CO	Englewood, Barnhill Assoc.	303-779-3600
CT	No. Haven, P. Jenks Assoc.	203-239-6201
FL	Ft. Lauderdale, W. A. Brown Instrs.	305-776-4800
FL	Melbourne, W. A. Brown Instrs.	305-723-0766
GA	Norcross, W. A. Brown Instrs.	404-441-2980
HI	Honolulu, EMC Corp.	808-836-2044
IL	Arlington Hgts., Dytec Central	312-394-3380
IN	Indianapolis, Dytec Central	317-247-1316
KS	Lenexa, Dytec South	913-888-0215
LA	Mandeville, W. A. Brown Instrs.	504-626-9701
MA	Woburn, P. Jenks Assoc.	617-938-0488
MI	Madison Hgts., WKM Assocs.	313-588-2300
MN	St. Paul, Dytec North	612-645-5816
MO	Maryland Hgts., Dytec South	314-569-2990
NM	Albuquerque, Barnhill Assoc.	505-299-7658
NY	Fairport, Naco Elctrns.	716-223-4490
NY	N. Syracuse, Naco Elctrns.	315-699-2651
NY	Utica, Naco Elctrns.	315-732-1801
NC	Durham, W.A. Brown Instrs.	919-682-2383
OH	Dayton, WKM Assocs.	513-434-7500
OH	Independence, WKM Assocs.	216-524-5930
OK	Tulsa, Data Mktg. Assoc.	918-496-1457
OR	Beaverton, Northwest Test & Meas.	503-646-9966
PA	Bensalem, Eastern Instrmn.	215-245-6660
PA	Pittsburgh, WKM Assocs.	412-892-2953
SC	Columbia, W. A. Brown Instrs.	803-798-8070
TN	Oak Ridge, W. A. Brown Instrs.	615-482-5761
TX	Austin, Data Mktg. Assocs.	512-451-5174
TX	Dallas, Data Mktg. Assoc.	214-661-0300
TX	Houston, Data Mktg. Assoc.	713-780-2511
TX	San Antonio, Data Mktg. Assoc.	512-342-3031
UT	Murray, Barnhill Assoc.	801-262-3000
VA	McLean, Creative Mktg. Assoc.	703-442-9100
WA	Redmond, Northwest Test & Meas.	206-881-8857

WAVETEK ROCKLAND SCIENTIFIC, INC., 10 Volvo Dr., Rockleigh Indl. Pk., Rockleigh, NJ 07647, Tel: 201-767-7900, TWX: 710-991-9852; Empl.: 100

Local Sales Offices & Reps

AL	Huntsville, W. A. Brown Instr.	205-883-8660
AZ	Scottsdale, Barnhill Assoc., Inc.	602-947-7841
CA	Irvine, Wavetek Rockland Sci.	714-261-8600
CA	Redondo Beach, Ward/Davis Assoc.	213-643-6977
CA	San Diego, Ward/Davis Assocs.	619-292-1000
CA	San Jose, Wavetek Rockland Sci.	408-286-8040
CA	Santa Clara, Ward/Davis Assoc.	408-245-3700
CO	Englewood, Barnhill Assoc., Inc.	303-779-3600
CT	N. Haven, Pat Jenks Assocs.	203-239-6201
FL	Fort Lauderdale, W. A. Brown Instr.	305-776-4800
FL	Melbourne, W. A. Brown Instr.	305-723-0766
FL	Orlando, W. A. Brown Instrs.	305-425-5505
FL	Tampa, Wavetek Rockland Sci.	813-626-6333
GA	Atlanta, W. A. Brown Instrs.	404-455-2035
GA	Norcross, W. A. Brown Instr.	404-441-2980
GA	Tucker, Wavetek Rockland Sci.	404-491-7614
HI	Honolulu, EMC Corp.	808-836-1138
IL	Arlington Hgts., Dytec/Central	312-394-3380
IN	Indianapolis, Dytec/Central	317-247-1316
IA	Iowa City, Dytec/South	319-683-2282
KS	Lenexa, Dytec/South	913-888-0215
LA	Mandeville, W. A. Brown Instr.	504-626-9701
MA	Burlington, Wavetek Rockland Sci.	617-273-4557
MA	Woburn, Pat Jenks Assocs.	617-938-0488
MI	Madison Hgts., WKM Assocs.	313-588-2300
MN	St. Paul, Dytec/North	612-645-5816
MO	Maryland Hgts., Dytec/South	314-569-2990
NM	Albuquerque, Barnhill Assoc., Inc.	505-299-7658
NY	Fairport, Naco Elec. Corp.	716-223-4490
NY	Great Neck, RTI	516-829-3770
NY	N. Syracuse, Naco Elec. Corp.	315-699-2651
NY	Utica, Naco Elec. Corp.	315-732-1801
NC	Durham, W. A. Brown Instr.	919-683-1580
OH	Dayton, WKM Assocs.	513-434-7500
OH	Independence, WKM Assocs.	216-524-5903
OH	Worthington, Wavetek Rockland Sci.	614-888-6060
OK	Tulsa, Data Mktg. Assocs.	918-496-1457
OR	Beaverton, Northwest Test & Meas.	503-646-9966
PA	Bensalem, Eastern Instrmn.	215-245-6660
PA	Montgomeryville, Wavetek Rockland Sci.	215-822-7001
PA	Pittsburgh, WKM Assocs.	412-892-2953
SC	Columbia, W. A. Brown Instr.	803-798-8070
TN	Oak Ridge, W. A. Brown Instr.	615-482-5761
TX	Austin, Data Mktg. Assocs.	512-451-5174
TX	Dallas, Data Mktg. Assocs.	214-661-0300
TX	Houston, Data Mktg. Assocs.	713-780-2511
TX	San Antonio, Data Mktg. Assocs.	512-828-0937
UT	Murray, Barnhill Corp.	801-262-3000
VA	McLean, Wavetek Rockland Sci.	703-442-0600
VA	McLean, Creative Mktg. Assoc.	703-442-9100
WA	Redmond, Northwest Test & Meas.	206-881-8857

WAVETEK SAN DIEGO, Div. of Wavetek, 9045 Balboa Ave., P.O. Box 85265, San Diego, CA 92123, Tel: 619-279-2200, TWX: 910-335-2007; Empl.: 470; *Sls. Mgr.:* Sam Lewis

WAYNE KERR, INC., W.K.R. Ltd., 400 West Cummings Pk., Woburn, MA 01801, Tel: 617-938-8390, Telex: 6817257 WKERR WOBN; *Sls. Mgr.:* Ken Berquist

WAYNE TRANSFORMER CO., INC., 99 Hazel St., Paterson, NJ 07503, Tel: 201-278-7674; *Sls. Mgr.:* Fred DeMauro .... **1A•2365**

WECKESSER CO. INC., 4444 W. Irving Park Rd., Chicago, IL 60641, Tel: 312-282-8626; Empl.: 90

WECO ELCTRL. CONNECTORS INC., Weco Wester, Ebbinghaus & Co., P.O. Box 84, Ste. Anne DeBellevue P.Q., Canada H9X3L4, Tel: 514-457-3648, Telex: 05-821840; *Sls. Mgr.:* Heiner Kammann; *Dist. Mgr.:* Heiner Kammann .... **2•1745-1747**

Local Sales Offices & Reps

CA	Fullerton, ISI Mktg. Co.	714-773-0411
CO	Littleton, Protronics Grp.	303-973-3096
FL	Coral Springs, HAI Elctrns.	305-752-7520
IL	Carol Stream, Lectro Comps.	312-690-0520
NH	Nashua, Bell Controls Inc.	603-882-6984
OR	Portland, SPS Elctrns.	503-297-6919
WA	Redmond, SPS Elctrns.	206-323-4140

Local Distributors

CA	Fullerton, ISI Mktg. Co.	714-773-0411
IL	Carol Stream, Lectro Comps.	312-690-0520

WEED INSTR. CO., INC., 707 Jeffrey Way, P.O. Box 300, Round Rock, TX 78664-0300, Tel: 512-255-7043, Telex: 776492; Empl.: 110; *Sls. Mgr.:* Tom Kurys

WEI CORP., 1405 S. Village Way, Santa Ana, CA 92705, Tel: 714-834-9333, TWX: 910-595-1709; FSC No.: 51272; Empl.: 50; *Sls. Mgr.:* R. H. Thomason

WEIDMULLER TERMINATIONS, 821 Southlake Blvd., Richmond, VA 23236, Tel: 804-794-2877, Telex: 828376; Empl.: 31; *Sls. Mgr.:* James G. Dunn; *Dist. Mgr.:* Mort Gelfand .... **2•1748**

Local Sales Offices & Reps

AZ	Scottsdale, Bill Earl Assoc.	602-994-3813
CA	Huntington Beach, Weidmuller Terminations	714-960-9264
CA	Lamesa, Weidmuller Terminations	619-466-5644
CA	Santa Clara, DC Elctrns.	408-980-1199
CA	Woodland Hills, Weidmuller Terminations	213-716-8929
CO	Denver, Weidmuller Terminations	303-753-1499
CT	Trumbull, Weidmuller Terminations	203-268-1496
FL	Apopka, Weidmuller Terminations	305-889-2791
GA	Marietta, Weidmuller Terminations	404-971-6472
IL	Barrington, R. Fisk Mktg.	312-381-0653
IL	Crete, Weidmuller Terminations	312-672-4460
LA	Baton Rouge, General Power & Control	504-924-3919
MA	Revere, Weidmuller Terminations	617-289-2122
MI	Highland, Holly & Upleger	313-363-8800
NJ	Port Reading, Weidmuller Terminations	201-636-7021
NY	E. Syracuse, L-Mar Assoc.	315-437-7779
NY	Rochester, L-Mar Assoc.	716-323-1000
NY	West Hempstead, Schmitt Indl. Mktg.	516-486-5510
OH	Cincinnati, J. W. Murray & Assoc.	513-574-8500
OH	Mentor, Weidmuller Terminations	216-255-1990
OK	Tulsa, Electrotech Sys.	918-496-2021
PA	Philadelphia, Weidmuller Terminations	215-698-8285
TX	Grapevine, Electrotech Sys.	817-481-1583
TX	Houston, Weidmuller Terminations	713-870-1515
TX	Missouri City, Weidmuller Terminations	713-437-2011
UT	Salt Lake City, Control Agency	801-320-4305
WA	Issaquah, Weidmuller Terminations	206-392-4333
WI	Milwaukee, Weidmuller Terminations	414-444-9441

WEINSCHEL ENGRG., One Weinschel La., Gaithersburg, MD 20877, Tel: 301-948-3434, 800-638-2048, Telex: ITT 440702, TWX: WU 89-8352; FSC No.: 93459; Empl.: 325; *Sls. Mgr.:* Ron Bastien .... **1A•1787; 3•1319**

Local Sales Offices & Reps

AL	Huntsville, Beacon Elctrns. Assoc.	205-881-5031
AZ	Tempe, Sierra Tech. Grp.	602-894-2335
AR	Little Rock, Beacon Elctrns. Assoc.	501-224-5449
CA	Malibu, G. McNamara	213-457-4563
CA	Rodondo Beach, Ward Davis Assoc.	213-643-6977
CA	San Diego, Ward Davis Assoc.	619-292-1000
CA	Santa Clara, Ward Davis Assoc.	408-245-3700
CO	Englewood, Sierra Tech. Grp.	303-790-1700
FL	Clearwater, Beacon Elctrns. Assoc.	813-796-2378
FL	Ft. Lauderdale, Beacon Elctrns. Assoc.	305-491-1054
FL	Maitland, Beacon Elctrns. Assoc.	305-647-3498
FL	Melbourne, Beacon Elctrns. Assoc.	305-724-8010
GA	Atlanta, Beacon Elctrns. Assoc.	404-256-9640
IL	Arlington Heights, Dytec Central	312-394-3380
IN	Indianapolis, Dytec Central	317-247-1316
KS	Lenexa, Dytec South	913-888-0215
MA	Burlington, R. J. Sickles Assoc.	617-862-5100
MN	St. Paul, Dytec North	612-645-5816

MO	Maryland Hgts., Dytec South	314-569-2990
NJ	Hackensack, Tech. Mktg.	201-342-4008
NM	Las Cruces, Sierra Tech. Grp.	505-524-8092
NY	Fairport, Naco Elctrns.	716-223-4490
NY	No. Syracuse, Naco Elctrns.	315-699-2651
NY	Utica, Naco Elctrns.	315-732-1801
NC	Raleigh, Beacon Elctrns. Assoc.	919-787-0330
OR	Portland, Arva-Hudson	206-455-0773
PA	Bensalem, Eastern Inst.	215-245-6660
TX	Austin, Sci. Dvcs.-Southwest, Inc.	512-442-6215
TX	El Paso, Sierra Tech. Grp.	915-591-5890
TX	Houston, Scientific Dvcs. - Southwest	713-864-1711
TX	Richardson, Scientific Dvcs. - Southwest	214-231-8106
TX	San Antonio, Ashcraft Assocs.	512-681-0477
UT	Salt Lake City, Sierra Tech. Grp.	801-322-3069
VA	McLean, Creative Mktg. Assocs.	703-442-9100
WA	Bellevue, Arva-Hudson	206-455-0773

WELLMAN THERMAL SYS., 1 Progress Rd, Shelbyville, IN 46176, Tel: 317-398-4411, TWX: 810-260-2616; FSC No.: 4S017; Empl.: 600; *Sls. Mgr.:* E. W. Abel; *Dist. Mgr.:* W. L. McNamee

WELLS ELCTRNS., 1701 S. Main St., South Bend, IN 46613, Tel: 219-287-5941, Telex: 25-8325; Empl.: 180; *Sls. Mgr.:* Michael Myers .... 2•1750-1755

Local Sales Offices & Reps

AL	Huntsville, Southeastern Mktg.	205-882-1633
AZ	Tempe, Foley, Tallent & Lee, Inc.	602-894-2345
CA	Los Angeles, EESCO	213-242-8823
CA	San Jose, Western Indl. Network	408-559-8118
CO	Denver, Foley, Tallent & Lee, Inc.	303-973-4934
CT	Wethersfield, Com/Pak, Inc.	203-563-4784
FL	Maitland, Lobo Mktg. Assocs., Inc.	305-628-8911
IL	Glencoe, Howard Benjamin Assocs. Inc.	312-835-0150
IN	Greenfield, France Entprs., Inc.	317-462-6098
IA	Davenport, Electro Tech Assocs.	319-386-1134
MA	Woburn, Com/Pak, Inc.	617-938-8580
MI	Ypsilanti, TAMCO, Inc.	313-572-1950
MN	Minneapolis, Electro-Tech Assocs.	612-927-5878
MO	St. Louis, KKB & Co.	314-647-2400
NJ	Berkeley Heights, Cambridge Allen and Assocs.	201-464-7987
NJ	Haddonfield, Sunday-O'Brien	609-429-4013
NY	Syracuse, T-Squared Elctrns. Co., Inc.	315-463-8592
NC	Raleigh, Tingen Tech. Sls., Inc.	919-781-1100
OR	Beaverton, Caruso & Northcutt, Inc.	503-646-4973
TX	El Paso, EPEC, Inc.	915-593-8481
TX	Irving, AID Elctrns., Inc.	214-259-4761
WA	Bellevue, Caruso & Northcutt, Inc.	206-454-9699
WI	Colgate, Rep 1 & Assocs.	414-628-4016

Local Distributors

AZ	Tempe, Waltronic Sls.	602-967-1020
CA	Anaheim, A To Z Elctrns., Inc.	714-634-3620
CA	North Hollywood, Elctrn. Hardware, Ltd.	213-982-6100
CA	San Jose, Cypress Elctrns., Inc.	408-945-8400
CO	Denver, CSID, Inc.	303-292-9594
FL	Pompano Beach, Comps. South	305-971-0350
IL	Chicago, Semiconductor Specialists, Inc.	312-279-1000
MA	Burlington, Schaal Assocs.	617-272-7940
MA	Mendon, Add Elctrn. Corp.	617-478-4200
MI	Southfield, L.S.I. Mktg.	313-356-7002
MN	Minneapolis, Semiconductor Specialists, Inc.	612-854-8841
MO	Kansas City, Semiconductor Specialists, Inc.	816-452-3900
NH	Hampstead, Astrum Elctrns.	603-329-5656
NJ	Bellmawr, Mid-Atlantic Elctrns. Corp.	609-931-5303
NY	East Syracuse, Add Elctrn. Corp.	315-437-0300
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Hauppauge, Schaal Assocs.	516-234-4600
NC	Charlotte, Elctrns. Mktg. Corp.	704-394-6195
OH	Columbus, Elctrns. Mktg. Corp.	614-299-4161
OR	Tigard, Moore Elctrns. Inc.	503-684-3100
PA	Pittsburgh, Semiconductor Specialists, Inc	412-963-7241
TX	Houston, Kent Elctrns. Inc.	713-780-7770
TX	Richardson, Kent Elctrns. Inc.	214-669-2600

WELTEK INTL., INC., 760 W. Cotter St., South Bend, IN 46613, Tel: 219-232-5400, Telex: 23-3131; Empl.: 28; *Sls. Mgr.:* Tom Gerschoffer

Local Sales Offices & Reps

CA	Fremont, HJR Entprs.	415-490-7911
CO	Littleton, Production Equip. Sls.	303-795-5022
DC	Washington, Harry Wise & Co.	202-363-9417
FL	Lake Worth, GRY Associates	305-965-5111
IN	Noblesville, King Sls	317-842-1035
KS	Prairie Village, Dougherty & Assoc.	913-649-3515
MA	Tewksbury, Hunt Assocs.	617-851-9042
MI	Royal Oak, Murray Percival & Co.	313-548-1971
MN	Edina, PEC/LEVI	612-94-8540
MO	St. Louis, John E. Metz Co.	314-993-1979
NY	Fair Haven, Feikert Assoc., Inc.	315-947-5994
NC	Cary, Interbit, Inc.	919-467-3200

WESCO ELECTRICAL CO., 201 Munson St., Greenfield, MA 01301, Tel: 413-774-4358; FSC No.: 12673; Empl.: 190; *Sls. Mgr.:* James R. DeSanty .... 1A•1212-1217

Local Sales Offices & Reps

CA	Costa Mesa, Electro-Mech Sls. Co.	714-642-2390
CA	La Jolla, Southwest Tech. Sls.	619-454-2034
CA	Santa Clara, Gagner-Toomey Assocs.	408-244-2200
CT	Milford, Cuming Assoc.	203-878-3946
FL	Fern Park, EIR Inc.	305-830-9600
IL	Addison, Banner Tech. Sls.	312-279-6070
IN	Columbus, J. H. Weaver Co.	812-372-3625
MA	Framingham, Bengal Assocs.	617-877-2639
MA	Randolph, Bengal Assocs.	617-961-4120
MN	Bloomington, Electronic Sls. Agcy.	612-884-8291
NJ	Madison, Livera-Polk Assocs.	201-377-3220
NY	Glen Head, Livera-Polk Assocs.	516-759-9300
NC	Raleigh, Leigh Sls.	919-872-1484
OH	Wickliffe, W. Brauer & Assoc.	216-943-0601
OR	Beaverton, L-D Elctrns.	503-649-6177
PA	Pittsburgh, W. Brauer & Assoc.	412-921-3213
TX	Dallas, Blackburn Assocs.	214-692-8885
WA	Snohomish, L-D Elctrns.	206-568-0511

WESCOM, PO Box 1458, Downers Grove, IL 60515, Tel: 312-985-9000, Telex: 253656, TWX: 910-695-4735; *Sls. Mgr.:* R. Don Webster

WESCORP ANTISTATIC PRODS., 144 S. Whisman Rd., Mountain View, CA 94041, Tel: 415-969-7717, Telex: 345507; Empl.: 15; *Sls. Mgr.:* Lourdes Rivera

Distributor

WES-GARDE COMPONENTS GROUP, INC., 190 Elliott St., Hartford, CT 06114, Tel: 203-525-6907 .... 1B•1742

WESTAMP, 1542 15th St., Santa Monica, CA 90404, Tel: 213-393-0401, TWX: 910-343-7443; Empl.: 90

WESTBERG MFG., INC., 3400 Westach Way, Sonoma, CA 95476, Tel: 707-938-2121; *Sls. Mgr.:* R. R. Westberg

WEST-CAP ARIZONA, Sub. of San Fernando Electric Mftg. Co., 2201 East Elvira Road, Tucson, AZ 85706, Tel: 602-294-2646

WEST COAST ELEC. MFG., 14045 Garfield Ave, Paramount, CA 90723, Tel: 213-633-1010; FSC No.: 81823; Empl.: 25; *Sls. Mgr.:* W. E. Seal

WESTCODE SEMICONDUCTORS, INC., 0-02 Fair Lawn Ave., Fair Lawn, NJ 07410, Tel: 201-791-3020, Telex: 130389; *Sls. Mgr.:* E. Hultz, Jr.

Local Sales Offices & Reps

CA	Long Beach, Megawatt Corp.	213-634-9731
FL	Oldsmar, Boggs & Assocs.	813-855-1812
NY	Kings Park, JL Sales Assocs.	516-979-9086
OH	Cleveland, Electronic Salesmasters	216-831-9555
TX	Dallas, Delta Comps.	214-287-6333
WI	New Berlin, Reko, Inc.	414-784-3430

WESTEMP CORP., Box 767, Cardiff, CA 92007, Tel: 619-942-9800; Empl.: 20; *Sls. Mgr.:* J. Huston

WESTERN DIGITAL CORP., 2445 McCabe Way, Irvine, CA 92714, Tel: 714-557-3550, TWX: 910-595-1139; *Dist. Mgr.:* Ron Weaver

WESTERN ELECTRIC CO., INC., 222 Broadway, New York, NY 10038, Tel: 212-669-2345

WESTERN ELCTRN. PRODS., 107 Los Molinos, San Clemente, CA 92672, Tel: 714-492-4677; FSC No.: 13988

WESTERN ELECTRO. MECH. CO. INC., 300 Broadway, Oakland, CA 94607, Tel: 415-452-1936; *Sls. Mgr.:* W. J. Foster

WESTERN GEAR CORP., Applied Tech. Div., 14724 E. Proctor, City of Industry, CA 91744, Tel: 818-968-6525, TWX: 910-584-4856; Empl.: 1125; *Sls. Mgr.:* D. Waite

WESTERN GRAPHTEC, 12 Chrysler St., Irvine, CA 92714, Tel: 714-770-6010, 800-854-8385

WESTERN RESERVE ELCTRNS., 2150 Highland Rd., Twinsburg, OH 44087, Tel: 216-425-4951; Empl.: 45; *Sls. Mgr.:* Robert Rhodes

WESTINGHOUSE ELECTRIC CORP., Aerospace Electrical Div., P.O. Box 989, Lima, OH 45802, Tel: 419-226-3121

WESTINGHOUSE ELECTRIC CORP., Electronic Tube Div., P.O. Box 284, Elmira, NY 14902, Tel: 607-796-3211

WESTINGHOUSE ELEC. CORP., Lamp Div., Parts Sls., 1 Westghse Plaza, Bloomfield, NJ 07003, Tel: 201-429-3325

WESTINGHOUSE ELEC. CORP., Semiconductor Div., Armbrust Rd., Youngwood, PA 15697, Tel: 412-925-7272, TWX: 510-468-2840; Empl.: 600; *Sls. Mgr.:* D. E. Rieth; *Dist. Mgr.:* P. DelPalazzo

Local Sales Offices & Reps

AL	Huntsville, JWL Assocs.	205-536-8410
AZ	Tempe, Quatra Assocs.	602-894-2808
CA	Agoura, Westpower Co.	818-706-0550
CA	Laguna Hills, Westpower Co.	714-380-0277
CA	Los Angeles, Westpower Co.	818-579-8230
CA	Mountain View, Westinghouse Elec.	415-949-0610
CA	Santa Clara, Engineering Assoc. Corp.	408-988-5001
CO	Denver, Lindberg Co.	303-758-9033
CT	Madison, HV Engrg.	203-401-4561
FL	Altamonte Springs, Semtronic Assoc.	305-831-8233
FL	Clearwater, Semtronic Assoc.	813-461-4675
GA	Atlanta, JWL Assocs.	404-429-8010
IL	Chicago, L & W Power Corp.	312-887-8909
IL	Wheaton, Westinghouse	312-462-0404
IA	Cedar Rapids, Dy-Tronix	319-377-8275
MD	Baltimore, Westinghouse Elect.	301-792-8857
MA	Boston, Westinghouse Elec.	617-237-6950
MA	Ludlow, Gerber Sls.	413-589-9837
MA	Newton Upper Falls, Gerber Sls.	617-969-2620
MI	Livonia, L & W Power, Corp.	313-525-1380
MN	Minneapolis, Comstrand	612-788-9234
MO	Independence, Dy-Tronix	816-373-6600
MO	St. Louis, Dy-Tronix	314-731-5799
NJ	Basking Ridge, Eastpower Co.	201-766-7886
NM	Albuquerque, Lindberg Co.	505-881-1006
NY	Ithaca, Bob Dean, Inc.	607-257-1111
NC	Charlotte, JWL Assocs.	704-523-3001
NC	Raleigh, JWL Assocs.	919-787-4826
OH	Cincinnati, J. R. Thornberry Co.	513-874-0236
OH	Kettering, L & W Power, Corp.	513-293-3482
OH	South Euclid, J.R. Thornberry Co.	216-321-3328
PA	Pittsburgh, Covert & Newman Co.	412-531-2002
PA	Youngwood, Westinghouse	412-925-7272
TX	Austin, NOVA Mktg.	512-835-1733
TX	Dallas, Nova Mktg.	214-750-6082
TX	Houston, Nova Mktg.	713-988-6082
UT	Salt Lake City, Lindberg Co.	801-969-2400
WI	Milwaukee, L & W Power Corp.	414-786-0260

WEST INSTRS, Gulton Inds, M. C. S. Div., Gulton Indl Pk, E. Greenwich, RI 02818, Tel: 401-884-6800, TWX: 710-387-1500; Empl.: 400; *Sls. Mgr.:* W. Hunt; *Dist. Mgr.:* W. Hunt

WESTLAKE CAPACITORS INC., 5334 Sterling Center Dr., Westlake Village, CA 91361, Tel: 818-889-4120, TWX: 910-494-4779; Empl.: 210; *Sls. Mgr.:* F. G. Edge; *Dist. Mgr.:* D. Lawrence

WESTON CONTROLS/POTS DIV., Div. Fairchild Weston Sys., Inc., Archbald, PA 18403, Tel: 717-876-1500, Telex: 83-1873, TWX: 510-656-2902; FSC No.: 94271; Empl.: 1077; *Sls. Mgr.:* J. Cousins .... 1A•2071-2084

Local Sales Offices & Reps

AZ	Phoenix, Sanford Sls. Assoc.	602-957-3570
CA	Carlsbad, Addem/San Diego	619-729-9216
CA	Mountain View, Westmark Assocs.	415-969-1700
CA	Van Nuys, Wes-K Assocs.	213-989-3070
CO	Denver, Quorum 3 Sls. Group	303-696-8480
CT	Ridgefield, Phoenix Sls. Co.	203-438-9644
FL	Clearwater Beach, Perrott Assocs.	813-443-5214
FL	Orlando, Perrott Assocs.	305-298-7748
FL	Sunrise, Perrott Assocs.	305-792-2211
GA	Stone Mountain, DTM, Inc.	404-962-2530
IL	Skokie, Marcon Assocs.	312-675-6450
KS	Olathe, Rush & West	913-764-2700
KS	Wichita, Repco	316-263-4238
MD	Baltimore, B. White & Co.	301-484-5400
MA	Stow, Today Comp. Sls. Corp.	617-897-7500
MI	Warren, DEM Elctrn. Sls.	313-575-9444
MN	St. Paul, Repco	612-642-2828
MO	Ballwin, Rush & West Assoc., Inc.	314-394-7271

MO	Independence, Repco	816-254-3410
NJ	Fairfield, Addem Sls.	201-882-0993
NY	Albany, Reagan/Compar	518-489-4777
NY	Endwell, Reagan/Compar	607-723-8743
NY	Endwell, Reagan/Compar	607-754-8946
NY	Fairport, Reagan/Compar	716-271-2230
NY	New Hartford, Reagan/Compar	315-732-3775
OH	Dayton, J. C. Hofstetter Co.	513-296-1010
OH	Medina, J. C. Hofstetter Co.	216-241-4880
OR	Beaverton, LD Elctrns.	503-649-6177
PA	Hickory, J. C. Hofstetter Co.	412-356-2305
PA	Rydal, ESPY Sls.	215-576-0780
TX	Austin, Delta Comps.	512-458-4288
TX	Seagoville, Delta Comps.	214-287-6333
UT	Salt Lake City, Quorum 3 Sls. Grp.	801-943-9227
WA	Snohomish, LD Elctrns.	206-568-0511
WA	Spokane, LD Elctrns.	509-922-4883

Local Distributors

AZ	Phoenix, TTI	602-861-0222
AZ	Phoenix, Arizona Comps.	602-269-5655
AZ	Tempe, Circuit Specialists, Inc.	602-966-2878
CA	Belmont, Arndt	415-592-6718
CA	Chatsworth, Diplomat Elctrns.	213-700-8700
CA	Chatsworth, Integrated Elctrns.	213-998-2200
CA	Chatsworth, Shelley Elctrns.	213-998-3333
CA	Costa Mesa, Diplomat Elctrns.	714-549-8401
CA	Garden Grove, Hi Rel Distr. Sls.	213-594-9571
CA	Gardena, Bell Inds.	213-515-1800
CA	Irvine, Kelex, Inc.	714-863-1230
CA	Irvine, Integrated Elctrns.	714-540-5600
CA	San Diego, DECO	619-693-1595
CA	San Diego, Diplomat Elctrns.	619-292-5693
CA	San Diego, Park West Distrs.	619-277-8433
CA	San Diego, Bell Inds.	619-268-1277
CA	San Diego, Shelley Elctrns.	619-453-7133
CA	San Fernando, Petell Elctrns.	213-365-9841
CA	San Jose, Shelley Elctrns.	415-969-1820
CA	Santa Clara, Pyramid Elctrns.	408-727-9810
CA	Santee, Mouser Elctrns.	619-449-2222
CA	Sunnyvale, Diplomat Elctrns.	408-734-1900
CA	Van Nuys, Elctrn. Expediters	213-781-1910
CO	Denver, Ragon Elctrns.	303-744-3601
CO	Englewood, Diplomat Elctrns.	303-740-8300
CT	Danberry, Diplomat Elctrns.	203-797-9674
CT	Norwalk, Park Dist.	203-853-2011
CT	Orange, Milgray	203-795-0711
FL	Clearwater, Diplomat Elctrns.	813-443-4514
FL	Longwood, Intertec	305-834-7777
FL	Miami, Electronic Equip.	305-871-3500
FL	Orlando, TTI II	305-859-1000
FL	Tampa, Shelley Elctrns.	813-884-0946
FL	Tampa, Impala Elctrns.	813-885-4747
FL	Winter Park, Milgray	305-647-5747
GA	Norcross, Diplomat Elctrns.	404-449-4133
ID	Spirit Lake, Al Elctrns.	208-623-3111
IL	Bensenville, Diplomat Elctrns.	312-595-1000
IL	Chicago, Bell Inds.	312-982-9210
IL	Elk Grove Village, GBL/Goold Elctrns.	312-593-3220
IL	Skokie, Marcon Assocs., Inc.	312-675-6450
IN	Indianapolis, Meunier Elctrn. Supp.	317-635-3511
IN	Indianapolis, Graham Elctrns.	317-634-8202
KS	Overland Park, Milgray/Kansas City	913-236-8800
KY	Louisville, Peerless Elctrn. Equip. Co.	502-637-7674
MD	Columbia, Diplomat Elctrns.	301-995-1226
MD	Rockville, Milgray	301-468-6400
MD	Timonium, Zebra Elctrns.	301-252-6576
MA	Burlington, Milgray	617-272-6800
MA	Canton, Impact Sls.	617-821-1500
MA	N. Chelmsford, Pilgrim Elctrns.	617-251-8746
MA	Woburn, Diplomat Elctrns.	617-935-6611
MI	Grand Rapids, RM Elctrns.	616-531-9300
MN	St. Paul, Ragon Elctrns.	612-642-2828
MO	St. Louis, Olive Elctrns. Inc.	314-426-4500
NJ	Audubon, Diplomat Elctrns.	609-858-2450
NJ	Marlton, Milgray	609-983-5010
NJ	Mountainside, Enox	201-654-7600
NJ	Nutley, Vantage Elctrns.	201-667-1840
NJ	Totowa, Diplomat	201-785-1830
NY	Bohemia, TTI	516-567-1500
NY	Bohemia, Justin Elctrns.	516-589-4000
NY	Buffalo, Summit Distr.	716-884-3450
NY	Dobbs Ferry, Gemini Elctrn. Co.	914-693-6363
NY	East Farmingdale, Tri-Start Elctrns. Inc.	516-293-0400
NY	Farmingdale, Pride Elctrns.	516-293-4020
NY	Farmingdale, Command Elctrns.	516-293-1212
NY	Farmingdale, Milgray Elctrns.	516-420-9800
NY	Hauppauge, JACO	516-273-5500
NY	Hauppauge, Fairmont Elctrn. Sls.	516-231-3313
NY	Liverpool, Diplomat Elctrns.	315-652-5000
NY	Melville, Diplomat Elctrns.	516-454-6400
NY	New York City, Centaur Elctrns.	212-695-6984
NY	Rochester, Masline Elctrns.	716-546-5373
NY	Valley Stream, L&S Elctrns.	516-561-2474
NY	West Babylon, Delmar Elctrns.	516-420-1234
OH	Cincinnati, Hughes Peters	513-351-2000
OH	Cleveland, Pruitt Energy Sources	216-566-1545
OH	Cleveland, Milgray/Cleveland	216-447-1520
OH	Dayton, Stotts Friedman	513-298-5555
OH	Dayton, Micro-Mil	513-434-8231
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
PA	Philadelphia, Encore Elctrns. Inc.	215-676-7200
PA	Philadelphia, Shap Elctrns.	215-969-3300
PA	Philadelphia, Herbach & Rademan	215-426-1700
PA	Pittsburgh, Alder-Tronics	412-821-5565
PA	Willow Grove, RESCO Elctrns.	215-659-4575
PA	York, Elctrn. Comps. for Inds.	717-843-8971
TX	Austin, Southwest Elctrns.	512-837-8971
TX	El Paso, Intl. Elctrns.	915-778-9761
TX	Ft. Worth, TTI	817-831-0441
TX	Ft. Worth, Allied Elctrns.	817-336-5401
TX	Richardson, Southwest Elctrns.	214-234-3050
TX	Richardson, JACO Elctrns.	214-235-9575
TX	Stafford, Southwest Elctrns.	713-491-4900
UT	Salt Lake City, Diplomat Elctrns.	801-486-4134
UT	Salt Lake City, Standard Supp.	801-486-3371
VA	Charlottesville, Virginia Radio	804-296-4184
WA	Bellevue, Integrated Elctrns.	206-455-2727
WA	Seattle, Pacific Elctrns.	206-575-1050

WESTREX, 1140 Bloomfield Ave., W. Caldwell, NJ 07006, Tel: 201-227-7290, Telex: 64-1490, TWX: 710-734-4323; Empl.: 180; *Sls. Mgr.:* J. C. Murray

WESTREX OEM PRODUCTS, Litton Inds., 51 Penn St., Fall River, MA 02724, Tel: 617-676-1016, Telex: 651490-WNJW, TWX: 710-341-3099; *Sls. Mgr.:* J. C. Murray; *Dist. Mgr.:* Ed Cunnie

Local Sales Offices & Reps

CA	Granada Hills, Westrex OEM Prods.	818-363-7419
NJ	Iselin, Westrex OEM Prods.	201-634-5492

WESTRONICS INC. OF TEXAS, 2441 Northeast Pkwy., Box 4619, Ft. Worth, TX 76106, Tel: 817-625-2311, Telex: 75-8273; Empl.: 250; *Sls. Mgr.:* Paul Schultz

WEST-TRONICS, INC., 215 Park St., Bensenville, IL 60106, Tel: 312-860-3560; *Sls. Mgr.:* Will Allen

WHEDCO, INC., 6107 Jackson Rd., Ann Arbor, MI 48103, Tel: 313-665-5473; *Sls. Mgr.:* K. V. Chilton

WHEELOCK SIGNALS, INC., 273 Branchport Ave., Long Branch, NJ 07740, Tel: 201-222-6880, TWX: 710-722-6510; Empl.: 200; *Sls. Mgr.:* Brian Van Horn

WHITMOR WIRE & CABLE, 13161 Sherman Way, Bldg. B, N. Hollywood, CA 91605, Tel: 818-764-6296, Telex: 194479; FSC No.: 15851; Empl.: 29; *Sls. Mgr.:* Michael Weiss; *Dist. Mgr.:* Mark Lee

Local Sales Offices & Reps

CA	Sunnyvale, Wirenetics Co.	408-745-6673

Local Distributors

CA	Sunnyvale, Wirenetics Co.	408-745-6673
CA	Valencia, Wirenetics Co.	805-257-2400

WHITSO, 9326 Byron St., Schiller Pk., IL 60176, Tel: 312-678-5200; Empl.: 200; *Sls. Mgr.:* A. Paloian

WHITTAKER CORP., 10880 Wilshire Blvd., Los Angeles, CA 90024, Tel: 213-475-9411, Telex: 674891; Empl.: 17,000

WHITTAKER CORP., Electronic Resources Div., 100 E. Tujunga Ave., Burbank, CA 91502, Tel: 818-843-5770, TWX: 910-498-2751; FSC No.: 72152

WHITTAKER CORP., Providence Chemicals Div., King Philip Rd., E. Providence, RI 02914, Tel: 401-434-1770, Telex: 92-7652; Empl.: 42

WIDE BAND ENGRG. CO., INC., Box 21652, Phoenix, AZ 85036, Tel: 602-254-1570; Empl.: 10

WIDE RANGE ELCTRNS. CORP., 2119 Schultz Rd., St. Louis, MO 63141, Tel: 314-567-5366, Telex: 44-2560; Empl.: 16; *Sls. Mgr.:* Otto Rauhut

WILBRECHT ELCTRNS., 240 Plato Blvd., St. Paul, MN 55107, Tel: 612-222-2791, TWX: 910-563-3679; Empl.: 300

WILCO

WILCO CORP., 4030 W. Tenth St., Indianapolis, IN 46222, Tel: 317-241-2516 **1A•1306, 1307**

WR

WILCOXON RESEARCH

WILCOXON RESCH., P.O. Box 5798, Bethesda, MD 20814, Tel: 301-770-3790, Telex: 898-342; Empl.: 26; *Sls. Mgr.:* W. Wilcoxon **1B•1886**

WILD ROVER, See Refac Elctrns.

WILKINSON, P.O. Box 4558, Westlake Village, CA 91359, Tel: 818-889-0050, 800-822-4653, Telex: 698213; Empl.: 34; *Dist. Mgr.:* R. Cook

WILMAR ELCTRNS., INC., 2430 Amsler St., Torrance, CA 90505, Tel: 213-326-6668, Telex: 182417; FSC No.: 25248; Empl.: 25; *Sls. Mgr.:* Zev Heifetz

WILMORE ELCTRNS. CO., Box 1329, Hillsborough, NC 27278, Tel: 919-732-9351, Telex: 292617; Empl.: 48; *Sls. Mgr.:* J. L. Harris **3•1807-1809, 1920, 1921**

WILSON, H.F., ENGRG. CO., 475 Taft Ave., Glen Ellyn, IL 60137, Tel: 312-469-8473, Telex: 72-1438; Empl.: 18; *Sls. Mgr.:* H. Wilson; *Dist. Mgr.:* R. Carroll

WILSON, H. M., CO., 11501 Chimney Rock Rd., Houston, TX 77035, Tel: 713-729-1183; Empl.: 3; *Sls. Mgr.:* H. M. Wilson

WILSON ELECTRONICS, PO Box 19000, Las Vegas, NV 89119, Tel: 702-739-1931, Telex: 684-522; Empl.: 175; *Sls. Mgr.:* J. Flatt; *Dist. Mgr.:* Mac Harrison

WILTRON, 805 E. Middlefield Rd., P.O. Box 7290, Mountain View, CA 94042-7290, Tel: 415-969-6500, TWX: 910-379-6578; FSC No.: 20944; Empl.: 500; *Sls. Mgr.:* W. Baxter

WINSLOW INTL., 2471 E. Bayshore #520, Palo Alto, CA 94303, Tel: 415-856-0552, TWX: 910-373-2060; Empl.: 8; *Sls. Mgr.:* G. Hall; *Dist. Mgr.:* M. Niland

WINTEK CORP., 1801 South St., Lafayette, IN 47904-2993, Tel: 317-742-8428, Telex: 70-9079; Empl.: 7; *Sls. Mgr.:* Stephen E. Belter **3•1118**

Local Sales Offices & Reps

CA	Santa Clara, PBC Assocs.	408-727-7244
CO	Parker, Western Mktg. Assocs.	303-841-2788
IL	Downers Grove, Physics Equip.	312-960-4053
UT	Logan, Western Mktg. Assocs.	801-753-0073

WIRE GRAPHICS, 215 B. Central Ave., Farmingdale, NY 11735, Tel: 516-293-1525; Empl.: 43; *Sls. Mgr.:* Nat Stettin

WIREMOLD COMPANY, W. Hartford, CT 06110, Tel: 203-233-6251, TWX: 710-425-6281; Empl.: 800; *Sls. Mgr.:* F. F. Keating

WONDER CORP OF AMERICA, 22 Elizabeth St., South Norwalk, CT 06856, Tel: 203-866-3033, Telex: 965838; Empl.: 140; *Sls. Mgr.:* Peter Schub

WOODWARD MEASUREMENT INSTRS. LTD., 236 Wineva Ave., Toronto, ON M4E 2T4, Canada

WORKMAN ELCTRN. PRODS., Box 3828, Sarasota, FL 33578, Tel: 813-371-4242, TWX: 810-864-0401; Empl.: 150; *Sls. Mgr.:* Frank Pounds

"WORLD" ENTERPRISES, INC., 550 N. Bayard Ave., Waynesboro, VA 22980, Tel: 703-942-4159; *Sls. Mgr.:* B. F. Baber

WORLD STORAGE TECHNOLOGY, LTD., 14251 Franklin Ave., Tustin, CA 92680, Tel: 714-838-1491, Telex: 182727; Empl.: 250; *Sls. Mgr.:* Richard McGowan

WOVEN ELCTRNS., Box 189, Mauldin, SC 29662, Tel: 803-963-5131, TWX: 810-287-2091; Empl.: 180; *Sls. Mgr.:* E. A. Ross Jr.

WRIGHT CAPACITORS, 3000 So. Orange, Santa Ana, CA 92707, Tel: 714-546-2490; Empl.: 25; *Sls. Mgr.:* Curtiss Wright

WYCO METAL, See Stantron

XANADU CONTROLS, Electroid Corp., 45 Fadem Rd., Springfield, NJ 07081-3189, Tel: 201-467-8100, Telex: 139241; FSC No.: 57841; *Sls. Mgr.:* Peter Mesniaeff; *Dist. Mgr.:* Peter Mesniaeff

XCP INC., 8 W. Main St., Dryden, NY 13053, Tel: 607-844-9143; *Sls. Mgr.:* Mary Dove

XEDAR CORP., 2500 Central Ave., Boulder, CO 80301, Tel: 303-443-6441, Telex: 910-940-2512; *Sls. Mgr.:* Carol Hill

XENON CORP., 66 Industrial Way, Wilmington, MA 01887, Tel: 617-658-8940, Telex: 951142; Empl.: 45; *Sls. Mgr.:* Louis R. Panico

Advertisement

XENON CORPORATION designs, develops and manufactures Flashtubes, UV Curing Equipment, Solar Simulators, and Pulsed Light Systems. Applications for Flashtubes include Laser Pumping, Beacon Light and Specialized Photography. Applications for UV Curing Equipment includes Wire Tacking, Photo Resist Curing, and Conformal Coating Curing, Curing Adhesive for Fibre Optic Connections, Cladding and Cladding Touch-up. Solar Simulators are used for testing Photo-Voltaic Cells and Panels. Applications for Pulsed Light Systems include Quality Control Processing and Research.

Xentek

XENTEK, INC., 279 S. Pacific St., San Marcos, CA 92069, Tel: 619-744-3346, TWX: 910-322-1155; FSC No.: 52360; Empl.: 430 .... **3**•1810, 1811

Local Sales Offices & Reps

AL	Huntsville, Conley & Assocs.	205-882-0316
AZ	Scottsdale, Williams Assoc.	602-947-4297
CA	Goleta, Thorson Co.	805-964-8751
CA	Los Angeles, Thorson Co.	213-595-0361
CA	San Diego, Robert Posten	619-744-3346
CA	Sunnyvale, RDP Instr.	408-735-9040
CO	Commerce City, Williams Assoc.	303-289-5647
CT	Canton, Bell Controls	203-693-8926
FL	Boca Raton, Conley & Assocs.	305-395-6108
FL	Oveido, Conley & Assocs.	305-365-3283
FL	Tampa, Conley & Assocs.	813-885-7658
GA	Atlanta, Conley & Assocs.	404-447-6992
IL	Chicago, Berndt & Assocs.	312-283-0713
IN	Carmel, Berndt Assocs.	317-844-0114
MD	Gaithersburg, Beacon North	703-591-1300
MI	Southfield, Fred Gehrke & Assoc.	313-559-5363
MN	Minneapolis, Berndt Assocs.	612-546-2021
MO	Grandview, R. R. Burton	816-763-5385
NH	Nashua, Bell Controls	603-882-6984
NJ	Haddonfield, Tritek Sls.	215-627-0149
NM	Albuquerque, Williams Assoc.	505-255-1638
NY	East Syracuse, Nycom	315-437-8343
NY	Hartsdale, Spectrum Sls.	914-472-8600
NC	Raleigh, Conley & Assocs.	919-876-9862
OH	Cleveland, Geotronix	216-526-2535
OH	Trotwood, Geotronix	513-854-5939
OR	Beaverton, Huntley Assocs.	503-649-5308
TX	Dallas, Allied Comps.	214-238-0408
TX	Houston, Allied Comps.	713-988-1600
TX	Round Rock, Allied Comps.	512-244-1166
UT	Salt Lake City, Williams Assoc.	801-485-6511
VA	Fairfax, Beacon North	703-591-1300
WA	Everett, Huntley Assocs.	206-353-1833
WI	Milwaukee, Berndt Assocs.	414-545-8400

XERCON, INC., P.O. Box 554, Portland, OR 97207, Tel: 503-641-9525; *Sls. Mgr.:* G. Osgood

XICO

XICO, INC., 120 Ocean Way, Santa Monica, CA 90402, Tel: 213-454-0302, Telex: 709577; *Sls. Mgr.:* Joe Sheppard .... **3**•1104

XIT ROD, PO Box 128, Beaumont, CA 92223, Tel: 714-845-3986; Empl.: 4

XSIS

XSIS ELECTRONICS, INC., 12620 W. 63rd St., Shawnee, KS 66216, Tel: 913-631-0448, Telex: 437227; FSC No.: 57051; *Sls. Mgr.:* Jerry Dehnert .... **1A**•1443

Local Sales Offices & Reps

AL	Huntsville, Murcota Corp.	205-539-8476
AZ	Phoenix, Anderson Co.	602-266-2070
CA	Culver City, Westaironics Inc.	213-641-4122
CA	Sunnyvale, Loeswick's	408-745-6751
CO	Loveland, Morbak Mktg.	303-669-8900
IL	Rolling Meadows, Sieger Assoc.	312-991-6161
KY	Ft. Mitchell, G. W. Thelen Co.	606-341-8181
MD	Ellicott City, VPI Inc.	301-461-2525
MA	Norwood, MPS Elctrns.	617-769-8700
MN	Eden Prairie, Aldridge Assoc. Inc.	612-944-8433
NJ	Fairfield, Addem Sls.	201-882-0993
NY	Fayettville, R. D. Sherman	315-637-9861
TX	Houston, Repmaster	713-692-8204
TX	Sherman, Repmaster	214-247-6236
EXP	NY, Great Neck, Ad Auriema	516-487-0700

XYCOM, 750 N. Maple Rd., Saline, MI 48176, Tel: 313-429-4971, TWX: 810-223-8153; Empl.: 225; *Sls. Mgr.:* Dan Lewis; *Dist. Mgr.:* Bill Nemeth

XYLOG CORP., 150 Tillman St., Westwood, NJ 07675, Tel: 201-664-7997; Empl.: 25; *Sls. Mgr.:* Milton Frank .... **3**•1813, 1922

YARDNEY BATTERY DIV., Yardney Elec. Corp., 82 Mechanic St., Pawcatuck, CT 02891, Tel: 203-599-1100, Telex: 6813114, TWX: 710-470-0260; FSC No.: 87362; Empl.: 300; *Sls. Mgr.:* Herman G. Lewis, Jr.

YELLOW SPRINGS INSTR., Box 279, Yellow Springs, OH 45387, Tel: 513-767-7241, Telex: 205437; Empl.: 375; *Sls. Mgr.:* R. Heggemann

Local Sales Offices & Reps

AZ	Tempe, Elec-Com Assoc.	602-967-8023
CA	Costa Mesa, FLW, Inc.	714-751-7512
CA	Hayward, FLW, Inc.	415-487-2222
CA	Van Nuys, FLW, Inc.	213-989-5238
CO	Boulder, Grady Moore & Assocs.	303-494-3351
GA	Atlanta, Craft Assoc.	404-256-0420
GA	Marietta, FLW, Inc.	404-424-1731
IL	Lansing, Van Meter Inst.	312-474-3580
IN	Indianapolis, RDP Corp.	317-788-4296
MA	Norwell, Bordewieck Engrg.	617-659-4915
MI	Farmington Hills, Anderson Elctrns.	313-553-7600
MN	Minneapolis, Trask Engrg.	612-537-2434
NJ	Scotch Plains, RJM Sls.	201-322-7880
NM	Albuquerque, Elec-Com Assoc.	505-898-6101
NY	Syracuse, Labtronics	315-455-7314
OH	Cleveland, RDP Assoc.	216-659-3138
OH	Dayton, RDP Assocs.	513-253-6175
PA	Pittsburgh, RDP Assoc.	412-487-5055
TX	Houston, American Analog	713-941-7265
TX	Lewisville, Milestek	214-436-1597
VA	Richmond, Advance Control Equip.	804-270-7182
WA	Bellevue, Topp Engrg Sls.	206-747-5400

Local Distributors

MN	Minneapolis, Trask Engrg.	612-537-2434
NJ	Scotch Plains, RJM Sls.	201-322-7880
NY	Syracuse, Labtronics	315-455-7314
OH	Dayton, RDP Corp.	513-253-6175
TX	Lewisville, Milestek	214-436-1597

YEW CORP., See Yokogawa Corp. of America

YOKOGAWA CORP. OF AMERICA, 2 Dart Rd., Shenandoah, GA 30265, Tel: 404-253-7000, TWX: 714-567-1256; Empl.: 70; *Sls. Mgr.:* J. V. Stegenga

YORK METAL PRODUCTS, INC., 34-20 12th St., Long Island, NY 11367, Tel: 212-932-3660; *Sls. Mgr.:* Harold Miller

ZECO, INC., 2075 H Bering Dr., San Jose, CA 95131, Tel: 408-286-8856; *Sls. Mgr.:* Conie Johnson; *Dist. Mgr.:* Conie Johnson

YORK TECHNOLOGY, INC., 1101 State Rd., Bldg. O, Princeton, NJ 08540, Tel: 609-924-7676; *Sls. Mgr.:* Geoffrey R. Gamble

YUASA

YUASA BATTERY (AMERICA), INC., 9728 Alburtis Ave., Santa Fe Springs, CA 90670, Tel: 213-949-4266, Telex: 696272; Empl.: 5,000; *Sls. Mgr.:* Les Biggins .... **3**•1437

Local Sales Offices & Reps

AZ	Tempe, Elec-Com	602-967-8644
CA	Diablo, Main Engrg. & Mktg. Assocs.	415-837-2193
CA	Garden Grove, West Elctrn Sls.	213-493-5569
CO	Englewood, Grimes Mktg.	303-740-6063
CT	Horth Haven, Kitchen & Kutchin	203-239-0212
FL	Ft. Lauderdale, QXI, Inc.	305-485-6030
FL	St. Petersburg, QXI, Inc.	813-821-2281
IL	Cary, Ellinger Sls.	312-639-1850
IA	Des Moines, Beams Co.	515-255-1148
KS	Shawnee Mission, Beams Co.	913-631-0300
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MA	Burlington, Kitchen & Kutchin	617-229-2660
MN	St. Paul, SKOR	612-426-1160
NJ	Berkeley Hgts., Cambridge Allen & Assocs.	201-464-0203
NJ	Fairfield, Yuasa Battery (Amer.) E. Reg. Off.	201-575-5848
NC	Asheville, Edco Sls.	704-253-1594
OH	Columbus, McFadden Sls.	614-459-1280
PA	Philadelphia, S. K. Macdonald Co.	215-545-1205
TX	Houston, Barry Sls.	713-784-5860
TX	Richardson, Barry Sls.	214-234-0255

ZAMBRE CO., INC., 2134 Old Middlefield Way, Mountain View, CA 94043, Tel: 415-968-9176

ZAX CORP., 2572 White Rd., Irvine, CA 92714, Tel: 714-474-1170, 800-421-0982, Telex: 183829; Empl.: 25; *Sls. Mgr.:* Hal Horrocks

ZEHNTEL, INC., 2625 Shadelands Dr., Walnut Creek, CA 94598, Tel: 415-932-6900, TWX: 910-385-6300; Empl.: 480; *Sls. Mgr.:* N. Vinson; *Dist. Mgr.:* N. Vinson

ZENDEX CORP., 6700 Sierra La., Dublin, CA 94566, Tel: 415-828-3000, TWX: 910-389-4009; *Sls. Mgr.:* James F. Bairey

ZENITH COMPONENTS & SYS. GRP., Zenith Radio Corp., 1000 Milwaukee Ave., Glenview, IL 60025, Tel: 312-391-7733; *Sls. Mgr.:* Norm Berkowitz

ZENITH CONTROLS, 830 West 40th St., Chicago, IL 60609, Tel: 312-247-6400, Telex: 25-3703; Empl.: 125; *Sls. Mgr.:* V. Helford

ZENITH TRANSFORMER CO., INC., 1728 West 130th St., Gardena, CA 90249, Tel: 213-321-4551

ZENITH CRT & COMPONENTS OPERATIONS, 1000 Milwaukee Ave., Glenview, IL 60025, Tel: 312-391-7733; *Sls. Mgr.:* Norm Berkowitz

ZENRAD CIRCUITS CO., 529 E. Gutierrez St., Santa Barbara, CA 93103, Tel: 805-963-3527; FSC No.: 33180; Empl.: 10; *Sls. Mgr.:* A. Radford

ZERO
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ZERO CORP., 777 Front St., Burbank, CA 91503, Tel: 213-846-4191, TWX: 910-498-2237; Empl.: 1400; *Sls. Mgr.:* J. J. Roderer .... **2**•1070-1079

Local Sales Offices & Reps

AZ	Phoenix, Howe & Howe Sls., Inc.	602-264-7971
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CA	Palo Alto, Northern Cal. Sls. Off.	415-964-7700
CA	San Diego, San Diego Sls. Off.	619-271-7221
CO	Boulder, Component Prod. Sls. Co. Inc.	303-530-2800
FL	Clearwater, Richard Straker	813-531-8991
IL	Elk Grove Village, Carlson Elctrns. Sls.	312-956-8240
IN	Indianapolis, L.M. DeVoe Co.	317-842-3245
IA	Cedar Rapids, Carlson Elctrn. Sls.	319-377-6341
LA	Metairie, Automation Supplies	504-831-2183
MD	Baltimore, R. P. Luce & Co.	301-752-8200
MA	Monson, Zero-East Div.	413-267-5561
MI	Grosse Pointe Park, Greiner Assoc. Inc.	313-499-0188
MN	Bloomington, Elctrn. Sls. Agcy.	612-884-8291
MO	Raytown, Cadon Tech. Sls.	816-356-7685
MO	St. Louis, Cadon Techn. Sls.	314-645-8670
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NM	Albuquerque, Fry-Gates	505-262-1525
NY	East Syracuse, Fountain Young & Co.	315-437-7733
NY	New Hyde Park, R.P. Luce & Co.	516-437-4550
NC	Wilson, Diemer Assoc.	919-237-8217
OH	Columbus, Tom Mulligan & Assocs.	614-457-2242
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PA	Boswell, B.E. Gibson	814-629-6772
PA	Huntingdon Valley, Inacker Sls.	215-947-5660
SC	Greenville, Sunbelt Sls.	803-877-9088
TX	Dallas, J. Gibbs & Assocs.	817-430-1861
TX	Fort Worth, J. Gibbs & Assocs.	817-237-1455
TX	Houston, Milco Mktg.	713-946-2841
UT	Salt Lake City, Effective Sls.	801-266-9617
VA	Powhatan, R. P. Luce & Co	804-598-2095
WA	Vashon, RTS, Inc.	206-285-1316

Local Distributors

AL	Huntsville, Powell Elctrns.	205-539-2731
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AZ	Phoenix, Dalis Elctrn Supp.	602-275-2885
AZ	Tucson, Inland Elctrn Supp.	602-294-2628
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CA	Sunnyvale, R. V. Weatherford Co.	408-738-8694
CO	Denver, R. V. Weatherford Co.	303-428-6900
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MI	Wyoming, R.M. Elctrns.	616-531-9300
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MO	Kansas City, L-Comp	816-221-2400
MO	Maryland Hghts, L-Comp	314-291-6200
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OR	Beaverton, Zepher Elctrns.	503-643-1980
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PA	McKean, Advacom	814-476-7774
PA	Montgomeryville, Pyttronic Inds.	215-643-2850
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TX	El Paso, Inter. Elctrns.	915-778-9761
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TX	Houston, Solid State Elctrns.	713-772-8483
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VA	Richmond, Sterling Elctrns.	804-226-2190
WA	Seattle, R.V. Weatherford	206-575-1340
WA	Seattle, Zepher Elctrn. Sls. Corp.	206-241-1980

ZERO-EAST DIV., 288 Main St., Monson, MA 01057

ZETA LABS., 3265 Scott Blvd., Santa Clara, CA 95051, Tel: 408-727-6001, TWX: 910-338-7336; FSC No.: 31260; Empl.: 195; *Sls. Mgr.:* C. W. Frank

ZEUS INDL. PRODS. INC., P.O. Box 298, Raritan, NJ 08869, Tel: 201-526-0800, 800-526-3842, TWX: 710-480-9346; FSC No.: 32039; Empl.: 110; *Sls. Mgr.:* John Worley; *Dist. Mgr.:* Arthur M. Silverman .... **2**•1871

ZEXCO, 7661 Densmore, #8, Van Nuys, CA 91406, Tel: 818-997-7895

ZIATECH, 3433 Roberto Ct., San Luis Obispo, CA 93401, Tel: 805-541-0488, Telex: 4992316; Empl.: 25; *Sls. Mgr.:* Jim Eckford

ZIERICK MFG. CORP., 44 Radio Circle, Mt. Kisco, NY 10549, Tel: 914-666-2911, TWX: 710-571-2143; Empl.: 120; *Sls. Mgr.:* L. T. Noyes

ZIPPERTUBING CO., P.O. Box 61129, Los Angeles, CA 90061, Tel: 213-321-3901, TWX: 910-346-6713; Empl.: 120; *Sls. Mgr.:* Terry Plummer

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ZYMOS CORP., 477 N. Mathilda Ave., Sunnyvale, CA 94086, Tel: 408-730-8800, 408-730-5400, TWX: 910-339-9530; *Sls. Mgr.:* Jeff Jacobsen

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eem FILE SYSTEM

EEM FILE SYSTEM CATEGORIES

The 1984-85 EEM contains 61 Product Sections spread over four volumes. These same Sections are the basis for the famous EEM File System which is in daily use in thousands of engineering libraries. The subcategories of the System appear on the following pages. The complete System is available for only $25.

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Amplifiers, Compressor
Amplifiers, Current, AC
Amplifiers, DC
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Amplifiers, Differential
Amplifiers, Distribution
Amplifiers, Fiber Optic
Amplifiers, IF
Amplifiers, Instrumentation
Amplifiers, Integrating-Also See Amplifiers, Operational; Integrators, Electronic
Amplifiers, Isolation
Amplifiers, Limiting
Amplifiers, Line
Amplifiers, Lock-in
Amplifiers, Logarithmic
Amplifiers, Magnetic
Amplifiers, Multichannel
Amplifiers, Narrow Band
Amplifiers, Null
Amplifiers, Operational
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Amplifiers, Phase-Lock Loop
Amplifiers, Power
Amplifiers, Programmable Gain
Amplifiers, Pulse
Amplifiers, Pulse Limiting
Amplifiers, RF
Amplifiers, Sample & Hold
Amplifiers, Sweep
Amplifiers, Transducer-Also See Signal Conditioners
Amplifiers, Travelling Wave Tube
Amplifiers, Ultrasonic
Amplifiers, Video
Amplifiers, Voltage Reference
Amplifiers, Wideband
Drivers, Chopper
Preamplifiers
Signal Conditioners & Equipment

1300 AUDIO EQUIPMENT & ACCESSORIES (Volume 3)

Amplifiers, AF
Amplifiers, Equalization
Amplifiers, Mixing
Attenuators, Audio
Audible Alarms & Transducers-Also see Piezoelectric Ceramics; Transducers, Audio
Baffles, Speaker
Coders, AF
Controls, Fader
Drivers, Speaker
Duplicators, Magnetic Tape
Editing Equipment, Tape
Equalizers, Audio
Erasers, Magnetic Tape (Bulk)
Grilles & Accessories, Speaker
Handsets, Chestsets, Headsets, etc.
Headphones
Heads, Magnetic Recording
Microphone Accessories (Incl. Stands, Holders, Booms)
Microphones, Bone Conduction
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Microphones, Ceramic
Microphones, Condenser (Incl. Electret)
Microphones, Crystal
Microphones, Dynamic
Microphones, Lavalier
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Microphones, Omnidirectional
Microphones, Subminiature
Microphones, Velocity
Microphones, Wireless
Mixers, Audio
Monitors, Power, AF
Networks, Crossover, Attenuator (Audio)
Pickups, Telephone (For Recording)
Public Address Systems
Recorders, Sound Level
Speaker Systems
Speakers, Explosion & Flame Proof
Speakers, Horn
Speakers, Intercom
Speakers, Midrange
Speakers, Musical Instrument
Speakers, Pillow
Speakers, Public Address
Speakers, Replacement (Including Aircraft, Automotive & TV)
Speakers, Submergence Proof
Speakers, Subminiature-Also See Bells, Buzzers, Gongs, Sirens & Aural Warning Devices
Speakers, Tweeter
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Benches, Consoles, Tables (Work Stations, Lab & Shop)-Also See Enclosures, Equipment and Panel Mounting
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Casters
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Enclosures, Circuit Board, Module, & Relay Mounting
Enclosures, Equipment & Panel Mounting
Enclosures, Keyboard
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Enclosures, Portable, Metallic & Nonmetallic
Enclosures, Shielded
Frames, Cabinet & Rack
Grilles, Metal, Plastic
Guides, Circuit Board
Handles For Cabinets, Circuit Boards, Racks, etc.
Housings, Terminal
Kits, Enclosure Prototyping
Slides, Cabinet & Chassis
Stands, Instruments
Stands, Printer/Terminal
Swivel Units, Data Entry Terminals
Work Room, Shielded
Work Stations/Decks, Data Entry

1500 CAPACITORS (Volume 1A)

Capacitors, Chip (For Microcircuits)
Capacitors, Energy Storage
Capacitors, Fixed, AC (Incl. Motor Start)
Capacitors, Fixed, Air
Capacitors, Fixed, Aluminum Electrolytic
Capacitors, Fixed, Ceramic, Disc & Tubular
Capacitors, Fixed, Ceramic, Monolithic
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Capacitors, Fixed, Film, Metallized & Nonmetallized
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Chemicals, Wire Stripping
Cleaners & Solvents
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Coatings, Antistatic
Coatings, Compounds, Lubricants, etc., Heat Conductive
Coatings, Conductive, Electric
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Coatings, Fungicidal
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Coatings, Radioactive
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Dispensers, Adhesive
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Lubricants
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Inks for Thick Film Microcircuits
Kits, Printed Circuit
Screens, Printed Circuit

1800 COILS, CHOKES, & INDUCTORS (Volume 1A)

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Coils, Degaussing
Coils, Field
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Coils, Foil Wound
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Coils, Hybrid & Repeater
Coils, IF
Coils, Metallized Ceramic
Coils, Metallized Glass
Coils, Molded
Coils, Relay
Coils, RF
Coils, Saturable Reactor
Coils, Shielded
Coils, Solenoid
Coils, Telephone
Coils, Toroidal
Coils, Transducer
Coils, Transformer
Coils, TV (All Types)
Coils, Variable
Coils, Vidicon Alignment
Reactors, Saturable
Yokes, Deflection, CRT
Yokes, Deflection, Oscilloscope
Yokes, Deflection, Radar PPI
Yokes, Deflection, TV Camera

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Antennas, Direction Finding
Antennas, Ground Plane
Antennas, Helical
Antennas, Log Periodic
Antennas, Loop
Antennas, Microwave
Antennas, Multiband, UHF/VHF
Antennas, Phased Array
Antennas, Rhombic
Antennas, Spiral
Antennas, Telescopic
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Attenuators, IF
Attenuators, RF
Boards, Plug-in Processor
Bridges, Telephone/Data
Cameras, Image Converter
Cameras, Television
CATV Systems & Equipment
Coders, Telephone, Dial
Communications Systems, FM
Communications Systems, Laser
Communications Systems, Multiplex
Communications Systems, Telemetering
Communications Systems, Telephone
Concentrators, Communications
Controllers, Error
Converters, Frequency Shift Keying
Converters, Frequency to Frequency
Converters, Telemetry
Converters, UHF to VHF
Converters, VLF to HF
Couplers, Acoustic
Couplers, Antenna
Couplers, Communications, Acoustic, Telephone
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Decoders, Tone
Decoders, Video
Demodulators
Detectors, Tone
Diplexers, Antenna
Discriminators
Duplexers, Nonmicrowave
Earth Stations, TV, Receive Only
Encoders, Tone
Equalizers, Delay
Equalizers, Phase
Facsimile Equipment, Receive Only
Facsimile Equipment, Send/Receive
Facsmile Equipment, Send Only
Filters, Telemetering
Generators, Baud Rate
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Modems, Communications, Eliminator/Line Driver
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Mounts, Antenna
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Multiplexers, Time Division
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Multipliers, Crystal
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Networks, Directional Antenna Phasing
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Oscillators, Telemetry
Preselectors
Processors, Communications, Front End
Processors, Communications, Message Switching
Processors, Communications, Network Node
Processors, Communications, Standalone
Receivers, Communication
Receivers, Frequency Shift
Receivers, Loran & Omega
Receivers, Monitoring, Communications
Receivers, Telemetry
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Recorders, Video
Scanners, Crossbar
Scanners, Flying Spot
Scramblers, Speech
Strips, Ground
Teleprinters, Auto Send/Receive
Teleprinters, Keyboard Send/Receive
Teleprinters, Receive Only
Teletypewriters & Equipment
Television Systems & Equipment Closed Circuit
Terminations, VHF, Video, Pulse
Transceivers
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Card Equip., Reader/Punch
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Cards, Data Communication/Interfaces
Cards, Linear Function
Cards, Logic
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Character Recognition Equip., Optical
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Controllers, Card Reader/Punch, Standalone
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Controllers, Hard Disk Drive, Add-in
Controllers, Hard Disk Drive, Standalone
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Controllers, Magnetic Tape Drive, Standalone
Controllers, Memory Device, Add-in
Controllers, Memory Device, Standalone
Controllers, Paper Tape Reader/Punch, Add-in
Controllers, Paper Tape Reader/Punch, Standalone
Controllers, Plotter, Add-in
Controllers, Plotter, Standalone
Controllers, Printer, Add-in
Controllers, Printer, Standalone
Controllers, Protocol, Communications
Controllers, Terminal, Add-in
Controllers, Terminal, Standalone
Controls, Computer Input, Joysticks, Mouse Devices, etc.
Converters, Card to Tape
Converters, CRT Display
Converters, Digital to Paper Tape
Converters, Graphic to Digital
Converters, Paper Tape to Magnetic Tape
Converters, Serial to Parallel/Parallel to Serial
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Data Compressors, Digital
Data Links, Optical
Digitizers, Audio
Digitizers, Pencil Follower (Incl. Coordinate & Graphic)
Digitizers, Video
Disks, Magnetic, 5¼" Flexible
Disks, Magnetic, 8" Flexible
Disks, Magnetic, Front-loading Cartridge
Disks, Magnetic, Pack
Disks, Magnetic, Sub-4"
Disks, Magnetic, Top-loading Cartridge
Disks, Magnetic, Winchester Module
Displays, Graphic Systems
Drives, Disc, Flexible and Rigid
Drives, Subsystems, Disk, 8" Diskette
Drives/Subsystems, Core Disk Emulator
Drives/Subsystems, Disk, 14" Winchester
Drives/Subsystems, Disk, 3½" Diskette
Drives/Subsystems, Disk, 5¼" Diskette
Drives/Subsystems, Disk, 5¼" Winchester
Drives/Subsystems, Disk, 8" Winchester
Drives/Subsystems, Disk, Fixed
Drives/Subsystems, Disk, Fixed/Removable
Drives/Subsystems, Magnetic Tape, Cassette
Drives/Subsystems, Magnetic Tape, Reel-to-Reel
Drives/Subsystems, Magnetic Tape, ¼" Cartridge
Drives/Subsystems, Semiconductor Emulator
Encoders, Proof
Generators, Time Code
Generators, Timing, Digital
Input/Output Equipment, Voice
Interfaces, Computer/Peripheral
Light Pens
Mark Recognition Equipment, Optical
Matrices, Switching-Also See Boards, Programming
Memory Devices/Controllers, Bipolar, Add-in
Memory Devices/Controllers, Bipolar, Add-on
Memory Devices/Controllers, Bubble, Add-in
Memory Devices/Controllers, Bubble, Add-on
Memory Devices/Controllers, CCD, Add-in
Memory Devices/Controllers, CCD, Add-on
Memory Devices/Controllers, Magnetic Core, Add-in
Memory Devices/Controllers, Magnetic Core, Add-on
Memory Devices/Controllers, MOS, Add-in
Memory Devices/Controllers, MOS, Add-on
Memory Systems, Bubble
Memory Systems, Core
Memory Systems, Delay Line
Memory Systems, Disk
Memory Systems, Disk, Flexible
Memory Systems, Semiconductor
Memory Systems, Tape
Microfilm, Computer Output (COM) Equipment
Modulator/Demodulators, Data
Networks, Computer, Local Area
Networks, Hybrid
Networks, RC
Paper Tape Equipment, Punch
Paper Tape Equipment, Reader
Paper Tape Equipment, Reader/Punch
Paper, Thermal
Perforators, Paper Tape (Electrically Powered)
Plotters/Hard-Copy Devices
Printer/Plotters
Printers, Daisywheel
Printers, Digital
Printers, Dot Matrix Impact
Printers, Page
Printers, Serial
Printers, Thermal
Processors, Image
Processors, Remittance
Programmers, Punched Card
Programmers, Tape
Readers, Badge
Readers, Bar Code
Readers, Character
Readers, Magnetic Card
Readers, Magnetic Stripe Card
Readers, Punched Card
Readers, Punched Tape
Readers, Static Card
Readers, Time Code
Recognition Equipment, Speech
Recorders, Computer Data
Recorders, Magnetic Tape
Recorders, Program Loading
Scanners, Bar Code
Tape Search Equipment
Tape Winders
Tapes, Magnetic, Digital Cassette
Tapes, Magnetic, ½", 2400' Reel
Tapes, Magnetic, ½", 3600' Reel
Tapes, Magnetic, ¼", 140' Cartridge
Tapes, Magnetic, ¼", 300' Cartridge
Terminal Equipment, Digital
Terminals, Credit Authorization
Terminals, Data Display (including Alphanumeric & Graphic)
Terminals, Data Entry, Multimedia
Terminals, Display
Terminals, Financial
Terminals, Intelligent/Programmable, Batch
Terminals, Intelligent/Programmable, Interactive
Terminals, Intelligent/Programmable, Multiprogramming

Terminals, Intelligent/Programmable, Multiuser
Terminals, Intelligent/Programmable, Real Time
Terminals, Intelligent/Programmable, Transaction Processing
Terminals, Point-of-Sale
Translators, Time Code
Transmission Systems, Data
Transports, Tape (all kinds)

2025 COMPUTERS (MINI/MICRO)

(Volume 3)

Array Processors
Board Computers & Subassemblies, Multibus Compatible
Board Computers & Subassemblies, Q Bus/Unibus Compatible
Board Computers & Subassemblies, S100 Bus Compatible
Board Computers & Subassemblies, STD Bus Compatible
Computers, Analog
Computers, CAD, CAM, & CAD/CAM
Computers, Digital, Micro
Computers, Digital, Mini
Computers, Hybrid, Analog/Digital
Computers, Mainframe
Computers, Micro
Computers, Mini, High End
Computers, Mini, Low End
Computers, Mini, Midrange
Computers, Personal
Computers, Small Business
Services, Computer Systems Integration
Word Processors, Shared Logic Systems
Word Processors, Standalone Systems

2050 COMPUTER SOFTWARE

(Volume 3)

Services, Computer Programming
Services, Computer Systems, Builders
Services, Computer Systems, Consulting
Services, Computer Systems, Integrators
Services, Computer Systems, Turnkey
Services, Data Processing, Consulting
Software, Applications
Software, Communications
Software, Compilers/Languages
Software, Computer Performance Measurement
Software, Data Base Management
Software, Data Base Management Dictionaries
Software, Data Base Query Language
Software, Data Communications Control
Software, Disk/Tape File Utilities
Software, Emulation/Simulation
Software, Information Storage & Retrieval
Software, Job Scheduling/Accounting
Software, Librarians
Software, Operating Systems
Software, Operating Systems Enhancement
Software, Program Translators
Software, Programming/Systems Development Aids
Software, Report Generators
Software, Security
Software, Sort/Merge
Software, Spoolers
Software, Utilities

2100 CONNECTORS, TERMINALS, & SOCKETS

(Volume 2)

Caps, Connector
Clips, Alligator
Clips, Battery
Clips, Fahnestock
Clips, Test
Connector Adapters
Connector Backshells
Connector Blocks, Mother Board
Connectors & Terminals, Push-on, Quick Disconnect
Connectors, Audio
Connectors, Battery
Connectors, Cable
Connectors, Circular, MS/AN
Connectors, D Subminiature
Connectors, DIN
Connectors, Elastomeric
Connectors, Filtered
Connectors, Flat Cable (Incl. Flexible)
Connectors, Fused
Connectors, Heavy Duty, Power
Connectors, Hermetically Sealed, Pressurized, or Waterproof
Connectors, High Voltage (1,000 Volts & Over)
Connectors, LCD
Connectors, Magnetron
Connectors, Miniature, Subminiature & Microminiature
Connectors, Plug-in, Program Board
Connectors, Printed Circuit (Other than Card Edge)
Connectors, Printed Circuit, Card Edge
Connectors, Rack & Panel
Connectors, RF, Coaxial & Triaxial
Connectors, Solderless
Connectors, Stripline
Connectors, Test
Connectors, Thermocouple
Connectors, Wirewrap (Z-3 Level)
Connectors, Zero & Low Insertion Force
Cords, Patch
Holders & Carriers, Chip (Capacitor, IC, LSI)
Jack Adapters (All Types)
Jack Covers
Jacks (All Types)
Jumpers, Bonding
Jumpers, Circuit Board
Kits, Connector
Kits, Terminal
Pads, Transistor Mounting
Panels, Jack
Pins, Electrically Conductive
Plug & Jack Sets
Plug Adapters
Plug Caps & Shells
Plugs, Electrical (All Types)
Plugs, Fused
Posts, Binding
Socket Adapters
Sockets, Capacitor
Sockets, Crystal
Sockets, Diode
Sockets, DIP and DIL
Sockets, Integrated Circuit
Sockets, Leadless Carrier
Sockets, LIF & ZIF
Sockets, Relay
Sockets, SIP
Sockets, Test
Sockets, Transistor
Sockets, Tube
Terminal Blocks (Incl. Barrier Types)
Terminal Boards
Terminal Strips (Including Barrier Types)
Terminals, Ferrule, Cable-End
Terminals, Lug (All Types)
Terminals, Miniature & Subminiature
Terminals, Printed Circuit Board
Terminals, Solderless
Terminals, Standoff
Terminals, Threaded
Terminals, Turret
Terminals, Wirewrap

2200 CONTROL SYSTEMS & COMPONENTS

(Volume 3)

Alarms & Alarm Systems
Annunciators
Bells, Buzzers, Gongs, Sirens & Aural Warning Devices
Clocks, Time Keeping — Also See Oscillators, Clock
Controllers, Energy Conservation
Controllers, Programmable
Controls, Audio System Consoles
Controls, Capacitance Operated
Controls, Counting & Sorting
Controls, Density
Controls, Fluid Conductivity
Controls, Fluid Flow
Controls, Frequency
Controls, Gas
Controls, Humidity
Controls, Ignitron Firing
Controls, Lamp Dimming, Flashing
Controls, Level, Dry Material
Controls, Level, Liquid
Controls, Machine Tool
Controls, Motor Speed
Controls, Oscillator
Controls, Photoelectric
Controls, Pressure
Controls, Proportional
Controls, Proximity-Also See Controls, Capacitance Operated
Controls, Remote
Controls, Run, Shutdown Command, Start
Controls, SCR
Controls, Sensing/Monitoring-Voltage, Phase, Frequency
Controls, Stepping Motor
Controls, Temperature
Controls, Torque, Electronic
Controls, Vibrator
Counters, Bidirectional
Counters, Coil Winding
Counters, Decade
Counters, Directional
Counters, Electromagnetic
Counters, Event
Counters, Mechanical
Counters, Photoelectric
Counters, Preset
Counters, Printing
Counters, Pulse
Counters, Revolution
Current Sensors-Also See Transducers, Volt, etc.
Demodulators, Magnetic
Energy Management Systems
Flashers
Gyros (All Types)
Indicators, Directional
Indicators, Elapsed Time
Indicators, Liquid Level
Indicators, Positioning
Integrators, Mechanical & Electromechanical
Measuring Equipment, Fiber Optic, Attenuation & Bandwidth
Meters, Fluid Flow
Modulators, Magnetic
Modules, Control & Switching
Monitors, Current
Monitors, Laser Energy
Monitors, Phase Sequence & Loss
Monitors, Power Failure
Monitors, Power, AC & DC
Multipliers, Magnetic Analog
Process Control Systems
Programmers, Cam & Drum
Sensors, Acoustic
Sensors, Chemical
Sensors, Proximity
Timers, Counting
Timers, Cycle & Reset
Timers, Delay
Timers, Electrolytic Cell
Timers, Interval
Timers, Programmed
Timers, Sequence
Timers, Solid State
Totalizers, Digital
Trackballs, XY Positioning

2300 CRYSTALS, OSCILLATORS, CRYSTAL & PIEZOELECTRIC FILTERS

(Volume 1A)

Crystal Blanks
Crystals, Frequency Control
Crystals, Microprocessor
Crystals, Piezoelectric
Crystals, Quartz
Crystals, Quartz, for Watches
Crystals, Semiconductor (Ingots & Wafers)
Crystals, YIG
Detectors, Crystal
Filters, Crystal (Incl. Monolithic Devices)
Filters, Tuning Fork
Holders, Crystal
Modules, Oscillator
Mounts, Crystal
Oscillators, Audio (Module)
Oscillators, Beat Frequency (BFO)
Oscillators, Bias
Oscillators, Cavity
Oscillators, Clock
Oscillators, Crystal Controlled (Module)
Oscillators, LC
Oscillators, Low Frequency (Module)
Oscillators, Oven
Oscillators, Power (Module)
Oscillators, Pulse (Module)
Oscillators, RC (Module)
Oscillators, Reed
Oscillators, RF (Module)
Oscillators, Sinusoidal (Module)
Oscillators, Square Wave (Module)
Oscillators, Temperature Compensated
Oscillators, Tuning Fork Controlled
Oscillators, UHF/VHF (Module)
Oscillators, Ultrasonic (Module)
Oscillators, Voltage Controlled (Module)
Ovens, Crystal & Component
Piezoelectric Ceramics
Resonators, SAW
Timing Systems, Oscillators
Tuning Forks

2325 DATA ACQUISITION/ HANDLING SYSTEMS & ACCESSORIES

(Volume 3)

Cameras, Data Recording
Cameras, Infrared
Converters, Analog to Digital
Converters, Analog to Pulse
Converters, ASCII to Baudot
Converters, ASCII to BCD
Converters, BCD to ASCII
Converters, Binary to BCD
Converters, Binary to Decimal
Converters, DC to Sine/Cosine
Converters, DC to Synchro
Converters, Digital to Analog
Converters, Digital to Resolver
Converters, Digital to Synchro
Converters, Frequency to Voltage
Converters, Multiplying, Analog to Digital & Digital to Analog
Converters, Polar to Rectangular Coordinates
Converters, Rectangular to Polar
Converters, Resolver to Digital
Converters, Synchro to Digital
Converters, Synchro to Linear DC
Converters, Synchro to Sine/Cosine
Converters, Voltage to Frequency
Data Acquisition & Reduction Systems-Also See Modules, Data Acquisition
Data Loggers
Generators, Character
Integrators, Electronic
Modules, Data Acquisition
Multiplexers, Analog
Multiplexers, Digital
Multipliers, Analog
Multipliers, Channel Electron
Scalers, Binary, Decade
Scramblers, Data
Security Systems, Data
Shift Registers
Signal Systems, Fiber Optic
Speech Compression & Synthesis Equipment
Spoolers, Printer Buffers
Switches, Data, Manual
Switches, Data, Programmable
Synthesizers, Speech
Translators, Data

2350 DELAY LINES

(Volume 1A)

Delay Lines, All Types
Delay Lines, Cable
Delay Lines, Digital
Delay Lines, Distributed, Constant (Fixed)
Delay Lines, Distributed, Constant (Variable)
Delay Lines, Glass & Quartz
Delay Lines, Liquid
Delay Lines, Lumped Constant (Electrically Variable)
Delay Lines, Lumped Constant (Fixed)
Delay Lines, Lumped Constant (Mechanically Variable)
Delay Lines, Magnetostrictive
Delay Lines, Miniature & Subminiature-Also See Specific Types Of Delay Lines
Delay Lines, Programmable
Delay Lines, Strip
Delay Lines, Trimmer
Delay Lines, Ultrasonic
Delay Lines, Waveguide
Standards, Delay Line
Surface Acoustic Wave Devices
Surface Acoustic Wave, Delay Line
Synthesizers, Delay Line

2400 PANEL HARDWARE (BEZELS, DIALS, KNOBS, ETC.)

(Volume 2)

Bezels, Shielded & Unshielded
Cords & Cable, Dial Drive
Couplings, Shaft, Rigid & Flexible
Decalcomania-Also See Labels, Pressure Sensitive
Dials, Instrument, Metal, Plastic, etc.
Dials, Turns Counting
Drives & Drive Mechanisms (Dial)
Escutcheons
Kits, Marking (Dial, Instrument, Equipment, etc.)
Knobs & Dials
Knobs, Limit Stop
Knobs, Locking, Control Shaft
Knobs, Slip Clutch
Knobs, Torque, Incremental, Ratio Drive
Labels, Pressure Sensitive, Adhesive
Locks, Dial & Shaft
Pointers, Dial
Scales, Dial

2440 MILITARY COMPONENTS

(Volume 1B)

Adapters, RF (MIL)
Antennas (MIL)
Arresters, Electrical Surge/Lightning (MIL)
Attenuators (MIL)
Attenuators (MIL), Inductive
Cable & Assemblies (MIL)
Cable (MIL), Flat
Cable (MIL), RF
Capacitors (MIL)
Caps (MIL)
Chassis (MIL), Electrical
Chokes (MIL)
Choppers (MIL)
Circuit Breakers, Boxes, Panel Boards, Enclosures (MIL)
Clamps (MIL), Cable
Clips (MIL), Electrical
Coils (MIL), RF
Connectors (MIL), Flat Cable
Connectors (MIL), Power
Connectors (MIL), Printed Circuit
Connectors (MIL), RF
Contactors (MIL)
Contacts (MIL), Assemblies & Holders
Couplers (MIL), Directional
Crystals (MIL)
Current Limiters (MIL)
Diodes (MIL)
Dummy Loads (MIL), RF
Electrostatic Discharge (MIL)
Fiber Optics (MIL)
Filters (MIL), Electrical & Networks
Flanges (MIL), Waveguide
Flashers (MIL)
Fuses, Fuseholders, Boxes & Panels (MIL)
Hardware (MIL), Connector
Headsets (MIL)
Heat Sinks (MIL)
Inductors (MIL)
Jacks (MIL)
Line Assemblies (MIL), RF Transmission
Magnets (MIL), Permanent
Meters (MIL)
Microcircuits (MIL)
Microcircuits (MIL), Linear
Microcircuits (MIL), Low Power Schottky
Microcircuits (MIL), Memories, CMOS, Hybrids
Microcircuits (MIL), TTL, Schottky, Microprocessor
Microphones (MIL)
Modules (MIL), Electronic
Modules (MIL), Standard Electronic
Oscillators (MIL), Crystal & Ovens
Oscillators (MIL), VCO, Solid State, RF
Plugs (MIL)
Potentiometers (MIL)
Printed Circuits & Printed Circuit Materials (MIL)
Reactors (MIL)
Rectifiers (MIL), Semiconductor
Relays (MIL)
Resistors (MIL)
Sockets (MIL)
Soldering (MIL)
Solenoids (MIL)
Speakers (MIL)
Switches (MIL), Non-RF
Switches (MIL), RF
Synchros & Resolvers (MIL)
Test Methods (MIL)
Thyristors (MIL)
Transformers (MIL), Audio, Power, RF
Transformers (MIL), Pulse & Variable
Transistors (MIL)
Transmission Lines (MIL), RF
Tubes (MIL), Indicator & Pickup
Tubes (MIL), Microwave
Tubes (MIL), Power & Gas, Planar
Tubes (MIL), Receiving, & Tube Shields
Waveguides (MIL)
Wire (MIL)
Wire, Airframe

2450 DISPLAYS, READOUTS, LAMPS, & LIGHTS

(Volume 1B)

Boards, Display, Graphic
Caps, Lenses, Indicator Light
Displays, Dot Matrix
Displays, Edge Lighted & Back Lighted
Displays, Electroluminescent
Displays, Electromagnetic
Displays, Electromechanical
Displays, Fiber Optic
Displays, Graphic
Displays, Indicator Lights
Displays, Laser
Displays, Light-emitting Diode (LED)
Displays, Lighted Segment
Displays, Liquid Crystal (LCD)
Displays, Planar Gas Discharge
Displays, Plasma
Displays, Projection Type (CRT; Electromechanical; Film; Light Valve)
Displays, Status
Displays, Touch Sensitive (Infrared & Membrane)
Displays, Vacuum Fluorescent
Drivers & Decoders For Readouts
Filters, Color, Panel Light
Filters, Display
Indicators, Circuit Condition, On, Off, etc. (Electromechanical)-Also See Indicators, Instrument, Flag, Pointer, etc.
Indicators, Instrument, Flag, Pointer, etc.
Lamp Adapters
Lamp Assembly Color Filters, Lens Mountable
Lamp Drivers
Lamps, Arc
Lamps, Edge Lighting, Panel
Lamps, Electroluminescent
Lamps, Exciter, Photographic
Lamps, Flashtube
Lamps, Fluorescent
Lamps, Incandescent
Lamps, Infrared
Lamps, Mercury Vapor
Lamps, Miniature & Subminiature
Lamps, Neon
Lamps, Oil Tight
Lamps, Press-to-Test
Lamps, Projection
Lamps, Stroboscopic Source
Lamps, Tritium (Hydrogen 3) Powered
Lamps, Tungsten Halogen
Lamps, Ultraviolet
Lamps, Xenon
Lenses, Readout & Display
Lights, Indicator
Nameplates
Panels, Back Lighted & Edge Lighted
Panels, Electroluminescent
Sockets, Lamp & Lamp Assemblies

2475 FIBER OPTIC EQUIPMENT & ACCESSORIES

(Volume 1B)

Adapters, Fiber Optic
Attenuators, Fiber Optic
Cable, Fiber Optic
Connectors, Fiber Optic
Couplers, Fiber Optic
Data Links, Fiber Optic
Emitters, Fiber Optic-Also See Diodes, Laser
Encoders, Fiber Optic
Joints, Rotary, Fiber Optic
Kits, Fiber Optic
Light Sources, Fiber Optic
Multiplexers, Fiber Optic
Receivers, Fiber Optic
Scanners, Fiber Optic
Sensors, Fiber Optic
Splicers, Fiber Optic
Switches, Fiber Optic
Terminations, Fiber Optic
Test Equipment, Fiber Optic

2500 MECHANICAL COMPONENTS (BEARINGS, CORES, MAGNETS, ETC.)

(Volume 2)

Bearings
Belts, Drive
Bobbins, Winding, Coil & Transformer-Also See Coil Assemblies & Forms
Bushings, Glass, Plastic, Metal, Rubber, etc.
Cans, Capacitor, Relay, Semiconductor, Transformer, etc
Cores, Ceramic
Cores, Magnetic, Ferrite, L, E, etc.
Cores, Magnetic, Ferrite, Pot/Cup
Cores, Magnetic, Ferrite, Slug
Cores, Magnetic, Ferrite, Toroid
Cores, Magnetic, Ferrite, Yoke Section
Cores, Magnetic, Metal Alloy (Other Than Silicon & Nickel-Iron)
Cores, Magnetic, Nickel-Iron, L, EE, F, & Ring Laminations
Cores, Magnetic, Nickel-Iron, Toroid
Cores, Magnetic, Powdered Iron, Pot/Cup
Cores, Magnetic, Powdered Iron, Slug
Cores, Magnetic, Powdered Iron, Toroid
Cores, Magnetic, Powdered Permalloy, Toroid
Cores, Magnetic, Silicon C
Cores, Magnetic, Silicon EI, EE, & F Laminations
Cores, Magnetic, Silicon, Toroid
Couplings, Quick-disconnect, Liquid or Gas
Feedthrus & Seals, Environmental
Ferrite Material & Parts
Foil, Magnetic
Gears & Gear Mechanisms (Precision)
Glass Parts
Graphite Parts
Headers, Relay & Transformer
Headers, Shrouded
Headers, Transistor & Diode
Holders, Diode
Honeycomb Sheets, Panels, etc.
Laminates, Metal Clad (Including Copper)
Laminates, Plastic Impregnated (Unclad)
Limit Stops, Mechanical
Magnets (Lab. Type)
Magnets, Permanent

Magnets, Superconducting
Materials, Shock, Noise, & Vibration Control
Mounts, CRT & Accessories
Pulleys
Quartz, Fused
Rings, Retaining
Seals, Ceramic To Metal
Seals, Glass To Metal
Seals, Hermetic-Also See Services, Hermetic Sealing
Seals, Pressure Sensitive
Silica, Fused
Springs (All Types)
Tubing, Ceramic
Tubing, Glass
Tubing, Metal
Windows, Sapphire

2550 ENVIRONMENTAL TEST EQUIPMENT
(Volume 3)

Chambers, Altitude
Chambers, Environmental
Chambers, Explosion
Chambers, Fluid Conditioner
Chambers, Humidity
Chambers, Pressure
Chambers, Radiation
Chambers, Shock
Chambers, Temperature
Chambers, Vacuum
Chambers, Vibration
Clean Room Equipment & Supplies
Controls, Environmental Test Equipment
Ovens, Aging, Burn-in, Life Test
Refrigerators, Environmental Test
Simulators, Motion
Testers, Burn-in, Aging
Testers, Heat, Manual
Testers, Life, Component
Testers, Material
Testers, Shock

2600 FANS, BLOWERS, COOLING EQUIPMENT, & HEAT EXCHANGERS
(Volume 2)

Air Cleaners & Filters (Shielded & Unshielded)
Air Conditioners (For Equipment)
Blowers, Centrifugal
Dehumidifiers (For Equipment)
Fans, Axial
Heat Exchangers & Systems
Heat Sinks, Semiconductor

2700 FILTERS (EXCL. CRYSTAL & PIEZO FILTERS)
(Volume 1A)

Filters, Active (All Types)
Filters, AF
Filters, Antenna
Filters, Band Elimination
Filters, Bandpass
Filters, Bandpass, SAW (Surface Acoustic Wave)
Filters, Ceramic
Filters, Coaxial
Filters, Comb
Filters, Continuously Variable
Filters, Digital
Filters, EMI/RFI
Filters, Equalizer
Filters, Harmonic
Filters, High Pass
Filters, Hybrid
Filters, IF
Filters, LC
Filters, Linear Phase
Filters, Low Pass
Filters, Mechanical
Filters, Miniature, Subminiature, Microminiature — Also see specific types of filters
Filters, Optical
Filters, RF
Filters, Single Sideband
Filters, Synchronous Tracking
Filters, Tone, Telegraph
Filters, UHF & VHF
Filters, Variable
Filters, Vestigial Sideband
Filters, Video
Hum Eliminators
Networks, LC
Networks, Phase
Networks, Pulse Forming
Networks, Video
Resonators, Ceramic
Suppressors, Noise
Surface Acoustic Wave, Filter

2800 HARDWARE (ELECTRONIC/ ELECTRICAL)
(Volume 2)

Capacitor Hardware
Clamps & Clips, Cable-Also See Wire & Cable Ties
Clamps, Synchro & Servo
Connector Boxes & Strips, Power Outlet
Contacts, Electrical
Grommets & Bushings
Resistor Hardware
Retainers, Battery
Rods, Ground
Strain Reliefs, Cable & Wire

Substrates, Ceramic
Substrates, Flexible
Substrates, Glass
Substrates, Metallic
Substrates, Sapphire
Switch Hardware
Switch Seals, Environmental
Terminals, Feedthru
Terminations, Antenna-Also See Dummy Loads
Tubing, Fiberglass
Tubing, Heat Shrinkable-Also See Caps, Forms & Tapes, Heat Shrinkable
Tubing, Paper
Tubing, Plastic-Also See Tubing, Spaghetti
Tubing, Spaghetti
Tubing, Spiral Wrap
Wire Nuts

2825 HARDWARE (MECHANICAL)
(Volume 2)

Bolts
Bumpers
Clamps & Clips, Component
Clamps & Clips, Ground
Eyelets
Fasteners, Metal
Fasteners, Nonmetallic
Ferrules, Cable-end
Hinges
Mounts, Shock & Vibration
Nuts, Metal
Pins, Cotter, Dowel, Taper, etc.
Pins, Mechanical
Plug Buttons
Preforms, Precious Metal
Rivets
Screws, Fastening
Sound Absorbing Materials
Spacers
Washers, Lock
Washers, Plain
Wire & Cable Ties

2900 INSTRUMENTS, TEST & MEASURING
(Volume 3)

Analyzers, AF
Analyzers, Antenna Pattern
Analyzers, Digital Signal
Analyzers, Harmonic
Analyzers, Impedance
Analyzers, Interference
Analyzers, Intermodulation
Analyzers, Logic
Analyzers, Magnetic
Analyzers, Modulation
Analyzers, Network
Analyzers, Noise
Analyzers, Phase & Voltage
Analyzers, Protocol
Analyzers, Pulse
Analyzers, Signature
Analyzers, Sonic & Subsonic
Analyzers, Spectrum
Analyzers, Transfer Function
Analyzers, Transient
Analyzers, Ultrasonic
Analyzers, Vibration
Analyzers, Waveform
Analyzers, Wow & Flutter
Blackbody Radiation Sources
Bolometers, Infrared
Bolometers, Microwave
Bridges, Admittance
Bridges, Audio
Bridges, Calorimeter
Bridges, Capacitance
Bridges, Deviation
Bridges, Impedance
Bridges, Inductance
Bridges, Kelvin
Bridges, LCR
Bridges, Power, RF
Bridges, Q
Bridges, Resistance
Bridges, RF
Bridges, Strain Gauge
Bridges, Synchro & Resolver
Bridges, Temperature
Bridges, Wheatstone
Cable Fault Locators
Calibrators, Accelerometer
Calibrators, Attenuation
Calibrators, Crystal
Calibrators, Current
Calibrators, Frequency
Calibrators, LVDT
Calibrators, Magnetic Field
Calibrators, Sound Level
Calibrators, Synchro
Calibrators, Time Base
Calibrators, Transducer
Calibrators, Voltage
Calibrators, VSWR
Calorimeters, Microwave
Clips, Logic Test
Collimators
Comparators, Digital
Comparators, Frequency
Comparators, Optical
Comparators, Phase
Comparators, Voltage
Controllers, IEEE 488 (GPIB) Bus
Counter/Timers
Counters, Frequency
Counters, Particle
Counters, Universal
Decade Boxes, Capacitance
Decade Boxes, Inductance
Decade Boxes, Resistance
Decade Boxes, Transformer

Detectors, Air Flow
Detectors, AM/FM
Detectors, Coaxial
Detectors, Flaw & Defect
Detectors, Phase Sensitive
Detectors, Radiation
Detectors, RF
Detectors, Standing Wave
Detectors, Synchronous
Detectors, Ultraviolet
Detectors, Video
Detectors, Voltage
Digitizers, Transient & Waveform
Dividers, Voltage-Also See Networks, Resistance; Transformers, Voltage Dividing
Dummy Loads, Electronic
Dummy Loads, Microwave
Dummy Loads, Power
Dummy Loads, Resistive
Electrodes, High Voltage
Electrostatic Discharge Guns — Also See Generators, ESD
Emulators, RTS
Gauges, Humidity
Gauges, Ionization
Gauges, Pressure-Also See Transducers, Pressure
Gauges, Temperature
Generators, AM
Generators, AM/FM
Generators, Arbitrary Waveform
Generators, Audio
Generators, Bar, Dot & Crosshatch
Generators, Color Bar
Generators, Electrostatic Discharge — Also See Electrostatic Discharge Guns
Generators, FM
Generators, FM/Stereo
Generators, Function
Generators, Gating/Timing
Generators, Harmonic
Generators, Light Pulse
Generators, Low Frequency
Generators, Marker
Generators, Noise, Random (Electrical)
Generators, Phase
Generators, Programmable, Function
Generators, Programmable, Pulse
Generators, Programmable, Synthesizers
Generators, Pulse
Generators, Pulse, Nuclear Instrumentation Module (NIM)
Generators, RF
Generators, Signal-Also See Generators, Specific Type
Generators, Sweep
Generators, Tone
Generators, Tone Burst
Generators, UHF/VHF
Generators, Ultrasonic
Generators, White Noise
Generators, Word
Holders, Test Lead
Imagers, Thermal
Indicators, Null
Insertion Loss Measurement Systems
Instruments, Test & Measuring, GPIB (IEEE 488) Compatible
Leads, Test & Adapters
Loads, Electronic, Variable-Also See Dummy Loads
Locators, Open Short
Magnetometers
Meters, Acceleration
Meters, Admittance
Meters, Ampere Hour
Meters, Ampere, AC
Meters, Ampere, DC
Meters, Ampere, RF
Meters, Ampere, True RMS
Meters, Attenuation
Meters, Audio Level
Meters, Capacitance, Inductance
Meters, Clamp-on
Meters, Conductance
Meters, Counting Rate, Nuclear
Meters, Decibel Indicating
Meters, Deviation
Meters, Digital ESR
Meters, Distortion & Noise
Meters, Electrometer
Meters, Field Strength
Meters, Flux
Meters, FM Deviation
Meters, Frequency
Meters, Frequency Deviation
Meters, Galvanometer
Meters, Gauss
Meters, Hand Held
Meters, Humidity
Meters, Impedance
Meters, Kilovolt
Meters, Light (Nonphotographic)
Meters, Megohm
Meters, Microwave
Meters, Modulation
Meters, Multifunction (Analog)
Meters, Multifunction (Digital)
Meters, Noise & Sound Level
Meters, Ohm
Meters, Peak Power
Meters, PH
Meters, Phase
Meters, Power
Meters, Power Factor
Meters, Power, RF
Meters, Q
Meters, Ratio
Meters, Reflectometer
Meters, RFI
Meters, S Unit
Meters, Standing Wave Ratio
Meters, Temperature (Contacting)
Meters, Temperature, Infrared
Meters, Thermal Voltage
Meters, Vacuum Tube Volt (VTVM)
Meters, VAR
Meters, Vibration
Meters, Volt, AC

Meters, Volt, DC
Meters, Volt, Digital
Meters, Volt, Potentiometric
Meters, Volt, RF
Meters, Volt, Sampling
Meters, Volt, True RMS
Meters, VU
Meters, Watt
Meters, Watt Hour
Meters, Watt, RF Directional
Meters, Wave
Microscopes, Measuring
Monitors, Frequency
Monitors, Modulation
Monitors, Phase & Phase Angle
Monitors, Power, Microwave
Monitors, Power, RF
Monitors, Response Time
Multipliers, Meter
Oscillators, Bridge (Test)
Oscillators, Decade (Test)
Prescalers
Probes, High Voltage (1,000 Volts & Over)
Probes, Logic Test
Probes, RF
Probes, Temperature
Probes, Test Lead
Pulsers, Logic Test
Pyrometers, Infrared
Pyrometers, Recording
Radiometers
Receivers, AM/FM (Incl. Precision Test)
Receivers, Fixed Frequency
Receivers, NBS
References, DC Voltage
RFI Measuring Equipment
Scanners, Infrared
Scanners, Instrument, Input/Output
Scanners, Optical
Scanners, Reed
Shunts, Meter
Signal Averagers
Simulators, Data
Simulators, Power Failure
Simulators, Powerline Disturbance
Simulators, Solar
Spectrometers
Standards, Atomic Beam
Standards, Capacitance
Standards, Current
Standards, Frequency
Standards, Inductance
Standards, Noise
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Standards, Temperature
Standards, Time
Standards, Voltage
Standards, Voltage Ratio
Switching Systems, Test & Measurement
Synthesizers, Frequency
Synthesizers, Waveform
Test Equipment, Closed Circuit TV-Also See Television Systems & Equipment, Closed-Circuit
Test Equipment, Color TV
Test Equipment, Mechanical Impedance
Test Equipment, Memory Systems, Disk
Test Equipment, Rental-Also See Services, Electrical Measurement & Test
Test Fixtures, ATC
Test Systems, Automatic DC
Test Systems, Board
Test Systems, Component
Test Systems, Computer Controlled (Automatic)
Test Systems, Functional
Test Systems, IC
Testers, Armature
Testers, Battery
Testers, Bit Rate
Testers, Cable
Testers, Capacitor
Testers, Coil & Transformer
Testers, Communication Equipment (Automatic)
Testers, Component Linearity
Testers, Corona
Testers, Diode
Testers, Electrical Parameter
Testers, Encoder
Testers, Fiber Optic
Testers, Insulation Breakdown
Testers, Integrated Circuit (Automatic)
Testers, Integrated Circuit (Manual)
Testers, Interface
Testers, LED & LED Arrays
Testers, Logic Card
Testers, Loopback
Testers, Magnetic Core
Testers, Magnetic Medium
Testers, Magnetron
Testers, Memory Board
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Testers, Modem
Testers, Motor
Testers, Potentiometer
Testers, Power Supply
Testers, Pulse Jitter
Testers, Relay
Testers, Resistivity
Testers, Resistor
Testers, Signal Tracing
Testers, Synchro/Resolver
Testers, Thickness (all types)
Testers, Thyristor
Testers, Tracking & Erosion Resistance (Insulation)
Testers, Transistor
Testers, Transmission & Delay
Testers, Tube
Testers, Vibration-Also See Services, Environmental Test
Testers, Voltage
Testers, Voltage Breakdown
Thermal Platforms
Thermographs
Thermometers, Resistance

Time Delays, Precision
Timer/Counters
Tracers, Curve

2950 PANEL METERS (ANALOG & DIGITAL)
(Volume 3)

Meters, Bar Graph
Meters, Digital, 2-wire, 4-20 mA Current Loop
Meters, Edgewise
Meters, Illuminated Scale
Meters, Moving Coil
Meters, Moving Iron
Meters, Moving Scale
Meters, Null
Meters, Panel (Analog)
Meters, Panel (Digital)
Meters, Taut Band

2975 OSCILLOSCOPES
(Volume 3)

Cameras, Oscilloscope
Hoods, Oscilloscope
Oscilloscope Plug-ins
Oscilloscopes, Digital
Oscilloscopes, General Purpose
Oscilloscopes, High Frequency (Above 200 MHz)
Oscilloscopes, Low Frequency (DC to 3 MHz)
Oscilloscopes, Mid Frequency (DC to 200 MHz)
Oscilloscopes, Multibeam
Oscilloscopes, Multiple Channel
Oscilloscopes, Portable, Battery Operated
Oscilloscopes, Programmable
Oscilloscopes, Sampling
Oscilloscopes, Storage
Oscilloscopes, Triggered Sweep
Probes, Oscilloscopes
Viewing Hoods, Cathode Ray Tube

3000 INSTRUMENTS, GRAPHIC RECORDING
(Volume 3)

Graphic Recording Paper & Supplies
Oscillographs, Direct Writing
Paper, Graphic Recording
Plotters, X-Y, & Accessories
Printers, Event
Recorders, Electrostatic
Recorders, Event/Multievent
Recorders, Polar
Recorders, Strip Chart
Recorders, Transient
Recorders, Vibration

3100 INSULATORS & INSULATING MATERIALS
(Volume 2)

Caps, Forms & Tapes, Heat Shrinkable-Also See Tubing, Heat Shrinkable
Coatings, Insulating
Compounds, Insulating
Films, Masking (Incl. Photographic)
Insulation Materials
Insulation Parts, Fabricated
Insulators, Antenna
Insulators, Clip, Test & Battery
Insulators, Mica
Tapes, Electrical Insulation

3130 INTEGRATED CIRCUITS, HYBRID CIRCUITS, & FUNCTION MODULES
(Volume 1A)

Circuits, Hybrid, Custom
Circuits, Hybrid, Thick Film
Circuits, Hybrid, Thin Film
Dividers, Analog
Erasing Equipment, EPROM
Generators, Sine/Cosine Function (Module)
Holders & Carriers, IC, LSI (Packaged)
Hybrid Voltage Regulators
Integrated Circuits, Custom/Semicustom
Integrated Circuits, Digital
Integrated Circuits, Interface
Integrated Circuits, Linear
Integrated Circuits, Memory
Integrated Circuits, Microprocessor
Integrated Circuits, Silicon Monolithic, Unpackaged Chips
Microcomputer Boards
Microprocessor Development Systems
Modules, Amplifier-Also See Amplifiers, Specific Types
Modules, Analog Multiplier
Modules, Analog-to-Digital Conversion
Modules, Digital-to-Analog Conversion
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Modules, I/O Relay
Modules, Logic-Also See Cards; Circuits; Networks
Modules, RMS-to-DC Conversion
Modules, Sample & Hold
Networks, Hybrid Substrates
Packages, Integrated Circuit
Programmers, PROM & Logic Array

3200 INTERCONNECTION SYSTEMS (BACKPANELS, CARD HOLDERS, & PACKAGING SYSTEMS)
(Volume 2)

Backpanel Interconnect Systems
Bars, Shorting
Boards, Plug-in
Boards, Plug-in, Extender
Boards, Plug-in, Interface
Boards, Plug-in, Memory
Boards, Prewired, High Density
Boards, Programming
Bus Bars & Systems
Integrated Circuit Interconnect Systems
Panels, Power BUS for ICs

3400 MICROWAVE SYSTEMS & EQUIPMENT
(Volume 3)

Absorbers, Microwave
Amplifiers, Klystron
Amplifiers, Microwave
Amplifiers, Parametric
Analyzers, Microwave
Coders, Transponder
Communications Systems, Microwave
Comparators, Attenuation
Detectors, Microwave
Down Converters
Duplexers, Microwave
Generators, Microwave
Impedance Converters, Microwave
Modulators, Microwave
Modulators, Pulse
Receivers, Microwave

3450 MICROWAVE COMPONENTS
(Volume 1A)

Adapters, Waveguide
Antenna Feed Systems
Attenuators, Coaxial
Attenuators, Fixed
Attenuators, Impedance Matching
Attenuators, Logarithmic
Attenuators, Microwave
Attenuators, Programmable
Attenuators, Turret
Attenuators, Variable
Attenuators, Voltage Controlled
Bends & Twists, Microwave
Cavities, Microwave
Chokes, Waveguide
Circulators, Ferrite
Couplers, Directional
Couplers, Microwave
Couplers, Rotary
Detectors, GaAs
Dividers, Frequency
Dividers, Power (LF, HF, VHF, UHF)
Dividers, Power, Microwave
Drivers, Switch
Filters, Microwave
Filters, Waveguide
Flanges, Waveguide
Isolators, Ferrite
Isolators, Microwave (All Types)
Joints, Rotary, Microwave
Junctions, Hybrid, Microwave
Limiters, Microwave
Line Stretchers, Microwave
Microwave Integrated Circuits (MICs)
Mixers, Microwave
Mixers, RF
Mounts, Microwave
Multipliers, Frequency
Oscillators, Microwave
Preselector-Mixers
Probes, Microwave
Radar System Components
Radomes & Windows, Microwave
Seals, Waveguide
Shifters, Phase, Microwave
Shifters, Phase, RF
Shutters, Microwave
Slotted Lines, Microwave
Strip-Line Components, Microwave
Switches, Diode
Tees, Coaxial
Tees, Waveguide
Terminations, Microwave
Tubing, Waveguide
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Waveguide-Coax Adapters
Waveguides

3475 MILITARY SYSTEMS & EQUIPMENT
(Volume 3)

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Acoustic Systems (MIL)
Analyzers (MIL), Antenna Pattern
Analyzers (MIL), Pulse
Analyzers (MIL), Spectrum
Antenna Groups (MIL)
Antenna Groups (MIL), Elint
Antenna Sets (MIL), DF
Antenna Systems (MIL)
Antenna Systems (MIL), DF
Antennas (MIL), DF
Antennas (MIL), ECM
Antennas (MIL), EW
Antennas (MIL), Multibeam
Antennas (MIL), Phased Array
Chaff Systems (MIL)
Chambers, Space Simulation
CM Sets (MIL), Conformal plus RWR
CM Sets (MIL), Internal
CM Sets (MIL), Mobile
Collection Systems (MIL)
Communications Intelligence (Comint) Systems (MIL)
Computer Sets (MIL), Digital Data
Computer Systems (MIL)
Connectors, Missile (Umbilicals, Interstage, Post Boost)
Consoles (MIL), ECCM
Control Systems, Air Traffic
Converters (MIL) DC to DC
Converters (MIL), Frequency
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Data Systems (MIL), Naval Tactical
Decoys (MIL), Buoy
Decoys (MIL), IR Flare
Detection & Ranging Systems (MIL)
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Detection Sets (MIL), Passive
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ECM Sets (MIL), Close Air Support
ECM Sets (MIL), Shipboard
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ECM Systems (MIL), Deceptive
ECMs (MIL), Torpedo Defense
Electronic Counter Countermeasures (ECCM) Fixes (MIL)
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Electronic Support Measures (ESM) Sets (MIL)
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ESM Suites (MIL)
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ESM Systems (MIL), IFM Receiver
EW Sets (MIL), Ground Multitarget
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Jammers (MIL), Chaff, Flares
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Synchronizers (MIL), Antenna
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3500 MOTORS, DRIVES, & ROTATING EQUIPMENT
(Volume 1B)

Brakes, Magnetic
Brakes, Mechanical
Brushes & Brush Assemblies
Clutches, Friction
Clutches, Magnetic
Clutches, Positive
Commutators
Gearheads & Speed Reducers
Indicators, Speed
Motor & Generator Armatures, Rotors, Stators
Motors, Brushless, DC
Motors, Clock & Timing
Motors, Control
Motors, DC Timing
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Motors, Gearhead
Motors, Gyro
Motors, Hysteresis
Motors, Induction
Motors, Linear
Motors, Permanent Magnet
Motors, Squirrel Cage
Motors, Stepping
Motors, Synchronous
Motors, Torque (Incl. Torquers)
Motors, Universal, AC or DC Operation
Reducers, Speed-Also See Gears & Gear Mechanisms
Shafts & Adapters-Also See Couplings, Shaft, Rigid & Flexible
Slip Rings & Assemblies
Steppers, Indexing, Motor

3700 ELECTRO-OPTICAL EQUIPMENT (EXCLUDING FIBER OPTICS)
(Volume 1B)

Alarms, Controls, Photoelectric
Cells, Photoconductive
Cells, Photoemissive
Cells, Photovoltaic
Detectors, Fiber Optic-Also See Diodes, PIN
Detectors, Infrared
Diode Arrays (Incl. Photo)
Diodes, Light Emitting (LEDs)
Diodes, Liquid Crystal (LCDs)
Diodes, Photoelectric
Heads, Reflective
Isolators, Optoelectronic
Laser Components & Laser Accessories
Lenses, Filters, Windows, Infrared
Lenses, Optical & Camera
Light Choppers
Light Sources, Photoelectric
Light Sources, Stroboscopic
Light Sources, Ultraviolet
Microscopes
Modulator/Demodulators, Laser
Modulators, Light
Optical Component Mounts & Accessories
Photodetectors, GaAs
Sensors, Light
Switches, Photoelectric
Transistors, Photo (Incl. Arrays)
Transmitters, Fiber Optic
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3800 PACKING, SHIPPING, & STORAGE CONTAINERS & MATERIALS
(Volume 2)

Bins, Part Storage
Carts & Dollies, Instrument & Equipment
Containers, Storage
Covers, Protective (Incl. Dustcovers)
Enclosures, Shipping, Metallic & Nonmetallic
Packaging Materials, Antistatic
Packaging Materials, Foam & Plastic
Storage Equipment, Disk
Storage Equipment, Flexible Disk
Storage Equipment, Magnetic Card
Storage Equipment, Media Transport
Storage Equipment, Microform
Storage Equipment, Multifunctional
Storage Equipment, Paper Tape
Storage Equipment, Printout
Storage Equipment, Punched Card
Storage Equipment, Reel-to-Reel Tape
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3900 BATTERIES
(Volume 3)

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Batteries, Carbon Zinc
Batteries, Gelled Electrolyte
Batteries, Lead Acid
Batteries, Lead Dioxide
Batteries, Lithium
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Batteries, Lithium Thionyl Chloride
Batteries, Mercury
Batteries, Mercury Oxide
Batteries, Nickel Cadmium
Batteries, Rechargeable
Batteries, Silver Cadmium
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Batteries, Standard Cell
Batteries, Thermal
Batteries, Zinc Air
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4000 POWER SUPPLIES, DC
(Volume 3)

Chargers, Battery
Converters, DC to DC, 30 to 300 VDC Output
Converters, DC to DC, 300 to 1,000 VDC Output
Converters, DC to DC, Greater Than 1,000 VDC Output
Converters, DC to DC, Less Than 30 VDC Output
Converters, Frequency to DC-Also See Power Supplies, AC Input, DC Output
Current Sources
Discharge Systems, Energy
Flashlights & Lanterns
Generators, Electrical Power
Motor Generator Sets
Power Supplies, AC Input, 301 to 1,000 VDC Output
Power Supplies, AC Input, 31 to 300 VDC Output
Power Supplies, AC Input, Greater than 1,000 VDC Output
Power Supplies, AC Input, Up to 30 VDC Output
Power Supplies, AC to DC Adapter
Power Supplies, Bipolar
Power Supplies, Constant Current
Power Supplies, Encapsulated
Power Supplies, Enclosed
Power Supplies, Ferroresonant
Power Supplies, Isolated
Power Supplies, Lab (Including Metered Units)
Power Supplies, Linear
Power Supplies, Multiple Output
Power Supplies, Open Frame
Power Supplies, Plug In
Power Supplies, Printed Circuit Card
Power Supplies, Programmable
Power Supplies, Standby (Emergency)
Power Supplies, Submodular
Power Supplies, Switching
Power Supplies, Switching, Battery Backup
Power Supply Interfaces & Accessories
Regulators & Stabilizers, Voltage-Also See Transformers, Voltage Regulating; Hybrid Voltage Regulators
Regulators, Current
Voltage Sources

4050 POWER SUPPLIES, AC
(Volume 3)

Alternators
Choppers-Also See Light Choppers
Converters, Frequency, Logarithmic
Converters, Phase
Converters, Power Frequency, Electronic
Converters, Power Frequency, Rotary
Isolators, Line
Line Conditioners
Power Supplies, AC Output
Power Supplies, Uninterruptable (UPS)
Regulators, Frequency
Shifters, Phase 60/400 Hz
Stabilizers, Line Impedance
Vibrators

4100 PRODUCTION EQUIPMENT & MANUFACTURING SERVICES
(Volume 3)

Antistatic Devices, Blowers, Guns, etc.
Baths, Controlled Temperature (Air & Liquid)
Cleaners, Ultrasonic
Comparators, Dimension Calibrators
Controls, Dimension
Controls, Positioning
Dehydrators
Deposition Equipment, Vacuum & Accessories-Also See Evaporation Equipment, Electron Beam
Detectors, Vacuum
Dielectric Heating Equipment
Electroplating Equipment & Supplies
Evaporation Equipment, Electron Beam
Furnaces, Electric
Furnaces, Gas (Production)
Furnaces, Vacuum
Handlers, Integrated Circuit (Automatic)
Heaters, Immersion
Holders, Circuit Board (Production Type)
Installation Equipment, Fiber Optic
Instrumentation, Fiber Optic
Jigs And Fixtures, Chassis & Circuit Board
Lamps, Magnifying, Inspection
Laser Systems
Machines & Accessories, Semiconductor Manufacturing
Machines, Cleaning & Degreasing-Also See Cleaners, Ultrasonic
Machines, Coil Winding
Machines, Component Handling, Feeding, Insertion & Sorting
Machines, Hermetic Sealing
Machines, Induction Heating (Electronic)
Machines, Lead Cutting & Forming
Machines, Marking & Numbering
Machines, Mask Alignment & Exposure
Machines, Plastic Molding
Machines, Plating
Machines, Printed Circuit Drilling, Etching & Punching
Machines, Terminal Installing
Machines, Ultrasonic Bonding
Machines, Wire Marking, Manual & Automatic
Machines, Wire Measuring & Cutting
Magnetizers
Magnifying Glasses, Inspection
Microcircuit Production Equip.
Ovens, Vacuum
Positioning Systems, Multiple Axis, Computer Guided
Probe Cards, Semiconductor Testing
Pumps, Vacuum
Scribers, Wafer-Also See Machines & Accessories, Semiconductor Manufacturing
Sealing Equipment, Metal to Glass/Ceramic
Semiconductor Wafer Fabrication, Assembling (Packaging)
Semiconductor Wafer Fabrication, Designing (Topological)
Semiconductor Wafer Fabrication, Maskmaking (Tooling)
Semiconductor Wafer Fabrication, Processing
Semiconductor Wafer Fabrication, Testing
Services, Assembly & Fabrication (Incl. R&D)
Services, Backplane Wiring
Services, Calibration & Instrument Repair
Services, Coating (All Types)
Services, Crimping
Services, Custom Molding, Plastics
Services, Decapsulation
Services, Electrical Measurement & Test
Services, EMI/RFI Testing
Services, Encapsulation
Services, Environmental Testing
Services, Hermetic Sealing
Services, High Vacuum
Services, Instrument Design (Industrial)
Services, Metal Etching, Engraving
Services, Metal Parts Fabrication
Services, Metallizing (Incl. Electroforming)
Services, Microprocessor
Services, Molding
Services, Packaging
Services, Photographic
Services, Plastics Fabrication
Services, Plating
Services, Precious Metal Refining
Services, Precious Metal Resmelting
Services, PROM & Array Programming
Services, Silk Screening
Services, Training/Education
Services, Vibration Surveys
Services, Wire Cutting & Stripping
Services, Wirewrapping-Also See Services, Backplane Wiring
Soldering Equipment, Induction Heating
Soldering Equipment, Printed Circuit
Soldering Equipment, Resistance
Soldering Equipment, Ultrasonic
Soldering Systems, Temperature Controlled
Testers, Solderability
Ultraviolet Inspection Lighting-Also See Microscopes, Ultraviolet
Valves, Vacuum
Wire Strippers, Automatic
X-ray Inspection Equipment

4200 PROTOTYPE BOARDS, KITS, & DESIGN AIDS
(Volume 2)

Boards, Plug-in, Prototype
Breadboard Assemblies
Calculators, Electronic, Desk Top
Calculators, Electronic, Hand Held
Clips, Breadboard
Drafting Machines
Drafting Symbols, Dry Transfer, Pressure Sensitive, etc. (Incl. Lettering)
Integrated Circuit Design Aids

Kits, Breadboarding (For Engineers)
Kits, Programming Board
Kits, Training Aid
Services, Computer-Aided Design (CAD)- Also See Computers, CAD, CAM, & CAD/CAM
Technical Books

4300 PROTECTIVE COMPONENTS (FUSES, CIRCUIT BREAKERS, ETC.)
(Volume 1B)

Circuit Breakers
Clips & Holders, Fuse-Also See Panels, Fuse
Detectors, Ground Fault
Fuse Elements
Fuses
Fuses, Failure Indicating
Fuses, Thermal
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Interrupters, Vacuum
Limiters, Current
Limiters, Surge
Panels, Fuse
Protectors, Brownout
Protectors, Surge-Also See Suppressors, Transient Voltage
Resistors, Fuse
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Suppressors, Transient Voltage (All Types)
Warning Systems, Lightning

4500 RELAYS
(Volume 1B)

Relay, Solid State
Relays, Cradle
Relays, Crystal Can, 1/2 Crystal Can
Relays, Current Sensing
Relays, Differential
Relays, Frequency Selective
Relays, General Purpose
Relays, High Voltage (500 Volts & Over)
Relays, Hybrid
Relays, Latching
Relays, Mercury-Wetted Contacts
Relays, Meter
Relays, Motor Start
Relays, Phase Sensing
Relays, Plug-in
Relays, Power
Relays, Printed Circuit Mounting (Including Transistor & DIP Case Types)
Relays, Programmable
Relays, Reed
Relays, RF (Incl. Antenna & Coaxial)
Relays, Sealed
Relays, Sensitive
Relays, Stepping
Relays, Telephone
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Relays, Time Delay
Relays, Vacuum
Relays, Voltage Sensitive
Retainers, Relay

4525 SHIELDS & SHIELDING
(Volume 2)

Chambers, Magnetic, Degaussing Coil
Conductive Elastomers
Conductive Plastic Materials & Parts
Contact Strips, Finger
Demagnetizers
Fabrics, Conductive
Gaskets, Shielding, RF-Also See Shields, RF
Kits, Shielding
Shielding Beads, Ferrite
Shielding, EMI/RFI
Shields, Cathode-Ray Tube
Shields, Coil
Shields, Corona
Shields, Indicator Light
Shields, Magnetic
Shields, Photomultiplier
Shields, RF-Also See Gaskets, Shielding, RF
Shields, Transformer
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Static Eliminating Materials, Devices, & Equipment
Tapes, Films & Foils, Pressure Sensitive
Wire Shielding-Also See Braid, Cable

4550 SOLENOIDS
(Volume 1B)

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Solenoids, Linear
Solenoids, Proportional
Solenoids, Rotary
Valves, Solenoid

4600 SOLDERING & DESOLDERING EQUIPMENT
(Volume 2)

Flux, Brazing & Soldering Materials
Heat Sinks, Soldering
Solder (All Types)
Solder Pots & Baths
Soldering Accessories
Soldering Guns, Irons & Desoldering Tools
Torches, Soldering, Welding & Accessories

4700 RESISTORS
(Volume 1A)

Films, Resistance
Networks, Ladder
Networks, Resistance
Resistors, Adjustable-Also See Potentiometers; Rheostats
Resistors, Ballast (Incl. Tube & Solid State Devices)
Resistors, Bulk Ceramic
Resistors, Carbon Film
Resistors, Ceramic Core
Resistors, Ceramic Metal (Cermet)
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Resistors, Deposited Carbon
Resistors, Disk, Rod & Tube
Resistors, Film, Metallized & Nonmetallized
Resistors, Flame Retardant
Resistors, Flux Sensitive
Resistors, Foil, Ultraprecision
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Resistors, High Frequency
Resistors, High Megohm (Over 22 Megohms)
Resistors, High Temperature (Over 125°C)
Resistors, High Voltage (1,000 Volts & Over)
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Resistors, Low Temperature Coefficient
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Resistors, Microwave
Resistors, Negative Temperature Coefficient
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Resistors, Plug-in
Resistors, Positive Temperature Coefficient
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Resistors, Pressure Sensitive
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4750 POTENTIOMETERS, TRIMMERS, CONTROLS, & RHEOSTATS
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Potentiometers, Composition, Carbon
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4800 DISCRETE SEMICONDUCTORS
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Diodes, High Voltage (1,000 Volts & Over)
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Diodes, Impatt
Diodes, Laser
Diodes, Limiting
Diodes, Matched Pairs
Diodes, Matched Quads
Diodes, Microwave Detector
Diodes, Microwave Mixer
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4900 SERVOMECHANISMS & ROBOTIC EQUIPMENT
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5100 SWITCHES
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5150 KEYBOARDS & KEYPADS
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5300 THERMAL COMPONENTS
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Bimetals, Thermostatic
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Labels, Coatings, Crayons, Pellets, etc., Temperature Indicating
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Monitors, Temperature-Also See Controls, Temperature
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5400 TOOLS (MANUAL & POWER)
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Alloys, Brazing
Awls
Burnishers, Contact
Cutters, Wire, Manual
Drills & Accessories, Manual & Power
Drivers, Nut
Extractors, DIP, IC, & Pin Grid Array
Gauges, Displacement, Linear
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Vises
Welding Equipment & Accessories (Excl. Equipment for Semiconductor Devices)
Wire Strippers, Manual
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5500 TRANSDUCERS & ENCODERS
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Accelerometers
Cells, Load
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5600 TRANSFORMERS
(Volume 1A)

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Reactors, Loading
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Transformers, Audio
Transformers, Autotransformer
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Transformers, Constant Voltage
Transformers, Converter, DC To DC
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6000 WIRE & CABLE
(Volume 2)

Braid, Cable-Also See Wire Shielding
Cable Assemblies & Harnesses
Cable Assemblies, Microwave
Cable, Audio
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Cable, Coaxial
Cable, FEP Insulated
Cable, Flame Retardant
Cable, Flat
Cable, Heater
Cable, High Temperature (Over 125°C)
Cable, High Voltage (1,000 Volts & Over)
Cable, Instrumentation & Control
Cable, Irradiated
Cable, Low Capacitance
Cable, Microphone
Cable, Multiconductor
Cable, Plenum
Cable, Power
Cable, Security
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Cords & Cord Sets, International
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Wire, Flame Retardant
Wire, Glass Insulated
Wire, Guy
Wire, High Temperature (Over 125°C)
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Wire, Resistance
Wire, Ribbon
Wire, Semiconductor Lead
Wire, Shielded
Wire, Strain Gauge
Wire, Test Lead
Wire, TFE Insulated
Wire, Thermocouple

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VOLUMES 1A, 1B & 2

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SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
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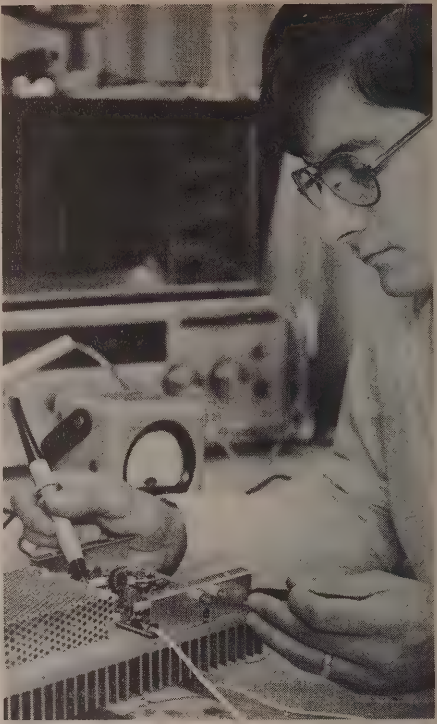
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

RF power from Amplifier Research. Design excellence in broadband engineering.



AR makes rugged, dependable amplifiers for broadband rf instrumentation. From 10 kHz to 1 GHz, from 1 W to 10 kW, AR amplifiers are designed to deliver under worst-case conditions, without damage, and without shutdown.

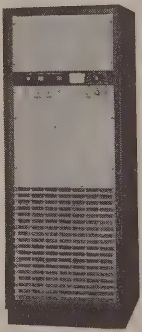
AR amplifiers offer instantly available power anywhere in their operating spectrum, without tuning or bandswitching. Your swept-frequency testing tests the equipment, not the amplifier. Your programmed procedures go through with no hangups from the instrumentation.

Meet our comprehensive line.

You'll find an AR amplifier that matches your toughest requirements in power and bandwidth, without overloading you on capability you don't really need. We can also create or modify equipment for OEM applications, or highly specialized systems.

Off-the-shelf or custom, you'll get an AR amplifier that meets the standard of design excellence we're known for, and meets your demand for tough, reliable rf instrumentation.

SERIES L



MODEL 1500L

Our original, and largest series, these broadband, Class A linear amplifiers give you the option of low, moderate, and high power over five decades of bandwidth. Series L models, both solid state and tube, deliver up to 10,000 watts of stable RF power in the 10 KHz to 300 MHz frequency range.

Solid State

Model	*RF Power (watts)*	*Frequency*
6LA	8	2 - 150 MHz
10LA	10	1 - 110 MHz
10L	10	150 kHz - 300 MHz
30LA	30	1 - 110 MHz

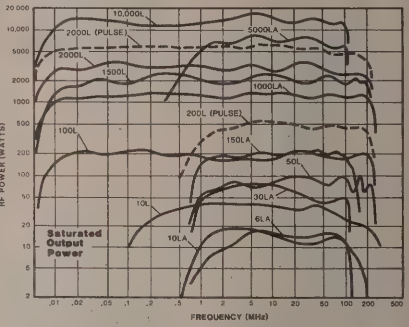
Solid State/Tubes Medium Power

Model	*RF Power (watts)*	*Frequency*
50L	50	1 - 240 MHz
100L	150	10 kHz - 220 MHz
100LM8	150	1 - 220 MHz
100LM9	200	1 - 200 MHz
150LA	150	1 - 150 MHz
200L	200	1 - 200 MHz

High Power

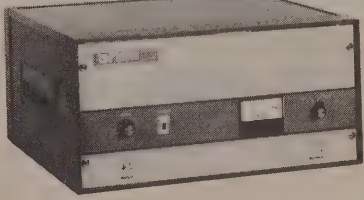
Model	*RF Power (watts)*	*Frequency*
1000LA	1000	10 kHz - 220 MHz
1000LAM8	1000	1 - 220 MHz
1500L	1600	10 kHz - 220 MHz
1500LM8	1600	1 - 220 MHz
2000L	2000	10 kHz - 220 MHz
2000LM8	2000	1 - 220 MHz
10,000L	10,000	10 kHz - 100 MHz

6-10,000 WATTS 10 KHz-300 MHz



SERIES A

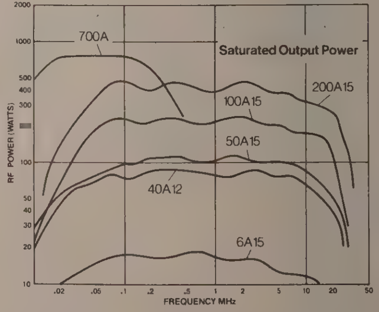
6-700 WATTS 10 KHz to 15 MHz



MODEL 100A15

If it's low to moderate RF power over three decades of bandwidth that you need, turn to Series A where standard models deliver up to 700 watts. Frequencies for these all solid state amplifiers range from 10 KHz to 15 MHz.

Model	*RF Power (watts)*	*Frequency*
6A15	6	20 KHz - 15 MHz
40A12	40	20 KHz - 12 MHz
50A15	50	20 KHz - 15 MHz
100A15	100	35 KHz - 15 MHz
200A15	200	40 KHz - 15 MHz
Model	*RF Power (watts)*	*Frequency*
700A	700	10 - 250 KHz



AMPLIFIER RESEARCH

160 School House Road, Souderton, PA 18964-9990 USA
Phone 215-723-8181 • TWX 510-661-6094

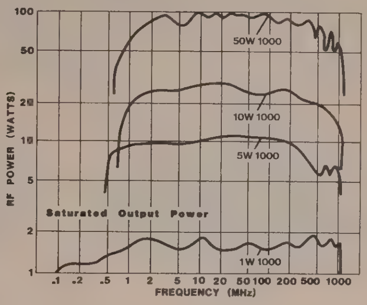
SERIES W

1-50 WATTS 100 KHz-1000 MHz

MODEL 5W1000

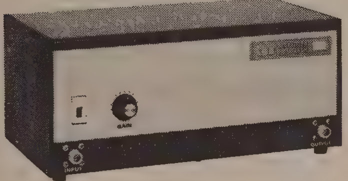
These versatile, ultra-broadband, solid state, linear amplifiers provide RF power over more than four decades of bandwidth from 100 KHz to 1 GHz. Our newest line, Series W includes standard models rated up to 50 watts. Special or modified units are available to provide even higher useful power.

Model	*RF Power (watts)*	*Frequency*
1W1000	1	100 kHz - 1000 MHz
5W1000	5	500 kHz - 1000 MHz
10W1000	10	1 - 1000 MHz
50W1000	50	1 - 1000 MHz



SERIES H

50-1250 WATTS 10 MHz-1000 MHz



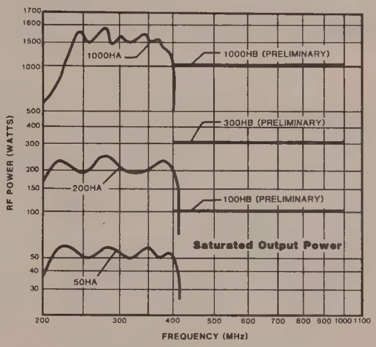
MODEL 50HA

Series H amplifiers offer sub-octave bandwidths from 10 to 410 MHz with standard models providing up to 1250 watts of CW power. Specially designed units can boost power output or extend the frequency range.

Solid State		
Model	*RF Power (watts)*	*Frequency*
50HA	50	220 - 400 MHz
200HA	200	220 - 400 MHz
100HB	100	400 - 1000 MHz
300HB	300	400 - 1000 MHz
1000HB	1000	400 - 1000 MHz
100H	100	*10 - 150 MHz
150H	150	*50 - 175 MHz
200H	200	*100 - 200 MHz

*Narrow band; Select center frequency.

Solid State / Tubes		
Model	*RF Power (watts)*	*Frequency*
1000HA	1250	220 - 400 MHz



ACCESSORIES AND RELATED EQUIPMENT

MODEL 777

LEVELING PREAMPLIFIER

• 5 kHz to 300 MHz • 40 dB gain control up to 200 MHz • ±0.5 dB flatness • Low harmonic distortion • Input rf attenuator

The Model 777 leveling preamplifier accepts a monitor input voltage of any polarity — positive, negative, or differential — and provides up to 40 dB of electronic gain control. Model 777 is ideal for use in constant-field rfi susceptibility testing, power output control, modulation envelope feedback, and simulation of current or voltage sources.

Front panel rf attenuation and threshold adjust range of up to 5 volts make Model 777 versatile enough to fit almost any application, and suitable for use with a wide range of signal sources and amplifiers.

MODEL 999

GATED LEVELING PREAMPLIFIER

• 1 MHz - 1 GHz • Pulse circuit for amplifier blanking

The Model 999 is similar to the Model 777 in its basic functions. In addition, its bandwidth extends to 1 GHz, and its gated pulse circuit makes it particularly suited for use with amplifiers (such as the Models 150LA and 200L) having blanking capability.

AT SERIES

ANTENNAS (200 V/m testing)

- AT1000
  150-1000 MHz; 2000 W; 91 cm x 102 cm x 13 cm log-periodic.
- AT2000
  30-1000 MHz; 3500 W; 117 cm x 61 cm x 51 cm. The AT2000 CAVITENNA® antenna is designed specifically for shielded-room testing.
- AT3000
  10 kHz-30 MHz; 1600 W; 188 cm x 72 cm x 7.0 cm E-field generator. 100 V/m at 1 meter centerline, 1000 V/m between elements.

DC SERIES

DIRECTIONAL COUPLERS

for interconnection of amplifiers with meters, scopes, or spectrum analyzers in power monitoring and leveling

- DC2000 Dual Directional Coupler
  - 10 kHz to 220 MHz • 2000 W
  - Handles forward and reflected power
- DC3000 Directional Coupler
  - 100 kHz to 1 GHz • 50 W
- DC3001 Dual Directional Coupler
  - Similar to DC3000, plus ability to handle both forward and reflected power.

BROADBAND RF TELEMETRY LINK

• Fiber-optic coupling • 1 kHz-1000 MHz, 10 kHz-500 MHz • 40 dB S/N • 200 μV input sensitivity • Return link for machine control

Electro Optic Developments telemetry links, sold and serviced in the U.S. by AR, are for EMI and EMC testing, antenna mapping, and use in noisy environments. Shielded for fields up to 100 kV/m, they are ideal for EMP and pulsed rf applications.

FIELD-STRENGTH MONITOR

• Isotropic response • Fiber-optic coupling • 20 Hz-500 MHz • 1-1000 V/m • 0.1-10 A/m

The Aeritalia monitor, sold and serviced in the U.S. by AR, senses E or H field strength and transmits the reading to a remote repeater via fiber-optic link. The unique sensor probes respond to all incident fields, regardless of polarization.

7985

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Specialists in Analog Electronics and Electro-optics

"HIGH TECHNOLOGY MODULES AND DESIGNS"

SHORT FORM CATALOG

AMPLIFIERS Complete modules in metal box, with connectors and internal stabilizers. From $200 ea.	LNVA LNCA	Low-noise amplifier range between DC and 500MHz. Noise down to 0.2nV/√ Hz. FET and bipolar models up to 80dB gain. Programmable instrumentation amplifiers. Low-noise current input amplifiers. DC to 500MHz. Noise down to .01pa/√ Hz. Up to 1MV/A gain (30MHz). Digitally programmable current amplifier down to 1pa.
COUNTER PRODUCTS	C C 100	Specialty counter products including low jitter delays and fast counting. Laser range receiver test delay with t_0 detector and LED display.
DESIGN SERVICES	DS	Consulting and design services on laser systems and electronics. Designs available for sale to OEM's. Custom design, breadboard, and manufacturing facilities.
FREQUENCY TO VOLTAGE CONVERTER Metal boxed modules from $181.	F/V	Gives dc output proportional to frequency. Up to 100KHz. 0.05% linearity. Optional calibrator. Smoothing down to 0.1Hz available. BNC connectors.
LASER ELECTRONICS Flashlamp Simmer PSU's Laser Diode Drivers from $99. Laser Energy Monitors Laser PFN Power Supplies and Trigger Systems Pockels Cell Drivers	SPS LD LEM LPU QSM	Off-line or dc input with auto trigger and HV initiate mode. 2nS to dc, avalanche and proportional types to 200A. "Safe" current sources. Measures peak single shot/rep. rate energy and holds/resets. Also threshold and power meters. Digital or analog display available. To 1KW, laser PSU's with all support electronics. Miniature modules. Shot counters, Q-Switch delays, PFN networks, trigger circuits, simmers. Avalanche, Krytron, and SCR Q-switch modulators, and delay units.
LOGARITHMIC AMPLIFIERS We are specialists in log amps. Call us. LA-90-DC from stock. Designs and volume pricing available. From $291.	LA-90-P LA-90-DC LA-80-HS	AC coupled for low duty cycles. Fast recovery. 10ns risetime, 90dB. DC coupled, zero-offset, for RF, video. Drift correction loop. DC to 10nS risetime, 90dB, 0.5dB accuracy. 100μ to ±6V input. High speed, dc to 2nS risetime for low duty cycle pulses.
FIBER OPTICS		Fiber optic receivers and transmitters to 500Mbits.
OPTICAL RECEIVERS For rangefinding, data communications, and Lidar. From $236.	LNOR DR LR	Optical receivers with PIN or APD detectors to 500MHz. High sensitivity. Digital receiver, similar to LNOR, but with digital output. Laser receivers for laser rangefinders, optical receivers for communication, logarithmic receivers for lidar/fiber optics.
POWER SUPPLIES 0-300/600 volts DPS units from stock. 12/15 or 24/48 V input. From $100 ea. Specify -N for NEG, M for Military.	DPS HVPS CCP	Low-power, miniature (1 cu. in.), programmable low-noise supplies for photodiode biassing, ionization chambers, etc. 12/15, 24/28V input, up to 2KV output. Similar to DPS but up to 4KV output. Proportional or programmed output. DC/DC converter, 10, 60, and 150 watts for capacitor charging or high voltage supplies. To 2KV. Battery or off-line inputs. Miniature modules.
PULSE STRETCHER (Peak sample and hold). From $181 ea.	PSR	Measures peak value of a single pulse down to 10nS and stretches to dc. One or two stages with reset. Gating and scaling, pre-amplifiers available.
SYSTEMS		Short range ultrasonic and optical rangefinders/object detectors and optical training and aiming systems. Quadrant detector and amplifier systems. Free space communications.

ANALOG MODULES, INC.

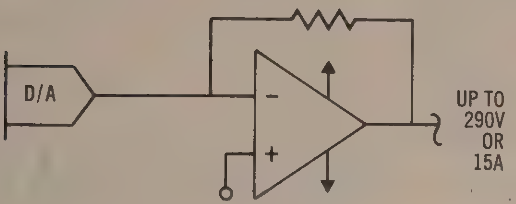
126 BAYWOOD AVENUE, LONGWOOD, FLORIDA 32750 • (305) 339-4355 or 56 • TELEX ANALOG MOD 467617

APEX μtech

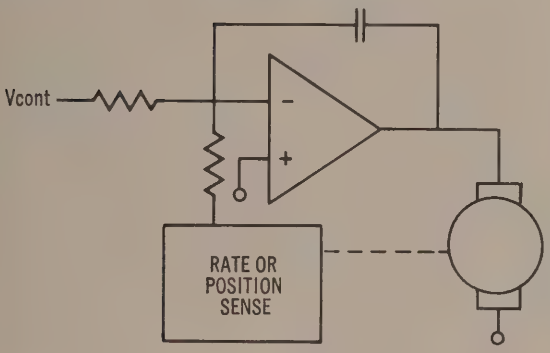
POWER OP AMPS

INDUSTRY'S MOST COMPLETE SELECTION
EVALUATION QUANTITIES FROM STOCK

I/V CONVERSION



ERROR INTEGRATION



PA12
APEX μtech
PA12A
APEX μtech

DESCRIPTION

APEX MICROTECHNOLOGY CORP. offers the industry's largest selection of high voltage, high current operational amplifiers designed for resistive, inductive and capacitive loads. The output of high current models is protected against inductive kickback or back EMF. For optimum linearity, most output stages are biased for class A/B operation. These devices are housed in hermetically sealed 8 pin TO-3 packages.

APPLICATION

These hybrid integrated circuits allow the designer to achieve the precision associated with Op Amps and the power associated with discrete multi-component boosters all in one device. This improves factors of reliability, performance and cost. Some of the prime applications for High current Models include: Motor Drives controlling rate or position, magnetic CRT Deflection, Programmable Power Supplies for constant voltage or current, Valve control, Pin drivers for ATE equipment and compact audio amplifiers. High voltage models often share some of the above applications and also take on tasks such as Electrostatic CRT Deflection and driving piezoelectric transducers.

SPECIFICATIONS & CROSS REFERENCE

		HIGH CURRENT MODELS								HIGH VOLTAGE MODELS			
		PA01	PA02/A	PA07/A*	PA09/A	PA10/A*	PA12/A*	PA51/A*	PA73	PA08/A*	PA83/A*	PA84/A*	Units
INPUT													
OFFSET VOLTAGE, initial at T_C=25°C	MAX	±12	±10/±3	±2 ±.5	±3/±.5	±6/±3	±6/±3	±10/±5	±10	±2/±.5	±3/±1	±3/±1	mV
OFFSET VOLTAGE, vs temperature	MAX	±65	±50/±25	±30, ±10	±30′±10	±65/±40	±65/±40	±65′±40	±65	±30/±10	±25/±10	±25, ±10	μV/°C
BIAS CURRENT, initial at T_C=25°C	MAX	50	.2/.1	.05/.01	.10/.02	30/20	30/20	40/20	40	.05/.01	.05/.01	.05/.01	nA
BIAS CURRENT, vs temperature	MAX	400	FET	FET	FET	±400	±400	400	400	FET	FET	FET	pA/°C
OFFSET CURRENT, initial at T_C=25°C	MAX	15	±.1/±.05	.05/.01	.05/.01	±30/±10	±30, ±10	±10/±3	10	.05/.01	.05/.01	.05/.01	nA
INPUT IMPEDANCE, DC	TYP	2 x 10^8	10^{12}	10^{11}	10^{11}	2 x 10^8	2 x 10^8	2 x 10^8	2 x 10^8	10^{11}	10^{11}	10^{11}	Ω
INPUT VOLTAGE, differential, safe	MAX	±V_S −3	±V_S −5	±V_S	±V_S	±V_S −3	±V_S −3	±V_S −3	±V_S −3	±50	±V_S −10	±V_S −10	V
COMMON MODE VOLTAGE, operating	MIN	±V_S −6	±V_S −6	±V_S −12	±V_S −10	±V_S −5	±V_S −5	±V_S −6	−V_S −6	±V_S −12	±V_S −12	±V_S	V
COMMON MODE VOLTAGE, safe	MAX	±V_S	±V_S −2	±V_S	±V_S	±V_S	±V_S	±V_S	±V_S	±V_S	±300	±300	V
COMMON MODE REJECTION, DC	TYP	110	100	120	104	100	100	110	110	130	130	130	dB
GAIN													
OPEN LOOP, full load at 10 Hz	MIN	91	86	92	80	96	96	94	91	96	96	100	dB
GAIN-BANDWIDTH PRODUCT, at 1 MHz	TYP	1	4.5	1.3	150	6	4	1	1	5	5	75	MHz
POWER BANDWIDTH, at nom. supply	TYP	23	500	18	2500	23	20	16	23	90	60	250	KHz
OUTPUT													
VOLTAGE SWING	TYP	±V_S −5	±V_S −2	±V_S −3	±V_S −7	±V_S −5	±V_S −5	±V_S −5	±V_S −5	±V −5	±V_S −5	±V_S −3	V
CURRENT, peak at T_C=25°C	MIN	5	5	5	4	5	10/15	10	5	.15	.075	.040	A
CURRENT, short circuit		adjustable	adjustable	adjustable	4.5 A	adjustable	adjustable	adjustable	adjustable	adjustable	.1 TYP	.050 TYP	A
SLEW RATE, at max. load	TYP	2.6	20	5	400	5	4	2.8	2.6	30	30	200	V/μs
POWER SUPPLY													
VOLTAGE, operating	MIN	±10	±7	±12	±10	±10	±10	±10	±10	±15	±15	±15	V
VOLTAGE, operating	NOM	±28	±15	±35	±30	±40	±40	±28/±34	±28	±100	±150	±150	V
VOLTAGE, operating	MAX	±28	±19	±50	±40	±45, ±50	±45/±50	±36/±40	±30	±150	±150	±150	V
CURRENT, quiescent at T_C=25°C	MAX	50	37	30	85	25	50/35	10	5	6.5	8.5	7.5	mA
POWER TO LOAD, AC peak T_C=70	MAX	105	70	180	120	165	420	270	110	13	10	5.7	Watts
THERMAL													
RESISTANCE, junction to case, DC	MAX	2.6	2.6	2.6	1.8	2.6	1.4	1.8	2.6	6.5	6.5	6.5	°C/W
RESISTANCE, case to air	TYP	30	30	30	30	30	30	30	30	30	30	30	°C/W
TEMPERATURE RANGE, storage		−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	−65 to 150	°C
TEMPERATURE RANGE, operating, case		25 to 85	−55 to 125	−55 to 125	25 to 85	−55 to 100/125	−55 to 100, 125	−55 to 125	−55 to 85	−55 to 125	−55 to 125	−55 to 125	°C
TEMPERATURE RANGE, specified case		−25 to 85	−25/55 to 85/125	−25 to 85	−25 to 85	−25 55 to 85/125	−25 55 to 85/125	−25 55 to 85/125	−25 to 85	−25 to 85	−25 to 85	−25 to 85	°C
INTERNAL POWER DISSIPATION, AC peak T_C=70	MAX	60	35	60	60	60	135	105	60	26	26	26	Watts
THERMAL SHUTDOWN		NO	NO	NO	YES	NO	NO	NO	NO	YES	YES	YES	N/A
SECOND SOURCED BY			National LH0101					Burr Brown OPA501	Burr Brown 3573		Burr Brown 3583	Burr Brown 3584	

* These models are available in MIL-STD./883B method 5008 screening. Specify "M version" (ie: PA10M) (ie: PA10M)

APEX MICROTECHNOLOGY CORP. / Tucson, AZ / Tel. (602) 746-0849 / 624-0273 / TWX 910-952-1176

APPLICATIONS HOTLINE: (800) 421-1865 • **LITERATURE AND ORDERS: (602) 746-0849**

CALEX MFG. CO., INC., 3355 Vincent Road, Pleasant Hill, CA 94523-4389
Telephone: (415) 932-3911 Telex: 338 506

CALEX
BRIDGESENSOR MODEL 165

BRIDGESENSORS are complete power sources and amplifiers for strain gages, load cells, and transducers. The 165 and 465 have analog outputs. The 166 and 167 have frequency outputs designed for digital readouts or microprocessor inputs. The Model 465 operates directly from the AC line.

SPECIFICATION	MODEL 165	MODEL 166	MODEL 167	MODEL 465
Gain	10–1000	10–1000	10–1000	10–1000
Output	±10V @ 10mA	0 to 10kHz	0 to 100kHz	±10V @ 5mA
Drift	±3uV/°C	±0.5uV/°C	±0.5uV/°C	±2uV/°C
Bridge Supply	+4 to +10V @ 100mA			+4 to 15V @ 150mA
Price	$132	$174	$174	$195

CALEX
INSTRUMENTATION AMPLIFIER MODEL 178

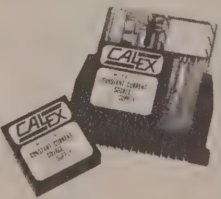
INSTRUMENTATION AMPLIFIERS for data acquisition systems, strain gages, transducers, instruments, scope preamps, laboratory use and control systems. Mounting kits shown with adjust. pots. and conn. available.

SPECIFICATION	MODEL 176J	MODEL 176K	MODEL 176L	MODEL 178
Gain	10–1000	10–1000	10–1000	10–1000
Input Impedance	10M			1000M
Drift @ 1000 Gain	±3uV/°C	±1uV/°C	±0.25uV/°C	±2uV/°C
CMRR @ 100 Gain	100dB min.			
Freq. Resp.	10kHz			5kHz
Size	1.5" X 1.5" X 0.5"H.			
Price	$59	$66	$73	$98

CALEX
MULTIFUNCTION VOLTSENSOR MODEL 546

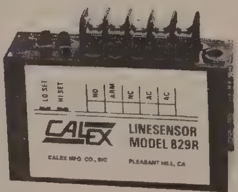
VOLTSENSORS are precision level detectors for OEM instruments and in-house test equipment. Mounting kits (pictured) are available for ease of system assembly. Contact factory for details.

SPECIFICATION	MODEL 540	MODEL 545	MODEL 546
No. of Trip Points	1	2	2
No. of Outputs	1	3 (HI, GO, LO)	
Trip Point Range	±14.5V	±10mV to ±1V	±100mV to ±10V
Trip point stability	±40uV/°C	±5uV/°C	±50uV/°C
Input Impedance	1M	10M	10M
Output (can source or sink)	100mA		
Size	1.4" X 0.6" X 0.5"		2" X 2" X 0.6"
Price	$43	$129	$108

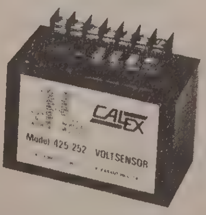


"I" SUPPLY MODEL 930 Programmable constant current source. For component, contact resistance, semiconductor, coil, motor, connector, and cable testing. Used to power strain gages, for slip ring instrumentation and RTDs.

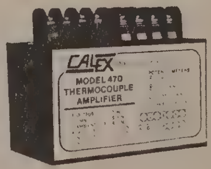
Output 0.5 to 50mA (up to 500 mA with special mtg. kit.). Output voltage or resistance programmable. Can be used as a voltage to current converter (4 to 20mA). Compliance voltage 0 to 27V. Size 1.5" X 1.5" X 0.5". Price $86.



LINSENSOR The **MODEL 829** monitors the AC line voltage to detect brown-outs, overvoltages, or line dropouts. Protects against motor burnout, instrument malfunction. Prevent computer memory loss or assure continued power by starting up or switching to auxiliary power sources. Available for domestic and all foreign voltages. Relay contact output 0.5A @ 115VAC. Ave. response time 100msec and 20msec on dropout. Accuracy 0.5VAC rms. Size 3.8" X 1" X 2.2". Price $106 OEM prices avail.

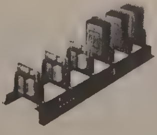


The **MODELS 425-252 and 415-215 VOLTSENSORS** are complete AC line powered DC voltage detectors for process control, computer backup, quality control, and manufacturing equipment. Trip point adjustable by internal pot. LED shows output relay state. Range ±100mV (415-215) and ±14V (425-252). Stability ±5uV and ±100uV/°C. Size 3.75" X 2" X 3". Relay contacts 3 Amps @ 115 VAC. Price $242 (415) and $193 (425).

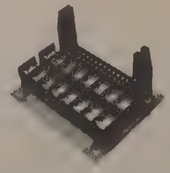


The **MODEL 470** Thermocouple amplifier is an AC line powered amplifier for use with type E, J, T, or K Thermocouples. Completely encapsulated for use in rugged environments. It has built-in cold junction compensation. Gain adjustable 175 to 650. Output ± 10 Volts. CMRR 120 dB. Zero stability 2 uV/°C. Linearity better than 0.005%. Size 3.75" X 2" X 3". Price $195.

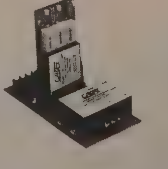
PACKAGING HARDWARE to conveniently mount and wire the module and/or mounting kit selected into a small mini-system. Quick & easy to use and professional looking.



MODEL 8100 MOUNTING RAILS for mounting kit connectors. Size 16" X 1" H. can be cut to size. 32 holes on 1/2" Ctrs. Price $23/Pair.



MODEL 2005 INTERFACE MOUNTING KIT converts 15 pin p.c. card to barrier strip allowing system wiring with a screwdriver. Price $27.



MODEL 22-100 POWER SUPPLY INTERFACE KIT allows a single card system to be powered up in minutes. ±15V at 100mA. Price $126.

Ectron CORPORATION

- Differential DC Amplifiers
- Strain Gage Signal Conditioners
- Thermocouple Signal Conditioners
- Signal Conditioning Systems
- Transducer Amplifiers
- Thermocouple/MV Calibrators

MODEL 314B

Miniature airborne amplifier occupies less than one cubic inch. Contains differential amplifier, strain gage excitation and power supply to operate from 28V dc. 20 kHz Bandwidth. Bulletin 2007

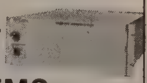
400 ENVIRONMENTAL SERIES

- Intrinsically Safe
- 100G Shock
- −25 to +71°C
- 0.5 μV/°C Stability
- Small Size 1″w×2″h×3″d
- Bridge Excitation and Balance
- Thermocouple Conditioning
- RFI protection
- 120 db CMR • 100V CMV
- Rack or Stud Mounting
- 12 or 28 V dc Power • 8 oz's.
- Bulletin 2001

500 ECONOMY SERIES

- 1 μV/°C
- 114 dB CMR
- Gains x.01 to x2500
- 16 Amps per 3.5″ high rack
- 80 kHz bandwidth
- Filtered output
- 10 ma, 100 ma, dual outputs
- Bridge Bal., Completion, CAL
- Bulletin 2004 and 2013

540 SERIES LOW COST MULTI-CHANNEL "FRONT END" FOR DATA SYSTEMS



- 4 Independent Channels Per Card
- 64 Channels in 7-inch Rack Enclosure
- True Differential Input
- 20 Meg Ohm Input Impedance
- 110 dB CMR
- Independent Fixed Gains x1 to x1000
- Independent Fixed Filter 10Hz to 1KHz
- Optional Excitation Power Supply
- Optional Bridge Calibration
- Optional Bridge Completion
- Bulletin 2011

680 INDUSTRIAL SERIES

- Auto Zero
- Strain Gage Conditioning
- Thermocouple Linearization
- Reference Junctions
- Multifunction Amplifiers
- Bridge Excitation and Bipolar Cal.
- .5 μV/°C Zero Stability
- 120 dB CMR and 300V CMV
- 12V dc, 28V dc or 115V ac power
- Bulletin 2005

700 WIDEBAND SERIES

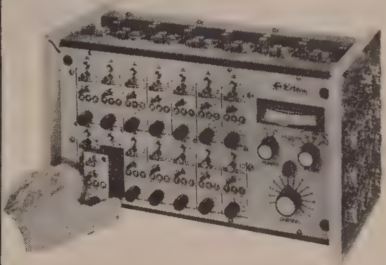
- 100 kHz Bandwidth
- Manual or Programmable Gain
- Digital Storage
- Local Readout
- 1 μV/°C Zero Stability
- .003%/°C Gain T.C.
- .01% Gain Accuracy
- 300V CMV • 126 dB CMR
- 3-pole filters • Dual outputs
- Bulletin 2003

776 SERIES HIGH PERFORMANCE SIGNAL CONDITIONING UNIT

- CMV ± 1200 Volts DC or Equiv. AC
- CMR 125dB DC to 50KHz, 85dB to 1MHz
- 10 Meg Ohm Input Impedance
- Selectable Gain x1 to x1000 with Vernier
- 0.1% Gain Accuracy, 0.01% Stability
- 100KHz Bandwidth
- Selectable Filter
- Constant Voltage or Dual Tracking Constant Current Excitation
- Internal Calibration Source
- AC Powered
- Bulletin 2014

4000 SERIES, SIGNAL CONDITIONING SYSTEMS

The typical 4000 series system shown below is designed for Airborne or Vehicular service involving moderately high G forces. It includes 14 stable 400 series amplifiers, a monitor meter and monitor selection switch, individual CAL switches, bridge excitation, bridge balance and conditioning.



Other 4000 series systems are designed for operation during shocks up to 100 G's. Features available in these systems include integral VCO's, FET Calibration, Channel ID signals, Rechargeable Battery Pack and others. (See Bulletin 2010)

MODEL 1120 THERMOCOUPLE SIMULATOR CALIBRATOR

Ectron
123456 °C R

CALIBRATES . . .

Digital Thermometers
Temperature Recorders
Thermocouple Transmitters

- 8 TC Types: E,J,K,T,R,S,B,C
- 0.005% of Reading Accuracy
- IEEE - 488 Interface
- Key in temperature directly in C or F
- Microprocessor based
- DC Calibration capability
- Bulletin 2012

8159 Engineer Road, San Diego, California 92111-1980
Phone (619) 278-0600/TWX 910-335-1259

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Specialists in Airborne, Vehicular and Industrial Instrumentation

Ectron CORPORATION

The Ultimate in RF Power.

Solid State Reliability with Incredible Versatility.

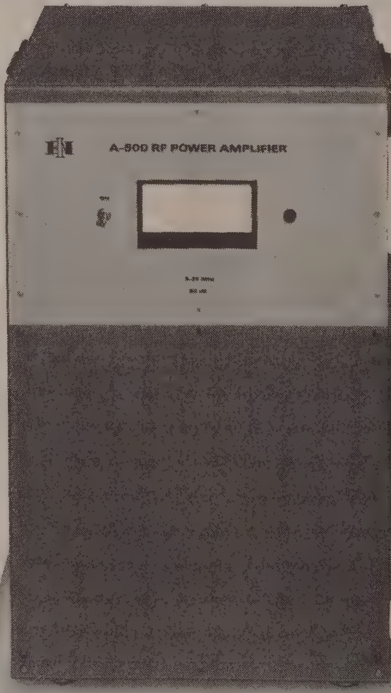
400 Watts/1040L

- 10 kHz to 500 kHz
- Up to 700 watts output
- Useful power up to 1 MHz
- Built-in true average power meter

MODEL 1040L POWER AMPLIFIER
INPUT
OUTPUT
CAUTION

500 Watts/A-500

- 300 kHz to 35 MHz
- Up to 1000 watts pulse and CW
- No bandswitching
- Works into any load impedance


A-500 RF POWER AMPLIFIER

100 Watts/2100L

- 10 kHz to 12 MHz coverage
- 100 watts linear Class A power
- Up to 250 watts saturated

MODEL 2100L RF POWER AMPLIFIER
INPUT
OUTPUT
CAUTION RF VOLTAGE

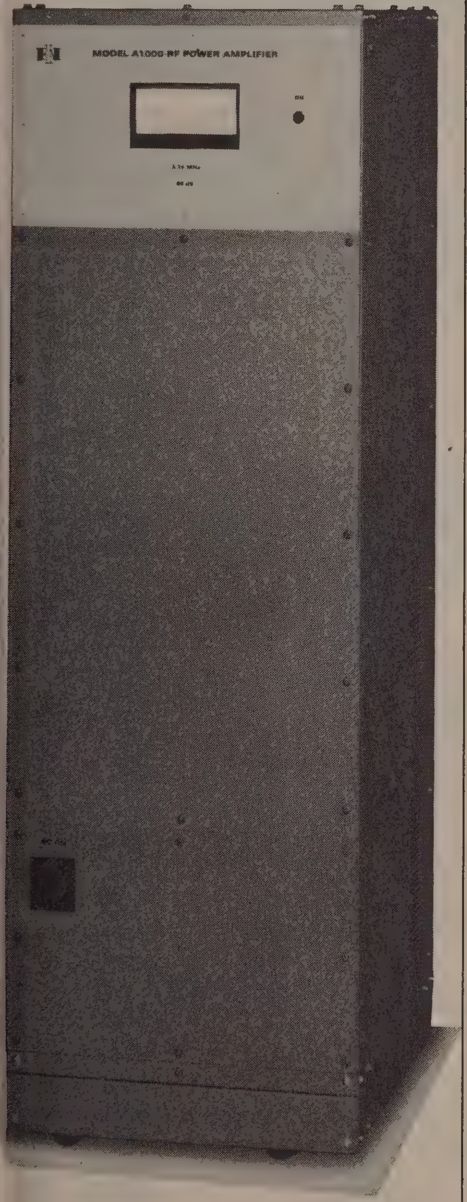
200 Watts/3200L

- 250 kHz to 150 MHz
- 200 watts linear power to 120 MHz
- 175 watts to 150 MHz
- Operates from 115/230V receptacle

3200L RF POWER AMPLIFIER

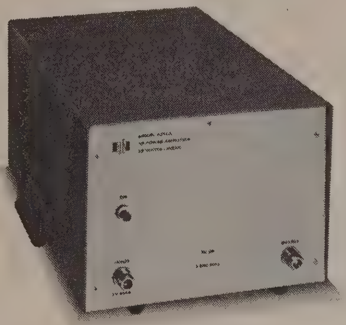
1000 Watts/A1000

- 300 kHz to 35 MHz
- 1000 watts linear Class A
- Ruggedly built
- Operates from 230 VAC, 3 phase


MODEL A1000 RF POWER AMPLIFIER
ON

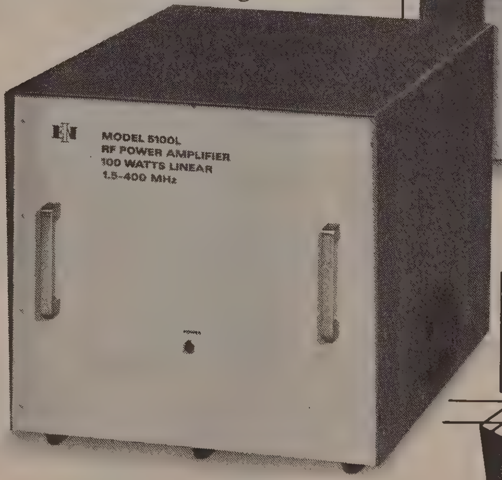
25 Watts/525LA

- Flat 1 to 500 MHz
- 25 watts linear output
- Up to 40 watts pulse and CW
- No bandswitching



100 Watts/5100L

- Flat 1.5 to 400 MHz
- 100 watts linear power
- 200 watts to 200 MHz
- No bandswitching

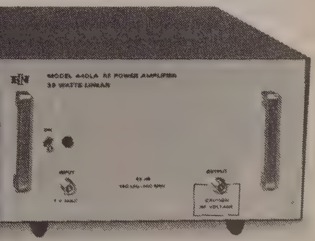

MODEL 5100L
RF POWER AMPLIFIER
100 WATTS LINEAR
1.5-400 MHz
POWER

3 Watts/603L

- 0.8 to 1000 MHz
- 3 watts of linear power
- Flat 37 dB gain
- Up to 5 watts saturated

40 Watts/440LA

- 150 kHz to 300 MHz
- 40 watts Class A linear
- State-of-the-Art
- Up to 75 watts CW and pulse


MODEL 440LA RF POWER AMPLIFIER

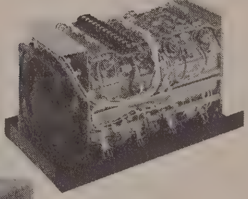
ENI

The advanced design line of RF power amplifiers

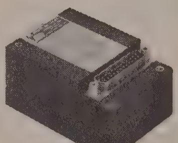
For our latest full-line catalog, please contact us at **ENI,**
3000 Winton Road South, Rochester, NY 14623. Call 716/473-6900 or Telex 97-8283 ENI ROC.
23 Old Park Road, Hitchin, Hertfordshire SG5 2JS England. Call Hitchin 51711 or Telex 825153 ENI UKG.
A subsidiary of Emerson Electric Co.
EMERSON

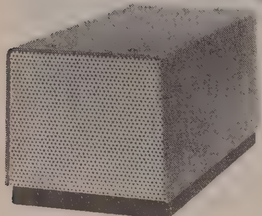
LINEAR D.C. SERVO AMPLIFIERS

25 to 1000 Watts

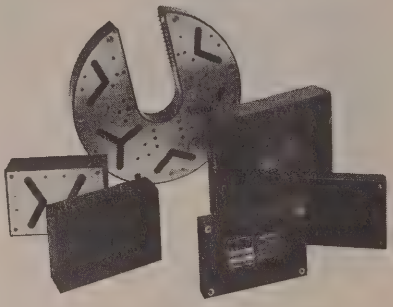


FAN COOLED
500, 750 and
1000 Watts





The **ATP** Series DCA/FC Servo Amplifiers are all forced air cooled. Heat sinks and fans are integral in all units.



EPOXY ENCAPSULATED, 25 to 600 Watts

Features:

- Dual Usage—Current or Voltage Amplifier
- Narrow Bandwidth—10kHz Small Signal, 1kHz Full Power
- Adjustable Gain
- Adjustable Current Limit
- Current or Voltage Feedback
- Power Sharing
- Short Circuit Protection (Output to Ground)
- Thermal Overload Protection
- Multiple Input Preamp
- Available with High Reliability Parts
- Mating Heat Sink Available
- Mating Sockets Available
- Continuous 100% Dissipation on Fan Cooled Units

Typical Applications

- DC Servo Motors
- DC Torque Motors
- Servo Valves
- Low Inertia Motors
- Deflection Coils

	OUTPUT AT NOMINAL SUPPLY			SUPPLY		GAIN		FREQUENCY RESPONSE		INTERNAL DISSIPATION		
		Current										
Model No.	Voltage Peak (V DC)	Maximum (Amperes)	Limit Adjust Range (Amperes)	Supply Voltage (V DC)	Bias Voltage (V DC)	Gain as Voltage Amplifier (V/V)	Gain as Current Amplifier (A/V)	Small Signal (kHz)	Full Output (kHz)	Continuous at 25°C (Watts/°C)	Derated for Temperature (Watts/°C)	Full Power Rating (W)
EPOXY ENCAPSULATED 25 TO 600 WATTS												
DCA 25	±20	±1.25	0.4 to 1.25	+ 28±3	−15±2	20	0.5	10	1	12.5	0.075	25
DCA 25/60	±50	±0.5	0.2 to 0.5	+ 60±5	−15±2	20	0.5	10	1	12.5	0.075	25
DCA 50/60	±50	±1	0.2 to 1	+ 60±5	−15±2	20	0.5	10	1	25	0.15	50
DCA 50/2*	±20	±2.5	0.4 to 2.5	+ 28±4	−15±2	20	0.5	10	1	25	0.15	50
DCA 200	±20	±10	0.4 to 10	+ 28±3	−15±2	20	0.5	10	1	200	1.25	200
DCA 200/60	±50	±4	0.4 to 4	+ 60±5	−15±2	20	0.5	10	1	200	1.25	200
DCA 200-1	±20	±10	0.4 to 10	+ 28±3	−15±2	20	0.5	10	1	200	1.25	200
DCA 200-1/60	±50	±4	0.4 to 4	+ 60±5	−15±2	20	1	10	1	200	1.25	200
DCA 300	±20	±15	0.4 to 15	+ 28±3	−15±2	20	1	10	1	300	1.75	300
DCA 300/60	±50	±6	0.2 to 6	+ 60±5	−15±2	20	0.5	10	1	300	2	300
DCA 300-1	±20	±15	0.4 to 15	+ 28±3	−15±2	20	0.5	10	1	300	1.75	300
DCA 300-1/60	±50	±6	0.2 to 6	+ 60±5	−15±2	20	1	10	1	300	2	300
DCA 600/60	±50	±12	0.2 to 12	+ 60±5	−15±2	20	0.5	10	1	600	4	600
DCA 600/100	±90	±6.7	1.0 to 6.7	+100±5	−15±2	20	0.5	10	1	600	4	600
FAN COOLED 500, 750 and 1000 WATTS												
DCA 500FC-1	±50	±10	1 to 10	±60±5	not req.	10	2.5	5	1	500	10	500
DCA 500FC-2	±50	±10	1 to 10	+60±5	−15±2	10	2.5	5	1	500	10	500
DCA 500FC-3	±50	±10	1 to 10	+60±5	not req.	10	2.5	5	1	500	10	500
DCA 750FC-1	±50	±15	1.5 to 15	±60±5	not req.	10	2.5	5	1	750	15	750
DCA 750FC-2	±50	±15	1.5 to 15	+60±5	−15±2	10	2.5	5	1	750	15	750
DCA 750FC-3	±50	±15	1.5 to 15	+60±5	not req.	10	2.5	5	1	750	15	750
DCA 1000FC-1	±50	±20	2 to 20	±60±5	not req.	10	2.5	5	1	1000	20	1000
DCA 1000FC-2	±50	±20	2 to 20	+60±5	−15±2	10	2.5	5	1	1000	20	1000
DCA 1000FC-3	±50	±20	2 to 20	+60±5	not req.	10	2.5	5	1	1000	20	1000

*This is a dual channel unit with two (2) identical 50 watt amplifiers in one encapsulated package. Data shown is for one channel.

FREQUENCY CONTROL PRODUCTS, INC.
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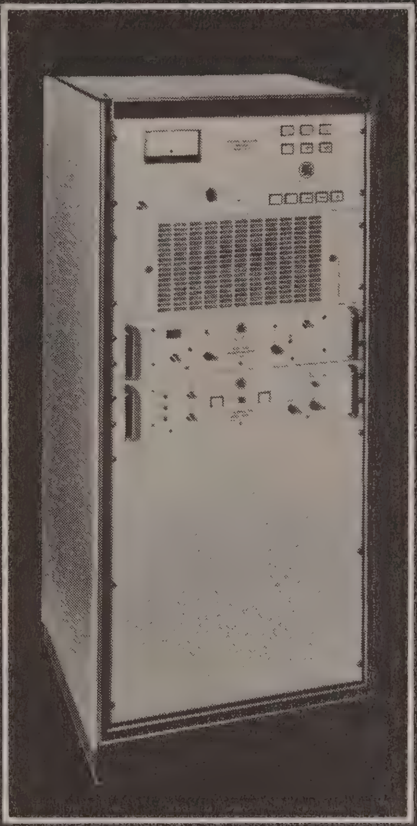

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400 SERIES
Ultra Wideband RF Power Amplifiers

Model	Rated Output (Watts)	Frequency
402	100	.01 to 220 MHz
412	100	1 to 220 MHz
422	200	1 to 220 MHz
404	400	.01 to 220 MHz
414	400	1 to 220 MHz
406	1000	.01 to 220 MHz
416	1000	1 to 220 MHz
410	2000	.01 to 220 MHz
430	2000	1 to 220 MHz
469	5000	1 to 100 MHz
489	15000	1 to 100 MHz

5300 SERIES
Broadband Solid State Power Amplifiers

Model	Rated Output(Watts)	Frequency
5300	15	.01 to 250 MHz
5301	10	.01 to 500 MHz
5310	15	1 to 320 MHz
5311	10	1 to 500 MHz
5360	50	.01 to 250 MHz
5361	35	.01 to 500 MHz
5362	40	1 to 500 MHz
5370	50	1 to 320 MHz
5401	10	500 to 1000 MHz
5411	15	500 to 1000 MHz

1600 SERIES
Solid State Broadband HF Power Amplifiers

Model	Rated Output(Watts)	Frequency
1660	5, Class A	.2 to 35 MHz
1560	5, Class A	.01 to 20 MHz
1670	35, Class A	.2 to 35 MHz
1570	35, Class A	.01 to 20 MHz
1680	70, Class A	.2 to 35 MHz
1580	70, Class A	.01 to 20 MHz
1600	130, Class A	.2 to 35 MHz
1500	130, Class A	.01 to 20 MHz
1690	150, Class AB	.5 to 30 MHz
1700	280, Class AB	.5 to 30 MHz
1610	500, Class AB	.5 to 30 MHz
3220	1000, Class AB	.5 to 30 MHz

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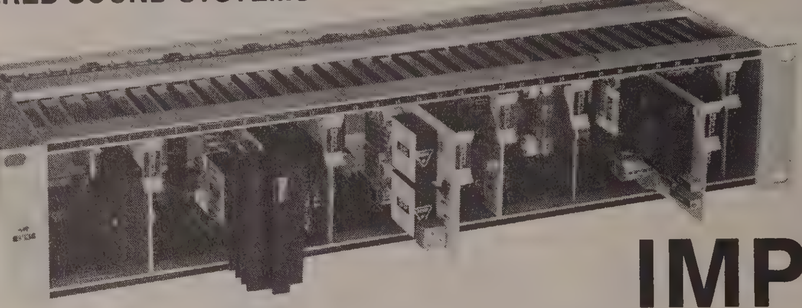

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MICROPHONE PREAMPLIFIER MODEL 4003
Low noise Mic Preamplifier featuring the Map Model 400-51 shielded Mic Input Transformer — a built-in network for powering condenser microphones — a wide range high level centertapped output transformer (Map Model 400-17) — and an auxilliary unbalanced direct output.

BRIDGING LINE AMPLIFIER MODEL 4004
Designed to bridge balanced medium to high level sources. Features Map Model 400-52 Bridging Input Transformer — Model 400-17 Output Transformer — and an auxilliary direct output.

LINE BOOSTER - DIFFERENTIAL OR COMBINING (SUMMING) AMPLIFIER MODEL 4006
Multi-purpose amplifier, simple external connections determine operating characteristics. Features direct access to non-inverting and inverting (summing) OP-AMP inputs — Model 400-17 Output Transformer and an auxilliary unbalanced direct output.

15W POWER AMPLIFIER MODEL 4007
Delivers 15 watts RMS continuous power output into a 4 OHM load. Designed for monitor — headphone driver — or cue AMP. Applications. Features an active balanced bridging transformerless (differential) input stage — A Map Model PDM-40 Power Drive Module and a direct coupled power output stage.

PHONO EQUALIZED PREAMPLIFIER MODEL 4009
Standard RIAA Phono Reproduce Equalization (±1DB), gain and high trim controls — Model 400-17 Output Transformer.

PEAK PROGRAM LED INDICATOR MODEL 4010
Four channels of peak indication on a single card. Detect instantaneous peaks in program or mic channels. Use with average reading VU meters for complete level monitoring — less costly than PPM's. Active balanced bridging transformerless (differential) inputs may be connected at virtually any circuit point in an audio console or system without affecting program audio.

SOLID-STATE FET AUDIO SWITCHING MODEL 4011
Four independent remote controlled Fet Audio Switch Circuits on a single card. Use for channel assignment in a remote controlled audio console or mixer — or to form a large switching matrix or routing switcher. FET switches operate by applying common (ground) of the bipolar power supply.

OSCILLATOR MODEL 4012
Versatile audio frequency oscillator for providing cueing — slating — alignment — or test tones in an audio console or system. External connections determine fixed or remotely variable frequency and gain. Features Model 400-17 Output Transformer and an auxilliary unbalanced output.

PINK/WHITE NOISE GENERATOR MODEL 4017
Provides selectable pink or white noise output, with variable gain, used in room analysis, amplifier performance, speaker tests, reverberation tests, and sound delay tests. Pink noise slope is per E.I.A. standards.

FOUR CHANNEL AMPLIFIER MODEL 4020
Uses four Map 5004 OP-AMPS in an active balanced configuration. For balanced, differential, or single-ended applications. On card user adjustable trimpots for up to 34DB gain. Outputs can be coupled into Map Model 400-17 Transformer for floating (or balanced) applications.

MOSFET AUDIO SWITCHER MODEL 4088-1
An eight channel SPDT Mosfet Switch which provides low distortion switching with minimal loss. All switches are CMOS compatible. Four of the eight switches are routed through a jumper matrix for additional flexibility.

Vu METER MODEL 4060
Provides an integral Vu meter which can be removed for remote mounting. Adjustable zero Vu setting, range from 0dB to +18dB. Switch selectable A and B, balanced or unbalanced inputs with 10K ohms input impedance.

VOLTAGE CONTROLLED AMPLIFIER MODEL 4102
Used for remote level control — fader grouping — or automated mixing applications. Card provides a regulated +5VDC reference voltage for simple connection as a 0 to 100DB attenuator.

VOLTAGE CONTROLLED AMPLIFIER MODEL 4202
Similar to Model 4102 with Model 400-17 Output Transformer added. Has floating 600 OHM-27DBM output & direct aux. Output. Requires 65MA Max. Width 1-7/16.

DISTRIBUTION AMPLIFIER MODEL 4820
Provides eight active balanced 600 OHM outputs at +20DBM max. each. Features active balanced bridging transformerless (differential) input with level control.

ACCESSORIES
MODEL 4900 RACK MOUNTING FRAME W. COVER -Holds up to 11 cards on 1-1/2 inch centers or up to 16 cards on 1 inch centers. Features hinged swing-down front cover. Connectors not included. 19 W x 3-1/2 H x 6 D.
MODEL 1828 (MF-17) OPEN MOUNTING FRAME - Similar to Model 4900 but without front cover.
MODEL 1817 (MB-1) CARD MOUNTING BRACKET - Single card holder with guides. PC connector attaches to studs at rear. Connector not included.
MODEL MC-102 PC CONNECTOR 30 pin connector (15 position - double readout). One connector is supplied with each Impac Series card.
MODEL 4030 EXTENDER CARD — A 6 inch extension for testing & trouble-shooting cards under actual operating conditions.

PC BOARD POWER SUPPLIES
MODEL 4000 ±15 VDC at 100MA max. 1-1/4 in. wide
MODEL 4005 ±15 VDC at 200MA max. 1-1/2 in. wide
MODEL 4050 ±15 VDC at 500MA max. 2-3/8 in. wide

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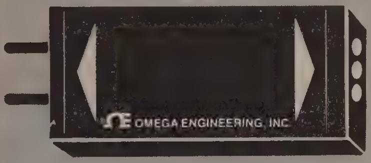
AMPLIFIER ASSEMBLIES

Signal Conditioners for Temperature, Pressure and Strain

CJ High Accuracy Cold Junction Compensation for Thermocouples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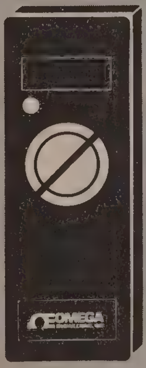
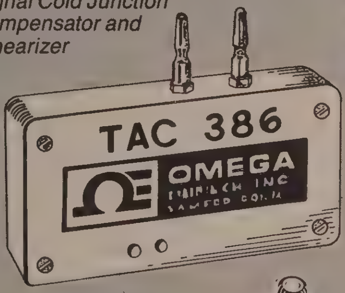


MCJ Miniature Cold Junction Compensator for Thermocouples

TAC-386 Thermocouple Signal Cold Junction Compensator and Linearizer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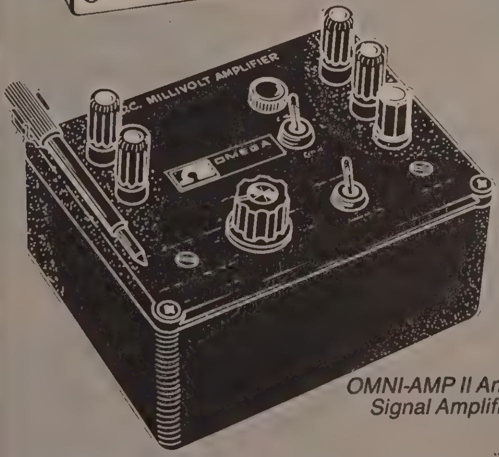
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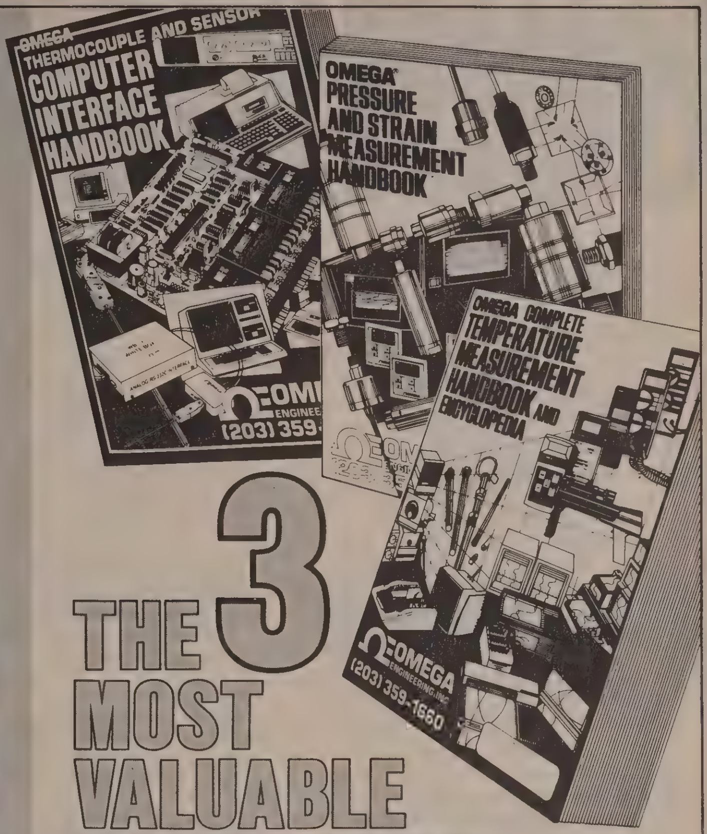
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eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

PACIFIC

TRANSDUCER SIGNAL CONDITIONING

SERIES 8200

- Mainframe/Plug-in Transducer Conditioners
- Transducer Calibration and Balance
- Isolated Excitation and Output
- Differential Instrumentation Amplifier
- Optically Isolated Remote Control
- Self-Contained, Line-Operated
- Compact-10 Channels in 5¼" High Rack

MODEL 8210 TRANSDUCER CONDITIONER

- Conditions 1, 2 and 4-Arm Resistive Transducers
- Voltage/Current Excitation
- Four Step Bipolar Single/Double Shunt Calibration
- Plug-in Completion/Calibration Card
- Remote Control

MODELS 8260/8265 INSTRUMENTATION AMPLIFIER

- Wideband Differential Instrumentation Amplifier
- Gains 1 to 2500
- 10 Volt or 300 Volt Common Mode
- Full Scale Output Offset
- Switch Selectable 2 or 4 Pole Filter
- AC or DC Input Coupling
- Dual Outputs, ±10 Volts at 100mA

MODEL 8270 CARRIER AMPLIFIER/DEMODULATOR

- LVDT, Variable Reluctance, Strain Gage Transducers
- Adjustable 1 to 5 Volts, 3kHz Excitation
- Gains from 2 to 1000
- Remote 5-Step Calibration
- 6-Pole (36db/octave) Filter
- Data, Tape and Recorder Outputs

TRANSDUCER AMPLIFIERS

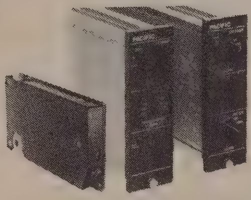
MODELS 8250/8255

- Strain Gage; 1, 2, or 4-Arm Bridges; RTD's and Potentiometers
- Isolated Voltage/Current Excitation
- Automatic Balance, Remote Calibration
- Instrumentation Amplifier, Gains 1 to 2500
- Switch Selectable 2 and 4-Pole Filters
- 10 or 300 Volt Common Mode
- Data, Tape and Recorder Outputs, ±10 Volts at 100mA

MODELS 3210/3215

- Strain Gage or Bridge Transducers
- Computer Addressable Calibration and Multiplexed Outputs
- Differential Amplifier, Gains 1 to 2500
- 10 or 300 Volt Common Mode
- Low Cost - $390 per Channel

INSTRUMENTATION AMPLIFIERS



MODELS 60A/70A

- Gains from .01 to 5000, Switch Selectable or Programmable
- High Accuracy and Stability
- 130db Common Mode Rejection, 10 or 300 Volts
- Selectable Filter; 2, 4 or 6 Poles
- Multiple Outputs with Independent Gain and Zero
- Self-Contained, Line-Powered
- Compact, 10-Channels in 5¼" High Rack

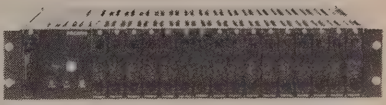
MODELS 3100/3150

- Gains from .01 to 2500, Continuously Adjustable
- 10 or 300 Volt Common Mode
- Computer Addressable Multiplexed Outputs
- Lowest Cost - $250 per Channel

DATA ACQUISITION SYSTEM

SERIES 3000

- Computer Interfaced, Mainframe Plug-in
- DEC, IBM, and Others
- 100kHz Acquisition
- Programmable Gain and Calibration
- Uses Series 3000 Modular Signal Conditioning
- Low Cost / 16 channels in 3½" high rack



The 3000 Series Transducer Conditioning System provides a user with the ability to process signals from diverse types of transducers. It combines the convenience of computer controlled data acquisition with the flexibility of hands-on local control.

Interface address buffers store multiple scan lists including programmable gain. High speed data acquisition is routine with "personal" or "mini/micro" computers. Acquisition software and system drivers are available.

TRANSIENT DATA RECORDER

SERIES 9800

- Analog Input, 12-Bit Resolution
- 500 kHz Sample Rate
- Pre-Trigger and Post-Trigger Data
- Non-Volatile Memory, Battery Back-up
- Computer Interface, Software Drivers
- 10-Channels in 7" High Rack

The Transient Data Recorder will condition, sample, digitize and store in CMOS memory, high speed transient analog signals. Data acquisition, recording and playback control functions are structured for direct computer interface.

Two hundred channels may be controlled by a single interface. Battery back-up assures data integrity in severe environmental applications.

PACIFIC INSTRUMENTS

2355 Whitman Road, Concord, California 94518 • (415) 827-9010 • TWX (910) 481-9977

OUR ONLY BUSINESS IS SIGNAL CONDITIONING

Precision Filters Inc., grew up between the faint remote analog signal and the analog-to-digital converter.

We contributed signal conditioning equipment you control by computer.

We were first to provide 80 dB/octave attenuation and time delay superior to Bessel in multichannel, programmable filter systems. We did it with 1° phase match. And these specifications became the standards of the industry.

Meanwhile, we've grown in other areas of signal conditioning you put under computer control—expanding on our eight years' experience with advanced filter systems.

Most recently, we've developed the first commercially available multiple channel, programmable frequency-band translators. Their analog zoom extends the capacity of existing systems for spectrum analysis, beam forming and modal analysis.

And their sharp selectivity permits them to operate as programmable super band-pass filters.

Our charter is signal conditioning. We will continue to advance technology with our growing line of Precision Conditioners.

Precision Conditioners Today

- Programmable multichannel filter systems for HP, LP, TD, BP, BR and anti-alias filters.
- Programmable multichannel frequency-band translators for analog zoom, beam forming, modal analysis and super filter applications.
- Programmable and automatic gain-ranging multichannel amplifiers.
- Preamplifiers for remote transducers.
- Multimode signal conditioners offering choice of voltage, charge and strain gage conditioning for each channel.
- 1/3 octave filters and analyzers.
- Programmable switching systems.

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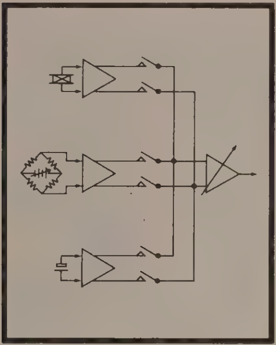
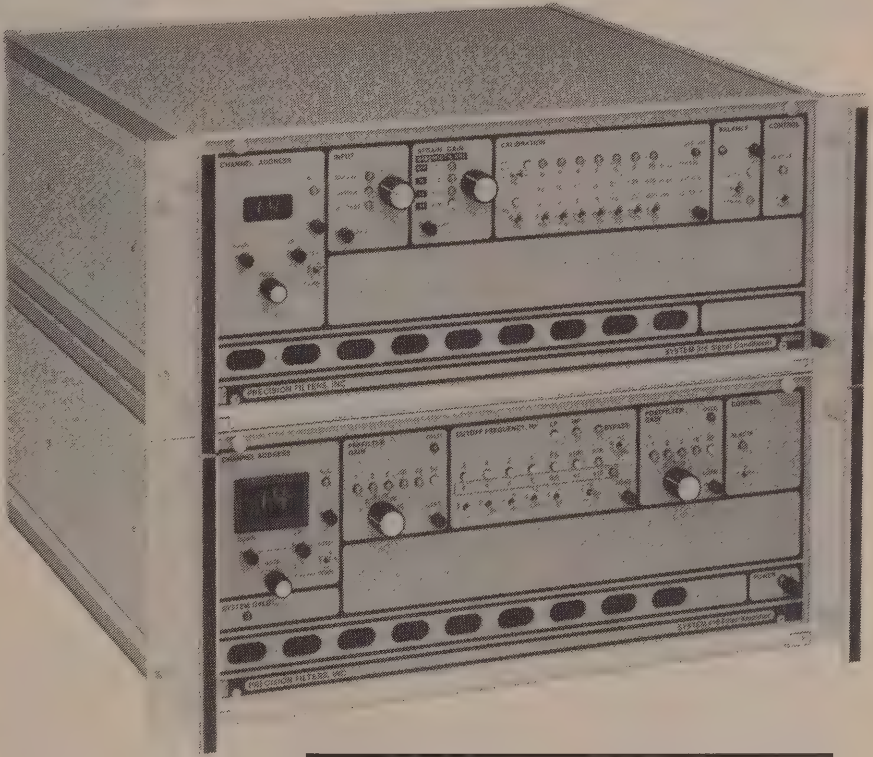
THE PRECISION CONDITIONERS™

†See other products in Section 2700.

THE MULTIMODE CONDITIONER

PRECISION 316/416





The Precision 316 gives you 16 channels, each with a choice of three types of conditioners—strain, charge and voltage.

To that, we add the Precision 416, which is 16 channels of filter-amplifier.

With the combined Precision 316/416, you have what you need at your fingertips: calibration, signal selection, autobalance of strain gages, as well as filter and gain settings.

Human error is prevented and the setup goes quickly, because all these functions are programmable.

Precision 316/416 Conditioners are at work on ballistic ranges, vehicle proving grounds, as well as in structural and vibration testing for large equipment.

In 14" Of Rack Space You Get:

- 16 programmable charge amplifiers with calibration.
- 16 programmable strain gage amplifiers with autobalance and calibration: 255 calibration states, which cover numerous gage resistances.
- 16 isolated strain gage excitation supplies: ± 15 V @ 100 mA.
- 16 programmable voltage amplifiers: gain 1-1000.
- 16 programmable anti-alias filters: 80 dB/octave attenuation.
- Programmable calibration for every function.
- 16 programmable 1-of-4 balanced input switches that permit selection of charge, strain, voltage or cal signals.

† See other products in Section 2700.

PRECISION FILTERS, INC.
240 Cherry Street, Ithaca, New York 14850, Tel. 607-277-3550

THE DATA BANKERS

GAIN-RANGING AMPLIFIERS

Signals of wide dynamic range must be conditioned for storage on magnetic tape, because of the limited dynamic range of tape recorders.

Three kinds of selectable conditioning are provided by the Data Banker, Precision 216:

- Filters band-limit the signal to the frequencies of interest.
- Precise networks favorably alter the signal spectrum in what is variously called rolloffs, prewhiteners or equalizers.
- Gain switching keeps the output signal within the prescribed recording limits.

Concurrently, the status of these three kinds of conditioning is recorded so that the signals can be processed or reproduced for playback. No manual logging is required.

Precision offers a choice of conditioning instruments that are finding growing use in underwater acoustic testing. Precision gain-ranging amplifiers are used on acoustic ranges, as well as in ship silencing sea trials for measuring structural and platform noise. They provide backup for on-line analysis, which can be reduced more leisurely in the lab.

PRECISION 216-01-R-01

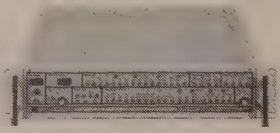
Permits front panel and computer control of all signal conditioning functions. System is auto-ranging.

PRECISION 216-01-R-02

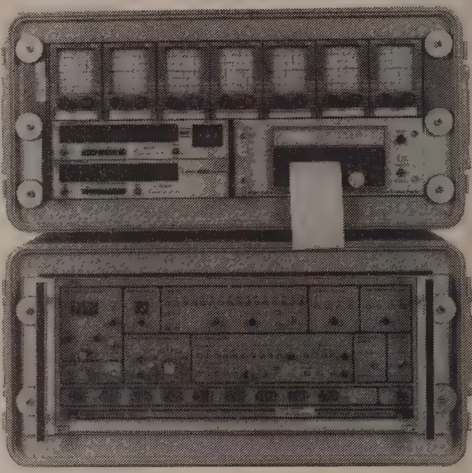
Provides front panel control of all signal conditioning functions and auxiliary equipment. Unit is auto-ranging with system status recorded. Multiple inputs per channel. Most user friendly of any gain-ranging amplifier.

PRECISION 216-03

Our most economical Data Banker. All signal conditioning functions can be either front-panel or computer controlled.



Precision 216-01 amplifier status demultiplexer offers a simple, economical instrument for reducing tape recorded data in the lab, instead of tying up the full 216-01 system that recorded the data.



Common Features:

- 16 gain states: −12 dB to +78 dB in 6 dB steps.
- Wide bandwidth: 1 Hz to 500 kHz.
- 120 dB dynamic range. Maximum output of 10V peak and broad-band noise of 5μV rms.
- Phase match between channels of ±1°, 10 Hz to 100 kHz.
- 4 selectable low frequency rolloffs.
- 4 selectable high frequency rolloffs are optional.
- AC coupled differential input: 100 dB CMRR.
- Channel overload indicators.
- Calibration oscillators.
- Output monitors.

Precision 216-01-SSX-02 signal selection matrix extends the number of inputs to 108. Nine banks of 12 inputs are selected by local or remote control.

THE PRECISION CONDITIONERS™

†See other products in Section 2700.

ADDITIONAL FEATURES

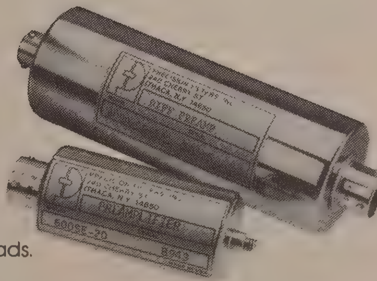
FEATURE	216-01-R-01	216-01-R-02	216-01-R-02 w/SSX-02	216-03	COMMENTS
Automatic gain ranging (6 dB steps)	Yes	Yes	Yes	No, but programmable in 6 dB steps	
Auto-ranging detector time constant	4 selectable settings	4 selectable settings	4 selectable settings		.03, 1, 3 and 10 seconds are standard; others, optional.
Number of amplifier channels	1-16	1-12	1-12	1-16	Recorders come with 14 or 28 channels. Twelve are amplifier channels, one is the amplifier status channel and one is the time code channel.
Number of input signals	1-16 (1 per channel)	3-36 (3 per channel: banks of 12)	9-108 (9 per channel: banks of 12)	1-16 (1 per channel)	The R-02 and the R-02 w/SSX-02 are both convenient ways of recording a large number of signals on a 14-channel tape recorder (12 channels of signals, plus status and time code).
Preamp power	No	Yes	Yes	No	The R-02 and the R-02 w/SSX-02 include a power supply to power the low-noise high-impedance preamps used in some applications. An external component is eliminated to help assure good system grounding.
Number of preamps		36	108		
Monitor scope switching	No	Yes	Yes	No	Monitor scopes come in groups of 7 channels and provide a convenient way to monitor signals during record and playback.
Number of monitor scope channels		7 or 14	7 or 14		
Type of signal		Record & reproduce	Record & reproduce		
Calibration oscillator display	OSC-1 (replaces an amplifier) Uses amplifier channel with second set of markings	216-01-0-01 Separate display	216-01-0-01 Separate display	OSC-1 (replaces an amplifier)	216-01-0-01 is much easier to use in a manually operated system since cal oscillator is always displayed, i.e., it is not necessary to address the cal oscillator in order to change it.
System status MX/DMX	216-01-C-05	216-01-C-06A	216-01-C-06A	No	The system status (amplifiers, oscillator, input selection, etc.) is formatted into a PCM code synchronized to IRIG-B time code generator and recorded on a single tape track 4 times per second.
Mixer/separator	Yes (replaces an amplifier)	Yes	Yes	No	Mixes time code and system status onto a single tape channel.
System cables	No	Yes (216-01-CAB-XXX)	Yes (216-01-CAB-XXX)	No	R-02 has many signals and switching functions and has a quick disconnect cable system, which is convenient to assemble and disassemble in the field.
216-01-DMX-01	Yes	Yes	Yes	No	Allows system status to be displayed in lab without tying up 216-01-R-XX.
216-01-DMX-02	Yes	Yes	Yes	No	Hard copy of system and time.

PRECISION 600

Rugged, high impedance preamplifiers feature excellent low-noise performance over a frequency response range of 0.2 Hz to 500 kHz.

Both single-ended and differential versions are available with standard fixed gains of 0, 10, 20, 30 and 40 dB or with switched gain. Gain sensitivity is typically 0.002 dB per volt and 0.002 dB per °C.

THE GO ANYWHERE PREAMPS



Other Features:
- Freedom for peaking effects with complex loads.
- Full output ±10 volts peak to 100 kHz.
- Full output response maintained at up to ±15 mA load current.
- Options included, special fixed gain, special switched gain, AC coupled output, calibration pad, negative power supply.

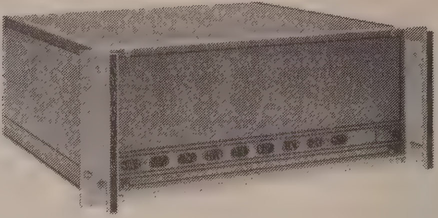
†See other products in Section 2700.

PRECISION FILTERS, INC.
240 Cherry Street, Ithaca, New York 14850, Tel. 607-277-3550

1/3 OCTAVE FILTER SYSTEMS

PRECISION 545

This Precision Conditioner can be a simple, no-frills bank of 1/3 octave filters with blank front as shown. Or it can range up to a complete 1/3 octave and full octave real-time analyzer with outputs for a bar-graph display, printer and GPIB interface.



Features:

- Filter type: 6 pole Butterworth bandpass.
- Center frequencies: 2 Hz to 160 kHz ± 1% (Std. 1/3 octave center frequencies).
- Bandpass ripple: 0.25 dB pk-pk.
- Bandwidth: 23.2% at –3.65 dB.
- Noise bandwidth: 1/3 octave effective noise bandwidth. (The noise voltage is equal to that which would be passed by an ideal 1/3 octave filter.)
- Stopband attenuation: Greater than 75 dB @ 5 & 1/5 Fo (18 dB/bandwidth-octave).
- Filter gain: 0 dB ± 0.05 dB. Other gains optional.
- Noise: 50μV rms in 100 kHz BW.
- Harmonic distortion and Intermodulation: All products –80 dB re full scale.
- True RMS detectors available as options.

SWITCHING MATRICES

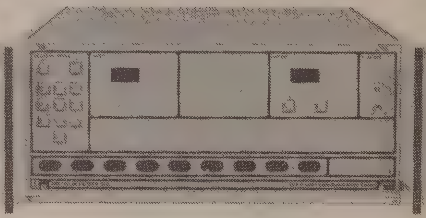
PRECISION 1024

This system modularly builds to a variety of programmable configurations, including 128 x 8, 64 x 16, 32 x 32, as well as much larger switching arrays.

Switching can be crosspoint, where an outlet can be connected to any number of inlets at the same time.

Or, you can specify unique inlet selection with random access to connect any outlet to any *single* inlet.

The system provides keyboard control and LED display of switch connections and a choice of computer interfaces.



Features:

- High density permits as many as 1024 crosspoint pairs in a 7″ frame.
- System is user friendly: inlet/outlet address instead of crosspoint address. Comes with inlet and outlet connectors. No user wiring needed.
- Several operating modes: signal selector/crosspoint matrix.
- Serial, parallel or GPIB interface, listener and talker.
- Battery back-up for memory.
- System is flexible and expandable.
- Complete system is portable and ready to go.

Applications:

- *Programmable patch panel:* The Precision 1024 puts reconfiguration and documentation under your computer control. You save great amounts of time in setting up for each test.
- *Signal selector:* System can function as a concentrator, where there are a limited number of transmission paths on the outlets but a large number of signals on the inlets.
- *Signal monitoring:* System facilitates your access to a large number of signals for monitoring.
- *Automatic test equipment:* Precision 1024 simplifies setting up tests by enabling you to put test configuration and test parameters under computer control.

† See other products in Section 2700.

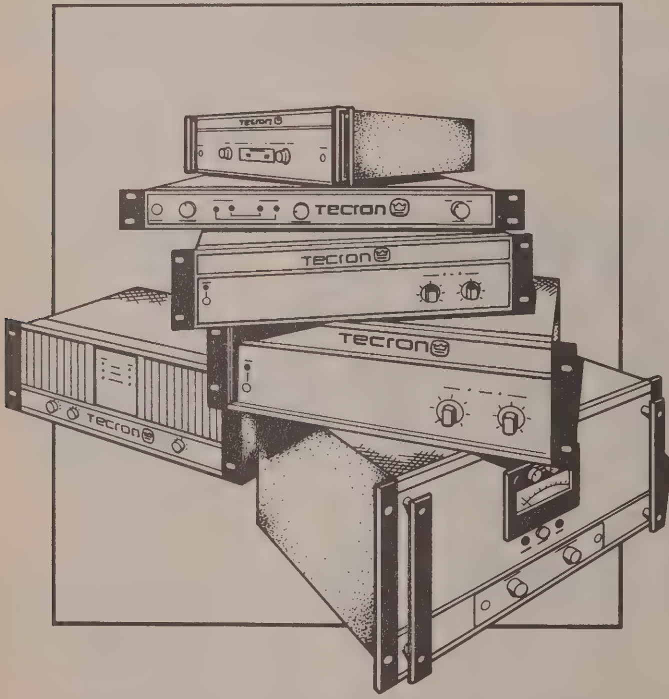
PRECISION FILTERS, INC.
240 Cherry Street, Ithaca, New York 14850, Tel. 607-277-3550

EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

Tecron®

POWER SUPPLIES/AMPLIFIERS AND ACCESSORIES
DC-ULTRASONIC



- **Power ratings up to 20 KVA**
- **Proven reliability**
- **19″ EIA rack mount**
- **Designed for continuous full-power operation**
- **Field-mountable accessories**
- **110, 120, 200, 220, or 240 V.A.C. operation**
- **Customizing services offered**
- **Made in U.S.A.**

NOTE: Specifications and prices shown in this catalog were in effect April 15, 1983, and are subject to change without notice.

Crown International is a privately owned U.S. corporation located in Elkhart, Indiana. Its business during the last several decades has been the design and manufacture of power supplies/amplifiers for applications in the DC to ultrasonic band. Crown also manufactures instrumentation for the audio and semiconductor fields.

Founded in 1947, Crown today markets products for a wide range of uses: industrial research and manufacturing; professional broadcast and recording studio monitor systems; and home audio systems.

The technology built-in to the Tecron industrial power supplies/amplifiers offered in these pages has been proven in the most rugged service. They provide reliable power for applications in automotive, medical, communication, simulation, chemical process, aerospace, nuclear, computer and other industries. Tecron amps are designed to work with any load, from fully reactive to fully capacitive.

Tecron products can also be modified at the factory to meet any special requirements you may have. Call us for a discussion of your needs.

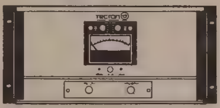
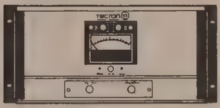
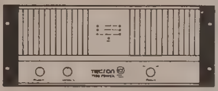
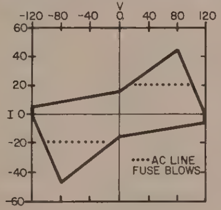
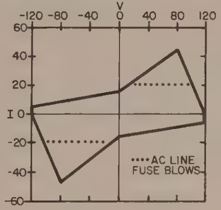
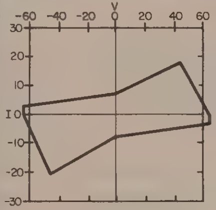
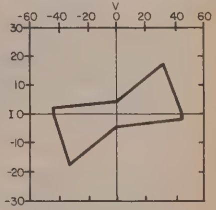
Tecron®
CROWN INTERNATIONAL, INC.
1718 W. MISHAWAKA ROAD, ELKHART, IN 46517
(219) 522-1274

tecron®

SERIES 7500 POWER SUPPLIES/AMPLIFIERS

Tecron Series 7500 Power Supplies/Amplifiers offer an unmatched reliability record, furnishing full-level, all-day power to meet the most stringent needs. In addition, 7500 series amplifiers can be modified with a number of options or modules that will adapt them for various special applications (see descriptions on opposite page). All of these amplifiers will develop maximum power output with loads from 2 to 4 ohms, but will operate into any load, from purely reactive to purely capacitive.

Rear-panel input connections on the 7500 series are BNC co-axial and terminal strips (7550 is BNC only); output connections are binding posts on ¾″ centers for banana plugs (all models) and terminal strips (7550, 7540, 7520).

Catalog Number	**7560**	**7570**	**7550**	**7540**	**7520**
Description	A single-channel constant-voltage amplifier featuring a front-panel plug-in circuit board which allows user construction of special signal sources or conditioners.	A constant *current* amplifier, with performance and construction specifications generally equivalent to Model 7560. Both 7570 and 7560 units can be cascaded with supplied cables to create systems with output power up to 20KVA.	Features unique output control circuitry with on-board computers. With difficult loads, 7550 amps will *limit* output only as necessary, returning to full output automatically when load clears.	These amps include the Crown MULTI-MODE™ circuit, a new three-stage output that produces ultra linear output signals at any power level.	
Channels	one	one	two	two	two
Power Response per channel into 4 ohms	1000W ±1dB DC-40KHz	1000W ±1dB DC-40KHz	375W ±1dB DC-25KHz	265W ±1dB DC-25KHz	160W ±1dB DC-50KHz
Power Response bridged, 8 ohm load	N.A.	N.A.	750W ±1dB DC-25KHz	530W ±1dB DC-50KHz	320W ±1dB DC-50KHz
Front View					
Limits of V-I Output			V-I curve is temperature, time and frequency dependent. Contact Tecron for full information.		
DC Output One channel driven	20A max. @ 100V (2KVA)	20A max. @ 100V (2KVA)	N.A.	23.8A max. @ 42V (1KVA)	12A max. @ 30V (360VA)
Phase Response @ 1 watt into 8 ohms	+0°-15° DC-20KHz	Load Dependent	+0°-15° DC-20KHz	+0°-15° DC-20KHz	+0°-15° DC-20KHz
Frequency Response @1 watt into 8 ohms					
dB, DC-20KHz	±.1	Load Dependent	±.1	±.1	±.1
dB, DC-100KHz	±1.0	Load Dependent	+0, −1.5	±1.0	±1.0
Voltage Gain	20 ±1% (26dB)	20 ±1% (26dB)	20 ±2% (26dB)	20.6 +2% (26.3dB)	20.6 ±2% (26.3dB)
Slew Rate, volts per microsecond	32	32	30	16	12
Input sensitivity volts RMS at rated power into 8 ohms	3.46 ±1%	3.46 ±1%	2.1 ±2%	1.76 ±2%	1.30 ±2%
Rated Output Power into 8 ohms watts/channel	600	600	220	165	90
Input Impedance, ohms	25K	25K	25K	30K	30K
Weight, lbs.	92	92	57	55	25
Dimensions, inches					
Width	19.0	19.0	19.0	19.0	19.0
Height	8.75	8.75	7.0	7.0	5.25
Length	16.5	16.5	14.75	10.5	10.125
Price, U.S. dollars (subject to change without notice.)	$2,970.00	$2,760.00	$1,775.00	$1,355.00	$895.00

CROWN INTERNATIONAL, INC.
1718 W. MISHAWAKA RD.
ELKHART, IN 46517
(219) 294-5571

7500 OPTIONS/MODULES

Options are factory installed only, modules can be field installed.

VU Meter
VU meter, peak catch and hold, with red over-level indicator (selectable level) and green range indicator (selectable level). Module for 7560 and 7570.

Dual Fans
Provide forced air cooling to prevent thermal damage to amps. Recommended for enclosed installations, or continuous service at high power levels.
Option for 7560, 7570
Module for 7540, 7520
(Single fan is standard on 7550, 7560 and 7570.)

Constant Current Output
A circuit modification that monitors output to maintain a constant current level.
Option for 7550, 7540, 7520

GPIB Gain Control
Provides for computer adjustment of input attentuation.
Module for 7560, 7550, 7540, 7520

Standard Input
Unless otherwise specified, this input module is supplied as standard equipment with the Model 7560 power supply. It contains an input attentuator and an AC/DC coupling switch mounted on a mostly blank-PC board, which can be modified to create signal-shaping circuits to fit a specific need. (Not available on 7570.)

Balanced Active Input
Isolates input to eliminate ground loops and hum pickup.
Module for 7550, 7540, 7520
Option for 7560, 7570

Balanced Transformer Input
Isolates input with transformer. Eliminates ground loops and hum pickup.
Module for 7550, 7540, 7520

tecron®

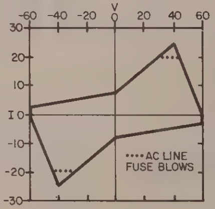
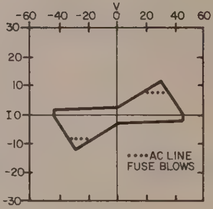
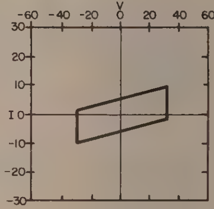
SERIES 5500 POWER SUPPLIES/AMPLIFIERS

Tecron Series 5500 Power Supplies/Amplifiers are off-the-shelf products, offered without options or add-on modules. They are performance proven, capable of all-day operation at full power without interruption (in closed cabinets or stacked in racks, forced-air cooling is recommended). All are dual channel amps, rear-panel switchable to single-channel operation.

These amplifiers include an AB+B output circuit developed by Crown for improved reliability and high linearity of the output signal. The amplifiers also include the IOC™ circuit, a unique distortion indicator which reports any variance from input of output waveform, regardless of the cause. The IOC™ sensitivity enables users to accurately set the gain controls just below clip level.

All input connections are BNC; output connections are binding posts on ¾″ centers for banana-plugs.

All 5500 amplifiers develop maximum power with 2 to 4 ohm loads, but can handle any load from pure reactive to pure capacitive.

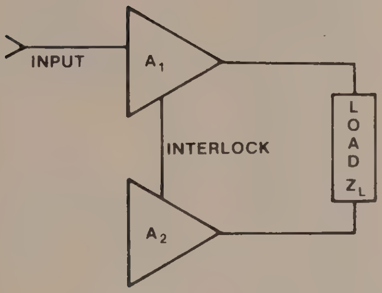
Catalog Number	**5530**	**5515**	**5507**
Channels	two	two	two
Power Response dual channel into 4 ohms	250W ±1dB DC-35KHz	130W ±1dB DC-35KHz	50W ±1dB 20Hz-20KHz
Power Response bridged, 8 ohm load	500W ±1dB DC-35KHz	260W ±1dB DC-35KHz	100W ±1dB 20Hz-20KHz
Front View			
Limits of V-I Output			
DC Output One channel driven	10A max. @50V (500VA)	8A max. @32V (256VA)	AC coupled
Phase Response @1 watt into 8 ohms	+0°-15° DC-20KHz	+0°-15° DC-15KHz	+0°-15° 20Hz-20KHz
Frequency Response at 1 watt into 8 ohms:			
dB, DC-20KHz	±.1	±.1	±.1 (20Hz-20KHz)
dB, DC-100KHz	±1.0	±1.0	±1.2 (5Hz-100KHz)
Voltage Gain	10.6 ±2% (26.3dB)	20.6 ±2% (26.3dB)	20.6 ±2% (26.3dB)
Slew rate, volts per microsecond	8	6	6
Input sensitivity volts RMS at rated power into 8 ohms	1.75 ±2%	1.19 ±2%	.812 ±2%
Rated Output power into 8 ohms, watts/channel	155	80	35
Input Impedance, ohms	25K	25K	25K
Weight, lbs.	45	24	10
Dimensions, inches			
Width	19.0	19.0	19.0
Height	7.0	5.25	1.75
Length	9.75	8.75	9.0
Price, U.S. dollars (subject to change without notice.)	$1,290.00	$805.00	$580.00

Tecron

POWER SUPPLIES/AMPLIFIERS

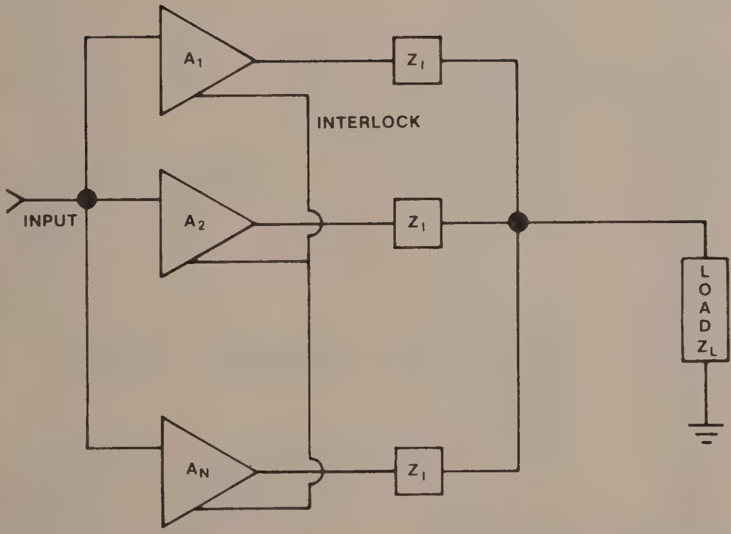
APPLICATION NOTES

Various system configurations of Tecron power supplies are possible to obtain greater voltage or current ratings. A few of the more common such configurations are shown here.



$I_L = I_A$
$V_L = 2V_A$
Load on each amplifier: $Z_A = \frac{Z_L}{2}$

7560 Push-Pull Connection



$I_L = I_{A1} + I_{A2} + \cdots + I_{AN} = NI_A$
$V_L = V_A$
Load on each amplifier: $Z_A = NZ_L + Z_I$

7560 Parallel Connection

As noted above, some of the interconnects needed for these systems are standard Tecron accessories. Special interconnects, either control or load, can be entirely user designed and built, or Tecron will be pleased to quote on design and/or fabrication. Since user modifications to Tecron amplifiers may invalidate the warranty, we suggest you review new or unusual applications with Tecron.

FLOYD BELL, INC.

MANUFACTURER OF QUALITY PIEZOELECTRIC ALARMS SINCE 1972

P.O. Box 12327, 897 Higgs Avenue / Columbus, OH 43212 / (614) 488-3193 / TWX 810-482-1763

AudioLarm® II Series

ENGINEERED ALARMS WITH EXCLUSIVE DESIGN FEATURES

MANUFACTURED IN U.S.A.

- Largest selection of alarms in the industry
- Ultra high sound output
- Durable high temperature glass-filled polyester case
- Four sound output levels (extra loud, loud, medium and soft)
- Three beep rates (fast, medium, slow)
- Two chime tone rates
- Exclusive warble tone
- Exclusive warning siren
- Exclusive acoustic volume control
- Wide operating voltage range — 1 to 30 volts DC — AC models to 220V
- Five types of termination
- Four mounting configurations

Solid State Piezoelectric design offers low voltage and current consumption, no R.F. interference, no moving parts for high reliability and long life.

When Ordering: Specify Fast, Medium or Slow Beep Rate.
Fast: 3 Beeps Per Second @ 30% Duty Cycle.
Medium: 2 Beeps Per Second @ 30% Duty Cycle.
Slow: 1 Beep Per Second @ 30% Duty Cycle.
Beep rate constant through all operating voltages.

INTERMITTENT TONE

CASE STYLE	MODEL NUMBER	OPERATING VOLTAGE VDC *VAC	TYPICAL SOUND PRESSURE db(A) AT 2 FEET			TYPICAL OPERATING CURRENT (mA)			Terminations
			At min. V	At max. V	Graph Curve	At min. V	At max. V	Graph Curve	
EXTRA LOUD BEEP — FREQUENCY 2900 ±500 Hz.									
04	XB-04-312-W	3-12	90	104	05-a	5	30	06-a	W
04	XB-04-312-T	3-12	90	104	05-a	5	30	06-a	T
04	XB-04-630-W	6-30	95	104	05-b	8	40	06-b	W
04	XB-04-630-T	6-30	95	104	05-b	8	40	06-b	T
05	XB-05-312-P	3-12	90	104	05-a	5	30	06-a	P
05	XB-05-630-P	6-30	95	104	05-b	8	40	06-b	P
06	XB-06-312-W	3-12	90	104	05-a	5	30	06-a	W
06	XB-06-312-T	3-12	90	104	05-a	5	30	06-a	T
06	XB-06-630-W	6-30	95	104	05-b	8	40	06-b	W
06	XB-06-630-T	6-30	95	104	05-b	8	40	06-b	T
09	XB-09-312-W	3-12	90	104	05-a	5	30	06-a	W
09	XB-09-312-Q	3-12	90	104	05-a	5	30	06-a	Q
09	XB-09-312-S	3-12	90	104	05-a	5	30	06-a	S
09	XB-09-630-W	6-30	95	104	05-b	8	40	06-b	W
09	XB-09-630-Q	6-30	95	104	05-b	8	40	06-b	Q
09	XB-09-630-S	6-30	95	104	05-b	8	40	06-b	S
19	XB-19-201-Q	*30-120	90	104					Q
19	XB-19-301-Q	*130-220	90	104					Q
LOUD BEEP — FREQUENCY 2900 ±500 Hz.									
04	LB-04-312-W	3-12	84	97	05-c	5	30	06-c	W
04	LB-04-312-T	3-12	84	97	05-c	5	30	06-c	T
05	LB-05-312-P	3-12	84	97	05-c	5	30	06-c	P
06	LB-06-312-W	3-12	84	97	05-c	5	30	06-c	W
06	LB-06-312-T	3-12	84	97	05-c	5	30	06-c	T
09	LB-09-312-W	3-12	84	97	05-c	5	30	06-c	W
09	LB-09-312-Q	3-12	84	97	05-c	5	30	06-c	Q
09	LB-09-312-S	3-12	84	97	05-c	5	30	06-c	S
MEDIUM BEEP TONE — FREQUENCY 2900 ±500 Hz.									
04	MB-04-325-W	3-25	75	95	07-a	2	20	08-a	W
04	MB-04-325-T	3-25	75	95	07-a	2	20	08-a	T
05	MB-05-325-P	3-25	75	95	07-a	2	20	08-a	P
06	MB-06-325-W	3-25	75	95	07-a	2	20	08-a	W
06	MB-06-325-T	3-25	75	95	07-a	2	20	08-a	T
09	MB-09-325-W	3-25	75	95	07-a	2	20	08-a	W
09	MB-09-325-Q	3-25	75	95	07-a	2	20	08-a	Q
09	MB-09-325-S	3-25	75	95	07-a	2	20	08-a	S
19	MB-19-201-Q	*30-120	75	95					Q
19	MB-19-301-Q	*130-220	75	95					Q
SOFT BEEP TONE — FREQUENCY 2900 ±500 Hz.									
04	SB-04-325-W	3-25	55	75	07-b	1	15	08-b	W
04	SB-04-325-T	3-25	55	75	07-b	1	15	08-b	T
05	SB-05-325-P	3-25	55	75	07-b	1	15	08-b	P
06	SB-06-325-W	3-25	55	75	07-b	1	15	08-b	W
06	SB-06-325-T	3-25	55	75	07-b	1	15	08-b	T
09	SB-09-325-W	3-25	55	75	07-b	1	15	08-b	W
09	SB-09-325-Q	3-25	55	75	07-b	1	15	08-b	Q
09	SB-09-325-S	3-25	55	75	07-b	1	15	08-b	S

CONTINUOUS TONE

CASE STYLE	MODEL NUMBER	OPERATING VOLTAGE VDC *VAC	TYPICAL SOUND PRESSURE db(A) AT 2 FEET			TYPICAL OPERATING CURRENT (mA)			Terminations
			At min. V	At max. V	Graph Curve	At min. V	At max. V	Graph Curve	
EXTRA LOUD CONTINUOUS TONE — FREQUENCY 2900 ±500 Hz.									
04	XC-04-212-W	2-12	82	103	01-a	8	50	02-a	W
04	XC-04-212-T	2-12	82	103	01-a	8	50	02-a	T
04	XC-04-330-W	3-30	82	103	01-b	6	50	02-b	W
04	XC-04-330-T	3-30	82	103	01-b	6	50	02-b	T
05	XC-05-212-P	2-12	82	103	01-a	8	50	02-a	P
05	XC-05-330-P	3-20	82	103	01-b	6	50	02-b	P
06	XC-06-212-W	2-12	82	103	01-a	8	50	02-a	W
06	XC-06-212-T	2-12	82	103	01-a	8	50	02-a	T
06	XC-06-330-W	3-30	82	103	01-b	6	50	02-b	W
06	XC-06-330-T	3-30	82	103	01-b	6	50	02-b	T
09	XC-09-212-W	2-12	82	103	01-a	8	50	02-a	W
09	XC-09-212-Q	2-12	82	103	01-a	8	50	02-a	Q
09	XC-09-212-S	2-12	82	103	01-a	8	50	02-a	S
09	XC-09-330-W	3-30	82	103	01-b	6	50	02-b	W
09	XC-09-330-Q	3-30	82	103	01-b	6	50	02-b	Q
09	XC-09-330-S	3-30	82	103	01-b	6	50	02-b	S
19	XC-19-201-Q	*30-120	82	103					Q
19	XC-19-301-Q	*130-220	82	103					Q
LOUD CONTINUOUS TONE — FREQUENCY 2900 ±500 Hz.									
04	LC-04-212-W	2-12	76	97	01-c	8	50	02-c	W
04	LC-04-212-T	2-12	76	97	01-c	8	50	02-c	T
05	LC-05-212-P	2-12	76	97	01-c	8	50	02-c	P
06	LC-06-212-W	2-12	76	97	01-c	8	50	02-c	W
06	LC-06-212-T	2-12	76	97	01-c	8	50	02-c	T
09	LC-09-212-W	2-12	76	97	01-c	8	50	02-c	W
09	LC-09-212-Q	2-12	76	97	01-c	8	50	02-c	Q
09	LC-09-212-S	2-12	76	97	01-c	8	50	02-c	S
MEDIUM CONTINUOUS TONE — FREQUENCY 2900 ±500 Hz.									
01	MC-01-116-W	1-16	68	93	01-d	1	24	02-d	W
01	MC-01-116-T	1-16	68	93	01-d	1	24	02-d	T
02	MC-02-116-P	1-16	68	93	01-d	1	24	02-d	P
03	MC-03-116-W	1-16	68	93	01-d	1	24	02-d	W
03	MC-03-116-T	1-16	68	93	01-d	1	24	02-d	T
07	MC-07-116-W	1-16	68	93	01-d	1	24	02-d	W
07	MC-07-116-T	1-16	68	93	01-d	1	24	02-d	T
07	MC-07-116-Q	1-16	68	93	01-d	1	24	02-d	Q
07	MC-07-116-S	1-16	68	93	01-d	1	24	02-d	S
01	MC-01-130-W	1-30	68	95	03-a	1	13	04-a	W
01	MC-01-130-T	1-30	68	95	03-a	1	13	04-a	T
02	MC-02-130-P	1-30	68	95	03-a	1	13	04-a	P
03	MC-03-130-W	1-30	68	95	03-a	1	13	04-a	W
03	MC-03-130-T	1-30	68	95	03-a	1	13	04-a	T
07	MC-07-130-W	1-30	68	95	03-a	1	13	04-a	W
07	MC-07-130-T	1-30	68	95	03-a	1	13	04-a	T
07	MC-07-130-Q	1-30	68	95	03-a	1	13	04-a	Q
07	MC-07-130-S	1-30	68	95	03-a	1	13	04-a	S
09	MC-19-201-Q	*30-120	68	95					Q
09	MC-19-301-Q	*130-220	68	95					Q
SOFT CONTINUOUS TONE — FREQUENCY 2900 ±500 Hz.									
01	SC-01-130-W	1-30	55	80	03-b	1	7	04-a	W
01	SC-01-130-T	1-30	55	80	03-b	1	7	04-b	T
02	SC-02-130-P	1-30	55	80	03-b	1	7	04-b	P
03	SC-03-130-W	1-30	55	80	03-b	1	7	04-b	W
03	SC-03-130-T	1-30	55	80	03-b	1	7	04-b	T
07	SC-07-130-W	1-30	55	80	03-b	1	7	04-b	W
07	SC-07-130-T	1-30	55	80	03-b	1	7	04-b	T
07	SC-07-130-Q	1-30	55	80	03-b	1	7	04-b	Q
07	SC-07-130-S	1-30	55	80	03-b	1	7	04-b	S

CHIME TONE/WARBLE TONE

When Ordering: Specify Fast or Moderate Chime Rate.
Fast: Two Chimes Per Second.
Moderate: One Chime Per Second.
Chime Rate Constant Through All Operating Voltages.

CHIME TONE — FREQUENCY 2900 ±500 Hz.									
04	CH-04-325-W	3-25	70	93	09-a	2	20	10-a	W
04	CH-04-325-T	3-25	70	93	09-a	2	20	10-a	T
05	CH-05-325-P	3-25	70	93	09-a	2	20	10-a	P
06	CH-06-325-W	3-25	70	93	09-a	2	20	10-a	W
06	CH-06-325-T	3-25	70	93	09-a	2	20	10-a	T
09	CH-09-325-W	3-25	70	93	09-a	2	20	10-a	W
09	CH-09-325-Q	3-25	70	93	09-a	2	20	10-a	Q
09	CH-09-325-S	3-25	70	93	09-a	2	20	10-a	S
19	CH-19-201-Q	*30-120	70	93					Q
19	CH-19-301-Q	*130-220	70	93					Q
WARBLE TONE — CENTER FREQUENCY 2200 ±500 Hz.									
04	MW-04-616-W	6-16	80	95	09-b	8	18	10-b	W
04	MW-04-550-W	(1)15-50	75	95		3	6		W
04	MW-04-201-W	*40-120	75	95		3	8		W
06	MW-06-616-W	6-16	80	95	09-b	8	18	10-b	W
06	MW-06-550-W	(1)15-50	75	95		3	6		W
06	MW-06-201-W	*40-120	75	95		3	6		W
09	MW-09-616-W	6-16	80	95	09-b	8	18	10-b	W
09	MW-09-616-Q	6-16	80	95	09-b	8	18	10-b	Q
09	MW-09-616-S	6-16	80	95	09-b	8	18	10-b	S
09	MW-09-550-W	(1)15-50	75	95		3	8		W
09	MW-09-550-S	(1)15-50	75	95		3	8		S
09	MW-09-201-W	*40-120	75	95		3	8		W
09	MW-09-201-S	*40-120	75	95		3	8		S
09	MW-09-301-W	*140-220	75	95		3	8		W
09	MW-09-301-S	*140-220	75	95		3	8		S

(1) V AC-DC

MANUAL VOLUME CONTROL (CASE STYLES 03, 06 & 16) OFFERS VARIABLE ATTENUATION FROM 0 TO 20 db FROM SOUND PRESSURE LEVELS SHOWN.

FLOYD BELL, INC.

MANUFACTURER OF QUALITY PIEZOELECTRIC ALARMS SINCE 1972

P.O. Box 12327, 897 Higgs Avenue / Columbus, OH 43212 / (614) 488-3193 / TWX 810-482-1763

AudioLarm® II Series

GENERAL SPECIFICATIONS

OPERATING TEMPERATURE: −20°C to +65°C.

STORAGE TEMPERATURE: −40°C to +85°C.

REVERSE VOLTAGE: Protected to the maximum operating voltage (some models may sound softly when connected to reverse polarity).

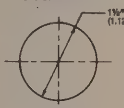
SURGE VOLTAGE: 20% over maximum rated voltage for less than 5 minutes.

LIFE EXPECTANCY: 10 years under normal operating conditions.

CONSTRUCTION MATERIALS: Case—glass filled polyester. Potting—epoxy.

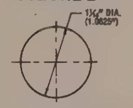
SUGGESTED HOLE PATTERNS

FIGURE 1



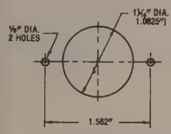
07, 09, 19 Cases Panel Mount with screw cap

FIGURE 2


1¹⁄₁₆″ DIA.
(1.0625″)

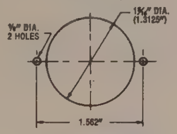
01, 04, 14 Cases Panel Mount with 2 #4 self-tapping screws

FIGURE 3


1¹⁄₁₆″ DIA.
1.0625″)
⅛″ DIA.
2 HOLES
1.562″

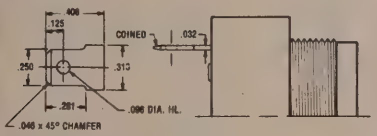
01, 04, 12 Cases Panel Mount with double-sided adhesive foam

FIGURE 4

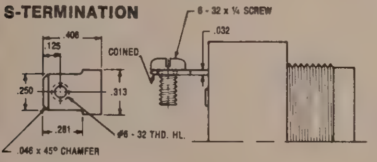

1⁵⁄₁₆″ DIA.
(1.3125″)
⅛″ DIA.
2 HOLES
1.562″

03, 06, 16 Cases Panel Mount with 2 #4 self-tapping screws

Q-TERMINATION


.408
.125
COINED
.032
.250
.313
.281
.096 DIA. HL.
.046 x 45° CHAMFER

S-TERMINATION


6 - 32 x ¼ SCREW
.032
.408
.125
COINED
.250
.313
.281
#6 - 32 THD. HL.
.046 x 45° CHAMFER

TERMINATIONS

W— Leads: 2 wires 24AWG (7 x 32) tinned copper, vinyl insulated, 2″ long, ¼″ end stripped, color coded.

P— PC Pins: 3 PC pins, 90° apart on a .500″ R from center, .032″ diameter.

T— .110 quick connect terminals: .110″ width, .020 thickness, brass solder plated for push on (quick connect) attachment or direct solder.

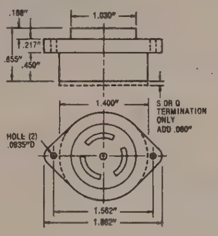
Q— .250 quick connect terminals: .250″ width, .033″ thickness, steel electro-tin plated for push-on (quick connect) attachment or direct solder.

S— Screw terminals: 6/32 ¼″ long plated screw for wires with lug attachments.

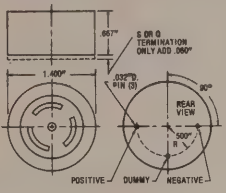
CASE DIMENSIONS

Tolerances are ±.010 All dimensions in inches

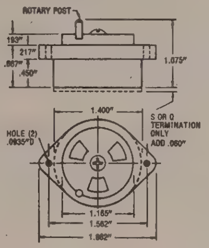
01 CASE


.188″
1.030″
.217″
.655″
.450″
1.400″
S OR Q TERMINATION ONLY ADD .060″
HOLE (2) .0935″D
1.562″
1.862″

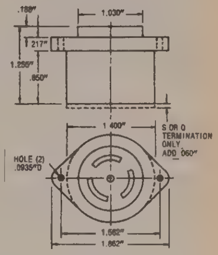
02 CASE


.667″
S OR Q TERMINATION ONLY ADD .060″
1.400″
.032″D. PIN (3)
90°
REAR VIEW
.500″ R
POSITIVE
DUMMY
NEGATIVE

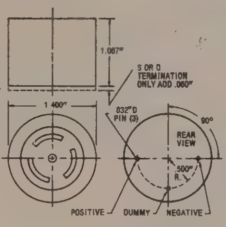
03 CASE


ROTARY POST
.193″
.217″
.667″
.450″
1.075″
1.400″
S OR Q TERMINATION ONLY ADD .060″
HOLE (2) .0935″D
1.165″
1.562″
1.862″

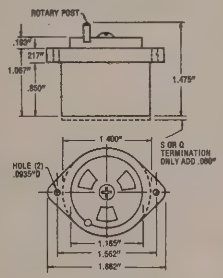
04 CASE


.188″
1.030″
.217″
1.255″
.850″
1 400″
S OR Q TERMINATION ONLY ADD .060″
HOLE (2) .0935″D
1.562″
1.862″

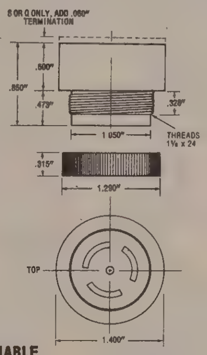
05 CASE


1.067″
S OR Q TERMINATION ONLY ADD .060″
1 400″
.032″D PIN (3)
90°
REAR VIEW
.500″ R.
POSITIVE
DUMMY
NEGATIVE

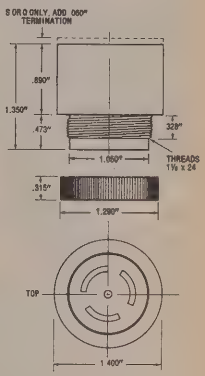
06 CASE


ROTARY POST
.193″
.217″
1.067″
.850″
1.475″
1 400″
S OR Q TERMINATION ONLY ADD .060″
HOLE (2) .0935″D
1.165″
1.562″
1.862″

07 CASE

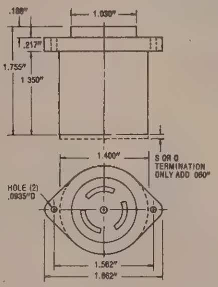

S OR Q ONLY, ADD .060″ TERMINATION
.500″
.850″
.473″
.328″
1 050″
THREADS 1⅛ x 24
.315″
1.290″
TOP
1.400″

09 CASE

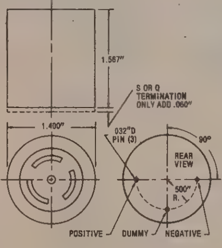

S OR Q ONLY, ADD .060″ TERMINATION
.890″
1.350″
.473″
.328″
1.050″
THREADS 1⅛ x 24
.315″
1.290″
TOP
1 400″

MANUAL VOLUME CONTROL (CASE STYLES 03, 06 & 16) OFFERS VARIABLE ATTENUATION FROM 0 TO 20 db FROM SOUND PRESSURE LEVELS SHOWN.

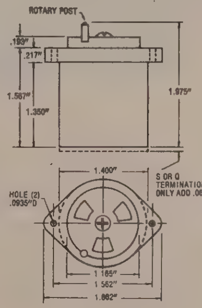
14 CASE


.188″
1.030″
.217″
1.755″
1 350″
1.400″
S OR Q TERMINATION ONLY ADD .060″
HOLE (2) .0935″D
1.562″
1.862″

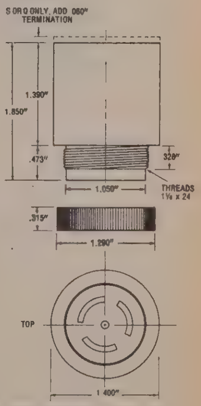
15 CASE


1.567″
S OR Q TERMINATION ONLY ADD .060″
1.400″
.032″D PIN (3)
90°
REAR VIEW
.500″ R.
POSITIVE
DUMMY
NEGATIVE

16 CASE

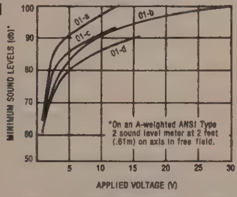

ROTARY POST
.193″
.217″
1.567″
1.350″
1.975″
1.400″
S OR Q TERMINATION ONLY ADD .060″
HOLE (2) .0935″D
1 165″
1 562″
1.862″

19 CASE


S OR Q ONLY, ADD .060″ TERMINATION
1.390″
1.850″
.473″
.328″
1.050″
THREADS 1⅛ x 24
.315″
1.290″
TOP
1 400″

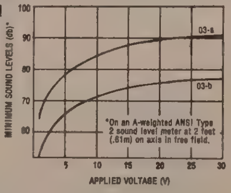
MANUAL VOLUME CONTROL (CASE STYLES 03, 06 & 16) OFFERS VARIABLE ATTENUATION FROM 0 TO 20 db FROM SOUND PRESSURE LEVELS SHOWN.

GRAPH #01



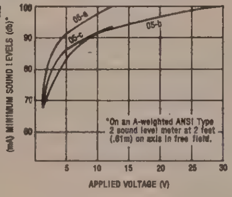
*On an A-weighted ANSI Type 2 sound level meter at 2 feet (.61m) on axis in free field.

GRAPH #03



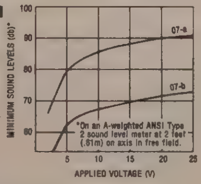
*On an A-weighted ANSI Type 2 sound level meter at 2 feet (.61m) on axis in free field.

GRAPH #05



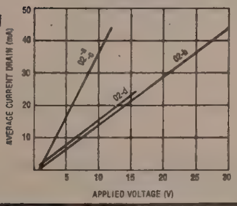
*On an A-weighted ANSI Type 2 sound level meter at 2 feet (.61m) on axis in free field.

GRAPH #07

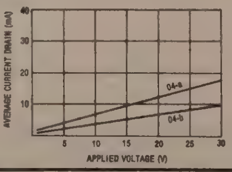


*On an A-weighted ANSI Type 2 sound level meter at 2 feet (.61m) on axis in free field.

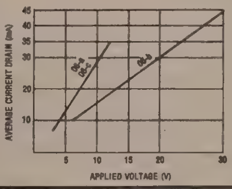
GRAPH #02



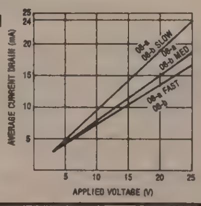
GRAPH #04



GRAPH #06



GRAPH #08



FLOYD BELL, INC.

MANUFACTURER OF QUALITY PIEZOELECTRIC ALARMS SINCE 1972

P.O. Box 12327, 897 Higgs Avenue / Columbus, OH 43212 / (614) 488-3193 / TWX 810-482-1763

Piezoelectric Warning Siren

MODEL AL-612 AUDIOLARM®

THE MODEL AL-612 AUDIOLARM® is a miniature panel or PC mounted alarm that emits a very-loud siren-like tone when power is applied.

The output tone varies from approximately 2500 Hz to 3500 Hz at a 2.5 Hz rate. The audible output level peaks at about 106 dbA when operated from a 12 vdc source.

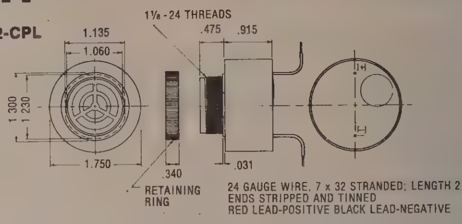
Designed for battery operated systems of 6 to 12 VDC and will operate very nicely from a 9V transistor radio battery. (Heavy-duty, Alkaline type recommended.)

Some potential applications include fuel vapor detectors (no arcing contacts or RFI), back-up alarms on fork-lift trucks, etc., intrusion alarms, exit alarms, medical alerts and call systems, vending machine tamper alarms, banking machines and credit card verification systems — anywhere an attention-getting alarm is needed. Due to its small size and power requirements, it is ideally suited for portable battery operated devices as well.

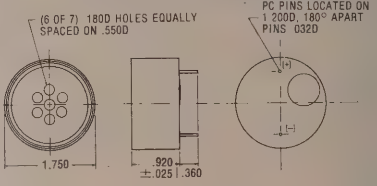
SPECIFICATIONS:

OPERATING VOLTAGE: 6 to 12 VDC (Maximum)
OPERATING CURRENT: Up to 100 MA (Voltage Dependent)
SOUND OUTPUT: Up to 106 dB(A) @ 2 ft. with 12 VDC supply. (Strongly Harmonic Police-Like Siren Tone)
OPERATING FREQUENCY: Sweeps from 2500 to 3500 Hz @ 2.5 Hz rate.
OPERATING MODE: Apply power/on, remove power/off.
OPERATING TEMPERATURE RANGE: −20°C to +65°C
STORAGE TEMPERATURE: −40°C to +80°C
TERMINALS: 24 gauge wire, 7 x 32 stranded; Length 2.25″ ends stripped and tinned. Read lead - positive. Black lead - negative.
MATERIAL: ABS-KJB Thermoplastic case
COLOR: Black
MOUNTING: Rear-panel mount in 1⅛ Dia. mounting hole, maximum panel thickness .250″.
WEIGHT: Two (2) ounces.

AL-612-CPL


1⅛ - 24 THREADS
1.135
1.060
.475
.915
1.300
1.230
1.750
.340
.031
RETAINING RING
(+)
(−)
24 GAUGE WIRE, 7 x 32 STRANDED; LENGTH 2.25″
ENDS STRIPPED AND TINNED
RED LEAD-POSITIVE BLACK LEAD-NEGATIVE

AL-612-PC

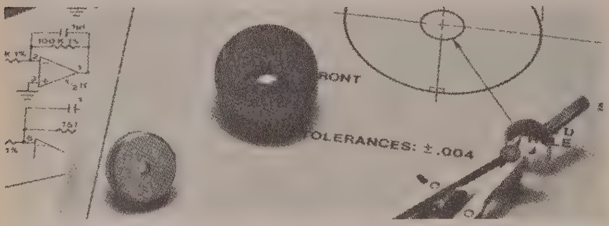

(6 OF 7) .180D HOLES EQUALLY SPACED ON .550D
PC PINS LOCATED ON 1.200D, 180° APART
PINS .032D
1.750
.920 ±.025
.360
(+)
(−)

NOTE:
(1) HOLES IN FRONT GRILL ARE RANDOMLY LOCATED IN RELATION TO PC PINS.

Floyd Bell, Inc. offers many standard alarms not listed in this catalog including direct drive alarms, dual function alarms (one alarm offering 2 distinct sounds), environmentally and under water secure alarms, specific frequency alarms and many more. Or, if your needs cannot be met with a standard unit we will design an alarm to your exact specifications. Call our sales department and tell them what you need.

Sound Transducers

MS-1/MS-3/MS-2 SUPERIOR QUALITY MADE IN U.S.A.


FRONT
TOLERANCES: ±.004

The **MS-1**, **MS-3** & **MS-2** Sound Transducers are piezoelectric devices for applications requiring a warning or alerting audible output. Both are designed to overcome the cost, size and supply current liabilities of devices such as buzzers and loudspeakers.

These completely assembled and tested audio units deliver consistent product performance at lower cost. They also eliminate difficult and costly lead attachment, mounting and adjustment operations from your production line. And may be handled like any other electronic component during stocking and assembly, inserted on a PC board and wave-soldered for high volume production.

The **MS-1**, **MS-3** & **MS-2** utilize a wide variety of drive signals which can be generated easily and economically as part of the product circuitry. As medium impedance devices of a few thousand ohms, the **MS-1**, **MS-3** & **MS-2** do not require any special drive or by-pass considerations at most frequencies of interest. In many applications, drive may be delivered directly from logic circuits or similar low level stages. Volume, frequency, and mode are functions of the circuitry you supply.

SPECIFICATIONS: MS-1/MS-3

OPERATING VOLTAGE: 0 to 150 Volts Peak to Peak maximum.
FREQUENCY vs dB: See Chart #1.
OPERATING TEMPERATURE: −20°C to +65°C.
STORAGE TEMPERATURE: −40°C to +85°C.
TERMINALS: .042″ dia. PC pins standard.
CONSTRUCTION MATERIALS: Case—Stainless steel; Back cap—glass-filled polyester: Pins—tin-plated brass. Suitable for Automatic Insertion and Wave-Soldering. (480°F - 10 seconds.)
WEIGHT: 4 Grams.
SIZE: See illustration #1 (MS-1)/ See Illustration #3 (MS-3)

SPECIFICATIONS: MS-2

OPERATING VOLTAGE: 0 to 150 Volts Peak to Peak maximum.
FREQUENCY vs dB: See Chart #2.
OPERATING TEMPERATURE: −20°C to +65°C.
STORAGE TEMPERATURE: −40°C to +80°C.
TERMINALS: .042″ dia. PC pins standard.
CONSTRUCTION MATERIALS: Case—ABS thermoplastic; Back cap—glass-filled polyester; Pins—tin-plated brass. Suitable for Automatic Insertion and Wave-Soldering. (480°F - 10 seconds.)
WEIGHT: 8 Grams.
SIZE: See illustration #2.

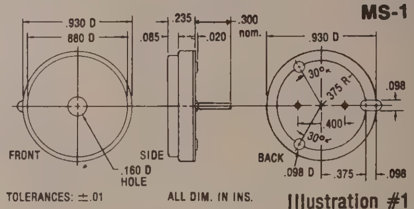

MS-1
.930 D
.880 D
.235
.085
.020
.300 nom.
.930 D
30°
.375 R
.098
.400
30°
FRONT
SIDE
BACK
.160 D HOLE
.098 D
.375
.098
TOLERANCES: ±.01
ALL DIM. IN INS.

Illustration #1

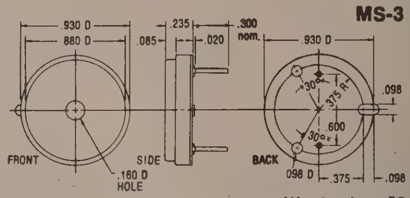

MS-3
.930 D
.880 D
.235
.085
.020
.300 nom.
.930 D
30°
.375 R
.098
.600
30°
FRONT
SIDE
BACK
.160 D HOLE
.098 D
.375
.098
TOLERANCES: ±.01
ALL DIM. IN INS.

Illustration #3

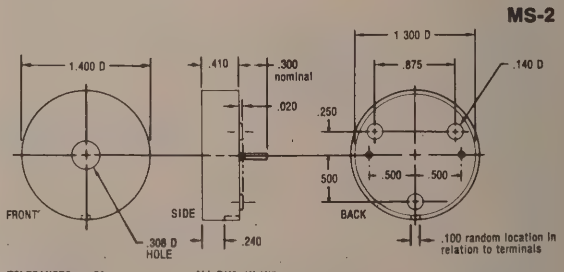

MS-2
1.300 D
1.400 D
.410
.300 nominal
.020
.875
.140 D
.250
.500
.500
.500
FRONT
SIDE
BACK
.308 D HOLE
.240
.100 random location in relation to terminals
TOLERANCES: ±.01
ALL DIM. IN INS.

Illustration #2

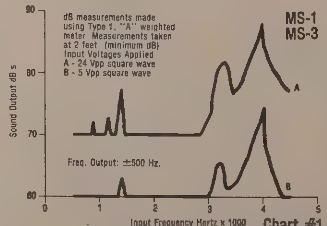


Chart #1

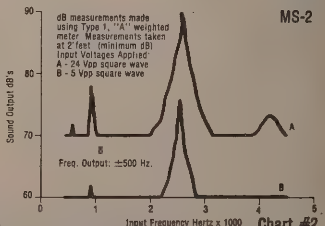


Chart #2

CITIZEN ELECTRONICS

SMALL SIZE
SOUND GENERATOR
DYNAMIC SPEAKER
MICRO BUZZER
MELOD
UNI

Sound has never been as important as it is today. In various fields, sound generators are being used extensively. To assure that sound products function faithfully to design specifications, the sound generator must be a well-made, high precision product. Citizen Electronics calls on extensive manufacturing experience and advanced technology to engineer a wide range of high-performance, cost-efficient sound generators. Our products are recognized for high quality and high reliability. We will continue to combine new ideas and new technology to create high quality sound generators to meet the needs of the times.

Small Size Sound Generator

A high performance design – low current consumption yet large sound pressure level. High precision sound generator – the fruit of extensive technical research by Citizen Electronics. No mechanical contacts afford no electrical noise.

Dynamic Speaker

Only Citizen Electronics can develop and offer such a dynamic speaker. Features a wide reproduction frequency band width and requires minimum space for installation, making it suitable for electronic music boxes, cameras, voice synthesizing, clocks and a variety of other products.

Micro Buzzer

Ultra compact construction yet rich and pleasant sound. This is made possible because the oscillation circuit acts in line with the action of the diaphragm. This can be built in various appliances and can be driven by DC voltage.

Melody Unit

Features ample volume of sound. Meets requirements for use as a signal and alarm and is very musical at the same time, thanks to Citizen Electronics know-how.

GPE GOLDEN PACIFIC ELECTRONICS, INC.
1020 N. Batavia St., Suite Q, Orange, CA 92667
TWX: 910-593-1620 (714) 538-9752
GPE INT'L ORGE (714) 538-9753

the heart
of good sound
INTERVOX® by **International©**

International Components Corporation, 105 Maxess Road, Melville, New York 11747 (516) 293-1500/TELEX # 221576 TOLL FREE 800-645-9154

SPEAKERS

General Purpose Miniature *

TYPE NUMBER	CONE DIAMETER & SHAPE	RATED POWER (Watts)	VOICE COIL IMPEDANCE (Ohms)	FREQUENCY RESPONSE (Hz)	MAGNET MATERIAL	MAGNET WEIGHT (Oz.)	DEPTH	REMARKS
S150RA	1½″ Round	0.1	8±15%	770~ 4,000	Alnico V	0.34	.705″	
S175RA	1¾″ Round	0.1	8±15%	550~ 4,000	Alnico V	0.34	.705″	
S200RA	2″ Round	0.2	8±15%	450~ 4,000	Alnico V	0.34	.705″	
S200SA	2″ Square	0.2	8±15%	450~ 5,000	Alnico V	0.34	.740″	
S225RA	2¼″ Round	0.2	8±15%	400~ 4,000	Alnico V	0.34	.740″	
S250RA	2½″ Round	0.3	8±15%	330~ 4,000	Alnico V	0.34	.830″	
S275RA	2¾″ Round	0.3	8±15%	280~ 4,000	Alnico V	0.34	.840″	
S300RA	3″ Round	0.5	8±15%	250~ 5,000	Alnico V	0.34	.915″	
S300SA	3″ Square	0.5	8±15%	250~ 5,000	Alnico V	0.34	.975″	
S350RA	3½″ Round	0.8	8±15%	220~ 5,000	Alnico V	0.34	1.100″	
S350SA	3½″ Square	0.8	8±15%	220~ 5,000	Alnico V	0.34	1.100″	
S2X3VA	1.77″x2.76″ Oval	0.5	8±15%	280~ 5,000	Alnico V	0.35	1.03″	

*Voice Coil Impedances from 3.0 ohms - 100 ohms available on special order.

Low Profile Samarium Cobalt Magnet**

TYPE NUMBER	CONE DIAMETER & SHAPE	RATED POWER (Watts)	VOICE COIL IMPEDANCE (Ohms)	FREQUENCY RESPONSE (Hz)	MAGNET MATERIAL	MAGNET WEIGHT (Oz.)	DEPTH	REMARKS
S150RL	1½″ Round		8±15%	350~ 7,000		.056	.250″	
S150RLS	1½″ Round		8±15%	450~ 8,000		.056	.327″	
S175RL	1¾″ Round		8±15%	400~ 7,000		.056	.334″	
S200RL	2″ Round		8±15%	300~ 5,000		.056	.350″	
S225RL	2¼″ Round		8±15%	200~ 5,000		.056	.445″	

**Waterproof Mylar Cones and Moisture Proof Paper Cones available on special order.

Commercial

TYPE NUMBER	CONE DIAMETER & SHAPE	RATED POWER (Watts)	VOICE COIL IMPEDANCE (Ohms)	FREQUENCY RESPONSE (Hz)	MAGNET MATERIAL	MAGNET WEIGHT (Oz.)	DEPTH	REMARKS
S400S3	4″ Square	3	8	150~11,000	Ceramic	3		
S400S6	4″ Square	4	8	140~15,000	Ceramic	6		
S4X6V3	4″x6″ Oval	3	8	110~ 9,000	Ceramic	3		
S4X6V6	4″x6″ Oval	4	8	110~ 9,000	Ceramic	6		
S4X10V3	4″x10″ Oval	3	8	90~ 8,000	Ceramic	3		
S4X10V6	4″x10″ Oval	6	8	90~ 8,000	Ceramic	6		
S500P3	5″ Pin Cushion	3	8	135~10,000	Ceramic	3		
S500P6	5″ Pin Cushion	6	8	135~12,000	Ceramic	6		
S525P3	5.25″ Pin Cushion	4	8	105~10,000	Ceramic	3		
S525P6	5.25″ Pin Cushion	6	8	120~13,000	Ceramic	6		
S525P10	5.25″ Pin Cushion	10	8	120~13,000	Ceramic	10		
S650P3	6.5″ Pin Cushion	4	8	70~14,000	Ceramic	3		
S650P6	6.5″ Pin Cushion	6	8	70~14,000	Ceramic	6		
S6X9V3	6″x9″ Oval	3	8	80~10,000	Ceramic	3		
S6X9V6	6″x9″ Oval	6	8	70~15,000	Ceramic	6		
S6X9D10	6″x9″ Oval	15	8	70~15,000	Ceramic	10		Dual Cone
S6X9C20	6″x9″ Oval	25	8	60~18,000	Ceramic	20		Co-Axial
S6X9T20	6″x9″ Oval	25	8	60~20,000	Ceramic	20		3-Way
S800R3	8″ Round	3	8	70~10,000	Ceramic	3		
S800R6	8″ Round	6	8	70~10,000	Ceramic	6		
S800C10	8″ Round	15	8	70~13,000	Ceramic	10		Co-Axial
S800D10	8″ Round	15	8	70~12,000	Ceramic	10		Dual

Horns

TYPE NUMBER	CONE DIAMETER & SHAPE	RATED POWER (Watts)	VOICE COIL IMPEDANCE (Ohms)	FREQUENCY RESPONSE (Hz)	MAGNET MATERIAL	MAGNET WEIGHT (Oz.)	DEPTH	REMARKS
5″		10W	8	180~13,000				
5″ x 8″		25W	8	170~13,000				
8″		25W	8	160~13,000				
12″		35W	8	130~15,000				

BUZZERS

Shape Round, Rectangular, P.C. Mount and Wire Lead Construction

DC Voltage Range 1.1V-30V

Current Range 16mA-30mA

SPEAKERS

HORNS

BUZZERS

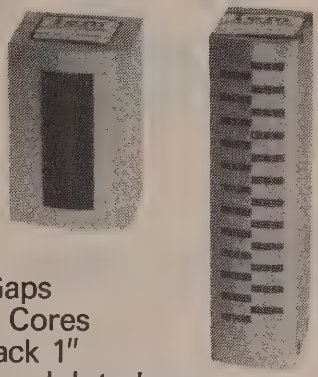
iem®

INTERNATIONAL ELECTRO MAGNETICS, INC.
ERIC DRIVE AND CORNELL AVENUE, PALATINE, ILLINOIS 60067 (312) 358-4622

MAGNETIC RECORDING HEADS

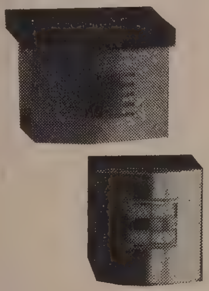
AUDIO MASTERING

- All Formats Available
- Standard Replacements in Stock
- Improved Channel Isolation
- Flattened Low Frequency Response



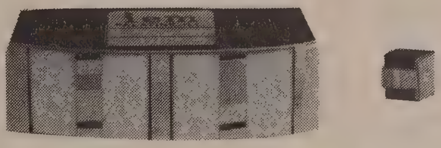
ERASE

- Dual Gaps
- Ferrite Cores
- Full Track 1″
- Multi-track Interlace



SMPTE Control Stacks

- Neo Pilot for ¼″ Mono
- FM for ¼″ Stereo
- VCR/VTR Formats
- Ceramic Wear Shoes



MAGNETIC STRIPE/MINIATURE

- Read After Write
- Hand Held Readers
- ¼″ Cube

CUSTOM DESIGN

We have manufactured over 5,000 different head designs. If we don't have one to suit your requirements, we will design and prototype it quickly and economically. Our toolroom is well equipped to produce precision parts, and our design projects have included optical alignment systems, microfiche cameras, and electronic test equipment.

HEAD ASSEMBLY

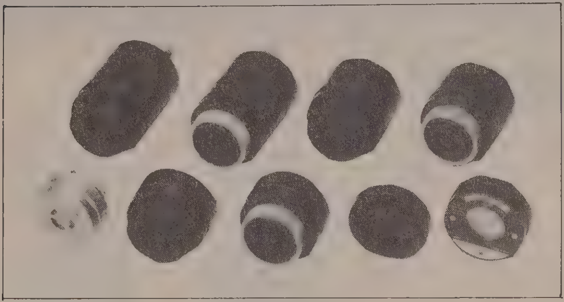
- Quick Change ¼″ to ½″
- Solenoid Tape Lifter
- Non-Resonant Head Spacing

HEAD RELAPPING

- Electrical Test
- Granite Flat Polishing
- Microscopic Inspection
- 24 Hour Service

MALLORY

Sonalert® Audible Signals



Mallory Sonalert® signals produce an audible tone by electronic means when voltage is applied. Voltages from 1V to 250V may be used depending upon the model.

Electrical power is converted to sound by means of a piezoelectric transducer operating substantially at resonance in a solid state oscillator resulting in efficient power conversion.

Sonalert signals may be powered by many electrical sources ranging from single cell batteries to industrial power lines. Little electrical power is required making them ideally suitable for portable battery operated equipment. This low power feature allows the Sonalert signal to be turned on or off with a low power transistor, SCR, or integrated circuit. Completely solid state with no moving parts, no arcing, and no mechanical wear, the Mallory Sonalert signals should give you many years of trouble-free service.

Audio and electrical specifications

Continuous Tones					Minimum Sound Pressure dB (A) at Two Feet		Operating Voltage *AC/DC Non-polar All Others DC Only		Typical Operating Current MA	
Part and Model Number	Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	At Min. V	At Max. V	**Min.	Max.	At Min. V	At Max. V
SC110N	LOUD	PANEL	D	2900	80	95	*30	120	8	28
SC616N	LOUD	PANEL	C	2900	80	95	6	16	4	16
SC616NL	LOUD	PANEL	C-3	2900	80	95	6	16	4	16
SC628AN	LOUD	PANEL	D	2900	80	95	* 6	28	8	28
SC648AN	LOUD	PANEL	D	2900	80	95	*10	48	8	28
SBM2	MEDIUM	PRINTED BOARD	F	2900	55	68	1	5	2	12
SBM428	MEDIUM	PRINTED BOARD	F	2900	64	78	4	28	2	14
SNP2	MEDIUM	SNAP IN PANEL	B	2900	55	68	1	5	2	12
SNP428	MEDIUM	SNAP IN PANEL	B	2900	64	78	4	28	2	14
SC110	MEDIUM	PANEL	D	2900	68	80	*30	120	4	16
SC110D	MEDIUM	PANEL	D	1900	60	75	*30	120	4	16
SC110H	MEDIUM	PANEL	D	4500	68	80	*30	120	4	16
SC250	MEDIUM	PANEL	D	2900	68	80	*60	250	4	16
SC250D	MEDIUM	PANEL	D	1900	60	75	*60	250	4	16
SC250H	MEDIUM	PANEL	D	4500	68	80	*60	250	4	16
SC628	MEDIUM	PANEL	C	2900	64	80	6	28	3	14
SC628A	MEDIUM	PANEL	D	2900	68	80	* 6	28	4	16
SC628AD	MEDIUM	PANEL	D	1900	60	75	* 6	28	4	16
SC628AH	MEDIUM	PANEL	D	4500	68	80	* 6	28	4	16
SC628D	MEDIUM	PANEL	C	1900	60	75	6	28	3	14
SC628H	MEDIUM	PANEL	C	4500	68	80	6	28	3	14
SC628L	MEDIUM	PANEL	C-3	2900	68	80	6	28	3	14
SC648	MEDIUM	PANEL	C	2900	68	80	10	48	3	14
SC648A	MEDIUM	PANEL	D	2900	68	80	*10	48	4	16
SC648AD	MEDIUM	PANEL	D	1900	60	75	*10	48	4	16
SC648AH	MEDIUM	PANEL	D	4500	68	80	*10	48	4	16
SC648D	MEDIUM	PANEL	C	1900	60	75	10	48	3	14
SC648H	MEDIUM	PANEL	C	4500	68	80	10	48	3	14
SC1.5	SOFT	TWIST TAB	A	3500	60 @ 1.5 V		1	4	4 @ 1.5 V	
SC6	SOFT	TWIST TAB	A	3500	70 @ 6 V		4	8	12 @ 6 V	
SC12	SOFT	TWIST TAB	A	3500	70 @ 12 V		8	15	14 @ 12 V	
SC18	SOFT	TWIST TAB	A	3500	70 @ 18 V		14	22	16 @ 18 V	
SC24	SOFT	TWIST TAB	A	3500	70 @ 24 V		20	30	16 @ 24 V	
SNP428F	SOFT	SNAP IN PANEL	B	2900	55	70	4	28	0.5	3
SC110E	SOFT	PANEL	D	1900	55	65	*30	120	3	14
SC110F	SOFT	PANEL	D	2900	55	70	*30	120	1	4
SC250E	SOFT	PANEL	D	1900	55	65	*60	250	3	14
SC250F	SOFT	PANEL	D	2900	55	70	*60	250	1	4
SC628AE	SOFT	PANEL	D	1900	55	65	* 6	28	3	14
SC628AF	SOFT	PANEL	D	2900	55	70	* 6	28	1	4
SC628E	SOFT	PANEL	C	1900	55	68	6	28	3	8
SC628F	SOFT	PANEL	C	2900	55	70	6	28	0.5	3

** Minimum voltage specified does not represent sound turn-off point. Some units will sound at lower voltage.

MALLORY CAPACITOR COMPANY, EMHART ELECTRICAL/ELECTRONIC GROUP
DEPT. EM, P.O. BOX 372, INDIANAPOLIS, IN 46206, U.S.A.
PHONE: (317) 636-5353

MALLORY
ELECTRICAL/ELECTRONIC GROUP
EMHART

MALLORY

Sonalert® Audible Signals

Audio and electrical specifications

Intermittent Tones

Fast Pulse Turns on and off at 2 to 9 pulses per second depending upon voltage at 50% duty cycle.

▼ **Slow Pulse** Turns on and off at .5 to 1.5 pulses per second depending upon voltage at 50% duty cycle.

Part and Model Number		Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	Minimum Sound Pressure dB (A) at Two Feet		Operating Voltage *AC/DC Non-polar All Others DC Only		Typical Operating Current MA	
Fast Pulse ▼	Slow Pulse ▼					At Min. V	At Max. V	**Min.	Max.	At Min. V	At Max. V
SC110NP	SC110NJ	LOUD	PANEL	D	2900	80	95	*30	120	8	28
SC616NP	SC616NJ	LOUD	PANEL	C	2900	80	95	6	16	4	16
SC628ANP	SC628ANJ	LOUD	PANEL	D	2900	80	95	* 6	28	8	28
SC648ANP	SC648ANJ	LOUD	PANEL	D	2900	80	95	*10	48	8	28
SBM616P	SBM616J	MEDIUM	PRINTED BOARD	F	2900	68	78	6	16	1	4
SC110DP	SC110DJ	MEDIUM	PANEL	E	1900	60	75	*30	120	4	16
SC110HP	SC110HJ	MEDIUM	PANEL	E	4500	68	80	*30	120	4	16
SC110P	SC110J	MEDIUM	PANEL	E	2900	68	80	*30	120	4	16
SC250DP	SC250DJ	MEDIUM	PANEL	E	1900	60	75	*60	250	4	16
SC250HP	SC250HJ	MEDIUM	PANEL	E	4500	68	80	*60	250	4	16
SC250P	SC250J	MEDIUM	PANEL	E	2900	68	80	*60	250	4	16
SC616P	SC616J	MEDIUM	PANEL	C-1	2900	68	78	6	16	1	4
SC616P-1	SC616J-1	MEDIUM	PANEL	C-2	2900	68	78	6	16	1	4
SC628ADP	SC628ADJ	MEDIUM	PANEL	E	1900	60	75	* 6	28	4	16
SC628AHP	SC628AHJ	MEDIUM	PANEL	E	4500	68	80	* 6	28	4	16
SC628AP	SC628AJ	MEDIUM	PANEL	E	2900	68	80	* 6	28	4	16
SC628DP	SC628DJ	MEDIUM	PANEL	D	1900	60	75	6	28	3	14
SC628HP	SC628HJ	MEDIUM	PANEL	D	4500	68	80	6	28	3	14
SC628P	SC628J	MEDIUM	PANEL	D	2900	68	80	6	28	3	14
SC648ADP	SC648ADJ	MEDIUM	PANEL	E	1900	60	75	*10	48	4	16
SC648AP	SC648AJ	MEDIUM	PANEL	E	2900	68	80	*10	48	4	16
SC110EP	SC110EJ	SOFT	PANEL	E	1900	55	68	*30	120	3	14
SC110FP	SC110FJ	SOFT	PANEL	E	2900	55	70	*30	120	4	16
SC250EP	SC250EJ	SOFT	PANEL	E	1900	55	68	*60	250	3	14
SC250FP	SC250FJ	SOFT	PANEL	E	2900	55	70	*60	250	4	16
SC628AEP	SC628AEJ	SOFT	PANEL	E	1900	55	68	* 6	28	3	14
SC628AFP	SC628AFJ	SOFT	PANEL	E	2900	55	70	* 6	28	4	16
SC628EP	SC628EJ	SOFT	PANEL	D	1900	55	68	6	28	3	8
SC628FP	SC628FJ	SOFT	PANEL	D	2900	55	70	6	28	3	14

Short Pulse
Turns on and off at .5 to 1.5 pulses per second depending upon voltage at 10% duty cycle.

Part and Model Number	Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	dB (A) At Min. V	dB (A) At Max. V	**Min.	Max.	MA At Min. V	MA At Max. V
SC110K	MEDIUM	PANEL	E	2900	68	80	*30	120	4	16
SC628K	MEDIUM	PANEL	D	2900	68	80	6	28	3	14
SC110FK	SOFT	PANEL	E	2900	55	70	*30	120	4	16
SC628FK	SOFT	PANEL	D	2900	55	70	6	28	3	14

Combined continuous or pulsing sound in one package.
When power terminals are connected, third terminal may be switched to common (−) to select a continuous sound or switched to positive (+) to select a pulsing sound. Switching current is less than .15 milliamp.

Dual Mode Operation

Continuous or Fast Pulse	Continuous or Slow Pulse	Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	dB (A) At Min. V	dB (A) At Max. V	**Min.	Max.	MA At Min. V	MA At Max. V
SC616NPU		LOUD	PANEL	D-1	2900	80	95	6	16	4	16
SBM616PU	SBM616JU	MEDIUM	PRINTED BOARD	F	2900	68	78	6	16	3	12
SC616PU	SC616JU	MEDIUM	PANEL	D-1	2900	68	78	6	16	3	12

Fast Warble Slow Warble
Produces two tones alternately when used with additional continuous tone unit.

Fast Warble	Slow Warble	Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	dB (A) At Min. V	dB (A) At Max. V	**Min.	Max.	MA At Min. V	MA At Max. V
SC628W (USE WITH SC628D OR SC628H)	SC628JW	MEDIUM	PANEL	D-1	2900	68	80	6	28	3	16
SC628FW (USE WITH SC628E)	SC628FJW	SOFT	PANEL	D-1	2900	55	70	6	28	3	14

Chime Tone
A pleasant sound which chimes every one or two seconds as long as voltage is applied.

Part and Model Number	Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	dB (A) At Min. V	dB (A) At Max. V	**Min.	Max.	MA At Min. V	MA At Max. V
SC616CP	MEDIUM	PANEL	D	2900	68	80	6	16	3	8

Chirp
A unique sound which pulses at 20-60 pulses per second rate.

Part and Model Number	Loudness Category	Mounting Method	Case Style	Frequency ±500Hz	dB (A) At Min. V	dB (A) At Max. V	**Min.	Max.	MA At Min. V	MA At Max. V
SC110Q (AC ONLY)	MEDIUM	PANEL	C	2900	68	80	30	120	3	12
SC616Q	MEDIUM	PANEL	C-1	2900	68	78	6	16	1	4

Underwriters laboratories

The following models are listed as recognized components—audible signal appliances. Guide Number UCST2, Yellow Card Number S1290.

SNP428 SC628 SC648 SC628P SC110 SC110P

** Minimum voltage specified does not represent sound turn-off point. Some units will sound at lower voltage.

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PHONE: (317) 636-5353

MALLORY
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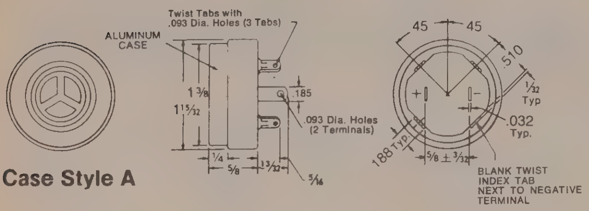
Sonalert® Audible Signals

Case styles

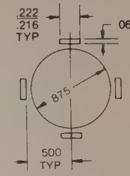
OUTLINE DIMENSIONS
FRACTIONS ±1/32 DECIMALS ±.01


Twist Tabs with .093 Dia. Holes (3 Tabs)
ALUMINUM CASE
1 3/8
1 15/32
.185
.093 Dia. Holes (2 Terminals)
1/4
5/8
13/32
5/16
45
45
.510
1/32 Typ
.032 Typ.
.188 Typ.
5/8 ± 3/32
BLANK TWIST INDEX TAB NEXT TO NEGATIVE TERMINAL

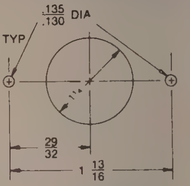
Case Style A

Terminals—.032 steel, tin plated with .093 dia. wire hole, will accept standard 3/16'' quick disconnect.

BP6 BAKELITE MOUNTING WAFER

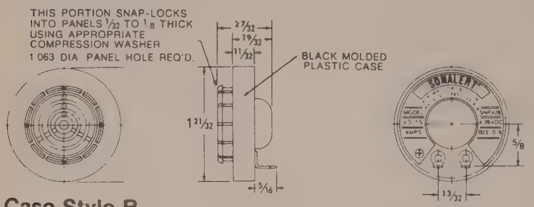

.222
.216
TYP
.060 TYP
.875
.500
TYP

CHASSIS CUT OUT FOR DIRECT MOUNTING


.135
.130 DIA
29/32
1 13/16

CHASSIS CUT OUT FOR MOUNTING USING MOUNTING WAFER MP6 OR BP6

Mounting— Four Twist Tabs per EIA std. RS395 are provided for mounting. Terminals are electrically isolated from case and Twist Tabs. Also may be mounted using mounting wafer number MP6 for uninsulated mounting or mounting wafer number BP6 to insulate case from chassis.

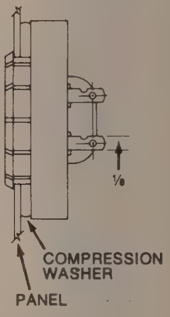

THIS PORTION SNAP-LOCKS INTO PANELS 1/32 TO 1/8 THICK USING APPROPRIATE COMPRESSION WASHER
1.063 DIA PANEL HOLE REQ'D.
27/32
19/32
11/32
BLACK MOLDED PLASTIC CASE
1 21/32
5/16
SONALERT
5/8
13/32

Case Style B

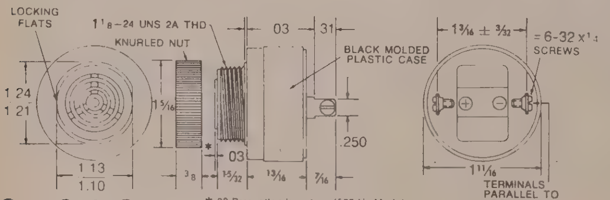
Terminals—.016 brass, hot tin finish with .076 wire hole. Terminal will accept standard 1/8'' quick disconnect.

Mounting—Panel hole 1.063 ± .005 diameter should be punched from the back side so that locking fingers enter on the slightly rounded edge of the hole. Assemble proper compression washer and press into panel hole until locking fingers snap over hole edge. Installation pressure should be applied only at the circumference of the device.

PANEL THICKNESS	COMPRESSION WASHER NO./ THICKNESS
11-12 GA. (.125-.109)	PW1/.063
13-17 GA. (.093-.056)	PW2/.125
18-22 GA. (.050-.031)	PW3/.187

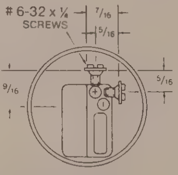

1/8
COMPRESSION WASHER
PANEL

TYPICAL PANEL INSTALLATION

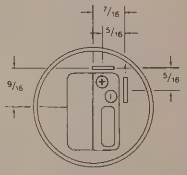

LOCKING FLATS
1 1/8-24 UNS 2A THD
KNURLED NUT
.03
.31
BLACK MOLDED PLASTIC CASE
1.24
1.21
1 5/16
*
.03
.250
1.13
1.10
3/8
15/32
13/16
7/16
1 3/16 ± 3/32
#6-32 x 1/4 SCREWS
1 11/16
TERMINALS PARALLEL TO LOCKING FLATS WITHIN ±15°

Case Style C

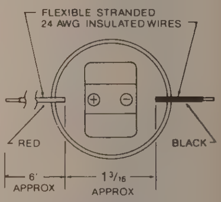
*.03 Projection is not on 4500 Hz Models


#6-32 x 1/4 SCREWS
7/16
5/16
9/16
5/16

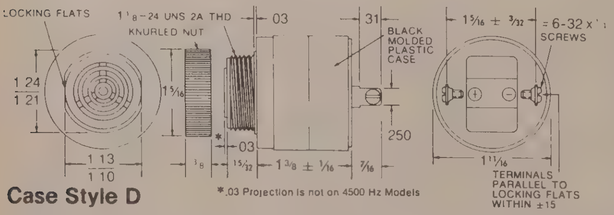
Case Style C-1


7/16
5/16
9/16
5/16

Case Style C-2

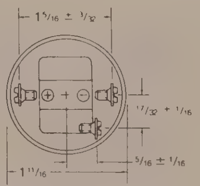

FLEXIBLE STRANDED 24 AWG INSULATED WIRES
RED
BLACK
6" APPROX
1 3/16 APPROX

Case Style C-3


LOCKING FLATS
1 1/8-24 UNS 2A THD
KNURLED NUT
.03
.31
BLACK MOLDED PLASTIC CASE
1.24
1.21
1 5/16
*
.03
.250
1.13
1.10
3/8
15/32
1 3/8 ± 1/16
7/16
1 5/16 ± 3/32
#6-32 x 1/4 SCREWS
1 11/16
TERMINALS PARALLEL TO LOCKING FLATS WITHIN ±15

Case Style D

*.03 Projection is not on 4500 Hz Models


1 5/16 ± 3/32
17/32 ± 1/16
5/16 ± 1/16
1 11/16

Case Style D-1

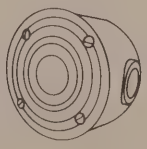
Case Style E—Outline dimensions are the same as case style D except length is changed to 1-15/16 ± 3/32.

Terminals—.032 brass, tin plated, tapped for #6-32 screw. Two #6-32 cadmium or zinc plated steel screws included. Will accept standard 1/4'' quick disconnect.

Mounting—Remove black plastic nut and insert threaded front through 1.25'' hole punched in panel. If orientation is needed, note locking flats on drawing. Screw nut back on. Do not overtighten.

Optional Mounting Nuts — To substitute natural finished aluminum nut add C to catalog number. To substitute black anodized aluminum nut add B to catalog number. Example: — SC628B.

Electrical Mounting Box — Part Number SCMB
Used to mount Sonalert® signal case styles C and D on standard 3/4 inch electrical conduit. 3-1/2 inch diameter, 2 inch deep ABS plastic.



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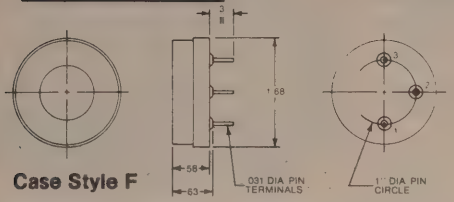
Sonalert® Audible Signals



Case Style F

Mounting—Insert into printed circuit board and hand or machine solder. For recommended fluxing, soldering, and cleaning procedures, send for Mallory Audio Signal Engineering Bulletin 778.

Terminals—.031 dia. soldercoated copperclad steel.

Electrical Connections—SBM2, SBM428, SBM616P, SBM616J—When pin 1 is connected to + voltage and pin 3 is connected to common (−), unit will sound. Pin 2 is for mechanical support only and is not connected internally.

SBM616PU, SBM616JU—When pin 1 is connected to + voltage, and pin 3 is connected to common (−), and the voltage on pin 2 is within 1.25V of pin 1 or higher, the unit will sound a pulsing tone. When the voltage on pin 2 is within .9V of pin 3 or lower the unit will sound a continuous tone. The maximum voltage which may be applied to pin 2 before damage may occur is ± 16V referenced to pin 3. Pin 2 input impedance is 110K ohm.

Environmental specifications

Surge voltage

15% over maximum rated voltage applied for less than one minute.

Reverse voltage — DC models

Maximum reverse polarity equal to rated voltage for one minute. Some models may sound softly when subjected to reversed polarity voltage.

Life specification

Continuous—100 hours continuous operation at 65°C with maximum rated voltage applied.

Intermittent—A duty cycle of 1 minute on, 5 minutes off, a minimum of 5000 times at room temperature and maximum rated voltage applied.

Life expectancy

5 years under normal operating conditions.

Storage temperature

−40°C to +85°C.

Operating temperature

−30°C to +65°C.

Humidity

The Sonalert® signal should operate after having been subjected to 95% Relative Humidity at +40°C continuously for 100 hours. After removal from test, the unit should be allowed to dry a minimum of 4 hours at room temperature before operation. Units should deliver original output characteristics.

Vibration

The Sonalert signal should be mounted in the standard manner on a mounting panel. The specimens should be subjected to a harmonic motion having an amplitude of 0.03 inch (0.06 inch maximum total excursion). The frequency should be varied uniformly between a limit of 10 and 55 Hertz. The entire frequency range from 10 to 55 Hertz and return to 10 Hertz should be traversed in approximately one minute. Motion should be applied for two hours in each of 3 mutually perpendicular planes (total 6 hours). This test should be conducted while the Sonalert signal is not operating. After completion of test, Sonalert signals should meet specifications.

Salt spray

The Sonalert signal should meet specified operating conditions after completing 96 hours in an atomized salt spray while not operating. The spray should consist of a 5% salt solution atomized by a forced air supply. The solution should be sprayed through a nozzle into a chamber maintained at 35°C. After salt spray, the unit should be removed and washed in running water not warmer than 40°C. A soft hairbrush or plastic bristle brush should be used, lightly brushing to remove salt deposits from the unit. The cleaned Sonalert signals should be placed on absorbent material with the nose cone pointed downward and allowed to dry at room temperature for 24 hours prior to use.

Terminal strength

5 pounds, applied axially for a period of 5 minutes. This is considered a destructive test.

Custom designed Sonalerts®

Even though there are many standard Sonalert models listed in this bulletin, we encourage you to contact Mallory regarding other audio signalling devices for your OEM custom applications. These can involve the modification of existing models, a completely new design or an entire system to provide multi-signals for various functions.

Our engineering staff has over 10 years experience in the design of audible signalling products for commercial, military, industrial, and automotive applications. We have an excellent, well equipped laboratory for the measurement of electrical and acoustical characteristics and can assist you in establishing audible signal specifications.

Shown here are three examples of custom Sonalert models currently being used in automotive, agricultural, and space applications.

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DRAWINGS?
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AVAILABILITY?
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CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
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CUSTOM?
COMPATIBILITY?
SPECS?
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QUOTES?
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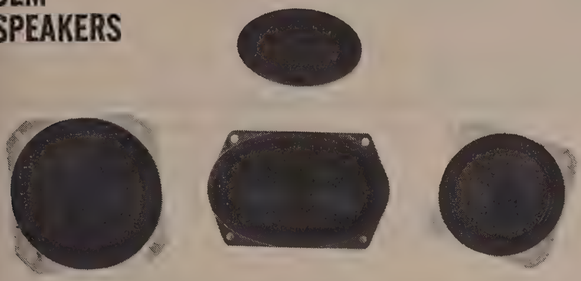
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

MG SPEAKERS & HORNS — FOR OEM OR DISTRIBUTOR

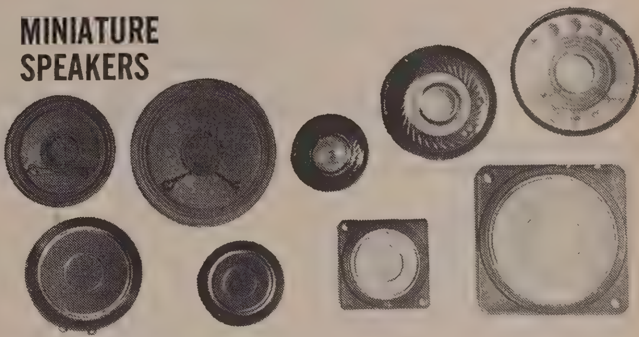
OEM SPEAKERS



- ☐ COMMUNICATIONS
- ☐ COMPUTER APPLICATIONS
- ☐ INTERCOM SYSTEMS
- ☐ ELECTRONIC TOYS AND GAMES

MG's wide range of miniature speakers are available in sizes from 1″ to 4″, round or square. Voice coil impedances range from 3.2 to 100 ohms. Magnets are available in ferrite and alnico V.

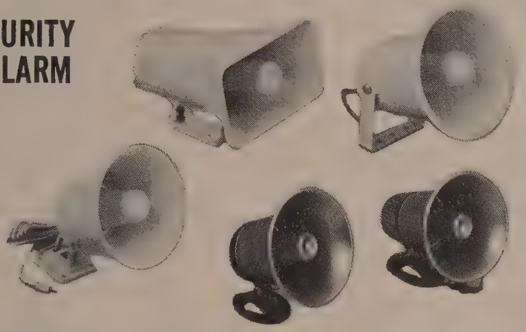
MINIATURE SPEAKERS



- ☐ TELEPHONE SYSTEMS
- ☐ MODEMS
- ☐ ALARMS
- ☐ KEYBOARD APPLICATIONS

These miniature thin line speakers produce a clean and natural sound. The wide frequency response make these speakers ideal for a broad range of O.E.M. applications.

SECURITY & ALARM



- ☐ HORNS AND SIRENS FOR PROTECTION AND SIGNAL SYSTEM APPLICATIONS

MG's paging, signaling horns, and electronic sirens all designed with built in drivers and available in sizes from 5″ to 12″. All constructed with heavy duty ABS or aluminum housings.

MG offers a wide range of high quality loudspeaker products for hundreds of industrial and commercial applications at competitive pricing. Speakers are "manufactured to your specifications" and available in OEM quantities. A broad range of options in configuration, voice coil impedance, magnet type and weight, and cone finish can be specified.

We also maintain a huge "off the shelf" raw speaker inventory of hundreds of assorted speaker types and sizes from 1″ to 18″. — Call us for availability.

GENERAL PURPOSE & COMMERCIAL SOUND SPEAKERS

- ☐ BACKGROUND MUSIC
- ☐ PUBLIC ADDRESS AND PAGING
- ☐ SOUND COLUMNS
- ☐ AUTOMOTIVE
- ☐ COMMUNICATIONS AND GENERAL REPLACEMENT APPLICATIONS

Paging horns are available in a wide range of sizes from 5″ to 12″, in plastic or aluminum housings. Speakers are available in single cone, dual cone and coaxial types in sizes from 4″ to 8″. All 8″ speaker baskets are prestamped for easy transformer mounting. A wide variety of voice coil sizes and magnet weights are available.

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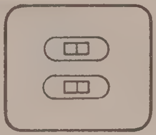
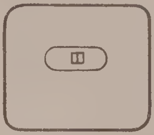
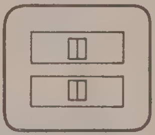
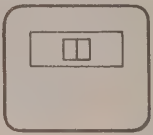
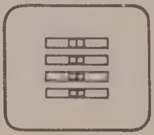
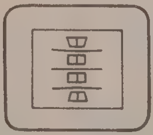

1/4 TR ST

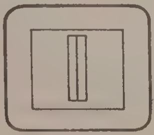

1/4 TR MONO


1/2 TR ST


1/2 TR MONO


1/8 TR 4 CH


1/4 TR 4 CH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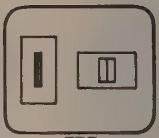
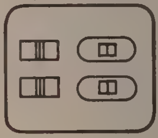
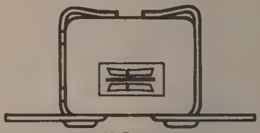
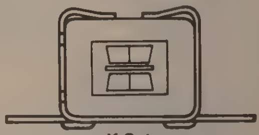
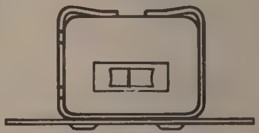
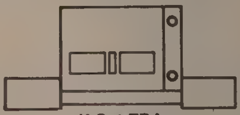

ERP
1/2 TR MONO

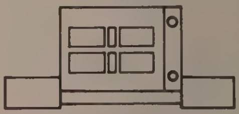

ERP
1/4 TR ST


K-Set
1/4 TR ST


K-Set
1/2 TR ST


K-Set
1/2 TR MONO


K-Set ERA
1/2 TR MONO

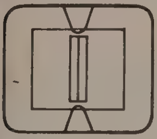

K-Set ERASE
1/2 TR ST

GEMCLAD® Will Give You Up To 10 Times the Wear

This new process of lamination construction combines long life with high performance. The magnetic properties of Mu Metal are preserved, and the hard metal gives longer wear.

the Costs of Your Products

- Michigan Magnetics Is the Mark of Quality. All Heads Are Warranted for a Full Year.
- We Will Design, Tool, and Manufacture To Your Specifications on a Shared Tooling Basis
- We Take Small Quantity Orders of Less Than 1,000—and Even as Small as 100 Heads of a Standard Item.
- Prompt, Reliable Service and Delivery. We Don't Make "Sales Promises"—Our Promises Are Real Promises.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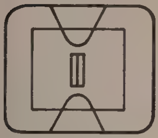
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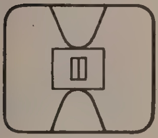
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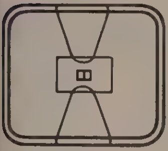
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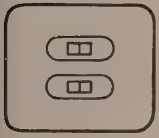
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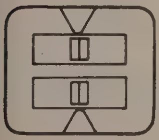
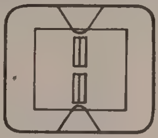

TYPE 6

CARD READER HEADS

- Magnetic Stripe Encoders and Readers
- Standard Designs, or Manufactured to Your Specifications
- Built-To-Order for Credit Card Readers, Reading Magnetic Ink Characters, Money Readers, Meter Readers...Whatever Your Application
- Available with Long Life, High Performance GEMCLAD® Cores (When Ordering GEMCLAD® Samples, Add Suffix G To Model Numbers)
- Relieved Face for Intimate Face Contact and Easy Loading (Optional)
- Uniform Frame Size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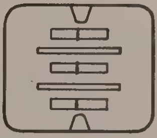
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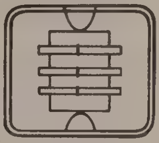
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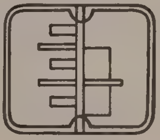
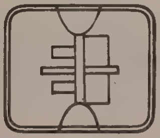
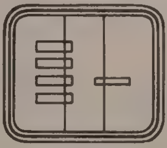

TYPE 10


TYPE 11


TYPE 12

TYPE	TRACK WIDTH	FUNCTION
1	.250	R/W
2	.120	R/W
3	.082	R/W
4	.038	Read
5	.038	R/W
6	.082	R/W
7	.110	R/W
8	.041	Read
9	.060	R/W
10	.120 .041	W/R
11	.120 .041	W/R
12	.038 .028	

To Prove You Can Improve Your Profits by Cutting Your Costs...

CONTACT

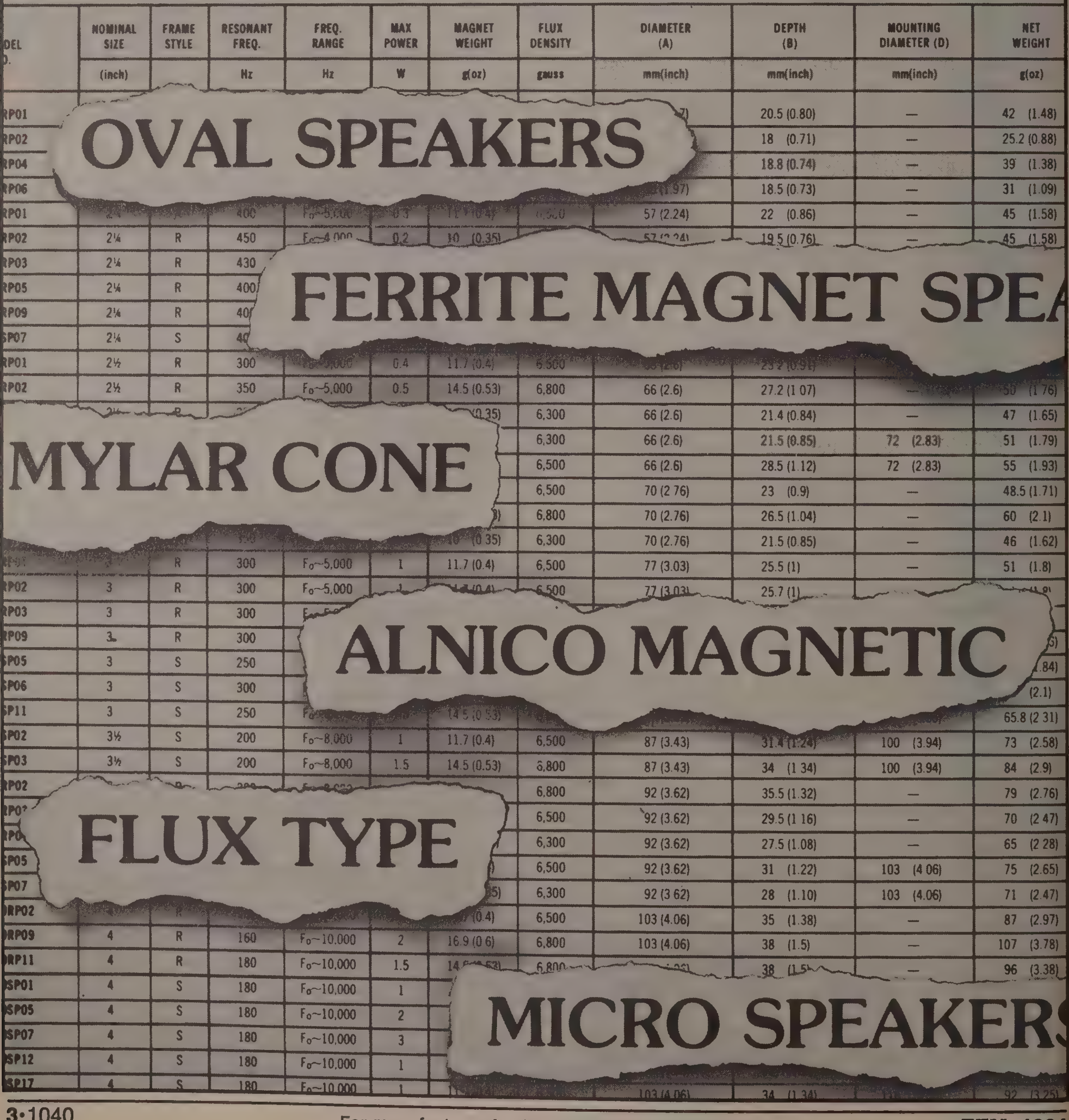
MICHIGAN MAGNETICS, INC.
203 West Third Street
Vermontville, Michigan 49096
(517) 726-0590

MURA® SPEAKERS

MURA offers a full range of general purpose miniature speakers in sizes less than an inch in diameter up to a 6 x 9 inch oval version. All speakers are available in standard impedances of 3.2, 4, 8, 16, 45, 75 and 100 ohms. Special coil impedances are available upon request. Many of our smaller speakers are available with samarium cobalt magnets in addition to the more common alnico and ceramic materials. Modern manufacturing, automation and technique assures a high quality and uniformly made product. Each production lot undergoes a MIL-STD-105D single sample inspection at General Inspection Level II, Acceptable Quality Level 0.65% for performance and 1.25% for appearance.

This page contains excerpts from our catalog. Please write or call us for our complete 8 page catalog or details on those speakers shown below.

MURA®
CORPORATION
177 Cantiague Rock Road, Westbury, N.Y. 11590
Phone: 516-935-3640 ■ Telex: 967-879


OVAL SPEAKERS
FERRITE MAGNET SPEA
MYLAR CONE
ALNICO MAGNETIC
FLUX TYPE
MICRO SPEAKER

DEL O.	NOMINAL SIZE (inch)	FRAME STYLE	RESONANT FREQ. Hz	FREQ. RANGE Hz	MAX POWER W	MAGNET WEIGHT g(oz)	FLUX DENSITY gauss	DIAMETER (A) mm(inch)	DEPTH (B) mm(inch)	MOUNTING DIAMETER (D) mm(inch)	NET WEIGHT g(oz)
RP01								[illegible]	20.5 (0.80)	—	42 (1.48)
RP02									18 (0.71)	—	25.2 (0.88)
RP04									18.8 (0.74)	—	39 (1.38)
RP06								[illegible]	18.5 (0.73)	—	31 (1.09)
RP01	[illegible]		400	F₀~5,000	0.3	11.7 (0.4)	[illegible]	57 (2.24)	22 (0.86)	—	45 (1.58)
RP02	2¼	R	450	F₀~4,000	0.2	10 (0.35)		57 (2.24)	19.5 (0.76)	—	45 (1.58)
RP03	2¼	R	430								
RP05	2¼	R	400								
RP09	2¼	R	[illegible]								
SP07	2¼	S	[illegible]								
RP01	2½	R	300	[illegible]	0.4	11.7 (0.4)	6,500	[illegible]	[illegible]		
RP02	2½	R	350	F₀~5,000	0.5	14.5 (0.53)	6,800	66 (2.6)	27.2 (1.07)	—	50 (1.76)
	[illegible]	[illegible]	[illegible]			[illegible]	6,300	66 (2.6)	21.4 (0.84)	—	47 (1.65)
							6,300	66 (2.6)	21.5 (0.85)	72 (2.83)	51 (1.79)
							6,500	66 (2.6)	28.5 (1.12)	72 (2.83)	55 (1.93)
							6,500	70 (2.76)	23 (0.9)	—	48.5 (1.71)
						[illegible]	6,800	70 (2.76)	26.5 (1.04)	—	60 (2.1)
						[illegible]	6,300	70 (2.76)	21.5 (0.85)	—	46 (1.62)
[illegible]		R	300	F₀~5,000	1	11.7 (0.4)	6,500	77 (3.03)	25.5 (1)	—	51 (1.8)
RP02	3	R	300	F₀~5,000	[illegible]	[illegible]	6,500	77 (3.03)	25.7 (1)		[illegible]
RP03	3	R	300	[illegible]							
RP09	3	R	300								[illegible]
SP05	3	S	250								[illegible]
SP06	3	S	300								(2.1)
SP11	3	S	250	[illegible]		14.5 (0.53)					65.8 (2.31)
SP02	3½	S	200	F₀~8,000	1	11.7 (0.4)	6,500	87 (3.43)	31.4 (1.24)	100 (3.94)	73 (2.58)
SP03	3½	S	200	F₀~8,000	1.5	14.5 (0.53)	6,800	87 (3.43)	34 (1.34)	100 (3.94)	84 (2.9)
RP02	[illegible]	[illegible]	[illegible]	[illegible]			6,800	92 (3.62)	35.5 (1.32)	—	79 (2.76)
[illegible]							6,500	92 (3.62)	29.5 (1.16)	—	70 (2.47)
[illegible]							6,300	92 (3.62)	27.5 (1.08)	—	65 (2.28)
SP05						[illegible]	6,500	92 (3.62)	31 (1.22)	103 (4.06)	75 (2.65)
SP07						[illegible]	6,300	92 (3.62)	28 (1.10)	103 (4.06)	71 (2.47)
RP02		R				[illegible]	6,500	103 (4.06)	35 (1.38)	—	87 (2.97)
RP09	4	R	160	F₀~10,000	2	16.9 (0.6)	6,800	103 (4.06)	38 (1.5)	—	107 (3.78)
RP11	4	R	180	F₀~10,000	1.5	[illegible]	[illegible]	[illegible]	[illegible]	—	96 (3.38)
SP01	4	S	180	F₀~10,000	1						
SP05	4	S	180	F₀~10,000	2						
SP07	4	S	180	F₀~10,000	3						
SP12	4	S	180	F₀~10,000	1						
SP17	4	S	180	F₀~10,000	1			103 (4.06)	34 (1.34)	[illegible]	92 (3.25)

MURA®
CORPORATION
177 CANTIAGUE ROCK ROAD, WESTBURY, N.Y. 11590 • (516) 935-3640 • TELEX 967 879

MICROPHONE CARTRIDGES

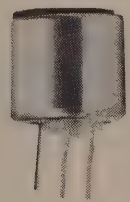
ELECTRET CONDENSER

9.4ϕ × 6h

EC-983-6

9.4ϕ × 6.7

EC-983-7


10ϕ × 10h

EC-983-10

10.7ϕ × 13h

EC-983-11

Sensitivity: —65dB ±3dB (0 dB:1v/μbar, 1 KHz)
Impedance: 600Ω
Frequency Range: 10-15,000 Hz
Operating Voltage: 2-10V

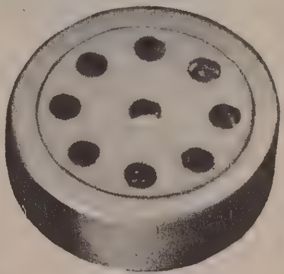
CERAMIC

CC-30

Sensitivity : —55 dB
Response : 30 - 15 KHz
Dimensions : 30ϕ X 10.5mm
Weight : 4.5 grs.

CC-20K

Sensitivity : —70 dB
Response : 100 - 7 KHz
Dimensions : 21.6 X 15 X 8.6 mm
Weight : 2 grs.

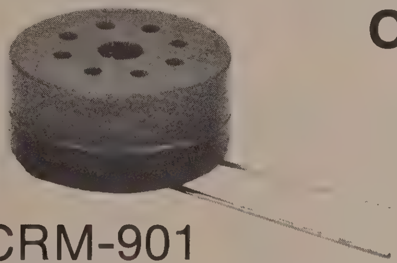


CC-253

Sensitivity : —60 dB
Response : 30 - 15 KHz
Dimensions : 25ϕ X 10mm
Weight : 3 grs.

***CC-30** and **CC-253** are also available with crystal element.

CRYSTAL



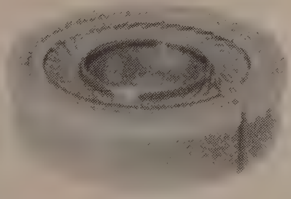
CRM-901

Sensitivity(OdB=1V/μbar) : —70dB±4dB(at 1KHz)
Frequency Response : 150-12,000Hz
Capacity : 650PF ± 30%
Impedance : Over 500K ohm.
Dimensions : 23.5 X 11mm ± 0.5mm
Weight : 3g ± 0.2g

*available with insulated wire leads.

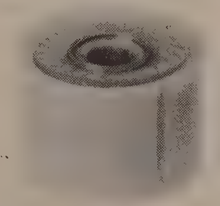
DYNAMIC

DMC-5F



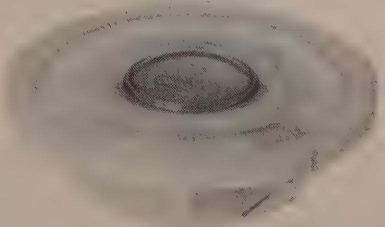
Dimensions : 30ϕ X 9mm
Sensitivity
(OdB=2V/μbar) : —71dB(at 1KHz)
Impedance : 500Ω
Directionality : Omnidirectional
Weight : 29g

DMC-15F



Dimensions : 19ϕ X 13mm
Sensitivity
(OdB=1V/μbar) : —79dB(at 1KHz)
Impedance : 400Ω
Directionality : Omnidirectional
Weight : 12g

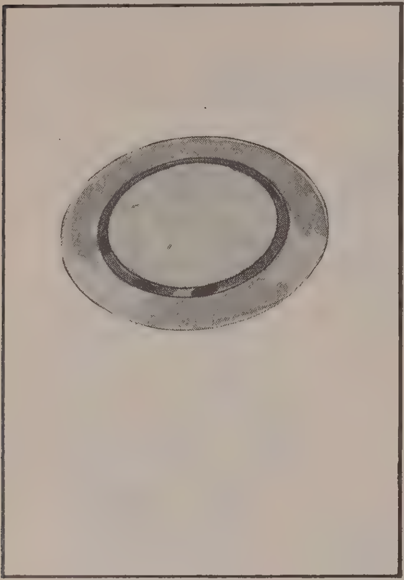
DMC-8A



Dimensions : 40ϕ X 13mm
Sensitivity
(OdB=1V/μbar) : —68dB(at 1KHz)
Impedance : 500Ω, 40Ω, or 55Ω
Directionality : Bidirectional
Weight : 30g

piezoelectric audio alarms

MURATA ERIE NORTH AMERICA, INC.



Piezoelectric Elements

Both leaded and unleaded Piezoelectric discs are supplied for specific application requirements and custom mounting. Listed below are typical performance characteristics.

FEATURES

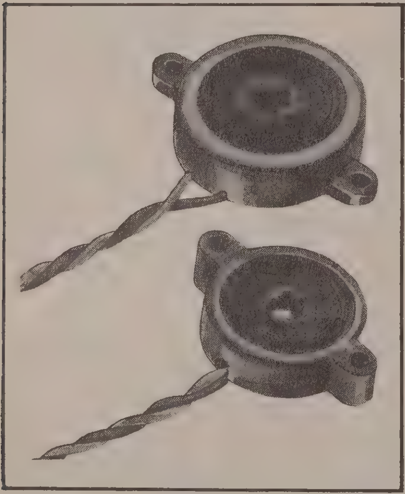
- Extremely clear penetrating sound
- Completely solid state
- One tenth the power consumption of a comparable electromechanical buzzer
- No electronic noise generation
- Compact size and light weight
- Variety of models for various tone functions

APPLICATIONS

- Fire alarms
- Gas detectors
- Calculators
- Medical electronics
- Appliances
- Burglar alarms
- Automobiles
- Aircraft
- Clocks
- Watches
- Communications systems
- Data processing
- Instrument and control systems
- Restaurant equipment
- Recreational equipment

TYPICAL SPECIFICATIONS

Diameter	Resonant Frequency	Resonant Impedance	Capacitance (pF)	Input Voltage
.787	6.3 KHz	350 Max.	10,000	30 Vp-p
1.002	4.6 KHz	200 Max.	20,000	
1.378	2.8 KHz	200 Max.	30,000	
1.614	1.7 KHz	1000 Max.	30,000	



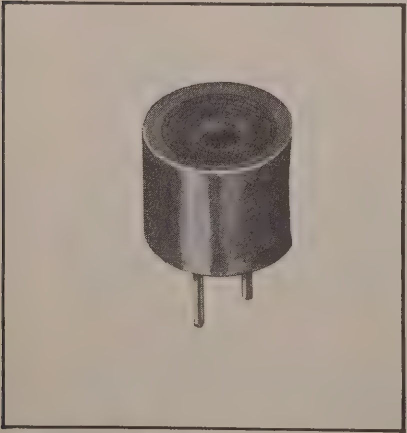
Encased Piezoelectric Alarms (No Internal Circuitry)

The alarms feature a resonant case to increase the audio output level of the piezoelectric disc mounted within them for maximum audio output vs electrical power input ratios. These alarms contain no integral circuitry, are for external drive applications and are offered with/without a feedback tab. Typical performance is illustrated below.

TYPICAL PERFORMANCE

Diameter	Oscillating Frequency	Sound Pressure Level (Min.)	Input Current (Max.)	Input Volt (Max.)
1.34	4 KHz	75 db*	1 mA	25 Vp-p
1.34	7 KHz	75 db*	4 mA	25 Vp-p
.866	4 KHz	75 db*	1 mA	25 Vp-p
1.18	2.5 KHz	75 db**	2 mA	30 Vp-p
1.5	2 KHz	75 db**	2.5 mA	30 Vp-p
1.54	3.4 KHz	85 db***	15 mA	30 Vp-p

* @ 10 cm ** @ 30 cm *** @ 1 meter



Encased, Self-Contained Piezoelectric Alarms with Integral Circuitry

These units are completely self-contained alarms requiring only a DC voltage source for operation. They are compatible with most pc board assembly and flow soldering procedures. Some typical performance characteristics are shown below.

TYPICAL PERFORMANCE

Diameter	Oscillating Frequency	Sound Pressure Level	Input Current	Input Voltage
.944	3.8 KHz	80 db*	10 mA	12 VDC
1.18	2.7 KHz	80 db*	17 mA	17 VDC
1.54	4.7 KHz	85 db**	12 mA	9 VDC
1.65	2.8 KHz	85 db**	12 mA	9 VDC
1.65	2.8 KHz	95 db**	5 mA	6 VDC
1.69 sq.	2.8 KHz	85 db**	12 mA	9 VDC

* @ 1 meter ** @ 30 cm

MURATA ERIE NORTH AMERICA, INC. 1148 Franklin Rd., S.E. Marietta, Georgia 30067 Tel: (404) 952-9777 Telex: 54-2329 TWX: 810-766-1531

NTK

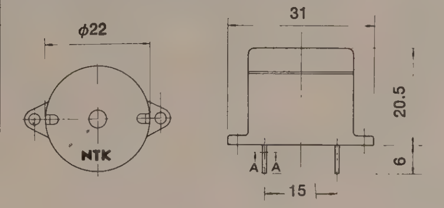
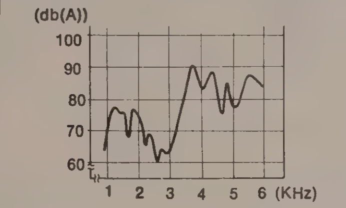
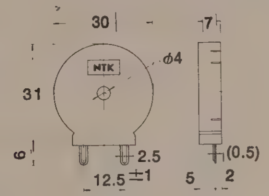
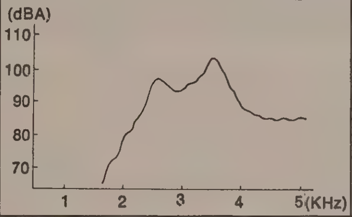
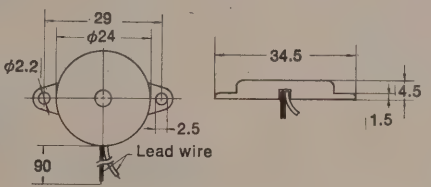
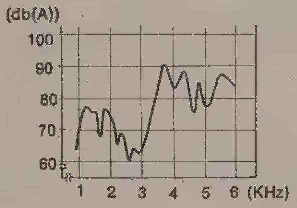
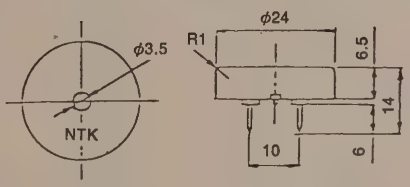
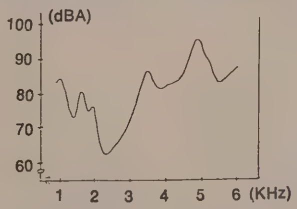
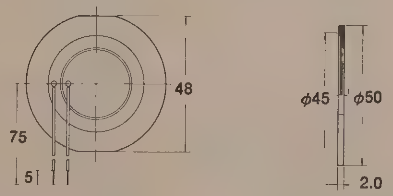
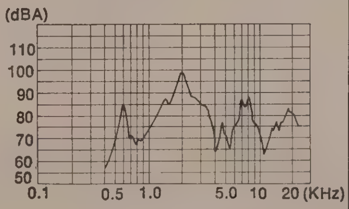
TECHNICAL CERAMICS

NGK SPARK PLUGS (U.S.A.), INC.

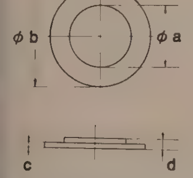
1701 North Greenville Ave., #205 Richardson, TX 75081,
Phone: (214) 235-8332. TELEX: 170547UT

NTK PIEZO SPEAKERS

Applications: Fire Alarms • Burglar Alarms • Communication Systems • Automobiles • etc.

MODEL NO.	DIMENSION Unit: mm	CHARACTERISTICS	SPECIFICATIONS	
PC BOARD MOUNT MODEL #PZB-20L12 DC VOLTAGE OPERATION			Sound Pressure dBA	75 Min.
			Current Consumption	20 mA Max.
			Frequency	4.0 KHz
			Operating Voltage	10-14V
PC BOARD MOUNT MODEL #PZS-22A	 30 7 φ4 NTK 31 6 2.5 (0.5) 12.5±1 5 2		Sound Pressure dBA	80 Min.
			Current Consumption	10 mA Max.
			Frequency	2.5 KHz
			Operating Voltage	30V Max.
FLEXIBLE LEADS MODEL #PZS-22A	 29 φ24 φ2.2 34.5 4.5 1.5 2.5 Lead wire 90		Sound Pressure dBA	75 Min.
			Current Consumption	1 mA Max.
			Frequency	3.0 KHz
			Operating Voltage	30V Max.
PC BOARD MOUNT MODEL #PZS-22YP			Sound Pressure dBA	75 Min.
			Current Consumption	15 mA Max.
			Frequency	2.5 KHz
			Operating Voltage	30V Max.
VOICE SYNTHESIZER SPEAKER MODEL #PZS-R45			Sound Pressure dBA	70 Min.
			Current Consumption	15 mA Max.
			Frequency	1.0 KHz
			Operating Voltage	30V Max.

PIEZOCERAMIC AUDIO TONE TRANSDUCERS

	Item Model No.	a (mm)	b (mm)	d (mm)	c (mm)	Capacitance	Resonant Frequency	Resonant Impedance
	EC-120H_2-30BA	12 ±0.2	30 ±0.1	0.43	0.2 ±0.02	21,000 ±30% PF	7.7 ±0.8 KHz	200 Ω >
	EC-150H_2-40BA	15 ±0.2	40 ±0.1	0.43	0.2 ±0.02	33,000 ±30% PF	4.3 ±0.5 KHz	200 Ω >
	EC-R150H_2-20BA	15 ±0.3	20 ±0.1	0.48	0.2 ±0.02	20,000 ±30% PF	6.6 ±0.6 KHz	400 Ω >
	EC-R200H_2-27BA	20 ±0.3	27 ±0.1	0.48	0.2 ±0.02	38,000 ±30% PF	3.6 ±0.5 KHz	200 Ω >
	EC-R200H_2-40BA	20 ±0.3	40 ±0.1	0.48	0.2 ±0.02	38,000 ±30% PF	4.5 ±0.5 KHz	200 Ω >
	EC-R250H_2-50BA	25 ±0.3	50 ±0.1	0.48	0.2 ±0.02	63,000 ±30% PF	2.9 ±0.5 KHz	200 Ω >

* Feed back types are also available.

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms	**1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code	**3**•1103
Batteries, Product Selection Guide	**3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide	**2**•1003
Capacitors, Basic Formulas	**1A**•1093
Capacitors, Miniglossary	**1A**•1069
Capacitors, Product Selection Guide	**1A**•1003
Circuit Boards (Printed), Product Selection Guide	**2**•1089
Coils, Chokes, & Inductors, Product Selection Guide	**1A**•1219
Connectors, Miniglossary	**2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide	**2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide	**1A**•1309
Delay Lines, Product Selection Guide	**1A**•1445
Discrete Semiconductors, Product Selection Guide	**1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide	**1B**•1021
EBCDIC Code	**3**•1153
Encapsulation, Miniglossary	**2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide	**2**•1801
Filters, Product Selection Guide	**1A**•1577
Instruments, Graphic Recording, Product Selection Guide	**3**•1381
Instruments, Panel Meters, Product Selection Guide	**3**•1321
Instruments, Test & Measuring, Product Selection Guide	**3**•1182
Interconnection Systems, Product Selection Guide	**2**•1873
Keyboards & Keypads, Product Selection Guide	**1B**•1759
Microwave Components, Product Selection Guide	**1A**•1685
Military Qualified Products Lists	**1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide	**1B**•1121
Opto Semiconductors, Miniglossary	**1B**•1218
Oscilloscopes, Product Selection Guide	**3**•1361
Panel Hardware, Product Selection Guide	**2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide	**1A**•2017
Power Supplies, Miniglossary	**3**•1455
Power Supplies, AC, Product Selection Guide	**3**•1815
Power Supplies, DC, Product Selection Guide	**3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide	**1B**•1255
Relay Contact Forms	**1B**•1317
Relays, Electromechanical, Miniglossary	**1**•**B**1292
Relays, Product Selection Guide	**1B**•1289
Resistor Color Codes	**1A**•1791
Resistors, Product Selection Guide	**1A**•1789
Servo Components, Miniglossary	**3**•1935
Solenoids, Product Selection Guide	**1B**•1481
Switches, Product Selection Guide	**1B**•1499
Thyristors/High Power Diodes, Miniglossary	**1A**•1652
Transducers & Encoders, Product Selection Guide	**1B**•1827
Transformers, Product Selection Guide	**1A**•2115
Wire & Cable, Product Selection Guide	**2**•1935

People looking for these speaker applications...

HI FI COMPONENTS • AIRCRAFT • EXPLOSION & FLAME PROOF • DETECTORS • PUBLIC ADDRESS • WEATHERPROOF • REPLACEMENT • UNDERWATER • DRIVERS • COAXIAL • OPTICAL SCANNERS • INTERCOM • DEPTH SOUNDERS • SYSTEMS • NOISE MASKING • SUBMERGENCE PROOF • ALARM • METAL LOCATORS • HANDI-TALKIES • FREE EDGE • FUNGUS RESISTANT • TWIN CONE • WARNING SYSTEM

looked to us last year.

Oaktron routinely builds and stocks speakers within these design features. If you don't see what you want...Send us your specs.

SPEAKER SIZES: 1″ to 18″ diameter in round, square, pin-cushion, rectangular and special shapes to design specifications.

VOICE COILS: ½″ to 3″ diameter; all wound on heat-dissipating, moisture-proof aluminum forms.

VOICE COIL LAYERS: 2 to 6, single or dual windings.

IMPEDANCE: 1.5 to 200 ohms, or any impedance as specified; multi-impedance taps.

CONNECTORS: Screw post, spade lug, solder eye, or as specified.

ALNICO V MAGNETS: 0.18 oz. to 20.0 oz., in yoke and/or high-energy cup housings.

CERAMIC MAGNETS: 2.35 oz. to 108 oz. Barium ferrite; single and stacked mountings with extended pole piece.

POWER CAPACITIES: ½ to 200 watts, true RMS ratings; 150% transient peak.

CONE MATERIALS: Polypropylene, acrylic or phenolic impregnated cloth, aluminum, paper; moisture-resistant, weather-proof, fire-retardant, and fungus-resistant treatments.

CONE CONSTRUCTION: Butyl rubber, foam rubber, and cloth free-edge surrounds; ½ roll up or down, multiple roll edge; molded, seamed, ribbed, curvilinear, deep, shallow, twin-cone "whizzer."

FREE AIR RESONANCE: Designed to specifications.

BASKETS: Precision formed steel, electrostatically coated in standard and special design shapes: shallow, deep-draw, perforated, solid back; with and without mounting holes and transformer emboss. Front and rear mounting with vinyl gasket ring, clip fasteners.

ENTERTAINMENT SPEAKERS: High response twin-cone, free-edge, musical instrument, woofers, tweeters, mid-range, color TV, co-axial, weather-proof patio speakers; three-way systems; automotive stereo, multi-impedance, and dual voice coil; general and automotive replacement; GM, Ford, and tractor type.

UNDERWATER SPEAKERS: Designed to specifications for deep-submergence, reactive measurement, and underwater communications.

COMMUNICATIONS: Voice range speakers, designed to reduce unwanted high and low frequency interference. Replacements to match original specs, for aircraft, industrial, military, and personal systems.

ARCHITECTURAL SOUND: Sound masking, music, paging, public address, dual voice coil, intercom, alarm; interior, exterior, waterproof, weather-and-fungus-resistant, explosion- or flame-proof; architectural enclosures.

HIGH TEMPERATURE SPEAKERS: Designed for life safety applications, these speakers will operate at full specs in temperatures over 400°F.

ACCESSORIES: Baffles, L-pads, transformers, ceiling rings, mounting brackets.

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EXPORT: MAGNUS ELEC. INC., (312) 679-6070

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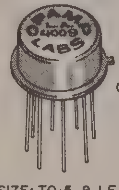
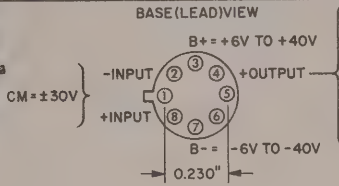
1 JUL 83

MODEL 4009 MEDIUM VOLTAGE D.C. OPERATIONAL AMPLIFIER


OPAMP
LABS
O-4009

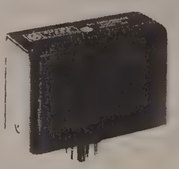

BASE (LEAD) VIEW
B+ = +6V TO +40V
CM = ±30V
-INPUT
+OUTPUT
+INPUT
B- = -6V TO -40V
0.230"

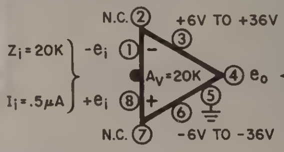
@ B± = ±36V
Z_0 = 2.5K
e_0 = ±30V/50K
$C_L \le 0.1\mu F$
SLEW RATE = 10V/µS
A_V = 800
NOISE = 2µV

SIZE: TO-5 8-LEAD WT: 0.1 OZ. PRICE: **$12**

MODEL 423 D.C. OPERATIONAL AMPLIFIER (REPAIRABLE)

- D.C. TO 150KC
- ±20mV OFFSET
- ±10µV/°C DRIFT
- 2µV (-115dbm) NOISE
- 0.1% T.H.D.




N.C.
+6V TO +36V
Z_i = 20K
I_i = .5µA
$-e_i$
$+e_i$
A_V = 20K
e_o
N.C.
-6V TO -36V

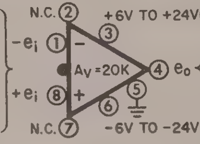
B± = ±24V (NOM.)
±18V/8Ω
12W RMS
40W PK (AUDIO)

OCTAL PLUG-IN
SIZE: 1-1/2" x 3-1/4" x 2-1/2" H. WT: 7 OZ. PRICE: **$40**

MODEL 425 D.C. OPERATIONAL AMPLIFIER

OPAMP
LABS
Operational
Amplifier
Model 425

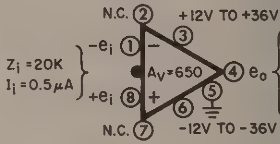
Z_i = 20K
±20mV OFFSET
I_i = 0.5µA
±20µV/°C
CM: ±20V
NOISE: 1µV (-120 dbm)


N.C.
+6V TO +24V (NOM.)
$-e_i$
$+e_i$
A_V = 20K
e_o
N.C.
-6V TO -24V (NOM.)

±20V/1K/D.C.-100KC
+24dbm/D.C.-50KC
0.05% T.H.D.

OCTAL PLUG-IN
SIZE: 1" DIA x 1-5/8" H WT: 2 OZ PRICE: **$35**

MODEL 440C 50W. D.C. THRU AUDIO OPERATIONAL POWER AMPLIFIER


N.C.
+12V TO +36V
Z_i = 20K
I_i = 0.5µA
$-e_i$
$+e_i$
A_V = 650
e_o
N.C.
-12V TO -36V

@ B± = 36V
±30V/8Ω
100W PK
50W RMS

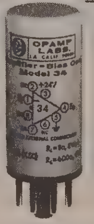
OCTAL PLUG-IN
SIZE: 4-3/4" x 5-1/2" x 2-5/8" H WT: 20 OZ PRICE: **$50/KIT** **$65/WIRED**

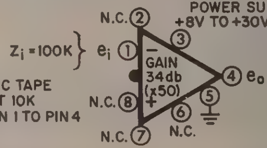
MODEL SM-100 DUAL 50W. OR MONO 100W. D.C. THRU AUDIO OPERATIONAL POWER AMPLIFIER

DESCRIPTION: PANEL-CHASSIS WITH HARDWARE, TWO 440KR POWER AMPLIFIER KITS, ONE WIRED AND TESTED 536 POWER SUPPLY, PC-SM 100 CONVERTIBLE STEREO, 50W OR MONO 100W PRINTED CIRCUIT BOARD AND ALL NECESSARY COMPONENTS.
SIZE: 7" H x 19" W x 7" D
WT: 15 LBS PRICE: **$240/KIT** **$320/WIRED**

MODEL 34 AMPLIFIER-BIAS OSCILLATOR

20CY TO 20KC (±1db) 0.25% T.H.D. (+18dbm)
50CY TO 10KC (±3db) 1% T.H.D. (8W PK) SINGLE POLARITY POWER SUPPLY


OPAMP
LABS
Model 34

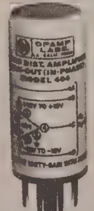

N.C.
+8V TO +30V
Z_i = 100K
e_i
GAIN
34db
(x50)
e_o
N.C.
N.C.
N.C.

+24V (NOM.)
Z_o = 1Ω
$R_L \ge 4Ω$
SHORT PROOF
$C_L \le 1\mu F$

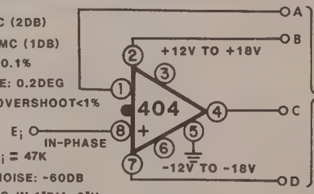
AS 100KC MAGNETIC TAPE BIAS OSC. CONNECT 10K RESISTOR FROM PIN 1 TO PIN 4
e_o = 20V/1K LOAD

OCTAL PLUG-IN SIZE: 1" DIA x 2" H WT: 2 OZ PRICE: **$25**

MODEL 404 VIDEO DISTRIBUTION AMPLIFIER (1-IN/4-OUT)


OPAMP
LABS
MODEL 404

DC TO 8MC (2DB)
DC TO 4.2MC (1DB)
DIFF GAIN: 0.1%
DIFF PHASE: 0.2DEG
TILT AND OVERSHOOT<1%


A
B
+12V TO +18V
404
C
E_i
IN-PHASE
R_i = 47K
-12V TO -18V
D

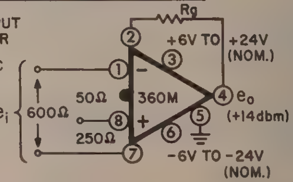
ISOLATION
> 40DB
@ 3.58MC
E_o
R_o = 75Ω
UNITY GAIN
W/75Ω LOAD

HUM AND NOISE: -60DB
OCTAL PLUG-IN: 1" DIA x 2" H WT: 2oz PRICE: **$35**

MODEL 360M MICROPHONE PREAMPLIFIER

OPAMP
LABS
Microphone
Preamplifier
Model 360M

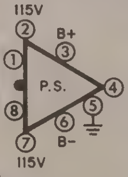
- INTERNAL INPUT TRANSFORMER
- 20CY TO 20KC
- 0.25% T.H.D.
- -125dbm NOISE


Rg
+6V TO +24V (NOM.)
e_i
50Ω
600Ω
250Ω
360M
e_o
(+14dbm)
-6V TO -24V (NOM.)

GAIN	Rg
60db	NONE
50db	15K
40db	3.3K
30db	1K

OCTAL PLUG-IN SIZE: 1" DIA x 2" H WT: 2 OZ PRICE: **$35**

POWER SUPPLIES (REPAIRABLE)

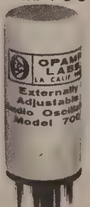

115V
B+
P.S.
B-
115V

OCTAL PLUG-IN
WITH BOLT-DOWN PROVISIONS

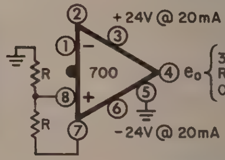
MODEL	DESCRIPTION	SIZE (INCHES)	PR-EA
*515P	± 15V @± 50mA	2x3x2 H	$40
522	± 24V @±150mA	2x3x2 H	40
523	± 24V @± 2A	3.25x5.25x4.25H	55
*524P	± 24V @± 40mA	2x3x2 H	40
525	± 24V @± 1A	3x4x3.25H	50
526	± 24V @± 4A	5x5.50x4.25H	60
536	± 36V @± 3A	5x5.50x4.25H	60
*523R	± 24V @±1.5A	3.25x5.25x4.25H	70
54	+ 24V @+700mA	3x4x1.75H	35

*REGULATED

MODEL 700 AUDIO OSCILLATOR (EXTERNALLY ADJUSTABLE)


OPAMP
LABS
Externally
Adjustable
Audio Oscillator
Model 700

FREQ	R(±5%)	FREQ	R(±5%)
16CY	NONE	1KC	1.6K
50CY	43K	2KC	800Ω
100CY	20K	5KC	320Ω
200CY	9.1K	10KC	160Ω
440CY	3.6K	12KC	130Ω
500CY	3.2K	15KC	100Ω


+24V @ 20mA
R
700
e_o
R
-24V @ 20mA

3V (+10dbm)
R_L = 600Ω
0.5% T.H.D.

OCTAL PLUG-IN SIZE: 1" DIA x 2" H WT: 2 OZ PRICE: **$35**

AUDIO TRANSFORMERS

OPAMP
LABS
MODEL T-25

OCTAL PLUG-IN
T-25 Shown

MODEL	DESCRIPTION	SIZE (INCHES)	PRICE
T-10K	10K/10K INPUT	1-3/8 DIA x 2 H	$30
T-18	600Ω/600Ω +18dbm	1 DIA x 2 H	15
T-25	600Ω/600Ω +24dbm	1-5/8 DIA x 2 H	25
T-26	150Ω/600Ω +24dbm	1-5/8 DIA x 2 H	25
T-28	150Ω/600Ω +24dbm	1-5/8 x 1-5/8 x 2-1/4 H	30
T-30	150Ω/150Ω/600Ω +30dbm	1-5/8 x 1-5/8 x 2-1/2 H	35
T-40	8Ω & 16Ω/600Ω C-T +39dbm	2 x 2-3/8 x 3 H	40
422	Electronic Trans +24dbm	1 DIA x 2 H	35

MODEL V-44 VIDEO DISTRIBUTION AMPLIFIER

4-Channels

SPECIFICATION (per channel)
DC to 8 MC (±1DB)
DIFF. GAIN: 0.1%
DIFF. PHASE: 0.2 DEG.
TILT & OVERSHOOT: <1%
HUM & NOISE: -60 DB
ISOLATION: >40 DB at 3.58 MC

SIZE: 1-3/4" H x 19" W x 6" D WT: 5lbs PRICE: $400

MODEL A-44 AUDIO DISTRIBUTION AMPLIFIER

4-Channels

SPECIFICATION (per channel)
BAL. (ELECTRONIC) INPUT IMP: 20K OHMS
FREQ. RESP: 20CY TO 20KC (±1DB)
GAIN: UNITY (0 DBM)/THD: 0.05%
OUTPUT IMP: (600Ω) FOR 600Ω LOAD
OUTPUT LEVEL: +24 DBM

SIZE: 1-3/4" H x 19" W x 6" D WT: 5lbs PRICE: $440

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

Quam Loudspeakers: The Sound Decision

For Industrial Applications

8 ohm impedances

MODEL NUMBER	SIZE (Inches) AND SHAPE	FREQUENCY RESPONSE (Hertz)	POWER HANDLING CAPACITY (Watts)	VOICE COIL IMPEDANCE (Ohms)	VOICE COIL DIAMETER (Inches)	MAGNET MATERIAL AND WEIGHT (Ounces) AV—Alnico V BF-Ceramic	DEPTH (Inches)	SHIPPING WEIGHT (Lbs.)
2A05Z8	2 RD	300 Hz to 6K Hz	1	8-10	9/16	.52AV	7/8	1/4
22A05Z8	2-1/4 RD	300 Hz to 10K Hz	1	8-10	9/16	.52AV	1	1/4
23A05Z8	2x3 Oval	250 Hz to 15K Hz	1	8-10	9/16	.52AV	1-1/8	1/4
25A05Z8R	2-1/2 RD	150 Hz to 12K Hz	1-1/2	8-10	9/16	.52AV	1-1/8	1/4
25A07Z8	2-1/2 SQ	150 Hz to 12K Hz	1-1/2	8-10	9/16	.65AV	1-1/4	1/4
26A07Z8	2x6 Oval	130 Hz to 16K Hz	2	8-10	9/16	.65AV	1-19/32	1/2
27A05Z8	2-3/4 RD	150 Hz to 8K Hz	1	8-10	9/16	.52AV	1-3/16	1/4
30A05Z8	3 SQ	150 Hz to 12K Hz	2	8-10	9/16	.52AV	1-9/32	1/4
30A05Z8R	3 RD	250 Hz to 12K Hz	2	8-10	9/16	.52AV	13/16	1/4
30C1Z8	3 SQ	150 Hz to 12K Hz	4	8-10	9/16	1.1BF	1-3/16	1/2
30C25Z8	3 SQ	150 Hz to 14K Hz	5	8-10	9/16	2.35BF	1-3/16	3/4
3A05Z8	3-1/2 SQ	130 Hz to 12K Hz	2	8-10	9/16	.52AV	1-5/16	1/4
3A05Z8R	3-1/2 RD	150 Hz to 11K Hz	2	8-10	9/16	.52AV	1-3/8	1/4
3C1Z8	3-1/2 SQ	130 Hz to 12K Hz	4	8-10	9/16	1.1BF	1-5/16	1/2
35A05Z8	3x5 Oval	130 Hz to 14K Hz	2	8-10	9/16	.52AV	1-1/2	1/4
35A2Z8	3x5 Oval	130 Hz to 12K Hz	4	8-10	3/4	1.2AV	1-11/16	1/2
35C1Z8	3x5 Oval	130 Hz to 12K Hz	4	8-10	9/16	1.1BF	1-1/2	1/2
35C3Z8	3x5 Oval	130 Hz to 12K Hz	5	8-10	3/4	3BF	1-11/16	3/4
4A05Z8R	4 RD	200 Hz to 12K Hz	2-1/2	8-10	9/16	.52AV	1-1/2	1/2
4A1Z8	4 SQ	200 Hz to 12K Hz	3	8-10	9/16	.65AV	1-5/8	3/4
4C1Z8	4 SQ	200 Hz to 12K Hz	4	8-10	9/16	1.1BF	1-1/2	1/2
4C25Z8	4 SQ	200 Hz to 12K Hz	5	8-10	9/16	2.35BF	1-5/8	3/4
4C5Z8	4 SQ	120 Hz to 15K Hz	7	8-10	3/4	4.8BF	1-5/8	1
46A1Z10	4x6 Oval	150 Hz to 9K Hz	3-1/2	8-10	9/16	.65AV	1-11/16	3/4
46C3Z8	4x6 Oval	130 Hz to 10K Hz	6	8-10	3/4	3.0BF	1-3/4	1
48C3Z8	4x8 Oval	120 Hz to 12K Hz	6	8-10	3/4	3BF	2-1/16	1-1/2
410A2Z10	4x10 Oval	120 Hz to 12K Hz	6	8-10	3/4	1.2AV	2-11/16	1
5A1Z8	5 PC	125 Hz to 12K Hz	3-1/2	8-10	9/16	.65AV	1-13/16	3/4
5C1Z8	5 PC	130 Hz to 12K Hz	4	8-10	9/16	1.1BF	1-11/16	1/2
5C3Z8	5 PC	130 Hz to 14K Hz	5	8-10	3/4	3.0BF	1-7/8	1
52A1Z8	5-1/4 PC	100 Hz to 12K Hz	3-1/2	8-10	9/16	.65AV	1-7/8	3/4
52C10Z8	5-1/4 PC	125 Hz to 9K Hz	10	8-10	1	10BF	2-1/4	2-1/4
57C3Z8	5x7 Oval	75 Hz to 10K Hz	7	8-10	3/4	3BF	2-5/16	1
6A2Z8	6-1/2 PC	70 Hz to 14K Hz	6	8-10	3/4	1.2AV	2-5/8	1
6C5Z8	6-1/2 PC	70 Hz to 14K Hz	7	8-10	3/4	4.8BF	3	1-3/4
69A2Z10	6x9 Oval	70 Hz to 15K Hz	8	8-10	3/4	1.2AV	2-3/4	1-1/4

Miniature speakers

2A05	2 RD	300 Hz to 6K Hz	1	3-4	9/16	.52AV	7/8	1/4
2A05Z8	2 RD	300 Hz to 6K Hz	1	8-10	9/16	.52AV	7/8	1/4
2A05Z45	2 RD	300 Hz to 6K Hz	1	45	9/16	.52AV	7/8	1/4
2A05Z100	2 RD	300 Hz to 6K Hz	1	100	9/16	.52AV	7/8	1/4
22A05Z8	2-1/4 RD	300 Hz to 10K Hz	1	8-10	9/16	.52AV	1	1/4
2205Z100	2-1/4 RD	300 Hz to 10K Hz	1	100	9/16	.52AV	1	1/4
23A05	2x3 Oval	250 Hz to 15K Hz	1	3-4	9/16	.52AV	1-1/8	1/4
23A05Z8	2x3 Oval	250 Hz to 15K Hz	1	8-10	9/16	.52AV	1-1/8	1/4
25A05Z8R	2-1/2 RD	150 Hz to 12K Hz	1-1/2	8-10	9/16	.52AV	1-1/8	1/4
25A07	2-1/2 SQ	130 Hz to 14K Hz	1-1/2	3-4	9/16	.65AV	1-1/4	1/4
25A07Z8	2-1/2 SQ	150 Hz to 12K Hz	1-1/2	8	9/16	.65AV	1-1/4	1/4
25A07Z45	2-1/2 SQ	150 Hz to 12K Hz	1-1/2	45	9/16	.65AV	1-1/4	1/4
25C1Z80T	2-1/2 SQ	200 Hz to 8K Hz	4	8-10	9/16	1.1AV	1-1/16	1/2
27A05Z8	2-3/4 RD	150 Hz to 8K Hz	1	8-10	9/16	.52AV	1-1/16	1/4
27A05Z45	2-3/4 RD	130 Hz to 6K Hz	1	45	9/16	.52AV	1-1/16	1/4

For more than 50 years,

Quam-Nichols Company has been making speakers that make good sound, and supplying them in ways that make good sense. Our product line currently includes more than 3,000 standard models with thousands of others that can be manufactured to meet specific requirements.

Quam speakers are available off-the-shelf through our nationwide distributor network, with a backup inventory of 70,000 standard units at our factory warehouse.

Engineering assistance is available for special applications. Such special designs can be produced in quantities as small as 100.

Quam-Nichols Company

234 East Marquette Road • Chicago, Illinois 60637
(312) 488-5800

Quam Loudspeakers: The Sound Decision

For Communications Applications

Intercom

MODEL NUMBER	SIZE (Inches) AND SHAPE	FREQUENCY RESPONSE (Hertz)	POWER HANDLING CAPACITY (Watts)	VOICE COIL IMPEDANCE (Ohms)	VOICE COIL DIAMETER (Inches)	MAGNET MATERIAL AND WEIGHT (Ounces) AV—Alnico V BF-Ceramic	DEPTH (Inches)	SHIPPING WEIGHT (Lbs.)
2A05Z45	2 RD	300 Hz to 6K Hz	1	45	9/16	.52AV	7/8	1/4
25A07Z16	2-1/2 SQ	150 Hz to 12K Hz	1-1/2	16	9/16	.65AV	1-1/4	1/4
25A07Z45	2-1/2 SQ	150 Hz to 12K Hz	1-1/2	45	9/16	.65AV	1-1/4	1/4
27A05Z45	2-3/4 RD	130 Hz to 6K Hz	1	45	9/16	.52AV	1-1/16	1/4
30A05Z45	3 SQ	130 Hz to 14K Hz	2	45	9/16	.52AV	1-3/16	1/4
30C1Z450T	3 SQ	170 Hz to 12K Hz	4	45	9/16	1.1BF	1-3/16	1/2
3A07Z450T	3-1/2 SQ	150 Hz to 10K Hz	2-1/2	45	9/16	.65AV	1-7/16	1/2
35A05Z16	3x5 Oval	100 Hz to 12K Hz	2	16	9/16	.52AV	1-1/2	1/4
4A1Z16	4 SQ	180 Hz to 15K Hz	3	16	9/16	.65AV	1-5/8	3/4
4A1Z45	4 SQ	180 Hz to 12K Hz	3.0	45	9/16	.65AV	1-13/16	3/4
5A1Z45	5 PC	130 Hz to 9K Hz	3-1/2	45	9/16	.65AV	1-13/16	3/4
5C1Z450T	5 PC	130 Hz to 9K Hz	4	45	9/16	1.1BF	1-11/16	1/2
8C6Z45	8 PC	70 Hz to 12K Hz	12	45	1	6.0BF	3	2-1/2

For Sound System Applications

Outdoor

MODEL NUMBER	SIZE (Inches) AND SHAPE	FREQUENCY RESPONSE (Hertz)	POWER HANDLING CAPACITY (Watts)	VOICE COIL IMPEDANCE (Ohms)	VOICE COIL DIAMETER (Inches)	MAGNET MATERIAL AND WEIGHT (Ounces) AV—Alnico V BF-Ceramic	DEPTH (Inches)	SHIPPING WEIGHT (Lbs.)
25C1Z80T	2-1/2 SQ	200 Hz to 8K Hz	4	8-10	9/16	1.1BF	1-1/16	1/2
30C1Z450T	3 SQ	170 Hz to 12K Hz	4	45	9/16	1.1BF	1-3/16	1/2
3A070T	3-1/2 SQ	150 Hz to 10K Hz	2-1/2	3-4	9/16	.65AV	1-7/16	1/2
3A07Z450T	3-1/2 SQ	150 Hz to 10K Hz	2-1/2	45	9/16	.65AV	1-7/16	1/2
3C1Z80T	3-1/2 SQ	180 Hz to 15K Hz	4	8-10	9/16	1.1BF	1-1/4	1/2
4A20T	4 SQ	130 Hz to 9K Hz	4	3-4	3/4	1.2AV	1-5/8	3/4
4A2Z80T	4 SQ	130 Hz to 9K Hz	4	8-10	3/4	1.2AV	1-5/8	3/4
5C1Z450T	5 PC	130 Hz to 9K Hz	4	45	9/16	1.1BF	1-11/16	1/2
8C6PA0T	8 PC	80 Hz to 8K Hz	12	8-10	1	6.0BF	2-7/8	2-1/2

Background music and public address

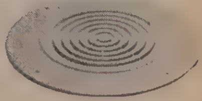
MODEL NUMBER	SIZE (Inches) AND SHAPE	FREQUENCY RESPONSE (Hertz)	POWER HANDLING CAPACITY (Watts)	VOICE COIL IMPEDANCE (Ohms)	VOICE COIL DIAMETER (Inches)	MAGNET MATERIAL AND WEIGHT (Ounces) AV—Alnico V BF-Ceramic	DEPTH (Inches)	SHIPPING WEIGHT (Lbs.)
4C10PA	4 PC	65 Hz to 15K Hz	18	8-10	1	10BF	3-1/2	2-1/4
8C5PAX	8 PC	70 Hz to 18K Hz	8	8-10	3/4	4.8BF	2-3/4	2
8C6PAX	8 PC	75 Hz to 19K Hz	12	8-10	1	6BF	3	2-1/2
8C10DVFR	8 PC	70 Hz to 12K Hz	15	8-10	1	10BF	3-1/8	3
8C10FEPAX	8 RD	40 Hz to 20K Hz	18	8-10	1	10BF	3-1/8	3
8C10PA	8 RD	70 Hz to 12K Hz	15	8-10	1	10BF	3	3
8C10PAX	8 PC	75 Hz to 20K Hz	15	8-10	1	10BF	3	2-3/4
8C12PA	8 RD	65 Hz to 9K Hz	20	8-10	1-1/4	12BF	3-1/8	3-1/4
10C10PA	10RD	70 Hz to 12K Hz	15	8-10	1	10BF	3-7/8	4-1/4
12C6PAS	12RD	75 Hz to 20K Hz	15	8-10	1	6BF	3-5/8	4
12C10PAX	12RD	60 Hz to 14K Hz	18	8-10	1	10BF	4-3/8	4-1/4
12C12PAX	12RD	50 Hz to 12K Hz	25	8-10	1-1/4	12BF	4-1/2	5-1/2

Transformers

MODEL NUMBER	POWER RATING	PRIMARY VOLTS	PRIMARY TAPS	INSERTION LOSS (Db)	MOUNTING CENTERS	CORE SIZE	SECONDARY LOAD (OHMS)	SHIPPING WEIGHT
TBL25	4W	25	1/4-1/2-1-2-4W	1.2	2″	1/2x5/8	8	1/2 lb.
TCL25	8W	25	1/2-1-2-4-8W	1.6	2-3/8″	5/8x5/8	8	3/4 lb.
TBL70	4W	70.7	1/4-1/2-1-2-4W	1.2	2″	1/2x5/8	8	1/2 lb.
TCL70	8W	70.7	1/2-1-2-4-8W	1.0	2-3/8″	5/8x5/8	8	3/4 lb.
TBLU	5W	25/70	5/16-5/8-1-1/4-2-1/2-5W	1.3 & 1.2	2″	1/2x5/8	8	1/2 lb.

Ceiling baffles

MODEL NUMBER	TYPE	SPEAKER SIZE (Inches)	BAFFLE DIAMETER (Inches)	MATERIAL	FINISH	CEILING PROJECTION (INCHES)	SHIPPING WEIGHT
BR8W	One-step contour	8	12-7/8	22-ga. steel (Zincrometal)	White semi-gloss powdered epoxy	3/8	1-1/2 lb.
BR8A	One-step contour	8	12-7/8	22-ga. aluminum	Brushed aluminum	3/8	1 lb.
BR8WC	Two-step contour	8	12-3/4	22-ga. steel (Zincrometal)	White semi-gloss powdered epoxy	5/16	1-1/2 lb.
BR8WP	Louvered two-step contour	8	12-3/4	White plastic	—	5/16	1 lb.



Complete speaker assemblies, including speaker, baffle and line matching transformer, are available completely assembled at the factory at no extra charge. Pre-assembled units with volume controls also are available.

Quam-Nichols Company

234 East Marquette Road • Chicago, Illinois 60637
(312) 488-5800

RTI

Reproduction Technologies Inc.

CASSETTE MECHANISMS

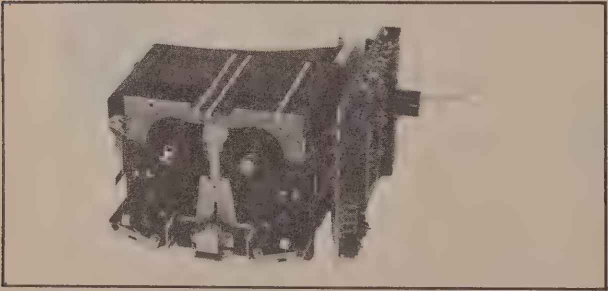
OEM QUANTITIES OR LOW QUANTITY PROTOTYPES

GENERAL SPECIFICATIONS

General cassette recorders
(Hi-Fi & Professional models significantly better.)
S/N: better than 45dB
Output Level: 250 MV ±3 dB
Frequency Response: ±4 dB 50 Hz-10 KHz
Crosstalk: better than 35 dB
WOW & Flutter: .35% NAB
Tape Speed: ±2.5%
Temperature: −10°C to +70°C
Fast Winds: 140 seconds
Distortion: better than 3%
Extensive Life testing for shock, vibration, temperature & humidity

CUSTOM DESIGNS

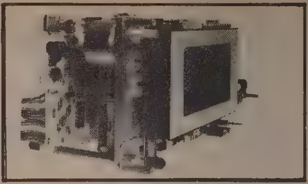
Reproduction Technologies will manufacture to your requirements specialized control and audio circuitry for any of our standard format recorders. Our engineering staff has 45 years of electronic and mechanical experience in tape recorders.



professional four motor, two solenoid cassette transport with full CMOS logic

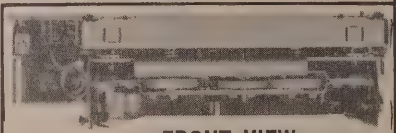
Excellent specifications in wow and flutter, timing and control. Full CMOS electronics, local and remote control functions, bi-directional operation, record, play, erase heads, precision head blocks and precise tape control. Four motor tape control. 3½″ vertical panel space, 4″ deep.

front-door loader- model 8501

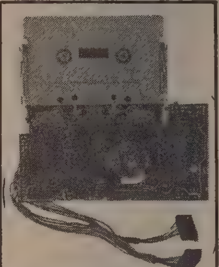


Tip down door model with erase, record and play head, dual motor, single direction, four function soft touch controls, good design 5¼″ of vertical rack space. Standard cassette specifications. Die cast frame.

slot loader- model 8220



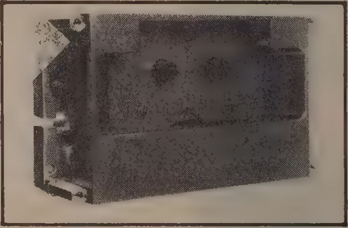
FRONT VIEW



FLAT VIEW

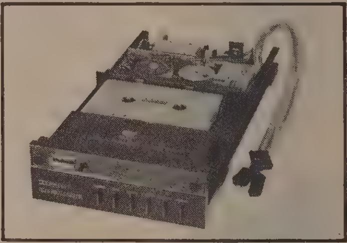
Cassette inserted "long way" into hole of the front panel. Requires the least vertical panel space of all models. Bi-directional, playhead and electronics provided, recording optional. Full function soft touch control, remotely located from transport. Logic level control. One motor, rugged design. Automatic cassette eject.

micro- cassette- model 8601



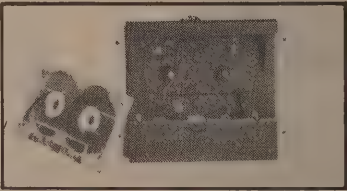
Dictation style, cassette format transport with die cast frame and full CMOS, six function soft touch control. Complete with mounting Bezel. Available also without control.

drawer loader- model 8030



"Works in a drawer." Slide tracks allow the deck to be pulled in and out of front panel mount for cassette insertion and removal. Momentary soft touch mechanical controls are mounted on the front of the drawer. Single direction, three motor, deluxe transport with hi-fi specification. Record, play, erase. 1¾″ or 3½″ vertical panel space.

free access front loader- model 8701



Direct drive, three speed transport with no belts and full logic tape control. 4.35 inches in height, 4.8 inches wide, 3.75 inches deep.

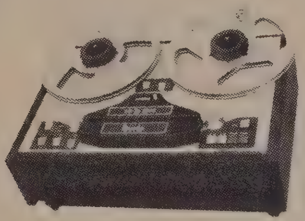
Choose a mechanism for your requirements and call for complete design packets.

REPRODUCTION TECHNOLOGIES INC.
P.O. Box 815
Bristol, Indiana 46507
(219) 848-5233

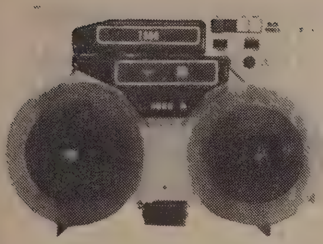
RTI MANUFACTURERS OF HIGH QUALITY PROFESSIONAL AUDIO TAPE RECORDERS

OEM RECORDER SYSTEMS MANUFACTURED BY RTI

10.5" Reel Transport with Heads & Mono R/P Electronics



120 IPS Cassette Duplicator Transport



7" Reel Transport with Heads Replaces Telex Model 67

RTI

Reproduction Technologies Inc.

OEM TAPE TRANSPORTS

- Data Logging
- Voice Logging
- Tape Search
- Random Access Search
- Security Listening
- Broadcast Automation
- Language Lab
- Aircraft Voice Simulator
- FM Recording
- Seismographic Recording
- High Speed Tape Copying
- Voice Print Recording
- Biomedical Recording

CONTACT

M. STOLL
BOX 815
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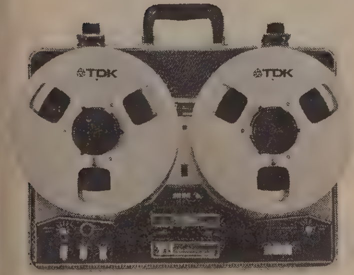
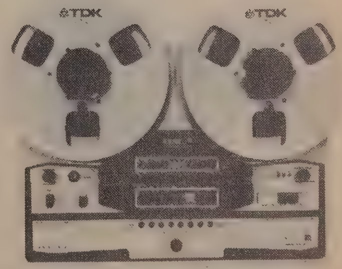
VOICE LOGGING EQUIPMENT

(Three models available)



Single Channel Portable Logger with 1-8 Channel Playback

- **8 Ch Rack Mounted Logger (R/P)**
- **1 Ch Portable Logger (R/P)**
- **1-8 Ch Portable Playback Unit**
  - Airport control tower monitoring
  - Security system monitoring
  - Court room recording
  - Facsimile recording
  - Data transmission logging
  - Conference room recording



Multi Channel Logger with 8 Channels and Monitor Speaker.

Eight secure channels with all channel monitoring of recording process, remote controllable transport, tone emergency monitor, super-long life construction, servo control, fully electronic transport, WWV or time code recording. Telephone, line & microphone inputs, cassette recorder outputs. Built-in monitor speaker. Automatic level control.

RTI

MANUFACTURERS OF HIGH QUALITY PROFESSIONAL AUDIO TAPE RECORDERS

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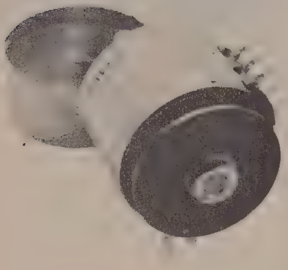
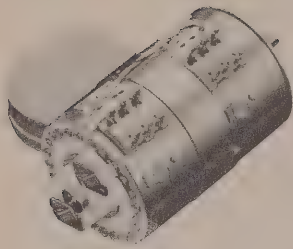
Shallco

SHALLCO, INC.

PRECISION ELECTRONIC COMPONENTS

SMITHFIELD INDUSTRIAL PARK • P.O. BOX 1089 • SMITHFIELD, N.C. 27577 • 919/934-3135





"T" AND BALANCED "H" ATTENUATORS

DEFINITION: Under this group we list those types which have zero insertion loss for 1:1 impedance ratios and constant impedance, both in and out on all steps of control. These networks may be inserted in a transmission system without introducing insertion losses. For unequal impedance ratio controls an insertion loss greater than zero is necessary. The amount depends upon the impedance ratio. The "T" control is used where one side of the line is grounded and the "H" where neither side of the line is grounded. They will not operate properly otherwise.

DESCRIPTION: Shallco offers two types of "T" attenuators, the "Bridged T" and the "T". Since both types are electrically and mechanically interchangeable, in the circuit, we list them all as "T" controls. The "Bridged T" consists of two variable and two fixed resistors and requires two rows of contacts. Over a certain range of attenuation and impedance, due to its electrical simplicity, this type offers advantages over the "T". The "T" employs three variable resistors and requires three rows of contacts. In the case of the "H" type network, we also offer the "Bridged H" and "H" form employing two or three sets of variable resistors, and a corresponding number of rows of contacts for each section.

CUEING: These networks may be obtained with a built-in cueing circuit. In these controls provision is made at the extreme attenuation position for connecting the incoming signal to a cue circuit before "FADING IN" the signal. By this means, a program can be smoothly "BROUGHT IN" at the right time without the operation of any additional switches. A lug on the terminal board is provided for connecting to the cueing system.

USE: These networks may be used as volume controls in low and high level multi-channel mixers and all types of measuring equipment where precision control is required.

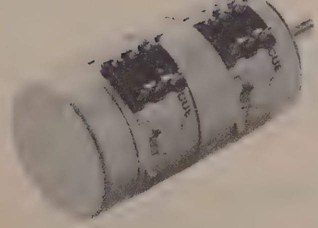
DECADE ATTENUATORS—AUDIO

SERIES 2500

The Series 2500 Decade Attenuator units are step type precision networks, designed for use in measuring equipment. These units are particularly adaptable for use in noise meters, audiometers, transmission measuring sets and attenuation networks.

All the controls in this series have ten steps of attenuation. The frequency characteristics are essentially flat from zero to 50 kc. Positive, accurate detents are supplied on all units. The mechanical construction of these networks is the same high quality as supplied on all Shallco attenuators.

Electrically, these units are offered in three circuit types—Potentiometers, "T" and Balanced "H". Resistors are calibrated to an accuracy of ±1%. For best results, it is recommended that the power input be limited to 0.5 watt or less. If a higher level input is required, please specify this information when ordering.

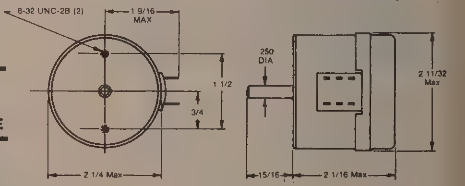


10 DB STEPS 100 DB TOTAL	1.0 DB STEPS 10 DB TOTAL	0.1 DB STEPS 1 DB TOTAL	CIRCUIT	IMPEDANCE
2506 2507 2508	2503 2504 2505	2500 2501 2502	Potentiometer	50,000 100,000 200,000
2513 2514 2523	2511 2512 2522	2509 2510 2521	"T"	600 500 150
2519 2520 2526	2517 2518 2525	2515 2516 2524	Balanced "H"	600 500 150

Special impedances or decibel steps other than those shown are available

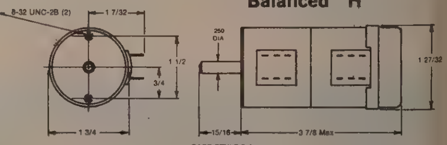
CONTACT SPACING: 15° between centers
TOTAL DEGREE OF ROTATION: 150°

"T" & Potentiometer



CASE STYLE B

Balanced "H"



CASE STYLE 2-A

Shallco

SHALLCO, INC.

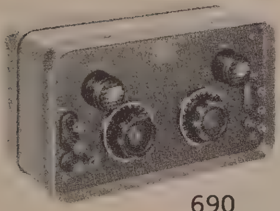
PRECISION ELECTRONIC COMPONENTS

SMITHFIELD INDUSTRIAL PARK • P.O. BOX 1089 • SMITHFIELD, N.C. 27577 • 919/934-3135

ATTENUATION NETWORKS

AUDIO FREQUENCY / MODEL NO. 690 & 693 SERIES

- **Decade Type—Direct Reading** • **Selectable Input and Output Impedance** • **Usable to 50 KC**
- **0 to 111 DB in 1 DB Steps or 0 to 110 DB in 0.1 DB Steps** • **"T" and Balanced "H" Versions Available**
- **Portable or Rack Mounted**



690

Models 690 and 693 Series Attenuation Networks are decade type, direct reading units providing reliable performance throughout the audio frequency spectrum.

Used as secondary attenuation standards, they are especially useful in the performance of general laboratory or production tests where extreme accuracy is secondary. They are used for low level testing at audio frequencies, and can be used at frequencies up to 50,000 cycles with very little decrease in accuracy.

An outstanding feature of these attenuation networks is flexibility; input and output impedances may be changed by means of convenient plug-in pads, available in a broad range of values. Both "T" and Balanced "H" versions of the 690 and 693 series are available as standard units.

They are available as portable or rack mounted units.

Input and output impedance adjusting pads are conveniently located and removable from the front panel.

Series 690 networks come with either balanced (Balanced "H") or unbalanced ("T") networks. The two dial models have a range of 0 to 110 db in steps of 1 db. The three dial models have a range of 0 to 111 db in steps of 0.1 db. The models with balanced networks are arranged so they may be used as unbalanced networks with the same attenuation range, but with one-half the base impedance.

SPECIFICATIONS:

Specifications shown are standard. Variations to fit individual customer requirements are available on request.

MODEL DESCRIPTION					STANDARD IMPEDANCE MATCHING PADS					
					INPUT		OUTPUT		IMPED	LOSS
Portable	Rack Mounting	Basic Imped.	Circuit	Range	T	Bal H	T	Bal H	(ohms)	(db)
T-690-C	T-690-CR	600/600	T	0-110 db in 1 db steps	6811	6831	6851	6871	500	3.77
					6812	6832	6852	6872	500	5.00
H-690-D	H-690-DR	600/600	Bal. H	0-110 db in 1 db steps	6813*	6833**	6853*	6873**	600	0
					6814	6834	6854	6874	250	8.74
T-693	T-693-R	600/600	T	0-111 db in 0.1 db steps	6815	6835	6855	6875	250	10.00
					6816	6836	6856	6876	200	9.98
					6817	6837	6857	6877	200	10.00
H-693	H-693-R	600/600	Bal. H	0-111 db in 0.1 db steps	6820	6840	6860	6880	50	16.63
					6821	6841	6861	6881	50	20.00

*Standard in "T" models unless otherwise specified. **Standard in Balanced "H" models unless otherwise specified.
Other impedances available upon request.

	Model 690	Model 693
Attenuation Range:	0-110 db	0-111 db

Impedance: 600/600 ohms
Input and output impedances may be changed by changing plug-in pad.
±1% at 1,000 cps ±2% 0 to 20,00 cps
Range may be extended to 50,000 cps with small decrease in accuracy

Power Input: 28 dbm (0.6 watt)

Switches: Heavy duty silver alloy contacts, multi-leaf rotor and slip ring return, positive wiping with individually sprung switch arm leaves

Terminals: Jack-top binding posts

Construction: All metal, two-tone cabinet. Also available for rack mounting

---

AUDIO VIDEO FREQUENCY / MODEL NO. 790 & 795

- **Decade Type—Direct Reading** • **Wide Frequency Range: 0 to 10 MC** • **600 Ohms Impedance**
- **0 to 111 DB in 1 DB Steps or 0 to 110 DB in 0.1 DB Steps** • **Positive Detent—Silver Alloy Switch Contacts**
- **Portable—Rugged** • **Both "T" and Balanced "H" Units Available**

795

Model 790 and 795 Attenuation Networks are portable, ruggedly constructed, decade type, direct reading units providing accurate performance into the low radio frequency spectrum.

The instruments cover a range from 0 to 10 mc. They have positive detent action and mechanical stops incorporated into each decade.

Stray capacitance and frequency discrimination are minimized through precision design. Silver alloy switch blades and contacts guarantee reliable long term operation.

These attenuator networks are general purpose instruments for use in laboratories, quality control departments and test facilities. They are particularly useful for making accurate measurements of gain or loss on filters, transformers, amplifiers and other equipment.

Both models are equipped with jack-top binding posts.

SPECIFICATIONS:

Variations to fit individual customer requirements are available on request.

	Model 790	Model 795
Attenuation Range:	0-110 db in 1 db steps	0-111 db in 0.1 db steps
Weight:	10¾ lbs	15½ lbs
Impedance:	600 ohms	600 ohms
Resistor Accuracy:	±0.25%	±0.25%
Attenuation Accuracy:	±0.1 db at 1000 cps when terminated in a resistive load	
Frequency Characteristics:	0.1 db per step and 1 db for step decades—±0.2 db, 0 to 10 mc 10 db per step—±0.5 db, 0 to 0.5 mc (with 90 db setting ± 0.5 db at 1 mc Lower values within this tolerance up to 10 mc	

Power Input: 30 dbm (1 watt)

Switches: Heavy duty solid silver alloy contacts and multi-leaf switch rotor. Each leaf of the switch arm is individually sprung to provide self alignment and equalized pressure, assuring low and uniform contact resistance

Terminals: Jack-top binding posts, ¾" spacing. Common terminal of "T" units grounded to chassis
Common terminal of "H" units floating

Construction: All metal two-tone cabinet

Rack mounting available on special order

SHOGYO
INTERNATIONAL CORPORATION

DEPT. EM, 287 NORTHERN BOULEVARD
GREAT NECK, NEW YORK 11021
(516) 466-0911
CABLE: "SHOGYONEWYORK"
TELEX: 12218 + 4758024

SPEAKERS

Highest quality speakers, manufactured to leading OEM specifications, provide the finest sound reproduction at the lowest cost. Experience, unsurpassed workmanship and the finest materials are ingredients Shogyo builds into its products. The speakers illustrated and listed are only a small representation of the full range of items available. All speakers are available in water-resistant mylar cones or standard paper cones.

LOW PROFILE SPEAKERS

Available from ¾″ dia. to 5″ dia. Depth ranges from .33″ to .85″. Also available in alnico, ferrite and samarium rare earth magnets. Especially suitable for headphone and telephone applications or wherever a compact requirement exists.

GENERAL PURPOSE SPEAKERS

Available in a range of sizes from 1″ to 8″, in either round, square, or super thin shapes. Alnico, ferrite, or samarium cobalt magnets can be specified.

MID RANGE SPEAKERS

Sizes range from 4″ to 12″ in diameter with either Alnico or ferrite magnets.

OVAL SPEAKERS

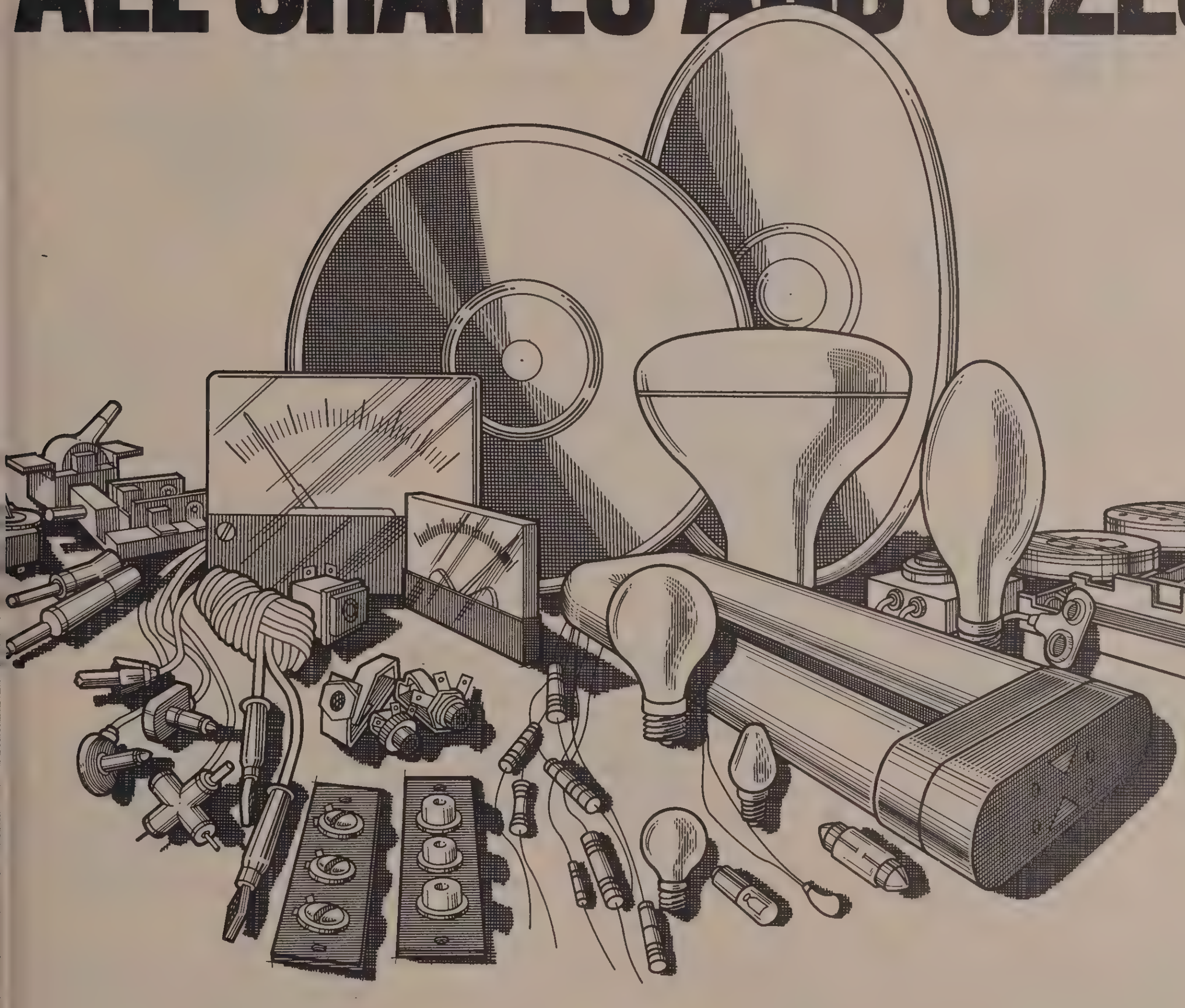
Sizes available: 2¾″ x 2″; 3″ x 1¾″; 3″ x 2″; 3½″ x 2½″; 4½″ x 3¾″; 5″ x 3″; 6″ x 2″; 6″ x 4″; 7″ x 4″; 5½″ x 3″; 7″ x 5″; and 9″ x 6″. Alnico or ferrite magnets can be specified.

TWEETERS

Sizes range from 2″ to 4″ in shapes of either round, square or round with mounting tabs. Alnico or ferrite magnets can be specified.

SEE OUR OTHER CATALOG PAGES IN EEM SECTIONS 2100/2450/2950/4750/5600/6000

SHOKAI VALUES COME IN ALL SHAPES AND SIZES.



When you need OEM quality components at the best possible price, specify SHOKAI. The name you can depend on!

Our proven record of reliable customer service and on-time delivery is no accident. We control every aspect in the manufacture of our products. We selectively review and test each category of components. And we consistently ensure the highest standards of production and design. All resulting in an assortment of quality components designed to meet every customer need. That's why more and more component purchasers have turned to SHOKAI.

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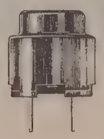
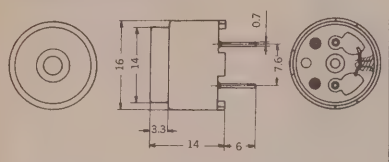
TRANSDUCERS MINIATURE AUDIO

NEW! SEALED VERSION FOR WAVE SOLDERING.
ASK FOR SPECIFICATIONS.

SERIES QMB

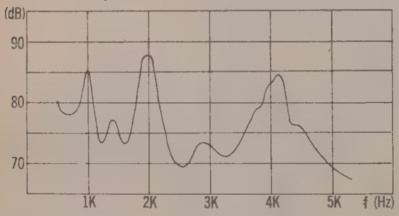


DIMENSIONS: mm



OPERATING CHARACTERISTICS

Sound Output vs. Frequency (At 4 in)



FEATURES

- Pleasing but penetrating "Pure tone" signal
- Available in 3 pin-types rated @ 1, 5, 6 and 12 volts DC
- Wide operating voltage and temperature range
- Pins conform to standard DIP sockets or may be soldered directly to PC board
- Low power consumption

The Star Series QMB is a miniature audio transducer designed to replace bulkier and more expensive speakers and piezoceramic crystals. It is especially economical for applications in which an audio signal and driving circuitry or a microprocessor clock already exists.

Unlike piezoceramic crystals, which require a minimum of 3 volts and provide poor sound output below 2000 Hz, the QMB functions at only 1 volt and generates loud sound output at frequencies as low as 1000 Hz. Another advantage is the fact that the QMB is mounted in a housing: piezoceramic crystals normally must be enclosed.

APPLICATIONS

The Star Series QMB may be used in a variety of consumer, industrial and military products:

- Pocket pagers and other telecommunications equipment
- Automobile and aircraft systems
- Medical instruments
- Computer peripherals
- Quartz-battery alarm clocks
- Microwave ovens
- Electronic toys and games

SPECIFICATIONS

	QMB-01	QMB-06	QMB-12
Rated Voltage	1.5V	6V	12V
Operating Voltage	1~3V	3~12V	6~18V
Maximum Rated Current*	15 mA	40 mA	40 mA
Sound Output*	Min. 70 dB at 8″ (20 cm) at 2048 Hz		
Recommended Frequency Range	1000-4200 Hz		
Operating Temperature	−6°F to 159°F (−20°C to 70°C)		
Weight	7g		

* Value applying rated voltage (2048 Hz, half-duty, half-wave pulse).

THREE NEW SERIES OF SPECIALITY AUDIO TRANSDUCERS

QMB-A

QMB-111

QMB-D

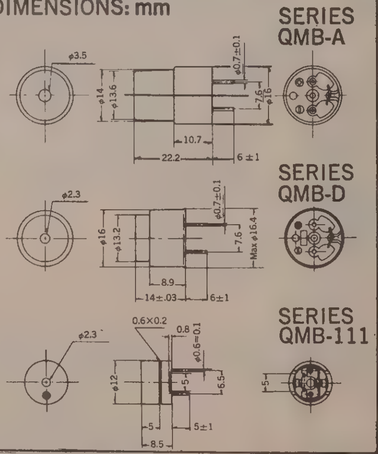
FEATURES

QMB-A SERIES — Electrically similar to standard QMB Series as shown above with flatter frequency response.

QMB-06D & 12D SERIES — Extremely high operating temperature up to 100°C.

QMB-111 SERIES — Ultraminiature, only 12 mm in diameter, 8.5 mm in height (not including pins).

DIMENSIONS: mm

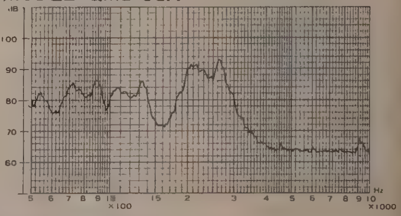


	QMB-01A	QMB-06A	QMB-12A	QMB-06D	QMB-12D	QMB-111
Rated Voltage (V)	1.5	6	12	6	12	1.5
Operated Voltage (V)	1~3	3~12	6~18	3~12	6~18	1~2
Max. Rated Current (mA)*	12	40	40	40	40	10
Coil Impedance (Ω)	100	135	270	120	220	140
Sound Output at 10 cm (dB)*	80	85		85		80
Rated Frequency	2048			2048		2048
Operating Temperature (°C)	−20~+70			−20~+100		−20~+60
Weight (g)	7			7		2

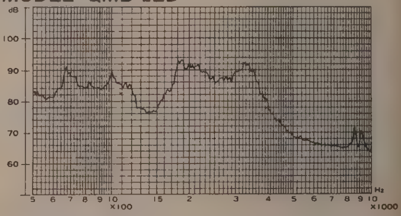
* Value applying rated voltage (2048 Hz, half-duty, half-wave pulse)

TYPICAL SOUND OUTPUT vs. FREQUENCY (at 4 in.)

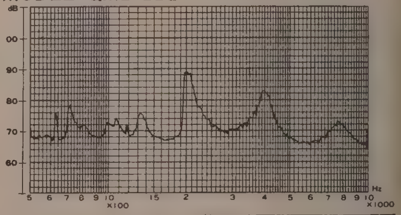
MODEL QMB-01A



MODEL QMB-12D



MODEL QMB-111



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COMPONENTS DIVISION
70-D ETHEL ROAD WEST, PISCATAWAY, NJ 08854 (201) 572-9512

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COMPLETE LINE OF ELECTRONIC AUDIO DEVICES

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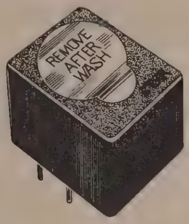
TRANSDUCERS

NEW! SEALED FOR CONTAMINATION-FREE WAVE SOLDERING AND PACKAGED FOR AUTOMATIC INSERTION.

SERIES SMX



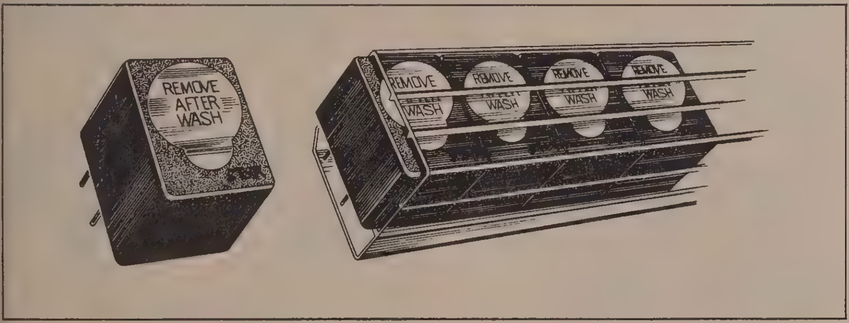
FEATURES
- Packaged in magazines for automatic insertion
- Sealed against contamination during wave solder washing
- Wide frequency response curve for consistent output
- Different pin lengths for polarity notation
- Wide operating voltage and temperature range
- Low power consumption
- Small size
- Low cost

The SMX series is a totally new type of audio transducer. Designed with 2 resonant chambers for a wider frequency response curve, it's the first audio component to meet the market needs for automated PC board production.

Packaged in magazines, the SMX is compatible with automatic insertion equipment. The base is epoxy sealed and the sound hole is covered with a removable adhesive-backed foil. This protects the SMX series from contamination during washing and drying in automatic wave solder operations, and also eliminates the extra step of manual insertion, saving both production time and expense.

APPLICATIONS
- Telephone tone ringer
- Feedback for keyboards
- Toys and alarm clocks
- Medical instruments
- Automotive safety equipment
- Battery operated equipment
- Computer peripheral equipment
- Microwave ovens and other household appliances

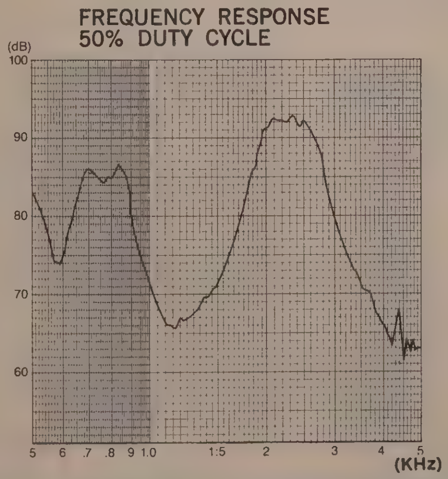
40 TRANSDUCERS PER MAGAZINE

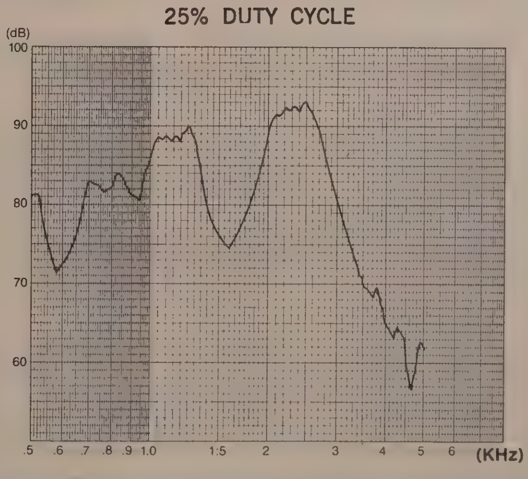


SPECIFICATIONS

	SMX-06	SMX-12
Rated Voltage (VDC)	6	12
Operating Voltage (VDC)	3~10	6~15
Max. Rated Current (mA)*	40	
Coil Impedance (Ω)*	90	170
Sound Output (dB)*	Min. 85 (at 10 cm)	
Recommended Frequency Range (Hz)	2000 — 2500	
Operating Temp. (°F)	−6° — +159°	
(°C)	−20° — +70°	
Weight (g)	4	

* Measured at rated voltage 2048 Hz, square wave (50% duty cycle).


FREQUENCY RESPONSE
50% DUTY CYCLE


25% DUTY CYCLE

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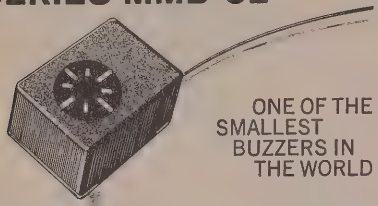
BUZZERS, TRANSDUCERS, PIEZOCERAMIC, MYLAR SPEAKERS AND MORE.

BUZZERS MINIATURE SOLID STATE ELECTRONIC

SERIES MMB-01



ONE OF THE SMALLEST BUZZERS IN THE WORLD

Star's MMB series is the state-of-the-art in miniature electronic buzzers. Tiny size, high efficiency, and value are obtained through use of a custom IC. As all circuitry is solid state, the MMB's simplicity of design provides high reliability not found in conventional "make and break" type alarms. There are no mechanical points to arc or require maintenance, and RF noise is non-existent.

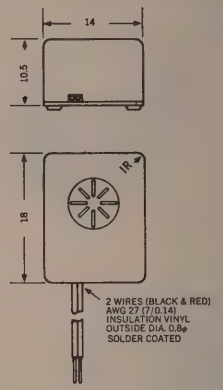
APPLICATIONS

- Alarm clocks
- Timer and control devices
- Portable and battery operated equipment
- Computer peripherals

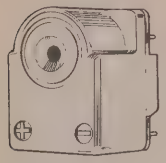
SPECIFICATIONS

	MMB-01
Operating Voltage (VDC)	1.1≈2.0
Max. Current (mA)	15
Sound Output at 8″ (20 cm)	70 dB min. at 1.5 VDC
Operating Temperature (°C)	−10≈+50
Storage Temperature (°C)	−20≈+70
Weight (g)	5

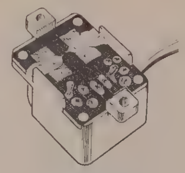
DIMENSIONS


14
10.5
18
IR
2 WIRES (BLACK & RED)
AWG 27 (7/0.14)
INSULATION VINYL
OUTSIDE DIA. 0.8φ
SOLDER COATED

SERIES KMB/AMB



SERIES KMB



SERIES AMB

FEATURES

- Pleasing but pentrating "pure tone" signal
- Low current drain
- No "make and break" contact points
- Cost effective
- Precision engineered and manufactured for reliability and long life

The Star Series KMB and AMB are miniature, solid state electronic buzzers designed to provide an aesthetically pleasing "pure tone" signal. Both are available in 6 and 12-volt models that combine an audio transducer and a transistor oscillator circuit with electro-magnetic feedback.

KMB-06 is TTL compatible; KMB-12 is CMOS compatible.

Series AMB, with 2 wires is available in 6 and 12 volt rated DC models.

APPLICATIONS

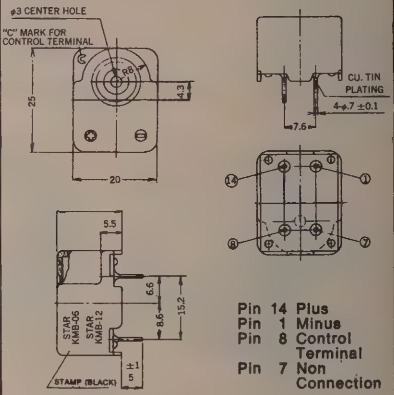
- Appliance controllers
- Battery-operated medical and scientific instruments
- Electronic cash registers
- Police radar detectors
- Telecommunications equipment
- Warning and monitoring systems in aircraft and automotive vehicles
- Gas detector and security systems
- Computer peripherals
- Electronic toys and games
- Keyboard data entry verification

SPECIFICATIONS

		AMB-06/ KMB-06	AMB-12/ KMB-12
Rated Voltage (V)		6	12
Operating Voltage (V)		4~8	8~16
Max. Rated Current (mA)		20	
Operating Temperature (°C)		−20~+70	
Sound Output (dB)		85 (at 10 cm)	
Fundamental Frequency (Hz)		2150	
Weight (g)		10	
Connection of lead wires AMB only	+	Orange	Red
	−	White	White
Trigger Terminal KMB only		3.5V at 0.4 mA	6.0V at 0.4 mA

Star Electronic Component Alarms are protected under the following patents. Other patents are pending.	USA 3,887,914 USA 3,974,499 USA 4,065,733	USA 4,149,153 USA 4,163,223 USA 4,175,262	West Germany P2459135 United Kingdom 17266/78 Japan P911850

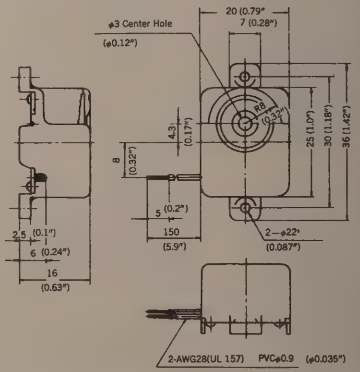
DIMENSIONS: mm SERIES KMB


φ3 CENTER HOLE
"C" MARK FOR CONTROL TERMINAL
R8
25
4.3
20
CU. TIN PLATING
4-φ.7 ±0.1
7.6
14
1
8
7
5.5
6.6
15.2
8.6
STAR KMB-06
STAR KMB-12
±1
5
STAMP (BLACK)

Pin 14 Plus
Pin 1 Minus
Pin 8 Control Terminal
Pin 7 Non Connection

Note: The above pin numbers are in accordance with 14 pin I.C. DIP sockets.

SERIES AMB


20 (0.79″
7 (0.28″)
φ3 Center Hole
(φ0.12″)
R8
(0.32″)
4.3
(0.17″)
8
(0.32″)
25 (1.0″)
30 (1.18″)
36 (1.42″)
5 (0.2″)
150
(5.9″)
2—φ22
(0.087″)
2.5 (0.1″)
6 (0.24″)
16
(0.63″)
2-AWG28(UL 157) PVCφ0.9 (φ0.035″)

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micronics·inc

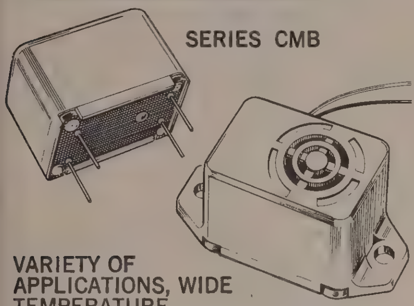
COMPONENTS DIVISION
70-D ETHEL ROAD WEST, PISCATAWAY, NJ 08854 (201) 572-9512

star™ COMPLETE LINE OF ELECTRONIC AUDIO DEVICES

BUZZERS, TRANSDUCERS, PIEZOCERAMIC, MYLAR SPEAKERS AND MORE.

BUZZERS MINIATURE SOLID STATE ELECTRONIC

SERIES CMB/SMB


SERIES CMB
SERIES SMB

VARIETY OF APPLICATIONS, WIDE TEMPERATURE OPERATING RANGE

Star series CMB pin-type electronic buzzers fit standard DIP sockets or may be wave-soldered. Model CMB-06 is TTL compatible; Model CMB-12 is CMOS compatible.

Series SMB, with 2 wires is available in 1.5, 6, 12, and 24-volt rated DC models.

APPLICATIONS

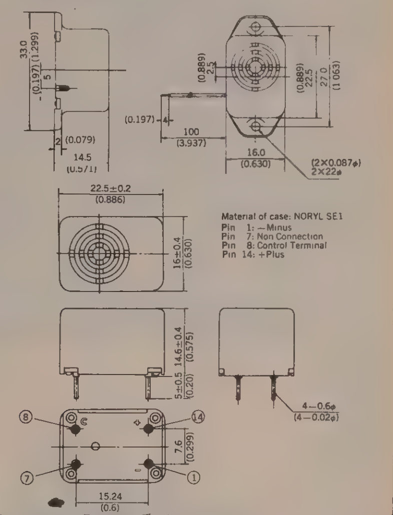
Star series CMB and SMB may be used in a variety of warning or monitoring systems. These include:

- Computer peripherals
- Automotive and aircraft systems
- Communications systems
- Microwave oven and other timing controls
- Instrumentation systems

SPECIFICATIONS

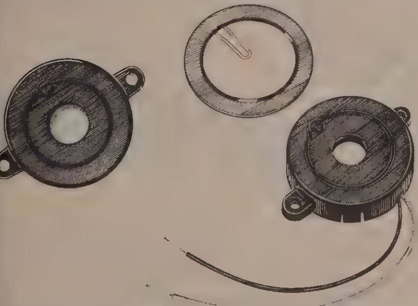
		SMB-01	CMB-06 & SMB-06	CMB-12 & SMB-12	SMB-24
Operating Voltage (VDC)		1.1≈2	3≈7	7≈17	16≈30
Max Current (mA)		17	23	14	16
Temperature Range (°C)		−20≈ +60	−30°C∼70°C		
Sound Output at 20 cm (dB)		70			
Weight (g)		10			
Connections (SMB Only)	Pos. (+)	Red	Orange	Red	Orange
	Neg. (−)	Black	White	White	Black
Trigger Terminal (CMB Only)			1 mA Vs≥3	1 mA Vs≥5	

DIMENSIONS mm (in.)


33.0 (1.299)
5 (0.197)
2 (0.079)
14.5 (0.571)
(0.197) 4
100 (3.937)
(0.889) 22.5
27.0 (1.063)
16.0 (0.630)
(2×0.087φ) 2×2.2φ
22.5±0.2 (0.886)
16±0.4 (0.630)
Material of case: NORYL SE1
Pin 1: −Minus
Pin 7: Non Connection
Pin 8: Control Terminal
Pin 14: +Plus
14.6±0.4 (0.575)
5±0.5 (0.20)
4−0.6φ (4−0.02φ)
⑧ ⑭ ⑦ ①
7.6 (0.299)
15.24 (0.6)

ACOUSTIC GENERATOR ELEMENTS

MINIATURE PIEZOCERAMIC



Piezoceramic acoustic generator elements are used in applications that require:

- minimum curent drain
- low profile or thin size mechanical
- mounting constraints
- high frequency, pure-tone audible signals

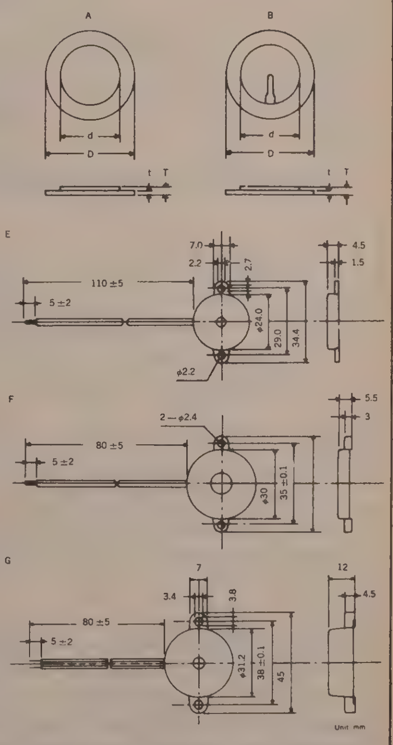
Care should be exercised in applications design, however, as mechanical shock may generate spike voltages that could damage other circuit components.

SPECIFICATIONS

	SE-2063	SE2075S	SE-2739	SE-2740S	SE-3530F	SEC-2437	SEC-3038	SEC-3109F
Resonant Frequency (KHz)	6.3±0.6	7.5±06	3.09±0.5	4.0±0.5	3.0±015	3.7±0.8	3.8±0.7	3.1±0.5
Resonant Resistance (ohm)	300 max.	300 max.	200 max.	200 max.	200 max.	2500 max.	1500 max.	300 max.
Electrostatic Capacitance (pF)	10,000 ±30%	10,000 ±30%	20,000 ±30%	20,000 ±30%	30,000 ±30%	10,000 ±30%	20,000 ±30%	30,000 ±30%
Max. Input Voltage (Vp-p)	30 max.	30 max.	30 max.	30 max.	330 max.	30 max.	30 max.	30 max.
Operating Temperature (°C)	−20∼ +60	−20∼ +60	−20∼ +60	−20∼ +60	−20∼ +60	−20∼ +60	−20∼ +60	−20∼ +60
Dimensions								
Vibration Plate (D)	20	20	27	27	35	See diagrams at right.		
Ceramic	14	14	19	19	25			
Thickness (T)	0.43	0.43	0.48	0.43	0.58			
Thickness of Vibration Plate (t)	0.2	0.2	0.25	0.2	0.3			
Vibration Plate Material	Brass	Stainless Steel	Brass	Stainless Steel	Brass			

- Specifications of Piezoceramic Acoustic Generator Elements that are enclosed in a housing without circuitry inside

DIMENSIONS


A
B
d
D
t T
E
7.0
2.2
2.7
4.5
1.5
110±5
5±2
φ24.0
29.0
34.4
φ2.2
F
5.5
3
2−φ2.4
80±5
5±2
φ30
35±0.1
G
7
3.4
3.8
12
4.5
80±5
5±2
φ31.2
38±0.1
45
Unit mm

star™ micronics·inc

COMPONENTS DIVISION
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24 PAGE PRODUCT INDEX BOOK LISTS 3,800 ITEMS
61 CROSS REFERENCE CARDS
308 FILE FOLDER LABELS
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electronic engineers master
FILE SYSTEM
HARDWARE (ELECTRICAL/ELECTRONIC)
CROSS REFERENCE
PRODUCTS
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2800
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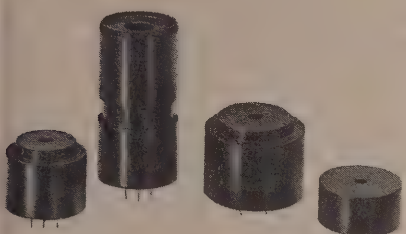
645 stewart ave., garden city, ny 11530

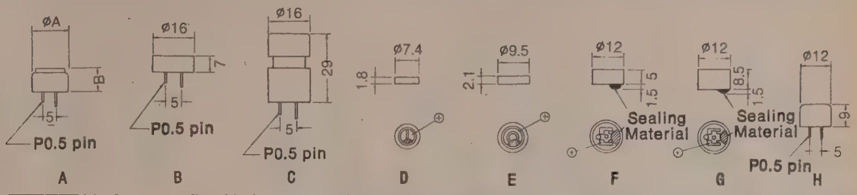
TDK

SOUNDUCERS, BUZZERS, SPEAKERS

SOUNDUCERS

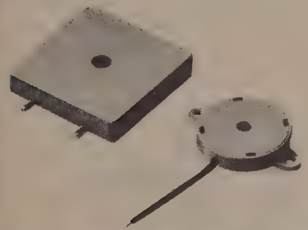


TDK Sounducers operate on the magnetic principle with a circular vibration plate, but no contacts. Sound output is excellent at low voltage because impedance is very low. May be used as a tonal alarm at high (4096 Hz) or low (2048 Hz) pitch or as a speech synthesis speaker or melody source.
Catalogue BCE-041C


ØA
B
5
P0.5 pin
A
Ø16
7
5
P0.5 pin
B
Ø16
29
5
P0.5 pin
C
Ø7.4
1.8
D
Ø9.5
2.1
E
Ø12
5
1.5
Sealing Material
F
Ø12
8.5
1.5
Sealing Material
G
Ø12
9
5
P0.5 pin
H

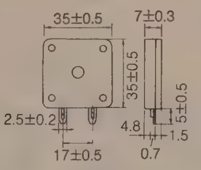
Part No.	Fig.	Term. Config.	Size (mm) Dia.	Size (mm) Ht.	Oper. Signal (Vdc)	Frequency (Hz) 2048	Frequency (Hz) 4096	Sound Press. dB @ 10 Cm	Test (Vdc)	Current (mA) Typ.	Resis. dc (Ohms)
MSD741801	D	P/C	7.4	1.8	1 to 3		X	68	1.5	12	110
MSD952001	E	P/C	9.5	2.0	1 to 3		X	72	1.5	15	90
SD120502	F	P/C	12.0	5.0	1 to 3		X	75	1.5	30	46
SD120802	G	P/C	12.0	8.5	1 to 3		X	85	1.5	30	46
SD120901	H	PIN	12.0	9.0	1 to 4	X		80	3.0	60	50
SD120904	H	PIN	12.0	9.0	1 to 4		X	80	3.0	80	25
SD141001	A	PIN	14.0	10.0	1 to 5	X		80	3.0	60	50
SD160710	B	PIN	16.0	7.0	1 to 3		X	80	1.5	80	15
SD160701	B	PIN	16.0	7.0	1 to 5		X	80	3.0	60	50
SD160709	B	PIN	16.0	7.0	3 to 9		X	83	5.0	70	70
SD160708	B	PIN	16.0	7.0	6 to 15		X	83	12.0	80	120
SD161210	A	PIN	16.0	12.0	1 to 3	X		80	1.5	80	15
SD161201	A	PIN	16.0	12.0	1 to 5	X		80	3.0	60	50
SD161216	A	PIN	16.0	12.0	3 to 9	X		85	5.0	70	70
SD161215	A	PIN	16.0	12.0	6 to 15	X		85	12.0	80	120
SD162910	C	PIN	16.0	29.0	1 to 3	X		90	1.5	85	15
SD162901	C	PIN	16.0	29.0	1 to 5	X		90	3.0	60	50
SD162904	C	PIN	16.0	29.0	3 to 9	X		95	5.0	70	70
SD162905	C	PIN	16.0	29.0	6 to 15	X		95	12.0	85	120
SD201410	A	PIN	20.0	14.0	1 to 3	X		80	1.5	80	15
SD201401	A	PIN	20.0	14.0	1 to 5	X		80	3.0	60	50
SD201409	A	PIN	20.0	14.0	3 to 9	X		85	5.0	70	70
SD201408	A	PIN	20.0	14.0	6 to 15	X		85	12.0	80	120

PIEZOCERAMIC BUZZERS, SPEAKERS

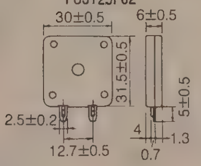


TDK Series PS sounders operate by means of a piezoelectric ceramic element which resonates at a specified frequency to produce a very loud sound. Applications are generally simple alarms, but these units may be used with speech synthesizers.

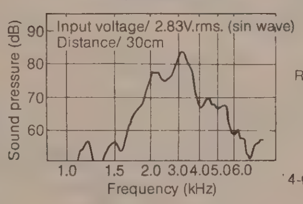
PS3520P02


35±0.5
7±0.3
35±0.5
5±0.5
2.5±0.2
4.8
1.5
17±0.5
0.7

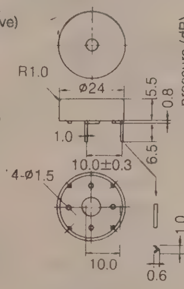
PS3125P02


30±0.5
6±0.5
31.5±0.5
5±0.5
2.5±0.2
4
1.3
12.7±0.5
0.7

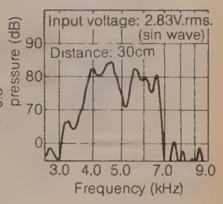
FREQUENCY-SOUND PRESSURE CHARACTERISTICS PS3520P02



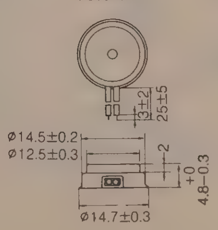
PS2440L30


R1.0
Ø24
5.5
0.8
1.0
10.0±0.3
6.5
4-Ø1.5
1.0
10.0
0.6

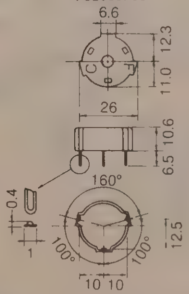
FREQUENCY-SOUND PRESSURE CHARACTERISTICS PS2440P02



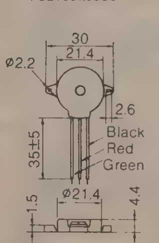
PS1520L25


3±2
25±5
Ø14.5±0.2
Ø12.5±0.3
2
+0
4.8−0.3
Ø14.7±0.3

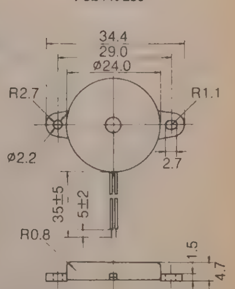
PS2335P03


6.6
12.3
11.0
26
10.6
6.5
160°
0.4
1
100°
100°
12.5
10
10

PS2135L30S3


30
21.4
Ø2.2
2.6
Black
Red
Green
35±5
Ø21.4
1.5
4.4

PS2440L30


34.4
29.0
Ø24.0
R2.7
R1.1
Ø2.2
2.7
35±5
5±2
R0.8
1.5
4.7

Part No.	Excitation Sep.	Excitation Self	Res. Freq. (Hz)	Sound Press. dB/Cm	Test Freq. (Hz)	Test Volts (Vp-p) Sq. Wv.	Max. Oper. Volts (Vp-p)
PS3520P02	X		2300 ±0.5	70/10	2000	3	30
PS3125P02	X		3300 ±0.5	75/10	2500	3	30
PS2440L30	X		4400 ±0.5	70/10	4000	3	30
PS2440P02	X		4400 ±0.5	75/10	4000	3	30
PS1520L25	X		4000 ±0.5	70/10	4000	3	30
PS2335P03		X	3400 ±0.6	90/10	3400	12 Vac	30 Vac
PS2135L30S3		X	3400 ±0.6	80/10	3400	12 Vac	15 Vac

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QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?

CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
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AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms	**1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code	**3**•1103
Batteries, Product Selection Guide	**3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide	**2**•1003
Capacitors, Basic Formulas	**1A**•1093
Capacitors, Miniglossary	**1A**•1069
Capacitors, Product Selection Guide	**1A**•1003
Circuit Boards (Printed), Product Selection Guide	**2**•1089
Coils, Chokes, & Inductors, Product Selection Guide	**1A**•1219
Connectors, Miniglossary	**2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide	**2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide	**1A**•1309
Delay Lines, Product Selection Guide	**1A**•1445
Discrete Semiconductors, Product Selection Guide	**1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide	**1B**•1021
EBCDIC Code	**3**•1153
Encapsulation, Miniglossary	**2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide	**2**•1801
Filters, Product Selection Guide	**1A**•1577
Instruments, Graphic Recording, Product Selection Guide	**3**•1381
Instruments, Panel Meters, Product Selection Guide	**3**•1321
Instruments, Test & Measuring, Product Selection Guide	**3**•1182
Interconnection Systems, Product Selection Guide	**2**•1873
Keyboards & Keypads, Product Selection Guide	**1B**•1759
Microwave Components, Product Selection Guide	**1A**•1685
Military Qualified Products Lists	**1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide	**1B**•1121
Opto Semiconductors, Miniglossary	**1B**•1218
Oscilloscopes, Product Selection Guide	**3**•1361
Panel Hardware, Product Selection Guide	**2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide	**1A**•2017
Power Supplies, Miniglossary	**3**•1455
Power Supplies, AC, Product Selection Guide	**3**•1815
Power Supplies, DC, Product Selection Guide	**3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide	**1B**•1255
Relay Contact Forms	**1B**•1317
Relays, Electromechanical, Miniglossary	**1•B**1292
Relays, Product Selection Guide	**1B**•1289
Resistor Color Codes	**1A**•1791
Resistors, Product Selection Guide	**1A**•1789
Servo Components, Miniglossary	**3**•1935
Solenoids, Product Selection Guide	**1B**•1481
Switches, Product Selection Guide	**1B**•1499
Thyristors/High Power Diodes, Miniglossary	**1A**•1652
Transducers & Encoders, Product Selection Guide	**1B**•1827
Transformers, Product Selection Guide	**1A**•2115
Wire & Cable, Product Selection Guide	**2**•1935

Voice Communications Subsystems
Intercom
Remote Control
Technical Control

GRIM CORP
AN INDUCTOTHERM COMPANY
Triangle Industrial Center Medford, New Jersey 08055
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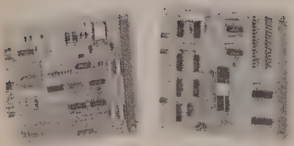
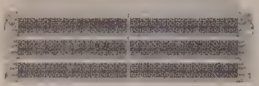


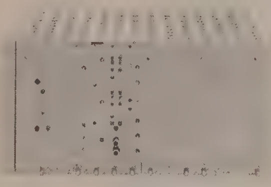
DATA TRANSCEIVER SET (DTS-300)

A pair of circuit cards which sense/generate DC levels and provide buffering and data communications over voice-grade communications facilities (full or half-duplex) at modulation rates to 300 bauds. Ask for brochure 80-0119.



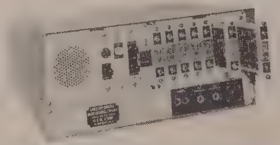
RUGGEDIZED PATCH PANELS

In addition to our standard miniature jack panels, we supply a wide range of custom voice and data patch panels for use in military transportable communications shelters world-wide. Ask for brochure 82-0924.



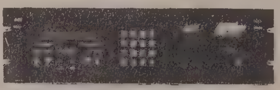
VO DATA COMM 80

A family of products which provide simultaneous transmission of speech and multiplexed digital control words over voice-grade communications facilities. Ask for VDC-80 brochure.



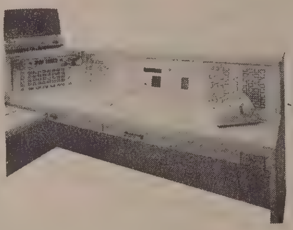
AIR TRAFFIC RADIO CHANNEL CONTROL (ATRCC) SYSTEMS

The highly-modularized and solid state ATRCC-2400A system provides for operator interface and control of radio transmitters/receivers via a distributed matrix. Within the same system, dedicated telephone channels can be accommodated. Ask for ATRCC-2400A brochure and PIB 81-0202.



AUDIO SWITCHING SYSTEMS

A variety of audio switches can be configured from a flexible microprocessor controller (GPS) and associated solid-state audio crosspoint matrix (ACM). GPS permits both local and remote control of the ACM, the latter by a system CPU with an RS-232/422 interface. Switch sizes to 128 x 128 can be provided. Switches may be interconnected for redundancy and flexibility. Applications include audio distribution and intercom systems. Ask for PIB 82-1207.



COMMUNICATIONS CONSOLES AND PANELS

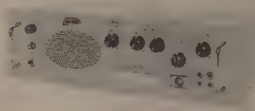
Customized communications consoles and operator control panels for use in air traffic control, air defense and ground traffic control systems. In development is a flexible microprocessor-based console equipment group which can be used with various CPU-switch combinations. We'd like to hear about your application. Ask for PIB 83-0125.

TEST MESSAGE GENERATOR

Model TMG-75/2400 is a self-contained code generator (ASCII/BAUDOT) for testing data transmission lines, etc. Sends a standard test message plus a user programmable 7 character identifier. Ask for PIB 83-0309.

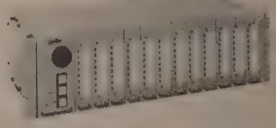
MANUFACTURING AND TEST SERVICES

We offer design-to-specification and build-to-print services for systems integrators and original equipment manufacturers (OEMs). Production services include purchasing, assembly, conformal coating and potting. Test and inspection services include burn-in, computerized automatic testing (ATE) and quality assurance per MIL-I-45208 and MIL-Q-9858A. Ask for an OEM literature package.



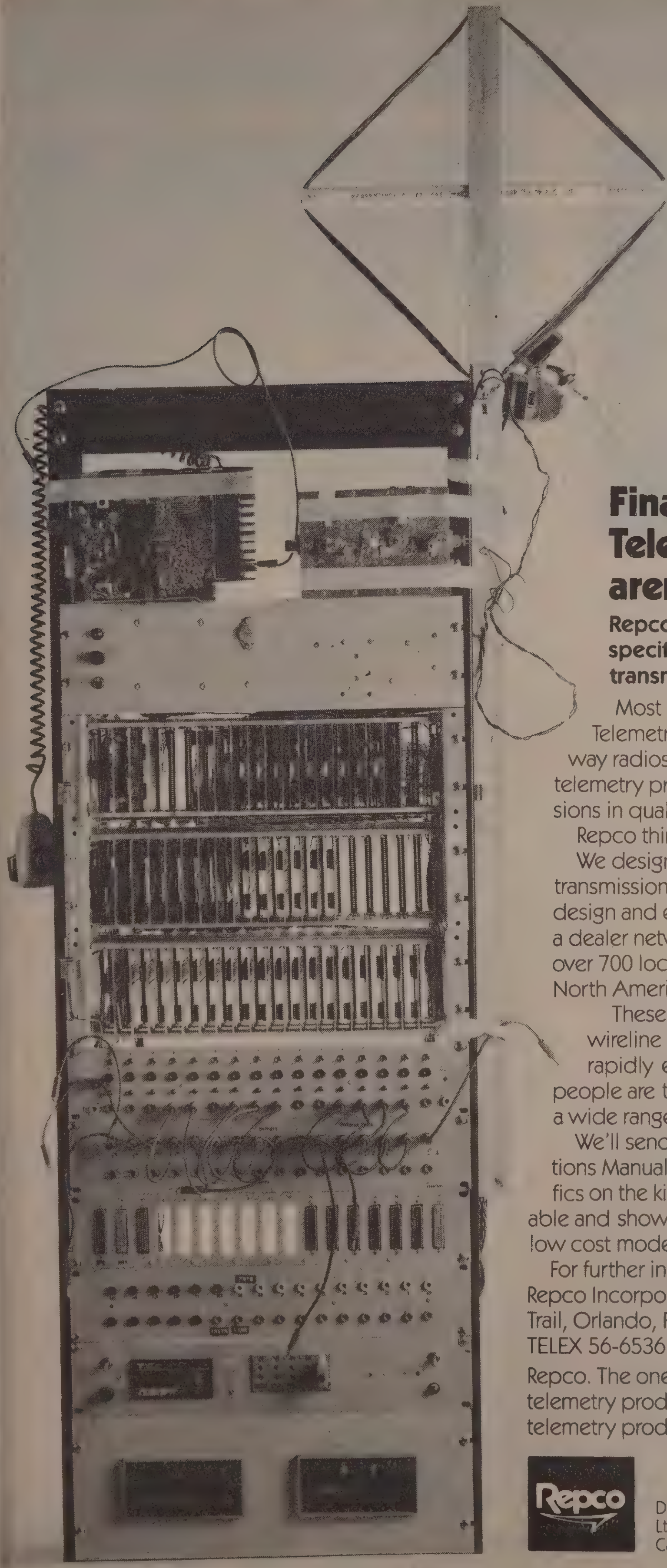
INTERCOM UNITS AND SYSTEMS

We are providing a wide range of intercom units and systems for use in industrial and defense-related applications. Ask for brochure 82-0930.



MODULAR ALARM SYSTEM

MAS-96 is a rack-mountable modularized, optically-coupled circuit monitor and alarm system for up to 96 circuits, in increments of 8. Ask for MAS-96 brochure.



Finally.
Telemetry products that aren't hand-me-downs.

Repco designs RF Links products specifically for monitor and data transmission applications.

Most RF Links products available to the Telemetry market were modifications of two-way radios. Then they were adapted as telemetry products, possibly with some concessions in quality and compromises in function.

Repco thinks you deserve better.

We design products exclusively for your data transmission and monitoring needs. We offer design and engineering services. And, we have a dealer network to support your RF needs in over 700 locations throughout North America.

These days, with the cost of wireline data transmission rapidly escalating, a lot of people are turning to wireless for a wide range of applications.

We'll send you our free Applications Manual. It'll give you the specifics on the kinds of products available and show you how RF Links and low cost modems will work for you.

For further information call or write: Bob Lowell, Repco Incorporated, 2421 North Orange Blossom Trail, Orlando, Florida 32804, (305) 843-8484
TELEX 56-6536

Repco. The one resource you can depend upon for telemetry products that were designed to be telemetry products.

Repco

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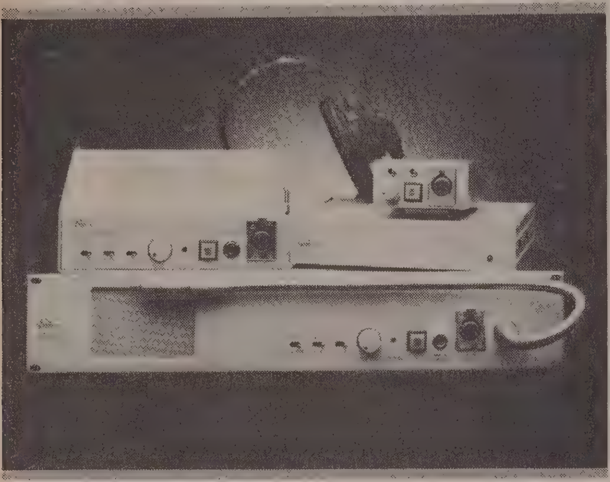
PROFESSIONAL AUDIO PRODUCTS

RTS Systems INC

PROFESSIONAL INTERCOMMUNICATIONS SYSTEMS



TW INTERCOM SYSTEM

A high performance two-wire conference-line (party-line) intercommunications system designed for use in teleproduction, broadcast, industrial and commercial applications.

User Stations

- Eight different packages available
- Headset and headset/speaker stations available
- Each station (10,000 ohms) bridges the line (200 ohms)
- Up to 75 units on a line without loading
- Two channels on three-conductor cable
- Full-duplex operation: simultaneous talk and listen to and from each station
- Powerful headphone amplification
- Dynamic and/or carbon headset capability
- Mic-level limiting
- 12-volt power operation
- Many options available

Power Supplies

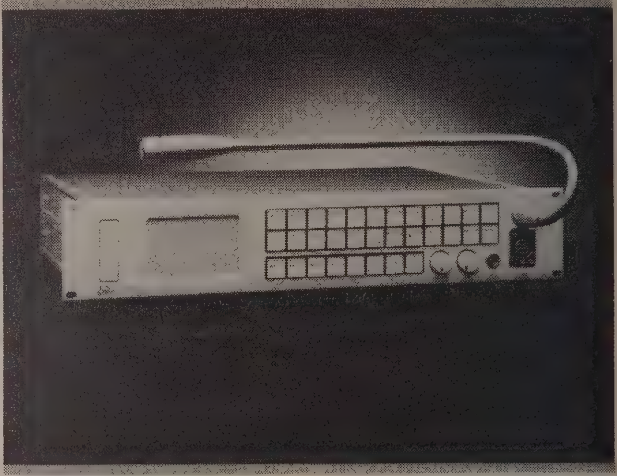
- PS8 powers 12 user stations
  Two channels – one dry channel at 200 ohms audio impedance – one powered channel at 32 volts at 200 ohms audio impedance
- PS30 powers 30 user stations
  Six channels – three dry channels at 200 ohms audio impedance – three powered channels at 32 volts at 200 ohms audio impedance

System Interface Units

- Interface between two-wire, three-wire, and four-wire lines
- Works with virtually any impedance, level, or type of line

Special Designs

- A number of standard products are available for special applications including station-isolate, source assignment, retrofit user stations, etc.
- Modified standard product and custom products available to customer specifications



Model 802 MASTER STATION

The 802 Master Station is a unique microprocessor-assisted communications network providing 22 independent signal paths operating in up to six separate modes.

Features

- Up to twelve full-duplex intercom channels
- Conference-line or dedicated-line mode
- Two-wire, three-wire, or four-wire operation
- One-way (simplex) announce/page functions
- Program audio monitoring
- Multi-source audio assignment to headset or speaker
- Front panel programmability
- Easy system expandability
- Unique momentary/latching front panel switch operation
- Individual channel listen levels
- Six programmable relays for auxiliary switching
- Wide range of options available
- Transformer-balanced audio lines
- Convenient interface to external equipment
- Programming safeguards
- Custom software available
- Each station self-contained
- Full-range high-quality audio
- Non-volatile user memory
- RS232 access to Z80-type microprocessor

ADDITIONAL PRODUCTS

Series 4000 IFB System

A one-way "program-interrupt" communications system used primarily for cuing "on-air talent." A modular building block format allows a system to be custom configured to user requirements. A combination of user stations, central electronics, and control stations make up a system.

Series 400 Amplifiers

- Model 405 Professional Stereo Phono Preamplifier
- Model 410 10-Watt Monitor Amplifier
- Model 414 1 x 4 Audio Distribution Amplifier
- Model 416 1 x 6 Audio Distribution Amplifier
- Model 444 Dual Two-Channel Buffer Amplifier
- Model 465 Microphone Preamplifier

Model HPM41 Microphone Mixer with 4 inputs and 1 output
Model 1400 Battery Powered Microphone Preamplifier

RTS Systems INC

1100 West Chestnut Street □ Burbank, California 91506 USA □ TEL 213/843-7022 TWX 910-498-4987 TELEX 194855
A SUBSIDIARY OF COMPACT VIDEO, INC.

VRN INTERNATIONAL
A DIVISION OF VERNITRON CORPORATION

BRIDGE-T ATTENUATORS

SPECIFICATIONS

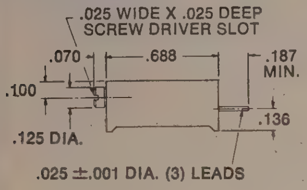
ELECTRICAL

Power rating: .25W @ 50°C 0W @ 125°C
Impedance: 75Ω std. (50Ω and 600Ω available)
Tolerance: ±20%
Attenuation range: .25dB max. CW to 20dB min. CCW
Attenuation vs frequency: 1dB max. variation 50-400MHz
Insulation resistance: 100MΩ min. @ 500VDC
Dielectric strength: 1000VAC

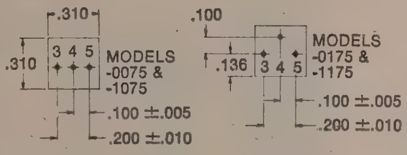
MECHANICAL

Rotation: 9958/59 295° ±5°, 9950/55 1800° (clutches both ends)
Stop strength: 10 in-oz. min. (9958/59 only)
Operating torque: 0.5 to 5.0 in.-oz.

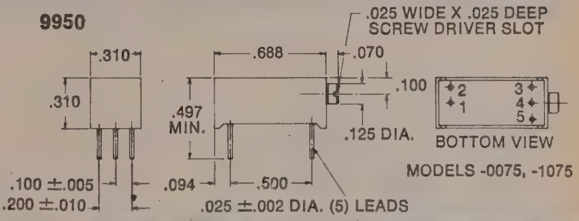
9950/9955


.025 WIDE X .025 DEEP SCREW DRIVER SLOT
.070
.688
.187 MIN.
.100
.136
.125 DIA.
.025 ±.001 DIA. (3) LEADS

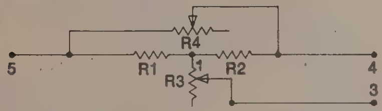
9955


.310
.100
.310
3 4 5
MODELS -0075 & -1075
.136
3 4 5
MODELS -0175 & -1175
.100 ±.005
.200 ±.010
.100 ±.005
.200 ±.010

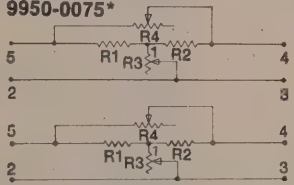
9950


.025 WIDE X .025 DEEP SCREW DRIVER SLOT
.310
.688
.070
.100
.310
.497 MIN.
.125 DIA.
.100 ±.005
.200 ±.010
.094
.500
.025 ±.002 DIA. (5) LEADS
2 3 1 4 5
BOTTOM VIEW
MODELS -0075, -1075

9955-1075, 1175

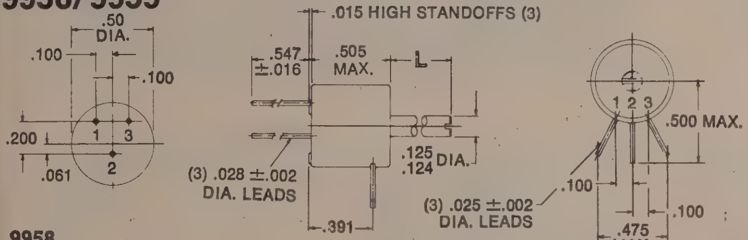

5
R4
R1
R2
R3
1
4
3

9950-0075*

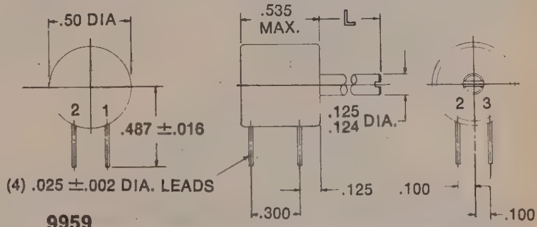

5
R4
R1
R3
R2
1
4
2
3
5
R4
4
R1
R3
R2
1
2
3

9950/9955		
TYPE	**DESCRIPTION**	**FIXED RESISTORS**
9950-0075	Side Adjust — Horizontal Mounting	None
9950-1075	Side Adjust — Horizontal Mounting	Two (2) 75Ω
9955-0075	Top Adjust — Vertical Mounting	None
9955-1075	Top Adjust — Vertical Mounting	Two (2) 75Ω
9955-0175	Top Adjust — TO5 Mounting	None
9955-1175	Top Adjust — TO5 Mounting	Two (2) 75Ω

9958/9959

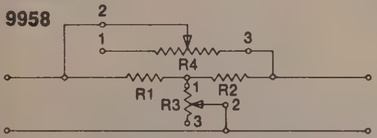

.50 DIA.
.100
.100
.200
1 3
2
.061
.015 HIGH STANDOFFS (3)
.547 ±.016
.505 MAX.
L
.125 .124 DIA.
(3) .028 ±.002 DIA. LEADS
.391
1 2 3
.500 MAX.
.100
(3) .025 ±.002 DIA. LEADS
.475 MAX.
.100

9958

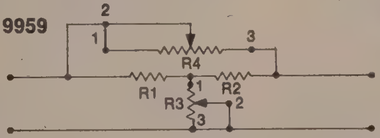

.50 DIA
2 1
.487 ±.016
(4) .025 ±.002 DIA. LEADS
.535 MAX.
L
.125 .124 DIA.
.300
.125
.100
2 3
.100

9959

9958

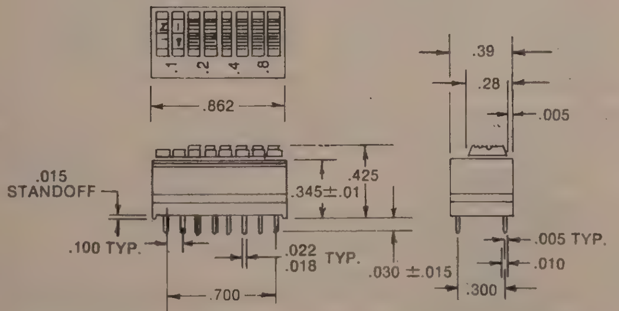

2
1
3
R4
R1
R2
R3
1
2
3

9959


2
1
3
R4
R1
R2
R3
1
2
3

SHAFT LENGTH L ±.02"	HOW TO ORDER			
	9958		9959	
	75Ω		75Ω	
	PLASTIC	METAL	PLASTIC	METAL
.031	-1752	—	-1750	—
.125	-2752	-6752	-2750	-6750
.250	-3752	-7752	-3750	-7750
.375	-4752	-8752	-4750	-8750
.500	-5752	-9752	-5750	-9750

SERIES 7010-
Switchable DIP Attenuator


1 2 4 8
.862
.39
.28
.005
.015 STANDOFF
.425
.345±.01
.100 TYP.
.022 .018 TYP.
.030 ±.015
.005 TYP.
.010
.700
.300

SPECIFICATIONS

ELECTRICAL

Impedance tolerance: ±2%
Power rating: 25W
Insertion loss: .02dB

MECHANICAL

Operating temperature range: 0° to 75°C
Lead temperature: (solder 10 sec.) 300°C maximum
Pin configuration: Standard 16 pin dual in-line (.300" x .100")

OPTION VAR.	ATTENUATOR SECTION			
	A (dB)	B (dB)	C (dB)	D (dB)
01	.1	.2	.4	.8
02	1	2	4	8
03	1.6	3.2	6.4	12.8
04	2	4	8	16
05	.25	.5	1	2
06	1.5	3	6	12

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Electro-mechanical products with

The Alps Advantage

SINCE 1948

Alps®

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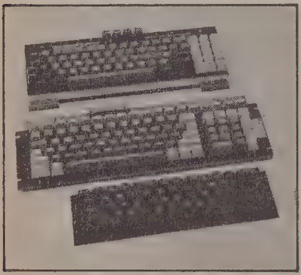
- High Quality & Reliability
- Competitive Pricing
- World-Wide Reputation

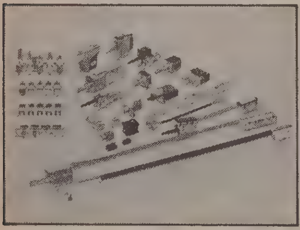
KEY SWITCHES

Choose from several contact types: mechanical, conductive rubber or tactile feedback. Snap-in mounting. Double-shot molded keytops in many colors, shapes, legends. Fully automated assembly assures maximum reliability, with ratings up to 20-million operating cycles.



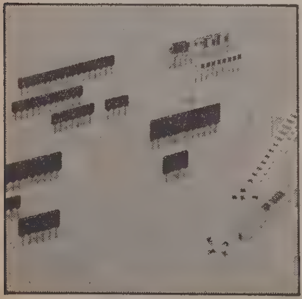
KEYBOARDS

Standard and custom keyboards, fully assembled including switches, keytops, PC board, matrix circuit, encoder circuit. NEW!—Series KFL Low Profile Keyboards meet all the latest European DIN standards for full-travel key switches with reduced profile dimensions.



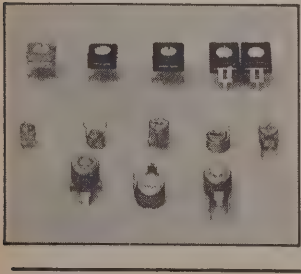
SWITCHES

Alps produces more than 900,000,000 switches per year, including some of the world's smallest, in a variety of types—rotary, push, slide, lever, power, flex and digital—all noteworthy for their unsurpassed smooth-action performance, built-in quality and long-life reliability.



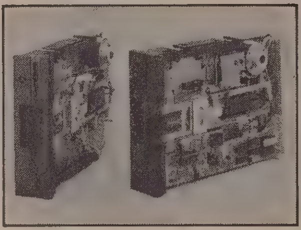
RESISTOR NETWORKS & CHIP RESISTORS

Thick film cermet element on alumina substrate, for extremely high stability. Networks in SIP configuration, from 4 to 17 pins, with resistance values from 10 ohms to 1 megohm. Chips are international standard size, 1.6 × 3.2 × .55 mm, with values from 10 ohms to 10 megohms. Available in bulk, reel tape, or plastic magazine for automatic chip placement machines.



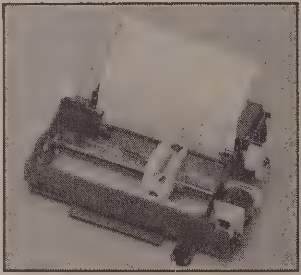
TRIMMER CAPACITORS

Ceramic or film elements, trimmer ranges from 2.5–6 pF to 10–150 pF. Snap-in terminals, with standard, reverse or side mounting—front or rear adjustment. Minimum drift, with virtually linear temperature characteristics. Precision structure protects dielectric from contamination by flux or wax.



FLOPPY DISK DRIVES

New Series 2000, for 5¼″ disks, offers super-slim profile—only 1.69″ thick, half the conventional thickness. Standard features include fast access time, automatic eject, long-life ceramic head, and surprisingly low price! Available with or without built-in electronics control board.

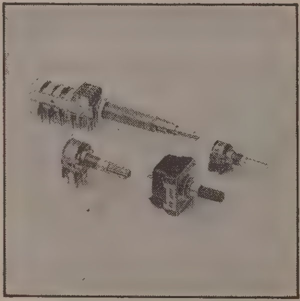


MICROMINIATURE PRINTERS

An incredible example of "The Alps Advantage" in technical innovation, Series DPG printers handle Alpha-Numeric-Graphic requirements, actually *writing* with microminiature ball point pens (1 or 4 colors!) invented by Alps using exclusive ink technology. Available for 2¼″ or 4½″ ordinary plain paper. Their small size and small price will astound you!

TACT SWITCHES

Tactile key switches with a "snap" (conductive rubber) or "click" (metal contacts) feeling to signal when contact is made. Available in a wide range of life cycle ratings, shapes, sizes, and "feelings"—ideal for many types of mini-keyboard applications.



VARIABLE RESISTORS

Rotary and slide types, ranges from 500 ohms to 2 megohms, with a wide variety of diameters, strokes, tapers, mounting, shafts, levers, etc. Exclusive lubricants for high quality smooth action. Miniature trimmer pots, sizes from 4mm to 16mm, with cermet, carbon film or carbon composition elements—ranges from 100 ohms to 2.2 megohms. Stick controls packaged with 2, 3 or 4 pots.

OTHER PRODUCTS now available from Alps include: telephone keypads, liquid crystal displays, magnetic heads, cassette mechanisms, RF modulators, switchers, TV tuners.

Alps®

NEW GENERAL CATALOG
20 pages of products with "The Alps Advantage"—
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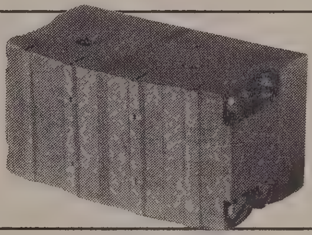
100 No. Centre Ave., Rockville Centre, NY 11570 Tel. 516-766-3636
1810 So. Lynhurst Dr. X, Indianapolis, IN 46241 Tel. 317-248-2577

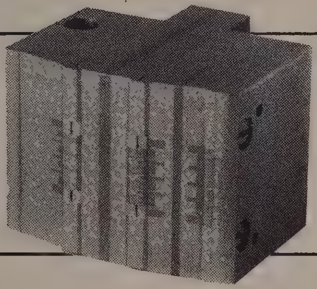
APOLLO MAGNETICS

As a recognized leader in the field, Apollo is the innovator and developer of many new techniques resulting in digital heads with greater range and capability than previously possible.

Series SSI heads are designed for ¼″ streaker/streamer cartridge drives and are available in 2 channel 4, 9, 12 and 16 track configurations to QIC standard formats, operating at or beyond 10K FRPI at 90IPS. Series SSI heads can use high coercivity 600′ tapes or standard 300′ tapes without compensation.

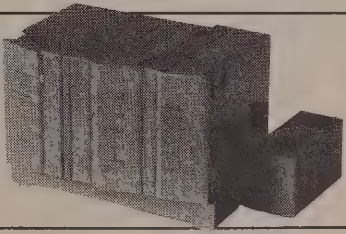
Series BDS heads are utilized on ¼″ cartridge drives operating in bi-directional serpentine modes to 10K FRPI. Shown is the 4 channel, 7 track with selective erase. Other serpentine configurations are available.

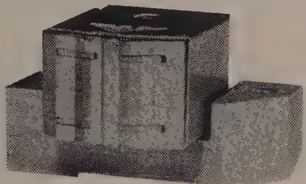




Series EWR head stacks are parallel read after write assemblies with selective erase. The 4 channel head shown is available with optional mounting and cable connectorization. Other track formats can be provided. Recording densities of 3200 or 6400 FRPI are standard.

Series WR/E heads perform at densities of 3200 or 6400 FRPI's in parallel or series Erase, Write, Read modes. Shown is the 4 track with optional erase head and base plate.





Series MCD heads, designed for mini-cartridge drives, operate at 1600 or 3200 FRPI and are available with most standard base/mounting configurations. Higher recording densities and militarized versions are available.

Depending on configuration, the above heads are available with **Apolco I™** or **Apolco II™** *long life* cores and optional hard face chrome or plasma coatings.

Apollo Magnetics has extensive Ferrite and Ceramic capabilities including *Winchester* sliders and assemblies, both monolithic and composite, and Floppy tape ferrite/ceramic indexing heads.

Whether your needs are an adaptation of one of our current series of digital heads or converting your design concepts into reality, Apollo cares about your ideas. Our design laboratory, exhaustive test programs, complete manufacturing facilities and quick turnaround are devoted to serving you.

With Apollo Magnetics you are guaranteed "**state of the art**" by a company that performs.

Apollo Magnetics Corporation
2720 West Beverly Boulevard
Los Angeles, California 90057
Telephone: (213) 381-2500 • Twx: 910-321-4348

APPLETON THERMAL PAPER
Works Quietly For You. So Does Our Research Department.

Designing new equipment that features thermal printing? Work with us.

Not only can we keep things quiet, chances are we've already solved some of your design problems on paper. Appleton Thermal Paper, of course.

As leaders in thermal paper research, our chemists have developed a wide range of thermal paper grades with various temperature sensitivities. In fact, the design problems you're seeing on paper might be eliminated by using one of our papers.

So, if your new model hasn't left the drawing board yet, work with us. We can keep your project as quiet as the paper it uses.

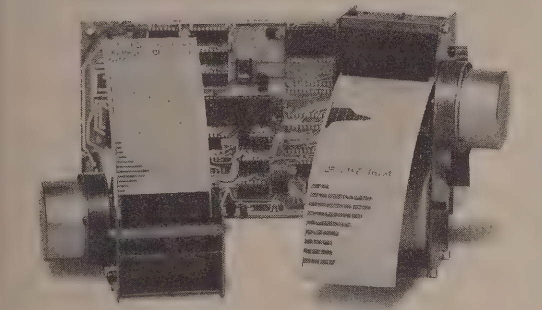
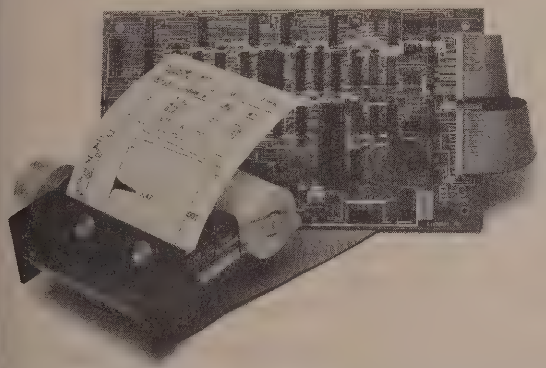
APPLETON PAPERS INC.
GENERAL OFFICES: P.O. BOX 359, APPLETON, WI 54912

Contact us for additional information at 414-734-9841

Smart 2¼ and 4½ inch printer/plotters.

Feature on-board microprocessing and custom programming for data-recording applications.

Standard Features.

	Model Number	Paper Width (inches)	Columns	Graphics Resolution (dots/line)	Printing Speed (lines/second)	Vertical Printing	Input Data Format	*Price Range
	PP-101	2.25	17	101	2.2	No	Parallel BCD and analog	$350 to $600
	PP-201	2.25	17	101	2.2	No	Parallel or serial ASCII	$350 to $560
	PP-301	2.25	17	101	2.2	No	Parallel ASCII	$310 to $460
	DataPlot 401	4.5	34	202	1.1	Yes	Parallel or serial ASCII and/or analog	$550 to $970
	DataPlot 416	4.5	34 or 68	416	2 to 5	Yes	Parallel or serial ASCII and/or analog	$700 to $1200

*Exact price depends on quantity ordered and options specified.

Reliable. All B-G Instruments' printers use fixed-dot, thick-film thermal printheads to achieve fast, quiet operation, long life and reliable performance.

Powerful. B-G's standard DataPlot software makes it easy to print across the paper, print down the paper, and print while you plot data. Simple plotting commands produce curves, grids and bar graphs directly from the input data.

Versatile. For a moderate one-time fixed charge, any B-G printer can quickly be reprogrammed to meet the special requirements of a specific application. Custom character sets, printing stored forms with inserted data, clock/calendar functions, special calculations, conditional operations—these are but a few of the many features that have been included in specially programmed B-G printers. In some cases, a custom-programmed B-G printer serves as the entire logic system for a fairly complex instrument.

For more information. Detailed brochures, a price list and application notes will be mailed to you as soon as we receive your inquiry. If you have an upcoming OEM application, we would be pleased to discuss it with you in detail and arrange a demonstration.

Most B-G Instruments' printer/plotters are also available with cabinets and power supplies.

B-G Instruments P.O. Box 67, Alta Loma, CA 91701
(714) 989-4802, (714) 980-2826 TWX 910-581-2792

Carroll Touch Technology

a subsidiary of AMP Incorporated

Infrared Scanning Touch Input Systems
Keeping computers in touch with people

MONITOR PRODUCTS

For Aydin 8039, 8810; Mitsubishi C3419; Ramtek GM714; Sanyo DMC6013; Sony PVM-1270Q. 13″-diagonal window. Opto-matrix 48X x 32Y. Resolution .230 inches X, .245 inches Y. (Sony 1270Q has opto-matrix 48X x 36Y; resolution .200 inches X, .200 inches Y.) 2-way communication. Touch system reports, diagnostic reports, communications support and special features software-selectable. RS-232 compatible. System includes frame, controller, cables, bezel assembly, power supply, user's guide. Single quantity price $2500.
For Aydin 8039 order #8000-6500-01.
For Aydin 8810 order #8000-4900-01.
For Mitsubishi C3419 order #8000-4800-04.
For Ramtek GM714 order #8000-7600-01.
For Sanyo DMC6013 order #8000-5000-01.
For Sony PVM-1270Q order
#8000-7300-01 (3rd quarter 1984).

For Aydin 8810; Mitsubishi C3419; Ramtek GM714; Sanyo DMC6013. 13″-diagonal window. Opto-matrix 40X x 32Y. Resolution .266 inches X, .234 inches Y. RS-232 compatible. System includes frame, controller, cables, bezel assembly, power supply, user's guide. Single quantity price $1900.
For Aydin 8810 order #8000-1200-02.
For Mitsubishi C3419 and Ramtek
For Sanyo DMC6013 order #8000-1600-01.

For Aydin 8025, 8026, 8040, 8830; Ikegami DM511H; Mitsubishi C3910, C3919, C6912, C6919; Ramtek GM719, GM720, 859C. 19″-diagonal window. Opto-matrix 64X x 48Y. Resolution .240 inches X, .230 inches Y. 2-way communication. Touch system reports, diagnostic reports, communications support and special features software-selectable. RS-232 compatible. System includes frame, controller, cables, bezel assembly, power supply, user's guide. Single quantity price $2500.
For Aydin 8025 order #8000-6200-01.
For Aydin 8026 order #8000-5100-01.
For Aydin 8040 order #8000-6300-01.
For Aydin 8830 order #8000-5800-01.
For Ikegami DM511H order #8000-6600-01.
For Mitsubishi C3910 order #8000-5700-01.
For Mitsubishi C3919 order #8000-5900-01.
For Mitsubishi C6912 order #8000-6400-01.
For Mitsubishi C6919 order #8000-5200-01.
For Ramtek GM719 order #8000-7400-01.
For Ramtek GM720 order #8000-6800-01.
For Ramtek 859C order #8000-6700-01.

For Aydin 8025, 8830; Mitsubishi C3910; Ramtek GM719. 19″-diagonal window. Opto-matrix 54X, 48Y. Resolution .275 inches X, .230 inches Y. RS-232 compatible. System includes frame, controller, cables, bezel assembly, power supply, user's guide. Single quantity price $1900.
For Aydin 8025, Mitsubishi C3910,
Ramtek GM719 order #8000-1500-01.
For Aydin 8830 order #8000-3000-01.

For Sony CVM1900. 19″-diagonal window. Opto-matrix 64X x 48Y. Resolution .240 inches X, .225 inches Y. 2-way communication. RS-232 compatible. System includes frame, controller and power supply in separate enclosure, cables, bezel assembly, user's guide. Single quantity price $2500.
Order #8000-0900-02.

Infrared Scanning Touch Input Systems
Keeping computers in touch with people

TERMINAL PRODUCTS

For Hewlett-Packard 264X series terminals. 9.5″ x 4.5″ window. Opto-matrix 40X x 24Y. Resolution .240 inches X, .195 inches Y. Supports full duplex communication, handshaking. Touch data "or-ed" with terminal transmit data. HP terminal must have extended async communication option. System includes frame, controller, cables, bezel assembly, user's guide. Single quantity price $2495.

Order #8000-0500-01.

For DEC VT100™ and VT103™ terminals. 8.5″ x 4.5″ window. Opto-matrix 40X x 24Y. Resolution .210 inches X, .200 inches Y. Controller uses terminal STP. Supports full duplex communication, handshaking. Touch data spliced serially with terminal transmit data. Touch system reports, diagnostic reports, communications support and special features software-selectable. System includes frame, controller, cables, bezel assembly, user's guide. Single quantity price $1200.

Order #8000-0200-04.

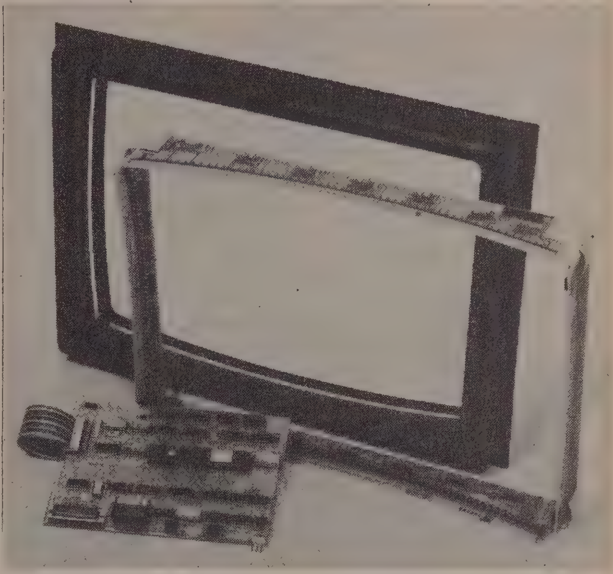
For Datamedia Excel 22, Excel 24 and ColorScan terminals. 12″- or 14″-diagonal window. Opto-matrix 40X, 24Y. Resolution .220″ X, .240″ Y. Touch system reports, diagnostic reports, communications support and special features software-selectable. RS-232 compatible. System includes frame, controller, cables, bezel assembly, power supply, user's guide. Single quantity price $1350.

For Excel 22 and ColorScan (12″ screen) order #8000-4700-06.

For Excel 24 (14″ screen) order #8000-4700-02 (future availability).

For ISC 8001G terminals. 19″-diagonal window. Opto-matrix 61X, 48Y. Resolution .216 inches X, .216 inches Y. Controller requires two ports in address space, fits in card cage. System includes frame, controller, bezel assembly, cables, user's guide. Single quantity price $1900.

Order #8000-5500-02.



FLAT PANELS

For display with 9″ x 9″ window. Opto-matrix 32X x 32Y. Resolution .266 inches X, .266 inches Y. 2-way communication. RS-232 compatible. External power required: +5V @ 1.5A. System includes frame, controller, cables, bezel assembly, user's guide. Single quantity price $1800.

Order #8000-0400-01.

For display with 17″ x 17″ window. Opto-matrix 64X x 64Y. Resolution .266 inches X, .266 inches Y. 2-way communication. RS-232 compatible. External power required: +5V @ 1.5A System includes frame, controller, cables, bezel assembly, user's guide. Single quantity price $2900.

Order #8000-1100-01.

Stand-alone generic kits also available for evaluation purposes.

Carroll Touch Technology

a subsidiary of AMP Incorporated
P.O. Box 1309
Round Rock, TX 78664, 512/244-3500

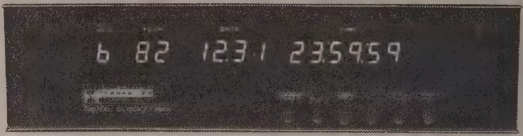
Keeping computers in touch with people

DIGITAL TIMING INSTRUMENTS

CHRONO-LOG CORPORATION

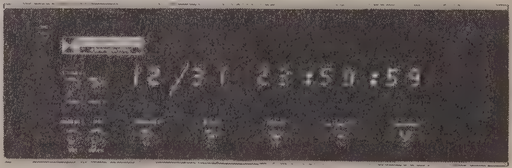
NEW

SERIES K
MULTI-SYSTEM CLOCK/TIMER



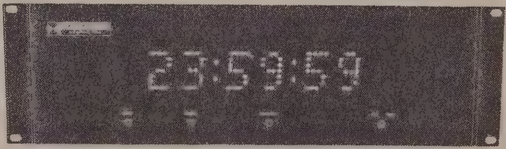
- Provides time to as many as five independent systems
- Serial bidirectional channels for timesetting & control
- Five types of interfaces (may be intermixed)
  - bidirectional RS-232C/20 ma current loop
  - bidirectional RS-422 channel
  - bidirectional RS-423 channel
  - byte serial, 4-bit, 8-bit, or 16-bit, TTL or tristate
  - parallel BCD, TTL or tristate
- Operates as real time clock or up-down timer
- Simple program commands
- User configured for various date-time ranges and outputs
- Time resolutions to 0.1 seconds, 0.01 minutes, or 0.0001 hours
- Internal battery back-up for 4-days (optional)
- Front panel LED display and timesetting controls (optional)
- Data format can be set and changed by user system

SERIES 70,000 DIGITAL CLOCK/CALENDARS



Large variety of time ranges and resolutions. Include gate controlled BCD outputs at TTL levels, open collector outputs, high voltage or current outputs, or relay closures for wide flexibility in interfaces. Standard features include pulse rate outputs at 1 pps, 0.1 pps and 1 ppm. Options include various time bases, power sources and battery back-up. Can also provide RS232C/20 ma current loop interface. Available as a Real Time Clock and as a Remote Display which accepts BCD inputs at TTL levels.

BIG TIME CLOCKS VISIBLE FROM 75 FEET



NEW

AVAILABLE AS A 2-WIRE REMOTE DISPLAY SYSTEM

- 1½″ LED dot shaped character
- 24 or 12 hour time
- 115/230 V., 50/60 Hz, or 12 V. DC
- Standby battery option (clock only)

VIDEO GENERATORS

CHRONO-LOG VIDEO CHARACTER GENERATORS accept up to 16 BCD characters at TTL levels from Chrono-log instruments or other sources and insert the data into a video signal. Fixed alpha-numeric characters, stored in a PROM in the Series 90,000 Character Generator, can be included as part of the display. Up to 31 characters can be displayed on one line, or 15 characters each on two lines.

TIME CODE INSTRUMENTS

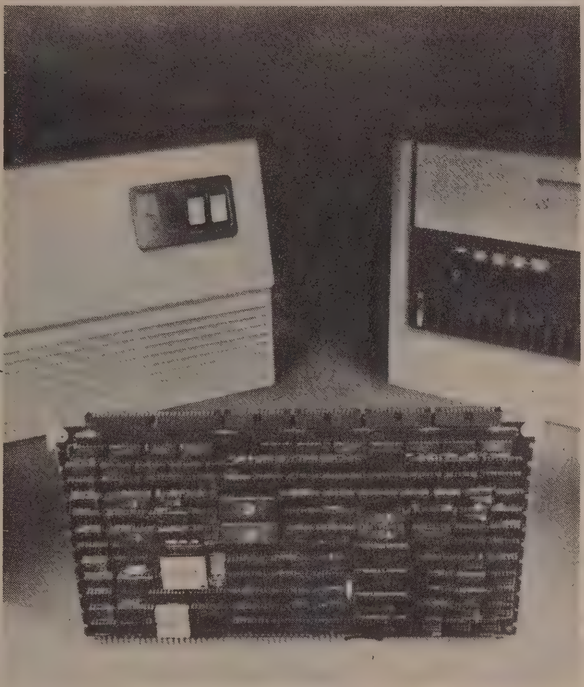
CHRONO-LOG TIME CODE GENERATORS and READERS generate and read IRIG A, B and E time codes for analog tape recorders and serial data transmission systems.

Single and multicode units are offered as Generators, Readers, and combination Generator/Readers. Buffered and gated parallel BCD outputs at TTL levels are available with resolutions to 1 millisecond. Semi-automatic synchronization to WWV is a standard feature.

CHRONO-LOG CORPORATION

2 WEST PARK ROAD • HAVERTOWN, PA 19083 • PHONE: (215) 853-1130 • TELEX 831579

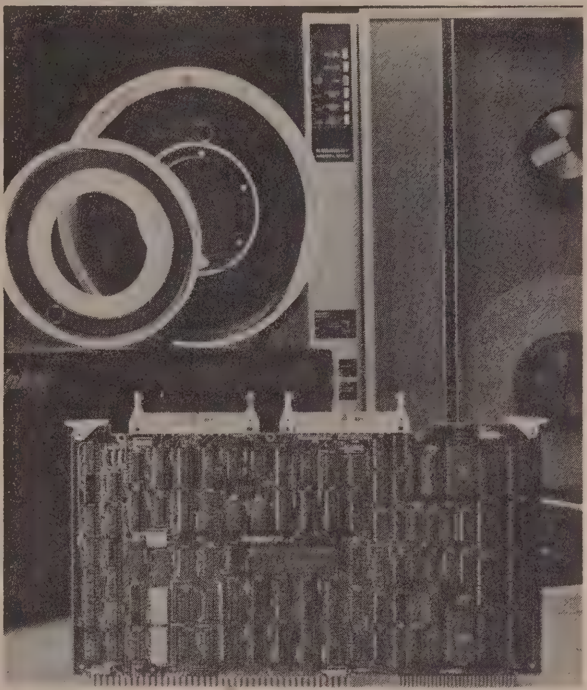
CIPRICO
Multibus® Disk and Tape Controllers



Rimfire 50 SMD Disk Controller

FEATURES

- ☐ Controls up to four SMD compatible disk drives.
- ☐ Multibus compatible, with unrestricted 24-bit addressing, 8/16-bit data bus, serial or parallel priority.
- ☐ Proprietary dual-function ECC circuit with a 48-bit data ECC word and a 16-bit ID CRC word.
- ☐ Independent Command Complete and Status Change Interrupts.
- ☐ 16 MHz disk interface with non-interleaved capability.
- ☐ System Gate option for multimaster systems.
- ☐ Absolute or offset memory addressing.
- ☐ Defect mapping and transparent alternate selection of either tracks or sectors.
- ☐ Automatic dump and restore capability using the CPC Tapemaster ½-inch tape drive adaptor.
- ☐ Many programmable options, including DMA throttle, linked Parameter Blocks and separate ECC/Retry disables.
- ☐ Executes user-written 80186 code from system memory.



Tapemaster ½-inch Tape Adaptor

FEATURES

- ☐ Controls any combination of up to eight start/stop or streaming, NRZI, GCR, PE or dual density drives.
- ☐ Data can be read or written in three modes: Direct, Buffered, or Ring Buffered.
- ☐ 64 byte FIFO in line with the data path demands on the system bus.
- ☐ Programmable for 8 or 16-bit systems.
- ☐ DMA Master with 24-bit addressing.
- ☐ Many programmable options including Bus Lock, Linked Commands and Multibus or Mailbox Interrupts.
- ☐ Single or Multimaster environments.
- ☐ Powerful Block Move capability with Search and Translate options.
- ☐ Executes user-written 8089 programs.
- ☐ Single 5 VDC operation.

Ciprico Inc. also manufactures the following Disk Controller boards:

Rimfire 44 — ANSI Disk plus ¼″ tape
Rimfire 45 — ANSI Disk plus ½″ tape
Rimfire 75 — ANSI Disk plus 3M ¼″ cartridge tape
Rimfire 38A — Priam Disk plus ½″ tape
Picomate — ¼″ Kennedy Cartridge tape

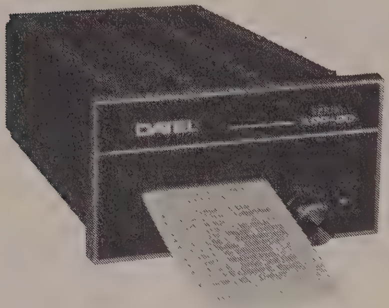
FOR COMPLETE INFORMATION:

CIPRICO, INC.
2405 Annapolis Lane
Plymouth, MN 55441
(612) 559-2034

MINI THERMAL PANEL PRINTERS

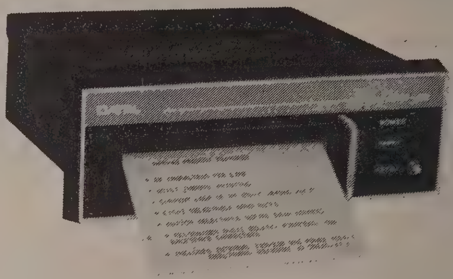
. . . All electronics are built-in!! . . .

20-COLUMN ALPHANUMERIC



APP-20 SERIES

48-COLUMN ALPHANUMERIC



APP-48 SERIES

COMMON FEATURES

APP-20 SERIES		APP-48 SERIES
96-CHAR. ASCII	CHARACTERS	96-CHAR. ASCII
63 LINES/MINUTE	SPEED	72 LINES/MINUTE
1 LINE, 20 CHAR.	BUFFER	1 LINE, 48 CHAR.
4.44″W x 2.76″H x 8.00″D	SIZE	8.20″W x 2.84″H x 8.14″D
4.3 LB (AC), 2.5 LB (DC)	WEIGHT	6 LB.
115,230 VAC OR 12 VDC	POWER	115,230 VAC or 12 VDC
2.31″ WIDE	PAPER	5″ WIDE
5 x 7, 0.11″ HIGH	FONT	5 x 7, 0.11″ HIGH
SELECTABLE	INVERTED PRINTOUT	SELECTABLE

SPECIAL FEATURES

APP-20 SERIES	APP-48 SERIES
SELECTABLE TALL CHARACTERS	SELECTABLE 2ND 96-CHAR. SET

INTERFACE MODELS

APP-20 SERIES		APP-48 SERIES
APP-20A1 SERIES	BYTE—PARALLEL	APP-48A1 SERIES (CENTRONICS)
APP-20A21 SERIES	SERIAL, RS-232-C AND ISOL. 20 mA	APP-48A2 SERIES
APP-20A3 SERIES	IEEE-488 GPIB	APP-48A3 SERIES
	OTHER PRODUCTS:	
APP-TR2 SERIES	TAKE-UP/REWIND REEL	APP-TR5 SERIES
APP-M20 SERIES	VEHICLE MOUNT RUGGEDIZED	APP-M48 SERIES

7-COLUMN BCD NUMERIC THERMOPRINTERS

DPP-Q7 SERIES • APP-TR1 SERIES TAKE-UP REEL

SEND FOR YOUR FREE THERMAL PRINTER BROCHURE

DATEL

11 CABOT BOULEVARD, MANSFIELD, MA 02048/TEL. (617)339-9341/TWX 710-346-1953/TLX 951340
• Santa Ana, CA (714) 835-2751 • Sunnyvale, CA (408) 733-2424 • Los Angeles, CA (213) 933-7256
• OVERSEAS: DATEL (UNITED KINGDOM) TEL. BASINGSTOKE (256)69085 • DATEL (FRANCE) TEL. 602 57 11
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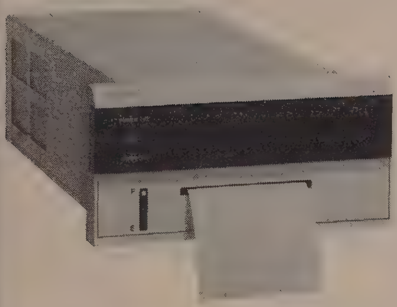
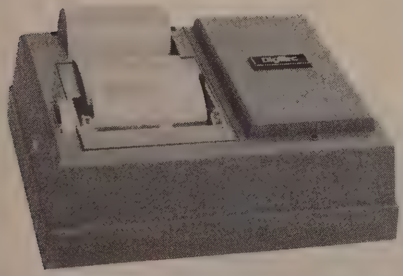
Digitec Printers



6600 Series

6600 Series with
optional keyboard



6400 Series

Panel-Mount & Desktop Printers – Bulletin 4400
Affordable microprocessor-based 21-32 column dot-matrix printers are mechanically reliable and easy to apply. The wide selection of buffered input types and data rates simplifies interface with computer-based equipment and panel instrumentation. For remote message printing, program listing, data logging and recording – anywhere hardcopy is desired. Standard word wrap on some models handles even long lines of output in a readable format. Choose from models for panel, office, lab, and industrial applications.

All Digitec printers can be custom-designed and programmed for OEM applications. Contact us with your requirements.

OEM Panel-mount Printers with clock panel

- Use plain paper.
- Serial and parallel inputs.
- Optional 2K nonvolatile buffer.
- Optional real time clock.
- Graphics and keyboard data entry capability.
- Common 4.50" x 2.78" cutout, DIN adaptable.

Digital Panel Printer

- Plain paper impact printer.
- Parallel BCD input, TTL compatible.
- Program clock option.
- Lowest price DPI printer.

Desktop Printers

- Thermal or electrosensitive.
- Compact size – just 3" x 5" x 7".
- Widest selection of inputs.
- Internal clock models.
- Optional 12V DC power.

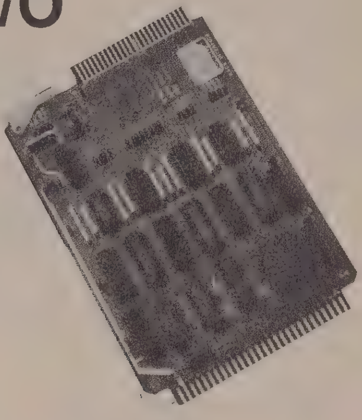
Printers	Cols	Printing	Inputs	Internal Clock
Panel-mount 6600 Series	24	impact	RS-232-C/20mA byte serial	opt.
Digital panel 6600 Series	16-22	impact	parallel BCD	opt.
Desktop 6400 Series	21-32	thermal, electro-sensitive	serial or parallel serial & parallel IEEE-488 Centronics comp.	opt. — — —
Panel/rack 6500 Series	21-32	thermal, electro-sensitive	serial parallel	— —
Benchtop 6300 Series	21	electro-sensitive	serial parallel	std. std.
Digital recorder 6100 Series	10-18	impact	parallel BCD	std.

Digitec Corporation, 918 Woodley Road, P.O. Box 458,
Dayton, Ohio 45401, Tel. (513) 254-6251. Telex (310) 687-4219.

DigiTec

GIC SYSTEMS

GIC SYSTEMS VSC™ PERIPHERALS G7507 I/O



I/O MODULE INTERFACE CARD

The G7507I/O provides an interface between the STD BUS and the Industry Standard I/O Module Mounting Rack (PB-16/PB-24). This interface card can control up to 24 AC or DC input or output modules in any combination and position on the I/O Module Board. The I/O Module Board may be separated from the G7507I/O by up to ten feet (3.05M) of 50 conductor ribron cable.

The G7507I/O is also useful as a general purpose TTL interface card. Three 8-bit read/write ports control 24 bidirectional signal lines. In additon, an output port-controlled power source rated at +4.7V at 500mA is provided. An LED assembly, visible from the card edge, monitors the state of the power source and the three signal lines. Connection to the G7507I/O is supplied through a 50-pin card edge connector. Adjacent grounds are provided for each signal line for use in ribbon cable or discrete wire cable assemblies.

FEATURES

- Up to 24 I/O Modules per G7507I/O
- Any type of Module can be Controlled in any Combination and Position
- Standard I/O Module Bus allows use of Industry Standard Industrial I/O Module Boards
- Low Pass Input Filters for Noisy Industrial Environments
- Single +5V Operation
- Socketed ICs

G7507 I/O MODULE INTERFACE CARD ELECTRICAL SPECIFICATIONS

MNEM.	Parameter	Recommended Operating Limits Min.	Typ.	Max.	Absolute Non-Operating Limits Min.	Max.	Unit
V_{CC}	Supply voltage	4.75	5.00	5.25	0.0	7.00	Volt
T_A	Free air temp.	0	25	55	−40	75	°C

USER INTERFACE ELECTRICAL CHARACTERISTICS OVER RECOMMENDED OPERATING LIMITS

MNEM.	Parameter	Min.	Typ.	Max.	Unit
V_{OL}	Low level interface voltage (at 10 mA current level)			.80	Volt
I_{OL}	Low level interface current (at 0.70V level)			20	mA
V_{OH}	High level interface voltage	4.75		5.25	Volt
I_{OH}	High level interface current (at 2.0V)	−3.0			mA
V_{EXT}	Supply voltage output to module board	4.45	4.70	4.95	Volt
I_{EXT}	Supply current output to module board			500	mA

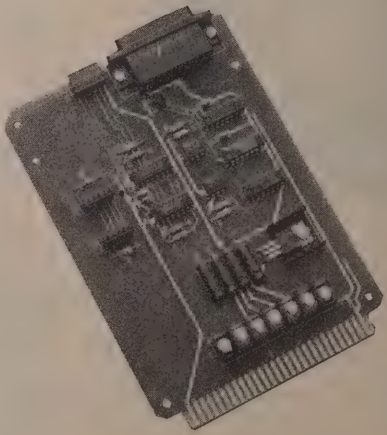
VSC™-TR

TRANSLATOR — REPEATER CARD

The VSC™-TR provides RS-232C translation to RS-422. This gives Serial Control capabilities (using VSC-31) to all computers which can provide RS-232C signals. RS-422 output permits industrial control at distances of up to 4000 feet.

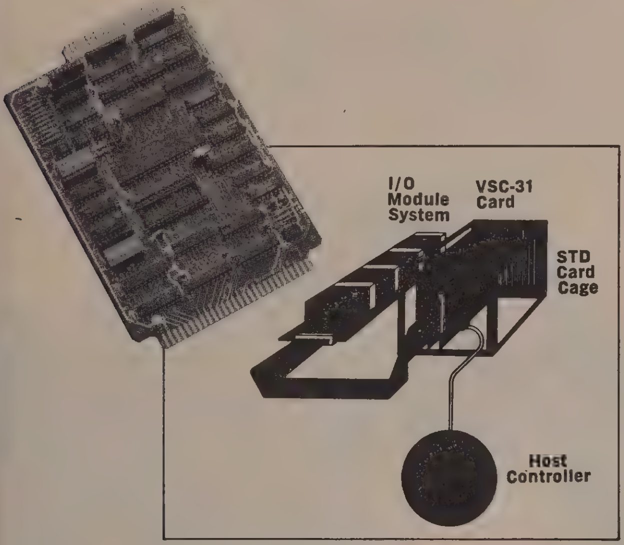
The VSC™-TR also functions as a RS-422 to RS-422 repeater for amplification of signals after each 32 stations.

±12V, +5V power supplies can be connected through an on board terminal block, or by sliding the VSC™-TR card into an STD card cage.



GIC SYSTEMS

GIC SYSTEMS VSC™-31 VERSATILE SERIAL CONTROLLER



The new GIC Systems VSC-31 Versatile Serial Controller is an 8031/51-based system (RS-422 compatible) for distributed I/O control, which can be used in the stand alone mode or as an STD bus controller.

I/O Capacity
The state-of-the-art processor permits up to 127 of these new cards to be linked to one host controller. Each VSC-31 uses resident firmware to control 16 I/O lines directly, or up to a total of 127 I/O ports through utilization of the STD bus interface provided.

STD Bus
Unlike most serial I/O systems, the STD interface permits the addition of other STD function cards at remote locations (including analog as well as digital I/O).

Available Translator/Repeater
GIC Systems VSC-TR card gives RS-422 capability to RS-232C-based system (for I/O control up to 4,000 feet).

Additional Applications
Slave intelligent peripheral controller utilizing DMA on the STD bus. STD-based 8031/51 processor card.

Stand Alone Computer
The VSC-31 can also function as a stand alone 8031 based STD bus controller.

OPERATING MODES

The following operating modes are selected with the DIP switch on the remote unit.

1) Data rate — The data rate of the serial channel is selected.

Data rate (baud)
110
150
300
600
1200
2400
4800
9600

2) Station address — The remote unit is assigned a unique address in the range of 1 to 127.
3) Parity select — The remote unit may be programmed to check for odd or even parity or ignore parity.
4) Checksum disable — The remote unit may be programmed to ignore the checksum on data transmitted by the host. The checksum byte must still be transmitted by the host but the remote unit will not check its value. The remote unit will always transmit the checksum.
5) Command echo mode — This switch specifies if the remote unit will echo the command to the master when it transmits a command acknowledge.

FOR NEW ANALOG COMMANDS, CONTACT FACTORY.

ERROR TYPES

Configuration Error
Character Error
Message Too Long
Undefined Command
Counter Overflow
Reset State
Checksum Error

COMMANDS

- Configuration
  - Set port address
  - Set module direction
  - Read module direction
  - Set expansion modes
- Control and Status
  - Turn on I/O module board
  - Turn off I/O module board
  - Read status register
  - Read and reset error counters
- Input/Output
  - Read from ports
  - Write to ports
  - Set outputs
  - Reset outputs
  - Toggle outputs
- Initialization
  - Reset
  - Clear
- Latched Input
  - Specify latched inputs
  - Set latch transition pattern
  - Read and clear latched modules
  - Clear latched modules
- Event Counters
  - Configure event counters
  - Read event counters
  - Read event counters and reset
  - Read overflow

GIC SYSTEMS / 2324A RIDGEPOINT DRIVE, AUSTIN, TX 78754 / (512) 926-8840

GIC SYSTEMS

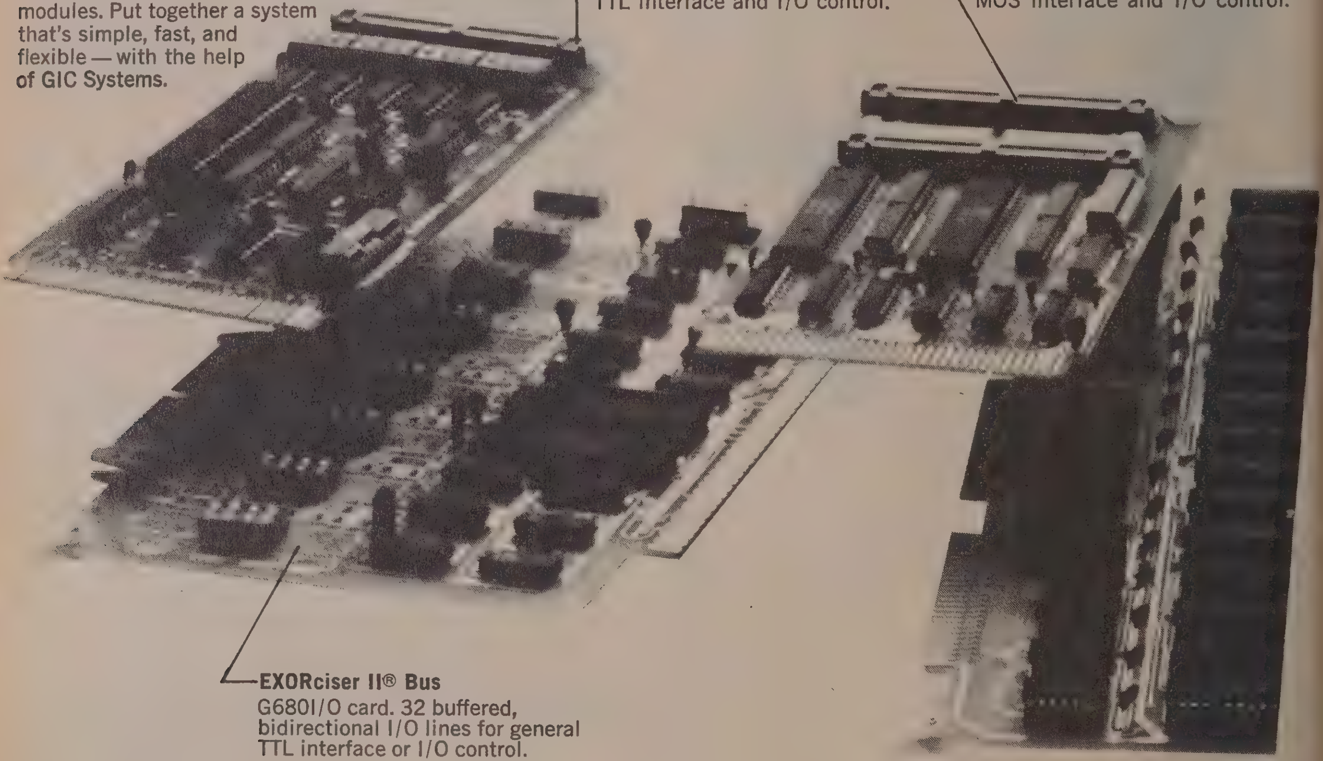
BUS-COMPATIBLE
Input/Output Control Systems

GIC SYSTEMS BUS-COMPATIBLE INPUT/OUTPUT CONTROL SYSTEMS

Choose your bus. Leave the interface cards and I/O control modules to us.

GIC Systems makes it easy to equip your RM-65™, Multibus™, EXORciser II®, or STD microcomputer bus for industrial control. We're the single source for everything you need, right off the shelf: interface cards, cable, I/O modules, and module boards. Even Eurocards and VDE-spec modules. Put together a system that's simple, fast, and flexible — with the help of GIC Systems.

RM-65™ Parallel I/O Cards
Eurocard versions available.



GPBI/O card. 16 buffered bidirectional I/O lines for general TTL interface and I/O control.

GPSI/O card. 32 non-buffered, bidirectional I/O lines for general MOS interface and I/O control.

EXORciser II® Bus
G680I/O card. 32 buffered, bidirectional I/O lines for general TTL interface or I/O control.

TECHNICAL SPECIFICATIONS, CONNECTIONS, AND ORDERING INFORMATION

To order, specify quantities and part numbers for each card, cable, or connection, as noted below. See back cover for I/O modules and module board availability.

PARALLEL I/O CARDS

Interface Cards					Interconnection Cables			I/O Module Requirements	
Bus	Part Number	Maximum Number of I/O Lines	I/O Lines Buffered (B) or Non-Buffered (N)	Number of Available 16 Bit Timers on Board	Part Number	Number Req'd.	Number Supplied Standard	Module Compatibility Standard (S) Buffered (B)	Current Sinking Capability
RM-65	GPBI/O	16	B	2	CP8001	1	1	S or B	24 mA
RM-65 Euro	GPBI/O-E	16	B	2	CP8001	1	1	S or B	24 mA
RM-65	GPSI/O	32	N	4	CP8001	1 or 2	1	B	1.6 mA
RM-65 Euro	GPSI/O-E	32	N	4	CP8001	1 or 2	1	B	1.6 mA
STD	G7507I/O	24	B	0	CA-x*	1	0	S or B	20 mA
EXORciser II	G680I/O	32	B	4	CP-8001	1 or 2	0	S or B	24 mA
Multibus	G519I/O	72	B	3	CA-x*	1, 2, or 3	0	S or B	24 mA

*x To order cable, specify length (ft.) required. (Example: CA-2 is a 2 foot cable.)

™RM-65 is a trademark of Rockwell International. ™Multibus is a trademark of Intel Corporation. ®EXORciser II is a registered trademark of Motorola, Inc.

GIC SYSTEMS / 2324A RIDGEPOINT DRIVE, AUSTIN, TX 78754 / (512) 926-8840

GIC SYSTEMS

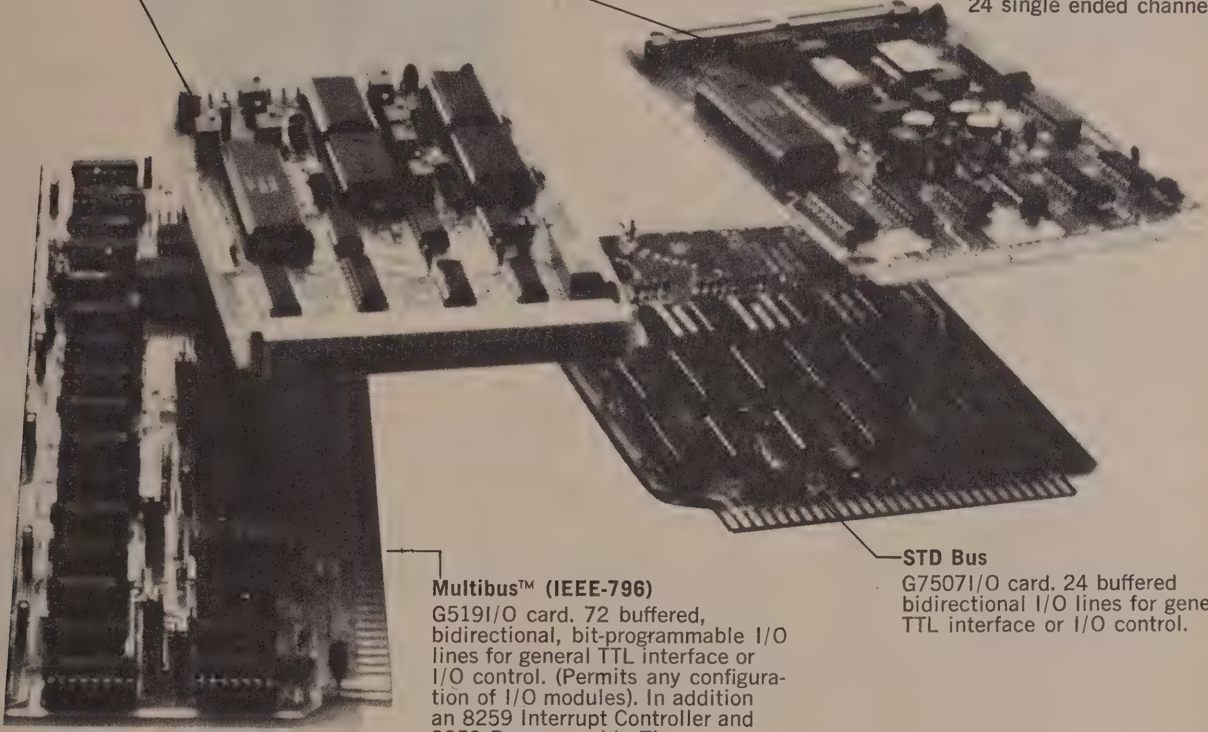
BUS-COMPATIBLE
Input/Output Control Systems

RM-65™ Data Conversion Cards
Eurocard versions available.

DA-410 card. Supports the RM-65 bus with four 10-bit digital-to-analog converters.

AD-10 card. Provides 10-bit analog-to-digital conversion. 8 dual or 16 single-ended channels.

AD-12-E (not shown) provides 12-bit analog-to-digital conversion, 8 dual or 24 single ended channels.



STD Bus
G7507I/O card. 24 buffered bidirectional I/O lines for general TTL interface or I/O control.

Multibus™ (IEEE-796)
G519I/O card. 72 buffered, bidirectional, bit-programmable I/O lines for general TTL interface or I/O control. (Permits any configuration of I/O modules). In addition an 8259 Interrupt Controller and 8253 Programmable Timer are provided.

DATA CONVERSION CARDS

Bus	Part Number	Conversion Type	Resolution (Bits)	Number of Channels	Characteristics	Connectors (Part Numbers)
RM-65	DA-410	Digital to Analog	10	4	Unipolar (0 to 10.23 Volts) OR Bipolar (−5.12 to +5.11 Volts)	Molex .156" • 2139 R
RM-65 Euro	DA-410-E					
RM-65	AD-10	Analog to Digital	10	8 dual or 16 single-ended	• Gain-Programmable instrumentation amp • Sample-and-hold circuit • Programmable analog filter with bypass switch	Optional CP8003 cable (3 ft. 50-conductor, color-coded ribbon cable with socket connector on one end)
RM-65 Euro	AD-10-E					
RM-65 Euro	AD-12-E	Analog to Digital	12	8 dual or 24 single-ended	Same	Same

SERIAL INTERFACE SYSTEM (RS-422 Compatible)

Provides twisted-pair serial link between a host controller and other serial systems, plus a wide variety of parallel I/O peripherals including the STD bus.

A converter is available to link these serial cards to RS-232C based systems. Contact GIC Systems for further information on this system.

GIC SYSTEMS / 2324A RIDGEPOINT DRIVE, AUSTIN, TX 78754 / (512) 926-8840

MINI BOX

GENERAL

Heurikon presents Minibox™ - Heurikon's multiuser Unix™ workstation based on its powerful HK68™ single board microcomputer and Uniplus+™ Unix System operating system.

Designed with the OEM in mind, the Heurikon Minibox is both compact and flexible. Included within its 10.5"w x 13.9"h x 20.5"l frame is a 200 or 400 watt power supply, four or six slot Multibus™ card cage (4 - 5 available for user use!), single double density floppy disk drive, streamer tape drive, 31 or 65 Megabyte Winchester drive expandable to two hundred and eighty megabytes (280MB) within the same cabinet (four drive bays are provided). System status LEDS on the front panel inform the user of CPU and disk drive activity. A drop-away rear panel speeds on-site cable installation.

The heart of the Minibox is the powerful Heurikon HK68 microcomputer based on the MC68000 (or MC68010) microprocessor. Contained on this single Multibus board is the MPU; quad channel DMAC; floppy disk drive controller; Winchester interface; four to twelve serial ports; from 128K to 1M byte of on-board RAM; up to 32K bytes of EPROM; CPU status LEDs, eight user LEDs and four DIP switches. Service (if necessary) can be done on a single board replacement level.

Because nearly all system facilities reside on the HK68 microcomputer; disk accesses and servicing of user terminals is done at high speed without the time penalty incurred by having to go through the system bus.

We think a workstation for the OEM system integrator should be compact, provide plenty of *extra* card slots to build a system, allow disk storage to be expanded within the cabinet (not piled around it), offer great performance and be cheap so *everyone* can make money. We offer you Minibox - in less than 1.5 square feet of desk space.

UNIPLUS+™ A MULTIUSER UNIX™ OPERATING SYSTEM

With Uniplus+™ from Unisoft Corporation, Heurikon offers the full power of the Unix™ operating system on the HK68 microcomputer. Including over 160 programs and commands. Uniplus+™ provides Heurikon customers with a flexible and affordable operating system for program development, text preparation, and general office tasks.

Uniplus+™ is derived from the recently released Bell Laboratories System III/V Unix and supports the most useful System III/V utilities, Source Code ControlSystem (SCCS), Programmers Workbench and many of the most powerful "Berkeley enhancements" including:

C-SHELL (csh)
Visual Editor (vi)
"adb," a general purpose debugger
"more," a pagination command for CRTs
"whereis," program and documentation locator
"yacc," yet another compiler compiler and a host of other useful utilities.

Uniplus+™ supports a multi-user/multi-tasking environment using a single chip Memory Management Unit.

Included in Uniplus+™ is a full "C" compiler, associated assembler using MIT mnemonics, and linker/loader. Optional Languages currently available are:

Motorala compatible 68000 macro assembler
ISO Pascal with many of the UCSD extensions (native mode compiler)
FORTRAN 77 (native mode compiler)
RM-COBOL
SVS BASIC (A DEC BASIC-4 compatible BASIC interpreter)
SMC BASIC (A Basic Four compatible BASIC interpreter)

Other utilities include Unify Data Base Management System, Ethernet and floating point processors, and in addition various host protocols.

CP/M-68K™

CP/M-68K™ contains all facilities of other CP/M systems with additional features to account for increased processor address space of up to sixteen megabytes of main memory. Further, CP/M-68K™ maintains file compatibility with all previous versions of CP/M. The file structure allows as many as sixteen drives with up to 512 megabytes on each drive.

CP/M-68K™ includes utility programs such as ED, PIP, and STAT. The debugger, DDT-68K, allows you to debug CP/M-68K™ machine code interactively. The assembler, ASM-68K™, allows you to program in assembly language that consists of Motorola mnemonics. The package also includes a 'C' compiler.

Please inquire about other available operating systems including Poly Forth™, Regulus™, and others.

MINIBOX SPECIFICATIONS

Mechanical —
Dimensions: 13.9"h x 10.5"w x 20.5"l
Cardrack: 4 or 6 slots — 0.60" spacing Standard Multibus™ with serial priority resolution scheme

Environment —
Typical working environment

Electrical —
AC Power
Input: 110V 60Hz @ 5 Amps
220V 50Hz @ 2.5 Amps

Specifications subject to change without notice.

Electrical — DC Power	Current Ratings		
	+5V.H	+12V.H	−12V.H
400 Watt Supply	45A	20A	10A
200 Watt Supply	25A	11A	4A

Example
Power Available to Card Rack
(3 Hard Disk Drives & 1 Floppy Drive in the System)

	+5	+12	−12
400 Watt Supply	38A	10A	10A
200 Watt Supply	18A	4.4A	4.0A

Individual maximum currents shown, total not to exceed indicated supply rating.

HEURIKON CORP.

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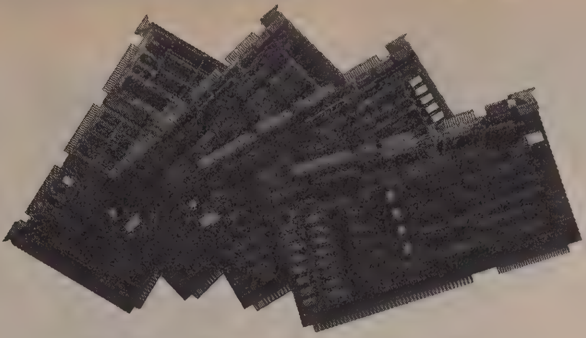
Heurikon Single Board 8 Bit Microcomputer



FEATURE	MLZ-90A	MLZ-91A	MLZ-92A	MLZ-93A
CPU	Z-80A	Z-80A	Z-80A	Z-80A
Speed (MHz)	2, 4	2, 4	2, 4	2, 4
ROM: Chips (Max)	9 (8 RAM or ROM)	2	2	4
Type	2716, 2732, 2764	2716, 2732, 2764	2716, 2732, 2764	2716, 2732, 2764
Max K on-card	72K bytes	16K bytes	16K bytes	32K bytes
off-card	1M bytes	1M bytes	1M bytes	16M bytes
RAM: Type	Static, CMOS (Byte-wide)	DRAM	DRAM	DRAM
Size	1K x 8; 2K x 8; (4K x 8; 8K x 8 future)	16K x 1; 32K x 1; 64K x 1	16K x 1; 32K x 1; 64K x 1	16K x 1; 32K x 1; 64K x 1
Max K on-card	16K bytes	64K bytes	64K bytes	128K bytes
off-card	1M bytes	1M bytes	1M bytes	16M bytes
Parity	No	Yes (optional)	Yes (optional)	No
PIO Ports (8 bits)	4	1 (optional)	1 (optional)	No
SIO Ports	2 Async/Sync	2 Async/Sync	4 Async/Sync	2 Async/Sync
Interface	RS232C	RS232C (RS422 optional)	RS232C (RS422 optional—2ch.)	RS232C or RS422 mix
Special Protocalls	SDLC (HDLC)	SDLC (HDLC)	SDLC (HDLC)	SDLC (HDLC)
Baud Rate Generator	Dual, 16 S/W rates	Dual, 16 S/W rates	Dual, 16 S/W rates (User channel straps)	Dual, Internal SCC Counter
CTC Channels	4	4	4	3
On-card DMA Controller	Yes	Yes	Yes	Yes
Special features				
Single/Double density floppy controller	Yes (optional)	Yes (optional)	Yes (optional)	Yes (optional)
5¼″ drives	Yes	Yes	Yes	Yes
8″ drives	Yes	Yes	Yes	Yes
PLL Data separator	Yes	Yes	Yes	Yes
Write pre-compensation	Yes	Yes	Yes	Yes
Winchester I/F	No	Yes (Priam, Shugart, Micropolis, others) (optional)	Yes (Priam, Shugart, Micropolis, others) (optional)	No
Streamer tape drive I/F	No	Yes (Archive) (optional)	Yes (Archive) (optional)	No
APU (AMD Am9511)	Yes (optional)	Yes (optional)	Yes (optional)	Yes (optional)
GPIB (IEEE 488)	No	Yes (optional)	No	No
Analog Input Channels	No	No	No	No
User DIP Switches	No	Yes (16) (optional)	Yes (16) (optional)	Yes (8) (optional)
User LEDs	Yes (1)	Yes (8) (optional)	Yes (8) (optional)	Yes (8) (optional)
Memory mapping RAM	Yes	Yes	Yes	Yes
Power-On-Jump	Yes	Yes	Yes	Yes
Bus Interrupts	8	8	8	8
Bus Interface	20 bit Multibus (Multi-master)	20 bit Multibus (Multi-master/Slave)	20 bit Multibus (Multimaster/Slave)	24 bit Multibus (Multimaster/Slave)
On-card memory available from Multibus	No	Yes	Yes	Yes, Dual port DRAM
On-card I/O available from Multibus	No	Yes	Yes	No
Memory Base	Software controlled mapping	Software controlled mapping	Software controlled mapping	Software controlled mapping
Operating Systems	CP/M, MP/M	CP/M, MP/M, CP/NET	CP/M, MP/M, CP/NET	CP/M, MP/M, CP/NET
Power Requirements	+5V ±12V	+5V ±12V	+5V ±12V	+5v ±12V
Operating Temperature Range	0°C to 65°C	0°C to 65°C	0°C to 65°C	0°C to 65°C
Board Technique	Multilayer	Multilayer	Multilayer	Multilayer
Card Size	6.75 inches x 12.0 inches	6.75 inches x 12.0 inches	6.75 inches x 12.0 inches	6.75 inches x 12.0 inches
Introduction date	July 1980	May 1981	3rd Qtr. 1981	2nd Qtr. 1982

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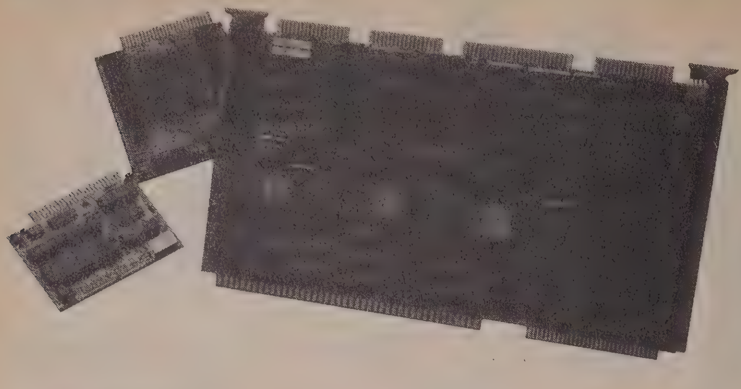


HK68™ FLEXIBILITY AND POWER

MICROPROCESSOR

The heart of the HK68 is the powerful MC68000 8MHz, or the MC68010 10 MHz microprocessor, which are rapidly becoming the standard of the industry. The MC68000/168010 provides a 16 bit data bus, 16M byte addressing; seventeen 32 bit registers, memory-mapped I/O, and 14 addressing modes. The speed and powerful instruction set of the MC68000/68010 (8-10 MHz) make short work of your microcomputer application.

DMA CONTROLLER

The *quad* channel MC68450 DMA controller has been included on the HK68. The MC68450 is a 4 channel, 16 bit access controller with internal 32 bit addressing, byte, word, or long word transfers, programmable priorities, vectored interrupt support, and both chained and unchained operational support.

MEMORY MANAGEMENT UNIT

The HK68 provides an MC68451 segmented memory management unit with logical to physical address translation, segment sizes of 256 bytes to 16 megabytes, separate supervisor, user program, data memory areas, and write protection. The MC68451 operates with the MPU, DMAC, and the Multibus™.

RANDOM ACCESS MEMORY

The HK68 may be configured to include 128K or 256K or 1 megabyte of dual access RAM with 2 parity bits per word. All RAM is accessible from the Multibus™. A single DRAM controller chip makes the hardware memory refresh transparent to the MPU.

READ ONLY MEMORY

Total capacity: 32K bytes.

BUS INTERFACE

The HK68 interfaces directly to the Multibus™ with 16 bit data path and 24 bit addressing. Master/slave and multimaster modes are supported.

An on-board byte-swap buffer allows the HK68 to interface easily with 8 bit peripherals and CPUs.

The HK68 can support both Motorala and Intel data bus conventions via hardware or software control.

WATCHDOG TIMER

An exclusive on-board watchdog timer is provided to prevent lengthy accesses from locking up on-card facilities.

SERIAL I/O

Four serial ports are provided on the HK68 via two Z8530 (SCC) serial communication controllers.

Each port has a separate, software controlled baud rate generator and all four ports support asynchronous or synchronous communications including IBM BiSync, HDLC, IBM SDLC, as well as others.

RS-232-C is standard on all four ports with EIA RS-422 available on one port. Transfer rates of 38.4K baud asynchronous and 1M bit synchronous are obtainable.

Four to eight additional ports may be added via Heurikon's SBX-SCC Serial Port Expansion Module.

FLOPPY DISK CONTROLLER

Floppy disk control is easily provided using a Heurikon SBX-FDIO plug-on module.

The SBX-FDIO handles single or double sided, single or double densty 5¼ inch or 8 inch floppy disk drive with various record formats. Both 8 inch and 5¼ inch drives may be mixed on the same cable.

WINCHESTER INTERFACE

An 8 bit port with control signals is provided for interface to various hard disk controllers such as the Western Digital WD100112 and Omni Controllers. The port may also be configured to support the SASI standard as defined by Shugart.

Various software drivers are available for CP/M-68K™ and Uniplus+™ operating systems.

STREAMER TAPE DRIVE INTERFACE

An 8 bit interface port for direct connct to an Archive (Cipher) streamer tape drive is included on-card. Support software is available which will run with either CP/M-68™ or Uniplus+™ operating systems.

The port can also be configured to resemble a Centronics (printer) compatible parallel port.

OPTIONAL 16 BIT PARALLEL I/O

The Winchester and streamer tape drive ports may be combined to form a single 16 bit parallel port if desired.

LIGHT EMITTING DIODES/DIPSWITCHES

There are eight latching LEDs and four piano-type dipswitches, located on the top edge of the HK68. Both are user programmable.

BOARD STATE LEDs

A bank of four LEDs is provided on the top edge of the HK68 to display whether the HK68 is in Supervisor, User, DMA, or Halt state.

EXPANSION MODULE CONNECTORS

Twin Intel iSBX™ compatible expansion connectors reside on the HK68 microcomputer. These connectors allow any of the numerous existing plug-in modules to be used on the HK68 for various I/O expansion. In addition, they enable users to quickly and cheaply construct custom interfaces, if needed.

There is one single and one double size mounting area available. Heurikon currently offers a quad channel serial port module and a floppy disk drive controller module. Others available include A/D, D/A, IEEE-488, bubble memory, etc.

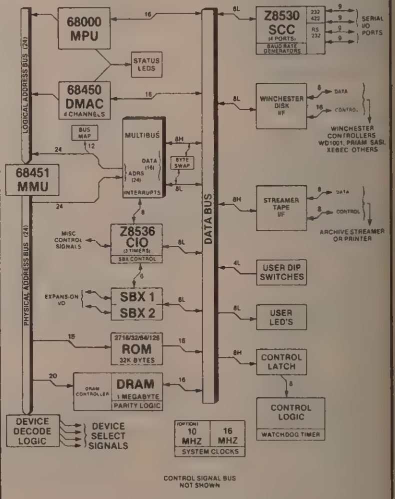
COUNTER/TIMERS

Three programmable 16 bit counter/timer channels are available on-card. Two channels may be linked to form a 32 bit counter.

BUILT-IN BOARD SERIAL NUMBER

In order to promote software securty, the HK68 microcomputer has a built-in serial number. This feature will allow an operating system or application program to uniquely identify the host board.

HK68 SYSTEM CONFIGURATION


LOGICAL ADDRESS BUS (24)
PHYSICAL ADDRESS BUS (24)
DATA BUS
68000 MPU
16
STATUS LEDS
68450 DMAC 4 CHANNELS
BUS MAP
12
24
68451 MMU
MULTIBUS
DATA (16)
ADRS (24)
INTERRUPTS
8H
8L
BYTE SWAP
Z8536 CIO (3 TIMERS)
SBX CONTROL
MISC CONTROL SIGNALS
6
SBX 1
SBX 2
EXPANSION I/O
15
2716/32/64/128 ROM 32K BYTES
20
DRAM CONTROLLER
DRAM 1 MEGABYTE
PARITY LOGIC
DEVICE DECODE LOGIC
DEVICE SELECT SIGNALS
(OPTION) 10 MHZ
16 MHZ
SYSTEM CLOCKS
Z8530 SCC (4 PORTS)
BAUD RATE GENERATORS
232 422
RS 232
9
SERIAL I/O PORTS
WINCHESTER DISK I/F
DATA
CONTROL
WINCHESTER CONTROLLERS WD1001, PRIAM SASI, XEBEC OTHERS
STREAMER TAPE I/F
ARCHIVE STREAMER OR PRINTER
4L
USER DIP SWITCHES
USER LED'S
CONTROL LATCH
8
CONTROL LOGIC
WATCHDOG TIMER
CONTROL SIGNAL BUS NOT SHOWN

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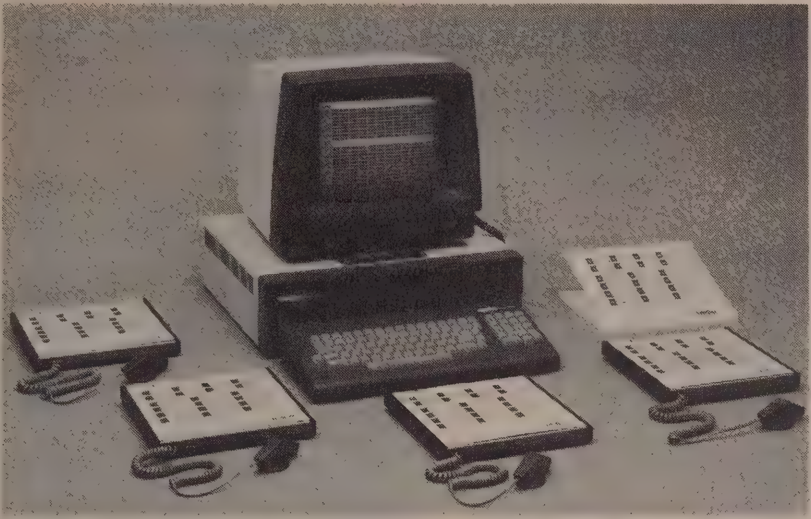
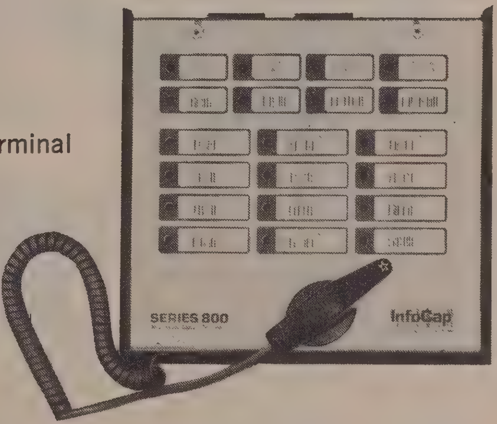
AUTOMATED DATA COLLECTION SYSTEM



FOR ADVANCED QUALITY & PRODUCTIVITY REPORTING

The InfoCap Model 3201 System provides Monitoring and Display of Production-Line Quality and Productivity Information In Real Time. The integrated computer hardware/software package will accept data from up to 255 remote bar-code reader terminals, and provide tabulated productivity information on a CRT display in real time. The turnkey system package includes production quality and defect-tracking software, and requires no programming knowledge for immediate operation.

- Networked Intelligent Bar Code Reader Terminals
- Host Computer Supports Up To 255 Bar Code Terminals
- Multiple Systems May Be Employed In A Networking Environment
- System Dynamically Reconfigures To Changing Input Terminal Quantities
- Complete Networking & Reporting Software
- Continuously Updating Screen Display Provides Real Time Defect Reporting
- System Configuration May Be Performed Remotely Thru Bar Code Terminal
- Distributed Intelligence Maximizes Network Flexibility & Cost Efficiency
- Total access and data transfer times as low as 0.05 second/terminal
- Automatic Logging Of Raw Data
- Human-Language Independent Bar Code Entry System
- Minimal operator training required for operation
- No System Operator Required
- Menu-Driven Bar Code Entry Format
- Expansion Port Allows Direct Monitoring Of Physical Sensors
- Real Time Clock Provides Automatic Time/Date Stamping Of Incoming Data
- Optional Printer Provides On-Site Generation Of Bar Code Labels & Reports
- Mainframe Reporting Capabilities Built-In
- Optional Hard Disk Storage of Information
- Clean Room-Compatible Bar Code Terminal Available



SERIES 800 BAR CODE READER TERMINAL

InfoCap manufactures a comprehensive line of component bar code and data collection products. Please contact the factory for availability and pricing information.

InfoCap

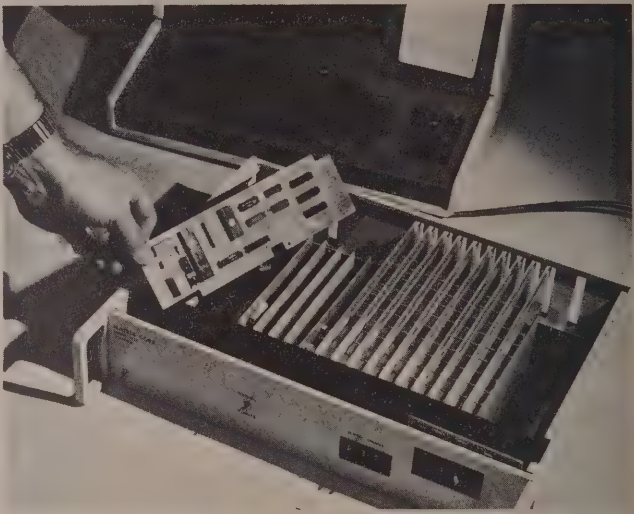
INFOCAP, INC.
31119 Via Colinas #502
Westlake Village, California 91362
Phone: (818) 991-1410

Now High Level Language Controls Intelligent Scanner Via RS-232

Matrix offers a MICROCOMPUTER INTERFACE BOARD (MIB) for the Model 1701 Scanner that provides the basis for a complete DATA ACQUISITION SYSTEM. The MIB allows a host computer or terminal using an RS-232 bus to read 100 analog inputs such as thermocouples, RTD's, strain gages or any other device with output levels from microvolts to hundreds of volts.

Commands such as SELECT CHANNEL and SEND DATA are accomplished by two-way communications between a terminal or computer and the Model 1701 scanner using ASCII and the RS-232 bus. The MIB command format accepts high level languages (BASIC, PASCAL, FORTRAN) to control the scanner. Commands and responses are sent as ASCII strings terminated with a carriage return.

The scanner connects a selected channel to an A/D converter (digital voltmeter, temperature indicator, etc.). The A/D converts the analog signal to parallel BCD (4½ digits, sign, decimal point locator). The BCD data is serialized by the MIB and sent to the computer on command.



The Matrix MICROCOMPUTER INTERFACE BOARD (MIB) is easily inserted into the Model 1701 scanner. Size and scanning capacity of the 1701 are not affected by the addition of the MIB.

Thermocouple and General Instrumentation Scanners

General Instrumentation MODEL 1701 SCANNER

- **Random access. Channels controlled by a BCD input to allow programming by external source such as computer.**

MANUAL DIGITAL SWITCH

- **The switch can manually select any desired channel from the front panel.**

GENERAL: The BCD input is compatible with standard TTL logic. The unit contains BCD output for use on auxiliary equipment. Switches are available in multiples of 10 up to 100 channels in a 3½" cabinet.

CAPACITY: 10 to 100 channels are available in the 3½" master. Slave units with 10 to 200 channels in 3½" cabinets allow expansion to 1000 channels.

SCAN RATE: The scan rate may be as fast as 5 msecs.

INPUT: Level — Standard BCD TTL logic.

CHANNEL READOUT: 7 segment LED digital indicators are provided for a visual indication of the channel selected.

CONTACT RATINGS: 500 volts maximum between conductor and chassis, 350 volts maximum between conductors. Current should not exceed 100 ma for maximum life.

CONTACT THERMAL EMF: 5 micro volts nominal — 10 micro volts maximum.

DIMENSIONS: 3½" high x 17½" wide x 10" deep.

LITERATURE: Write for Bulletin RS-71.

MATRIX CORPORATION

Dept. EM, 2260 Distributors Drive, Indianapolis, Indiana 46241
Telephone: (317) 248-2036

Your Choice!

Parallel Input
Model MAP-20P

Serial Input
Model MAP-20S

Memodyne
MAP-20P
ON
TEST
FEED
Memodyne
MAP-20S
ON
TEST
FEED

Microprocessor Compatible 20 Column Alphanumeric Thermal Printers from Memodyne Corporation

Parallel Input Model MAP-20P

- 8 Bit TTL parallel data input
- Accepts rates up to 2000 characters per second
- Programmable controls for:
  - Text or lister printing
  - Character size — normal or extended

Price: $625.00 each in single quantities

Common Characteristics of Both Models

- 96 Character print set
- Print rate of 2 lines per second
- Internal self test program of all characters and printing modes
- Complete with microprocessor electronics and AC power supply
- Small size measures 4.4" W x 2.75" H
- Fits in panel 4.5" W x 2.78" H
- Weighs 4.2 lbs.

Serial Input Model MAP-20S

- Simple 2 wire data input
- Isolated 20 mA current loop and RS232C interface
- Baud rates from 75 to 9600
- Internal/External Baud Clock
- Programmable controls for:
  - Text or lister printing
  - Character size — normal or extended
  - Baud rate

Price $725.00 each in single quantities.

Write for our complete 8 page color brochure.

Memodyne
CORPORATION
Subsidiary of Computer Products Inc.

220 Reservoir St., Needham Heights, MA 02194
(617) 444-7000 Telex: 92-2537

NES SLIMLINE® MINI-PERIPHERALS

DIGITAL METERS WITH SERIAL ASCII

METERING WITH SERIAL ASCII & SETPOINTS

Counts, Temp, Current, Time, Etc.
278542
Serial ASCII
Alarms or Controls

These meters feature serial ASCII output and full message formatting. Setpoint outputs provide alarm or control capabilities. Microprocessor-based Ratemeter measures DC pulses from one per hour to 3 kHz.

• Full 6-digit display • Scale factor .000000001 to 59999 • Baud rates 110-9600 • Non-volatile memory • Full instrumentation input • Threshold adjustment • Setpoint outputs • 3-year warranty • Price: $295 - $425

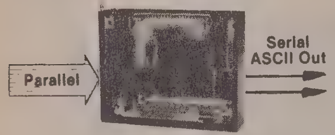
SERIAL/PARALLEL CONVERTERS

Serial ASCII In
Parallel

Convert serial ASCII data to common parallel data (such as BCD) with the Receiver Bustle®. These converters can provide an input to your PC's, computers, printers, terminals, etc.

• Convert ASCII data up to 6 digits of BCD data or 24 bits • 100 unit addressing capability • 2-digit switch-selectable ID number • 110-9600 baud rate • RS232, RS422, 20/60 mA formats • Price: $296 - $303

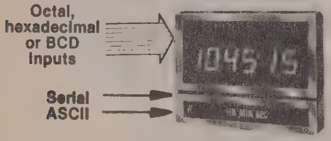
PARALLEL/SERIAL CONVERTERS


Parallel
Serial ASCII Out

Convert common parallel data to serial ASCII with the Transmitter Bustle®. Transmit data to your computer, printer, programmable controller, etc.

• Convert BCD data to up to 6 digits of serial ASCII data or 24 bits • 100 units addressing capability • 2-digit switch-selectable ID number • 110-9600 baud rate • RS232, RS422, 20/60 mA formats • Price: $340 - $352

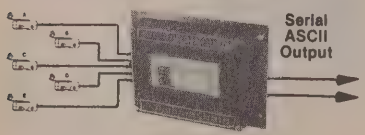
LOCAL & DISTANT READOUTS


Octal, hexadecimal or BCD inputs
Serial ASCII
1045 15

Meters accept BCD, octal, hexadecimal or 2-wire serial ASCII inputs. Display up to 6 digits with LCD's or LED's. ASCII command switches provide remote control or alarm capabilities. Displays are easily read even in bright light.

• Parallel, octal, hexadecimal or BCD inputs • Serial ASCII inputs • Latch capability • 2 to 6 digit models • Buad rates 110-9600 • Flexible addressing capability • Surface mounting • Easy wiring • 3-year warranty • Price: $156 - $500

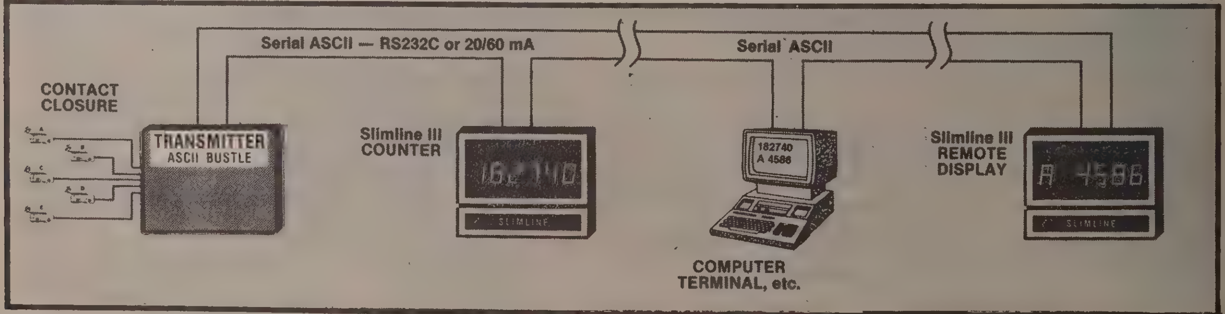
CONTACT STATUS MONITORING


Serial ASCII Output

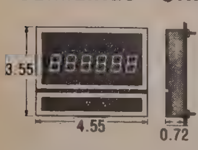
These monitors accept up to 25 individual contact closures at up to 24 VDC. These units are all self-contained and built rugged and reliable These monitors provide standard serial ASCII output.

• Directly compatible with CRT's, printers, etc. • Self-contained • CMOS, TTL compatible • Accepts up to 25 contact contact closures • Accepts up to 24 VDC; others available • RS232, RS422, 20/60 mA formats • Price: $290 - $350

APPLICATION EXAMPLE:


Serial ASCII — RS232C or 20/60 mA
Serial ASCII
CONTACT CLOSURE
TRANSMITTER ASCII BUSTLE
Slimline III COUNTER
16 140
SLIMLINE
182740
A 4586
COMPUTER TERMINAL, etc.
Slimline III REMOTE DISPLAY
A 4586
SLIMLINE

SLIMLINES' UNIQUE FEATURES


888888
3.55
4.55
0.72

Size: 4.55″ x 3.55″ x 0.72″. Panel surface mounting means easy & fast installation. Also fast wiring – no soldering needed.

High Quality: Less downtime, long useful life. Much better investment: socketed parts and highest quality components. Conservative design; works well in harsh factory environments, not like other meters that are made to only work in a laboratory.

Who Uses: With over 1 million meters shipped, NES is recognized as the leader in high quality industrial meters. Some users are: the Space Shuttle, Air Force 1, virtually all of the Fortune 1000's and tens of thousands of others.

Other Products: NES designs & manufactures over 3,000 different products from Broadcast Automation Computers to the broadest range of panel meters available.

Please call us. It is easy to talk to one of our expert Application Engineers. They care about your problem and will do all they can to assure your success.

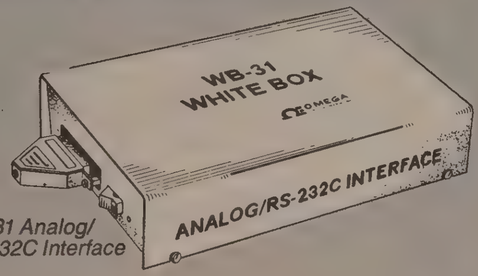
Call: (312) 289-8820

NES, Inc. ***NATIONWIDE ELECTRONIC SYSTEMS***
1536 Brandy Parkway, Streamwood, IL 60103 • (312) 289-8820

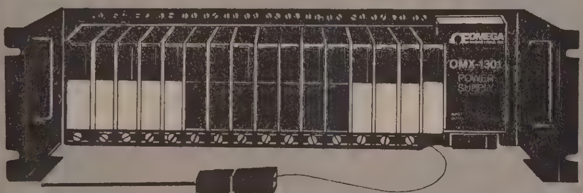
For other products in EEM from NES, see Sections 2200, 2325, 2450 & 2950.

COMPUTER INTERFACE

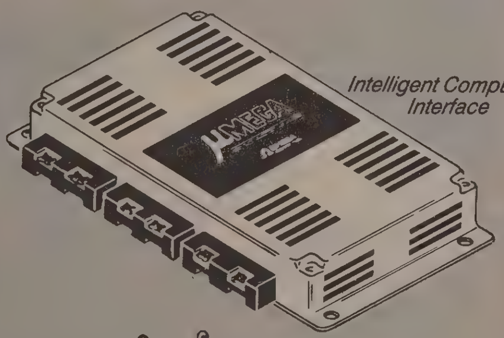
A Complete Line of White Box™ Signal Conditioners That Link the Real World with Any Computer!


WB-31
WHITE BOX
OMEGA
ANALOG/RS-232C INTERFACE

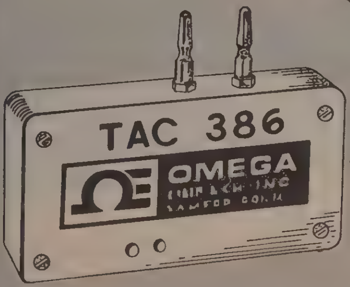
WB-31 Analog/ RS-232C Interface


OMEGA
OMX-1301
POWER SUPPLY

OM-3 and 4 Series Signal Conditioners
• Condition • Record • Alarm • Control



Intelligent Computer Interface


TAC 386
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ENGINEERING INC
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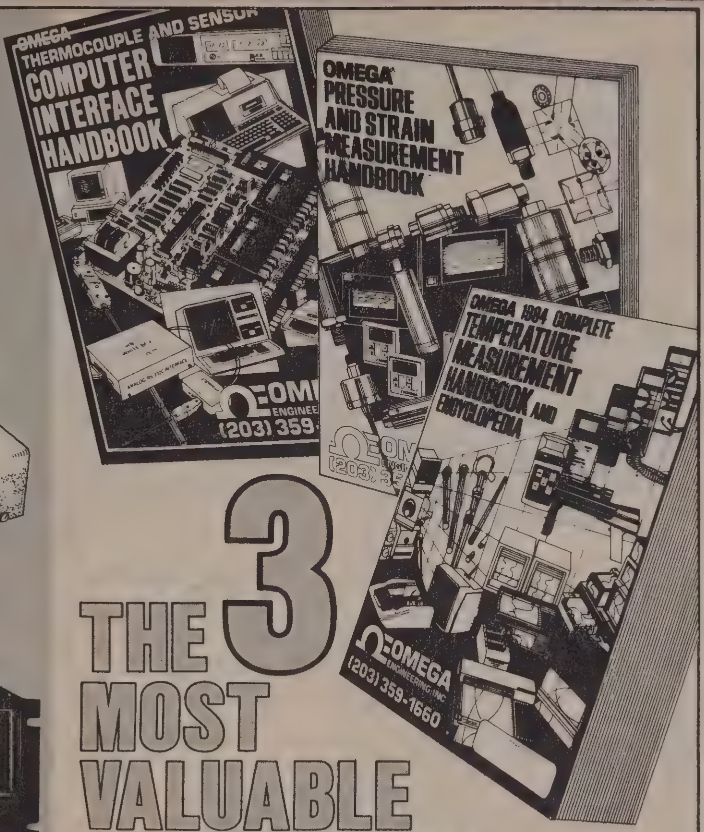
TAC-386 Thermocouple Signal Cold Junction Compensator and Linearizer

A Complete Selection is Featured in THE OMEGA THERMOCOUPLE AND SENSOR COMPUTER INTERFACE HANDBOOK

Over 200 Products Featured!

Thousands of Products Ready for Immediate Delivery!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(203) 359-
OMEGA PRESSURE AND STRAIN MEASUREMENT HANDBOOK
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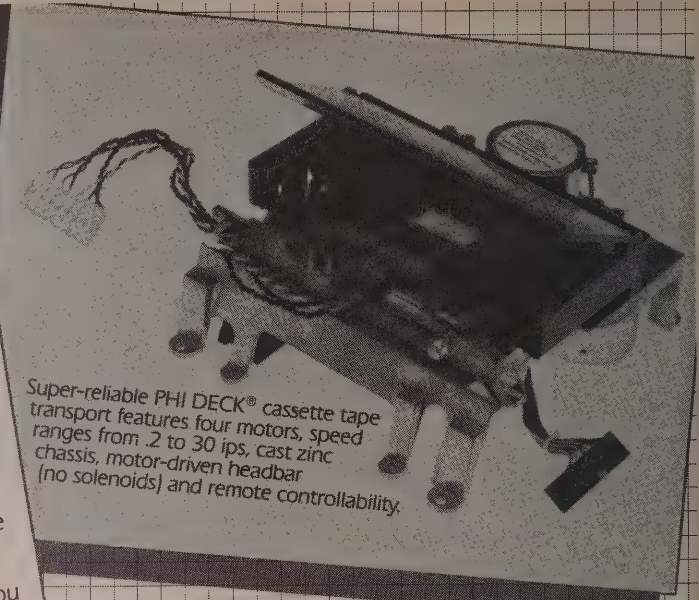

Super-reliable PHI DECK® cassette tape transport features four motors, speed ranges from .2 to 30 ips, cast zinc chassis, motor-driven headbar (no solenoids) and remote controllability.

The Phi Deck® Cassette Tape Transport — so reliable that nuclear subs use our deck on board theirs.

Whether you're sweating over a prototype or you're ready for mass production, the PHI DECK® from Phi Technologies gives you the finest American-made quality at a budget-conscious price. That's because you can buy the rugged, reliable PHI-DECK a la carte or with associated electronics. And a wide range of heads and options makes each deck a custom unit. Choose from four basic models, featuring:

- AC or DC capstan motors
- Speed ranges from .2 to 30 ips
- Cast zinc chassis
- Variable speed servo drive systems
- Motor-driven headbar (no solenoids)
- Computer and remote controllability
- Analog and digital applications
- More than 100,000 in use worldwide

Phi Technologies can also supply you with PHI DECK-related electronics for a wide range of uses, including:

- **Motion Control Board** Accepts 5-volt CMOS signals for Run, Stop, Fast Forward and Fast Rewind. Tape tension, braking and motion sensing are automatically controlled.
- **Combined Motion Control and Record/Play Amplifier** Stereo R/P operates from a single 12-volt supply. Line and mike inputs, line and speaker outputs.
- **Combined Motion Control and Read/Write Amplifier** For saturated digital recording and reading. TTL Level data interface logic. Recording density up to 1600 FRPI.
- **Addressable Search System Board** Zeros in on precise address with average access speed of 120 ips., accurate to within one audio word. Either keypad or computer entry of desired tape position.
- **Search 400** A complete subsystem that provides rapid, random access to any of a large number of audio recordings. Microcomputer controllable.
- **Custom Design Engineering and Production** Services include recording mechanisms, interface electronics, hardware and software design, digital audio, speech synthesis and more.

PHI-DECK
SEARCH 400

Search 400
Random Access Audio system

PHI Technologies, Inc.

Leaders in cassette deck technology and service.

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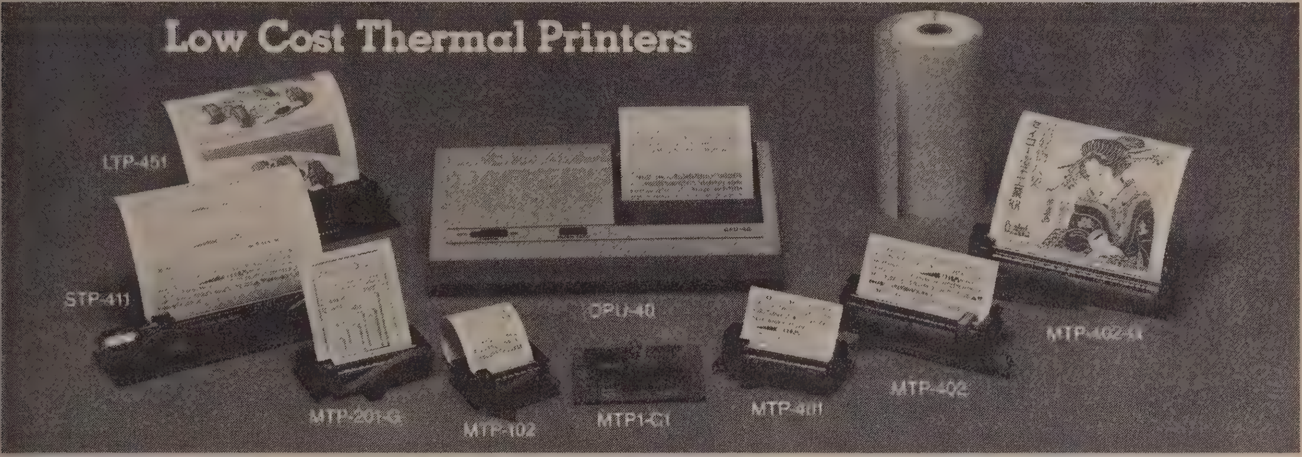
(405) 521-9000
TWX: 910-831-3286

For more information, call or write Steve Browning at Phi Technologies (405) 521-9000 about your design requirements.

SEIKO INSTRUMENTS

Low Cost Thermal Printers



MTP Series Printers

Character Printers / Graphic Printers

Model	MTP102		MTP201		MTP401		MTP402	MTP201		MTP401			MTP402
Item	13BM	16BM	20BN	24BN	32BN	40BN	40BN	G128	G166	G192	G256	G280	G280
Printing System	Heat-sensitive serial dot system							Heat-sensitive serial dot system					
Printing Direction	Left to right							Left to right					
Paper Width (mm)	38^{+0}_{-1}		58^{+0}_{-1}		80^{+0}_{-1}		112^{+0}_{-1}	58^{+0}_{-1}		80^{+0}_{-1}			112^{+0}_{-1}
Number of Columns	13	16	20	24	32	40	40	—					
Character Size (mm)	2.4 x 1.4	2.4 x 1.1	2.4 x 1.5	2.4 x 1.3	2.4 x 1.4	2.4 x 1.1	2.4 x 1.6	2.4 x 1.6	2.4 x 1.3	2.4 x 1.6	2.4 x 1.2	2.4 x 1.1	2.4 x 1.6
Character Construction	7 x 5 dot matrix							7 x 5 dot matrix					
Print Timing	Tacho-generator synchronized system							Tacho-generator synchronized system					
Home Position Detection	Mechanical switching system							Mechanical switching system					
Dot Composition (Columns x rows)	—							126 x 8	166 x 8	192 x 8	256 x 8	280 x 8	280 x 8
Dot Pitch (vertical) (mm)	—							0.35	0.35	0.35	0.35	0.35	0.35
Dot Pitch (horizontal) (mm)	—							0.35	0.277	0.35	0.26	0.24	0.35
Printing Width (mm)	—							44.8	46.0	67.2	66.6	67.2	98.0
Printer Supply Voltage (v)	DC 5.0 ± 1							DC 5.0 ± 1					
Printing Speed (room temperature, 5.0V) (lines/sec)	Approx. 1.5		Approx. 0.8		Approx. 0.6		Approx 0.35	Approx. 0.9	Approx. 0.8	Approx. 0.7	Approx. 0.6	Approx. 0.6	Approx 0.4
Dimensions (W x D x H) (mm)	48 x 31 x 13.8		70 x 34 x 14.4		91.5 x 35.5 x 20		122.5 x 35.5 x 20	70 x 34 x 14.4		91.5 x 35.5 x 20			122.5 x 35.5 x 20
Weight (g)	Approx. 35		Approx. 40		Approx. 50		Approx. 70	Approx. 40		Approx. 50			Approx. 70
Operating Temperature Range (°C)	0 ~ 50°C												
Reliability (5.0V rated energy, normal temperature, "8" full columns printing)	MCTF 500,000 Lines												
Recommended Heat-sensitive Paper	Jujo Paper TP50KS-A or equivalent												

STP Series Printers

Model / Item	STP411-256	STP411-320
Principle	Thermal serial dot method	
Print Direction	Character: double direction logical seek Graphics: single direction logical seek	
Print timing	Synchronization of step motor	
Number of total dots per line	7 x 5 dots	9 x 7 dots
Number of figures (one dot space)	42	40
Print dot size (H x w) (mm)	0.3 x 0.2	0.23 x 0.2
Print width (mm)	89.6	
Character size (H x W) (mm)	2.4 x 1.6	2.47 x 1.88

Model / Item	STP411-256	STP411-320	Comments
Print speed Uni-Directional (LPS) Bi-Directional (LPS)	approx. 0.5 approx. 1.0	approx. 0.4 approx. 0.8	Total dot print (Motor: 250 pps)
Paper feeding force (at 5.0V)	more than 50 g		(Motor: 300 pps)
Paper holding force	more than 100 g		Paper feeding motor not magnetized
Life MTBF Min. 500,000 lines			at 5.0V rated energy
Outline Dimension (W x D x H) (mm)	153 x 44.5 x 20		
Weight (g)	135		
Printer supply voltage	D.C. 5.0 ± 0.5V		
Environmental Operation temp. range Characteristics Storage temp. range	0°C 50°C −20°C 60°C		

LTP Series Printers

Model / Item	LTP-451	Comments:
Printing System:	Thermal Line Printing	
Input Interface:	1) Parallel Input Centronics Compatible TTL Level 8-Bit Code 2) Serial Input RS232C Suitable 300 ~ 9600 Selectable Baudrate	
Total Dots/Line:	256	
Character Font:	7 x 5 Dot Matrix	
Number of Columns:	40	
Pixcel Size:	0.35 mm (H) x 0.35 mm (W)	
Printing Width:	89.6 mm	
Character Size:	2.45 mm (H) x 1.75 mm (W)	
Printing Speed:	1) Text Mode—240 Characters/Second Max 2) 15 m sec/1 dot line max	Choice of 1) or 2) Depends on external switch

Model / Item	LTP-451	Comments:
Dimensions:	156 mm (W) x 56 mm (D) x 30 mm (H)	
Weight	500 g	
Output Interface:	1) Paper Feed 2) Test Mode 3) White and Black Reverse 4) Magnified Print 5) Exchange Up and Down	Controlled by external switch
DC Power Supply	24VDC 3.5A Max 5VDC 1.0A Max	

SEIKO INSTRUMENTS U.S.A., INC., 2990 W. Lomita Blvd., Torrance, CA 90505 • (213) 530-8777

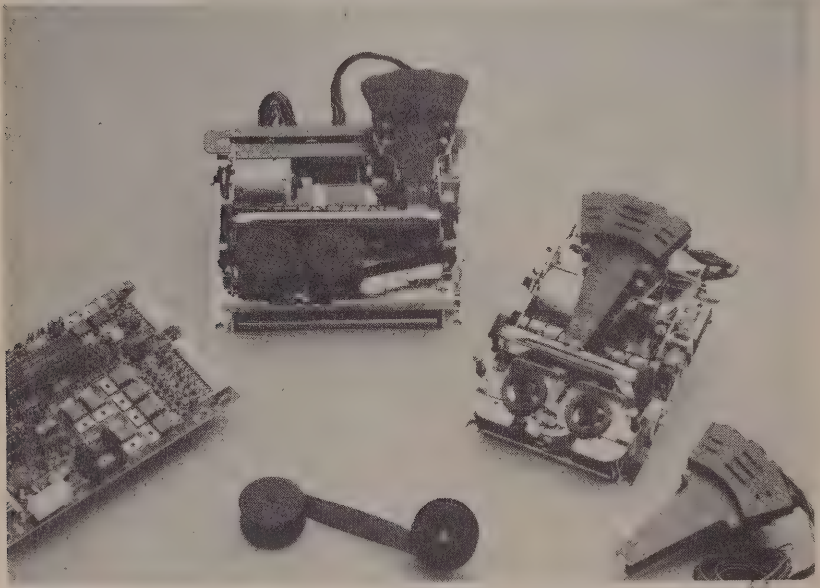
star™

COMPLETE LINE OF ELECTRONIC AUDIO DEVICES

BUZZERS, TRANSDUCERS, PIEZOCERAMIC, MYLAR SPEAKERS AND MORE.

PRINTER MECHANISMS

21 & 40 COLUMNS, IMPACT DOT-MATRIX



Start printer mechanisms are all guaranteed for 100% reliability. They're compact, easy to install and inexpensive to maintain.

822-20 column dot matrix printer mechanism has a 7 wire head that enables it to print 2½ lines every second. It prints on standard 2½″ adding machine tapes and provides unusually strong printing impact.

824-40 column dot matrix printer mechanism has a 5 x 7 standard matrix array. It types 60 cps and can provide a variety of printouts. These include standard 4½″ adding machine tapes and double stock carbonless tapes. For fanfold and labels, all that's needed is an optional tractor feed.

Plus, there's a huge selection of replacement print heads, control boards, ribbon and paper supplies available. All with the Star name on them and behind them.

FEATURES

- Low cost
- Disposable printing head
- Simple interface
- Handles any type font
- Needs only one DC power supply
- DP-822 uses standard 2¼″ adding tape or carbonless paper
- Easy to install and maintain
- Automated banking terminals
- Desktop calculators

APPLICATIONS

- Electronic cash registers
- Medical and scientific instruments
- Industrial measurement, process and control systems
- Mini-microcomputers: business professional and hobby
- Point-of-sale (POS) terminals
- Security monitoring systems
- Emergency vehicle data receivers
- Fast-food kitchen printers
- Telecommunications equipment
  . . . and many more!

SPECIFICATIONS

	DP-822	DP-824
Character formation process	Dot matrix serial impact	Dot matrix serial impact
Number of characters/line of print	21 columns standard	40 columns standard at 12 cpi 34 columns standard at 10 cpi
Standard matrix array	5 dots wide by 7 dots high	5 dots wide by 7 dots high 7×7 and 9×7 available with special software
Character height	Up to .114″ (2.9 mm)	Up to .114″ (2.9 mm)
Direction of printing	Left to right	Left to right
Speed of printing	2.5 lines/sec. @ 12 VDC	Approximately 1.0 line/sec. at rated voltage
Maximum printing distance/ line of print	1.77″ (45 mm)	3.3″ (84.4 mm)
Paper advance/line of print	1/6″ (4.24 mm)	1/6″ (4.24 mm)
Paper slew speed	Up to 10 lps during continuous paper advance	Up to 10 lps during continuous paper advance
Dimensions	Width: 4.173″ (106 mm) Length: 5.710″ (145 mm) Height: 2.067″ (52.5 mm)	Width: 6.221″ (158 mm) Length: 5.787″ (147 mm) Height: 2.244″ (57 mm)
Weight	1.25 lbs. (570 grams)	1.8 lbs. (820 grams)
Operating temperature	5°C to 45°C (Note: Temperature and relative humidity affect ribbon ink viscosity)	Operating: 5° to 45°C. 80% Storage: −20° to +75°C. 90% (Note: Parameters affect ribbon ink viscosity)

SIMPLE TO INTERFACE

A variety of standard interface boards provide the information necessary to drive the print head. Specifically, each board can control the print head solenoids as well as paper feed characteristitics. The controlling circuit for the timing pulses and the character generation is also available for designers who wish to include the interface electronics within overall system design. Suggested interface circuits may be readily obtained from Star without charge.

EASY TO INSTALL AND MAINTAIN

Servicing these printers does not require any unusual mechanical skills or special tools. The replaceable print head and the ribbon may be changed quickly by field personnel with a minimum of down time for your equipment. For more information, please contact Star Micronics or your nearest Star representative.

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MICRONICS·INC

COMPONENTS DIVISION
70-D ETHEL ROAD WEST, PISCATAWAY, NJ 08854 (201) 572-9512

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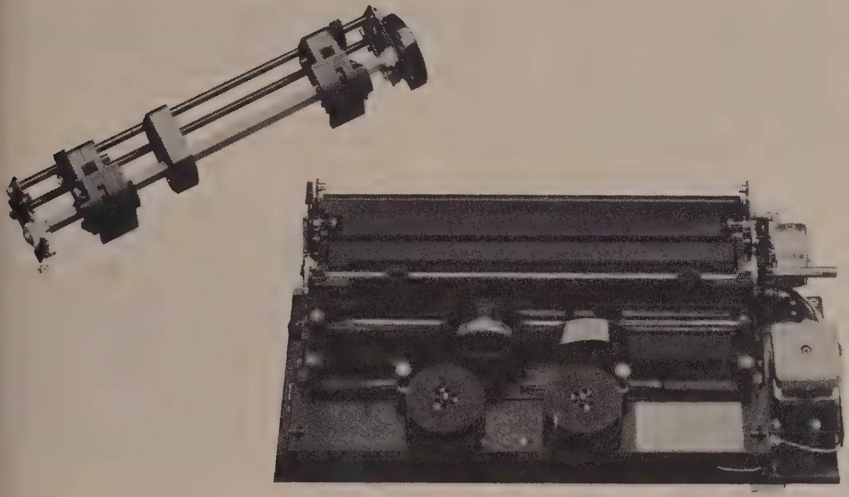
COMPLETE LINE OF ELECTRONIC AUDIO DEVICES

BUZZERS, TRANSDUCERS, PIEZOCERAMIC, MYLAR SPEAKERS AND MORE.

PRINTER MECHANISMS

80 & 136 COLUMNS, IMPACT DOT-MATRIX



FEATURES

- Proven reliability
- Complete graphics capability
- 100% duty cycle
- Bidirectional high speed graphics capability
- Rugged all steel construction

APPLICATIONS

- Telecommunications
- Banking systems
- Integrated mini-micro computer systems
- Automated test equipment
- Security monitoring systems
- Environmental control systems
- CAD/CAM systems and more

SPECIFICATIONS

	DP-858	DP-8513
Character formation process	Dot matrix serial impact	Dot matrix serial impact
Number of characters/line of print	80 columns at 10 cpi 96 columns at 12 cpi	136 columns at 10 cpi 164 columns at 12 cpi
Standard matrix array	9×9	9×9
Character height	.09″ (2.4 mm) std pica	.12″ (3.1 mm) max. height
Direction of printing	Bidirectionally	Bidirectionally
Speed of printing	120 cps using std. Star Controller*	120 cps using std. Star Controller*
Maximum printing distance/ line of print	8″ (203 mm)	13.6″ (345 mm)
Paper advance/line of print	1/6″ (4.24 mm)	1/6″ (4.24 mm)
Paper slew speed	Up to 10 lps	Up to 10 lps
Dimensions	Width: 14.8″ (364 mm) Length: 7.4″ (189 mm) Height: 4.8″ (122 mm)	Width: 20.2″ (512 mm) Length: 7.4″ (189 mm) Height: 4.8″ (122 mm)
Weight	7.7 lbs. (3.5 grams)	10.8 (4.9 grams)
Operating temperature	Same as DP-822/-824	Same as DP-822/-824

* Star will guarantee 100 cps (at 6 Dot Pitch), 600 Hz, with independent controller.

NEW WIDER MECHANISMS

Two new models have been added to the Star family of printers. These industry proven mechanisms are the success story behind our popular Gemini series printers. And now the same reliable mechanical components can be added to your OEM design to enhance its performance.

Model DP-858 features a 10″ carriage for printing 80 columns at 10 cpi plus condensed and enlarged type from 5 to 17 characters per inch. It accepts both single sheets and roll paper. A tractor feed option handles fan fold stock. A print speed of 120 cps with the Star controller, plus low cost Underwood-style spool ribbons make the DP-858 a good device for products requiring an integral printer.

Model 8513 is the wide carriage version with the added features of 132 column printing at 10 cpi, as well as condensed and enlarged characters, plus it has bottom paper feed capability when the tractor option is used.

Both models utilize bi-directional logic seeking printheads with an expected life of 100 million characters. Plus, a 9 x 9 character matrix with true descenders, bit image and block graphics, and numerous type fonts.

Printer control boards which acept Centronics parallel input are available for each model. Star controllers allow full use of the DP-858/8513 mechanism features. And if you need to customize further, we'll help you design your own control board.

Star Micronics, for all your printer mechanism needs.

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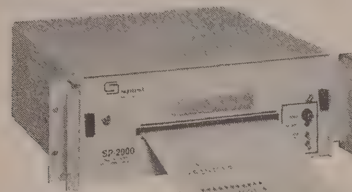
CORPORATION



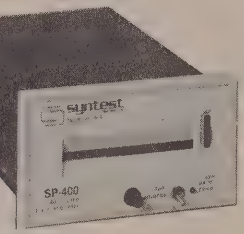
SP-2000
80 Column Rack Mounted Printer

The Syntest SP-2000 is a low cost microprocessor controlled intelligent printer, which performs functions not available on standard printers. These functions include multiple size printing, tabs, and multiple line feeds. The SP-2000 is rack mounted saving valuable bench or floor space.

SPECIFICATIONS

Input
- 5 x 7 dot matrix
- Impact printing
- 80 columns
- 12 characters per inch
- 122 inch character height
- 100 characters per second print speed
- Multiple copy capability
- XTAL baud rate 110-9600 baud with dip swtich

Input
- Serial RS-232C and 20 ma. current loop internal jumper selectable
- RS-232C busy signal
- Rear EIA connector
- Mating connector Cinch DB25-P



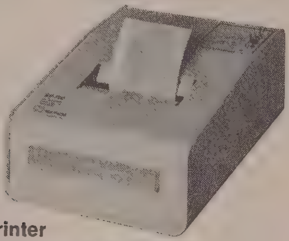
SP-400
Panel Mounted or 12 VDC Mobile Use Thermal Printer

The SP-400 is a low cost miniature 40 column thermal printer. This printer provides very quiet operation on 115 VAC or 12 VAC or DC input. A 40 character buffer along with RS-232 and 20 ma loop input make this unit very easy to interface. A standard EIA connector and busy line are also provided.

SPECIFICATIONS

Printing
- 5 x 7 dot matrix
- Thermal printing
- 40 columns
- 15 characters per inch
- .08 inch character height
- 24 characters per second print speed
- XTAL baud rate 50-9600 baud with dip switch

Input
- Serial RS-232C and 20 ma. current loop internal jumper selectable
- RS-232C busy signal
- Rear EIA connector
- Mating connector Cinch DB25-P
- 24 VDC optional

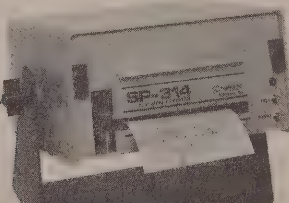


SP-700
Two Color Printer

The newest addition to Syntest's printer line has features and prices that make this your logical choice for your O.E.M. requirements.
- 40 column output
- 2 color printing, red and black
- 40 character buffer
- 115/230, 12 VAC standard, 12 VDC also standard
- RS-232C or 20 mA loop
- 1.5 lines per second thruput
- Under $300 in O.E.M. quantities

SP-450
Printer with Paper Cutter

40 column printer with the features needed for special requirements:
- Paper cutter actuated with ASCII command
- Stepper motor control of paper movement and print head for exceptional mechanical versatility
- Z-80A controller with 2K EPROM plus 2K RAM
- Available with cabinet or components only for the O.E.M. user.
- RS-232, 20 mA loop, X on, X off or 8 bit parallel input
- 115, 230V, 50-400 Hz power requirements
- Up to 1500 character dynamic buffer



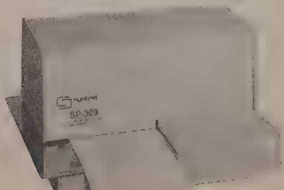
SP-314
12 VDC Alpha Numeric Printer

The Syntest SP-314 is specifically designed for applications where only 12 VDC is available as a power source. This hard copy device features an extra rugged aluminum enclosure allowing it to withstand the rigor of operating in harsh environments. With horizontal elongation and graphics capability the SP-314 has the versatility to perform the most demanding printing job.

SPECIFICATIONS

Printing
- 5 x 7 dot matrix
- Impact printing
- 40 columns
- 10 characters per inch
- .130 inch character height
- 2 L.P.S. print speed
- Multiple copy capability

Input
- Serial TTL and RS-232
- Parallel TTL
- Crystal baud rate
- TTL and RS-232 Busy



SP-309
High Speed Ticket Printer

A new high speed low cost ticket printer, with the ability to print on card stock and credit card slips and is also very fast. With a thru-put of 120 characters per second, the SP-309 provides the user with a large character buffer and programmable baud rate.

Having a dedicated EPROM for its internal program, this new unit can be modified to its users specifications. Outline dimensions are 12" W x 9.75" D x 6.5" H. Input voltage is 115/230V 50-60 Hz, RS-232, 20 mA inputs are standard as data inputs.

- 3 lines per second print rate.
- Ability to print on almost any document or card stock, multipart forms etc.
- Internal PROM to provide customer custom feature programmability
- 2 K RAM standard to use as a large character buffer or other options.
- Stepper motor paper drive for graphics and X2, X3, X4 character size as standard.

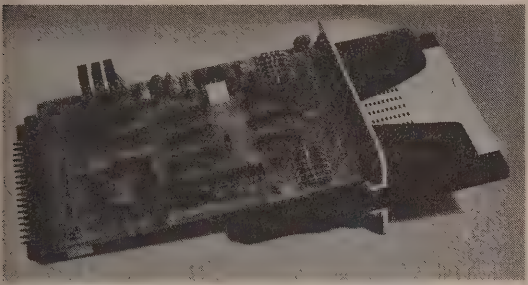
SYNTEST CORP. / 40 LOCKE DR., MARLBORO, MA 01752 U.S.A. / 617-481-7827 / TWX 710 390 7659

Punched Card Readers

Serial...
Serial/Parallel...
Static/Parallel

High Reliability
Heavy Duty
Card & Badge
Readers—
for industrial use

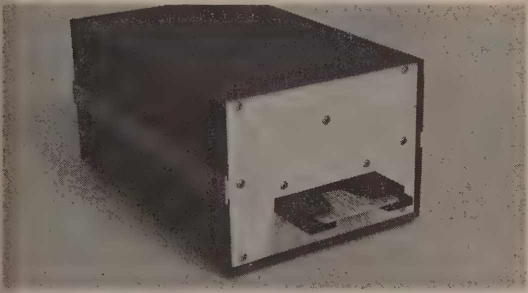
A complete line of readers for OEM, system and industrial applications



Badge/Card Readers... Series H

Read cards/badges of up to 12 rows and 10 to 68 columns. Optical reading with no moving parts, error-free readout, long life, minimum maintenance. Completely self-contained. To operate, insert badge or card fully and withdraw. Readout is character (column) serial, bit (row) parallel. Can easily replace less satisfactory readers in existing installations. Designed for OEM and system applications. Custom-feature models can be supplied.

The 10-column Model H-10 is pictured. For complete details on our complete badge/card reader line, request Series H Catalog. Patent No. 4,132,352.



Series H Readers with RS232C or 20ma Loop Interface

Series HT are complete, self-contained manual Card or Badge Reader terminals designed for industrial applications in factory data collection systems, warehousing assembly floors, and the like.

Completely and thoroughly documented, they are particularly well suited for system developers who require an inexpensive, flexible terminal for low to moderate usage, or where a manual terminal is suitable. Because the terminals are micro-processor based, their application is extremely flexible, and modifications to meet particular system requirements are simple and straightforward.

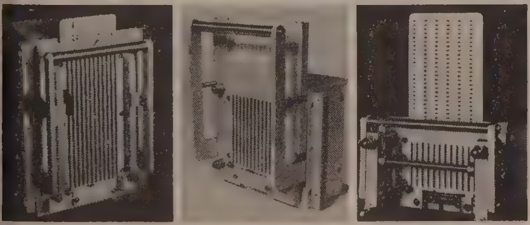
Serial Readers

Read cards one column at a time. Photo-electric hole sensing. Free-standing or panel-mount. Various output formatting...bit parallel, ASCII, teletype, etc. In use since 1967.

- 64 standard options. Custom options also available.
- 4 Card-Handling Modes
- 4 Readout Modes
- 4 other characteristics

These card readers are specifically designed for OEM and systems applications in warehousing, data-handling, industrial and process control, manufacturing and other fields where conditions are not especially favorable for card readers.

Also new microprocessor controlled unit.



Model M-4A (left)
up to 80 columns

Model JM-4A (center)
up to 40 columns

Model CM-20 (right)
up to 20 columns

Static or Parallel Readers... 3 Models

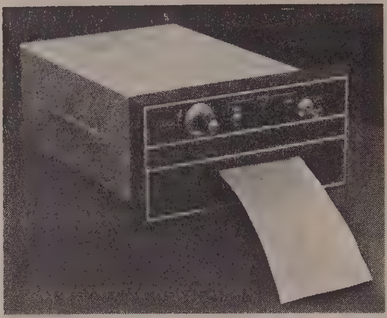
Read all or part of an IBM card in parallel. Insert card, push handle. HOLE...closed switch. NO HOLE...open switch. Contacts not through the card. Reliable indirect switching. All switching at one time. Thousands in use since 1956.

TAURUS CORPORATION
P.O. Box 278
Lambertville, NJ 08530
Telephone: (609) 397-2390

telpar, inc. Thermal Printers for the OEM

*OEM Version**

**Mechanism alone available*



Rack Mount Version

- 12, 20 and 40 Columns
- Choice of Interfaces: Serial, Parallel, BCD, IEEE488
- DOT Addressable Graphics
- Analog Inputs
- Custom Programs
- AC or 12V DC Power Input
- Up to 19200 Baud
- Paper Take-up Reel Available

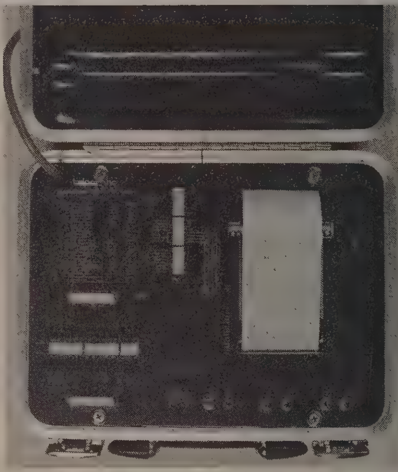
telpar, inc. Datacomm Testers with Integral Printers

The ULTIMATE RS232C BREAKOUT BOX with Integral Printer

IDEAL FOR . . .

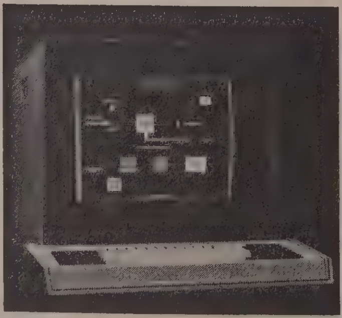
- Field Service Personnel
- Diagnostic and Test Engineers
- System Integrators
- Communication Equipment Manufacturers and Owners

- Exact Data Stream
- Compact Size
- Ideal for Field Service, Test Engineers, and System Integrators
- Integral 20 Column Printer
- Print Formats: ASCII, ASCII and Control Codes, and hexidecimal values
- Start Code Select
- Prints Out Baud Rates
- Baud Rates 50-19200
- Print Buffer: 2K or 8K



telpar, inc. Color Graphic Terminals

- ISC 8001G* Compatibility
- 80 Column x 24 or 48 Line
- High Resolution CRT
- Custom Firmware and Keyboards
- In-Line Gun and Self Convergence
- 12″ & 19″ Models



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- Geometry configurations especially well suited to hybrid circuit applications
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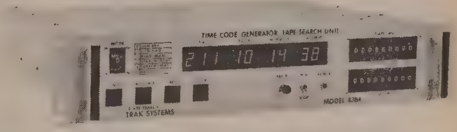
TRAK® SYSTEMS DIVISION OF **TRAK® MICROWAVE**

Timing Instruments

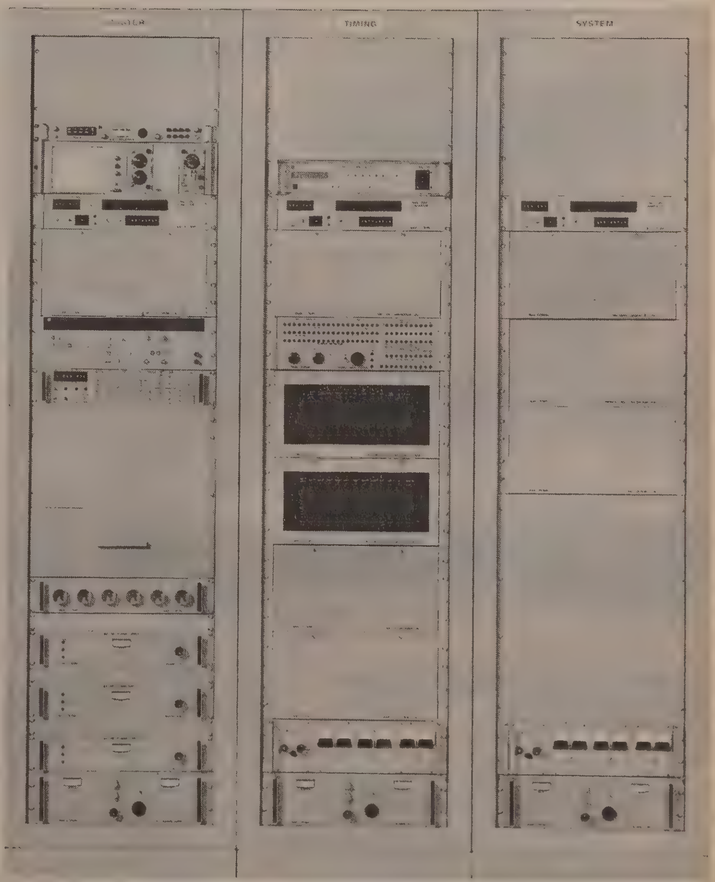
Precision Timing Instruments For Your Application

- COMPLETE TIMING SYSTEMS
- TIME CODE PROCESSORS
- COMPUTER CONTROL TAPE SEARCH
- SATELLITE CONTROLLED TIME CODE GENERATORS
- TIME CODE GENERATORS
- TIME CODE READERS
- TIME CODE TRANSLATORS
- TIME CODE DISTRIBUTION



Custom Service is our specialty

TRAK Systems' Master Timing Systems are specifically designed to meet the accuracy and reliability required by primary timing stations. The Model 8407 Master Timing System contains three complete time code generators and provides multi outputs with time coherency of 50 nanoseconds. An integral majority voting and fault sensing subsystem assures continuous outputs with visual fault isolation to the card level in the event of a single time code generator failure. Redundant and external battery backup provisions are in the power supply system. Built-in test with indicators permit rapid system checkout. Many variations and options are available for specialized requirements.



MASTER TIMING SYSTEM

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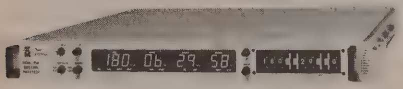
TRAK. SYSTEMS DIVISION OF **TRAK. MICROWAVE**

Timing Instruments 8500 Series



TIME CODE PROCESSOR MODEL 8500

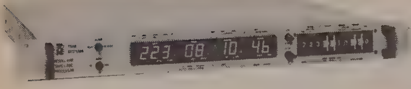
- MICROPROCESSOR CONTROLLED
- TRANSLATOR
- SYNCHRONIZED GENERATOR
- TAPE SEARCH AND CONTROL
- HOST COMPUTER I/O
- SINGLE RUGGEDIZED 1-3/4" UNIT
- HEARTBEAT CLOCK OPTION

The Model 8500 Time Code Processor is a full-function time code data processing instrument featuring both time code generation and time code translation functions under control of a built-in micro processor subsystem. The unit combines all of the best features of TRAK Systems' field proven time code instruments. Fully automatic search and control of a tape transport is a standard option. Included as a standard feature is a host computer interface providing for both remote setup and operation of the Model 8500 and for status output to the host computer. Available interfaces include RS-232, IEEE-488 and 16-bit/DR11C parallel. A unique battery-powered heartbeat clock option is also available. For high-precision timekeeping applications, an external frequency source and internal slew controls may be used to obtain microsecond accuracy. Optionally available are an internal tracking oscillator that may be locked to the external frequency source and an oven-controlled precision oscillator.

An internal clock continuously provides a serial time code output (normally IRIG B). The translator section of the instrument reads either an externally-supplied time code (XLATE mode) or the internal clock (GEN mode) and provides a variety of standard and optional code, rate, and parallel outputs. All outputs are phase locked to the input time code for playback ratios ranging from 1/32 to times 32 speed-up. The front-end code reader circuits feature wide dynamic amplitude and frequency range, full range search and playback, analog filtering, digital filtering, and errol bypass.

Automatic search and control is fully supervised by the internal microprocessor. With this approach, many features too complex to be implemented with hardware logic circuits are provided under program control.

The front panel parameter-setup system features a minimum number of controls to set up a full range of operating parameters (Start Time, Stop Time, modes, filter parameters, etc.). Operator feedback is provided by the front-panel display group. Default setup values are used to minimize setup complexity and time.



TIME CODE PROCESSOR MODEL 8510

- MICROPROCESOR CONTROLLED
- TRANSLATOR
- SYNCHRONIZED GENERATOR
- HOST COMPUTER I/O OPTION
- SINGLE RUGGEDIZED 1-3/4" UNIT

The Model 8510 Time Code Processor is a full-function time code data processing instrument featuring both time code generation and time code translation functions under control of a built-in microprocessor. Available as an optional feature is a host computer interface providing for both remote setup operation, and for status output to the host computer. Optional interfaces include RS-232, IEEE-488 and 16-bit/DR11C parallel. For high-precision timekeeping applications, an external frequency source and internal slew controls may be used to obtain microsecond accuracy. Optionally available are an internal tracking oscillator that may be locked to the external frequency souce and an oven-controlled precision oscillator.

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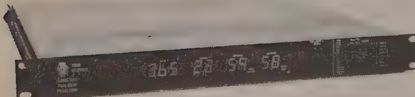


TIME CODE PROCESSOR MODEL 8520

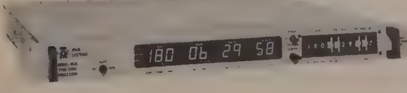
- READER/PRECISION TRANSLATOR
- AUTOMATIC FORWARD/REVERSE
- MULTICODE INPUT & OUTPUT
- AUTOMATIC ERROR BYPASS
- PHASE LOCKED LOOP

TRAK Systems' Model 8520 Time Code Processor combines a forward/reverse time code reader and a precision time code translator in a single instrument. Precision translation with all outputs phase locked to the input time code is provided for playback ratios between 1/64 and 32 times speed-up. Forward/reverse time code reading is provided over the frequency range of 30 Hz to 1 MHz. The front-end code reader circuits feature wide dynamic amplitude and frequency range, full-range analog filtering, digital filtering, and error bypass.

A variety of multicode input options are offered. Included are IRIG family, NSA family, NASA 36-Bit, and combinations of these codes.

For controlled playback ratios, input filter frequency selection for each selected code is automatic. For example, when IRIG B (1 KHz carrier) is played back at a 2:1 speed-up ratio, a 2 KHz filter is selected. For high speed playback (beyond 32:1 speed-up) four filter frequencies between 160 KHz and 1 MHz may be manually selected.

The Model 8520 has standard rate outputs of 1, 10, 100, and 1000 PPS on BNC connectors and parallel BCD outputs of hundreds-microseconds through hundreds-days on a multipin connector. Included in the BCD output connector are 1 PPS, 1K PPS, and 10K PPS delayed strobes. The instrument may also be ordered with a variety of special rate, parallel, and code outputs. All commonly used parallel binary codes, are available. A Universal Computer Interface (UCOI) option features a freeze buffer and word-length selection of 4, 8, or 16 bits.



TIME CODE GENERATOR MODEL 8530

- MICROPROCESSOR CONTROLLED
- HOST COMPUTER I/O
- MICROSYNCHRONIZATION
- FULL THUMBWHEEL PRESET

The Model 8530 Time Code Generator is a microprocessor-supervised unit incorporating all of the features required of a precision time generating instrument. The unit is designed to operate from a precision external frequency standard and may be ordered with one of several optional internal oscillators. Automatic start from a WWV tick or an external start pulse is provided. Slew and propagation delay controls are provided to permit synchronization to within one microsecond of an external time standard. Included as a standard feature is host computer I/O providing for remote setup, status monitoring, and time data output from Model 8530. Available interfaces include RS-232, IEEE-488, and 16-bit/DR11C parallel.

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TRAK® SYSTEMS DIVISION OF TRAK® MICROWAVE

Timing Instruments Slimline Series

- FULL THUMBWHEEL RESET
- HIGH-STABILITY INTERNAL STANDARD
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8390 Time Code Generator is specifically designed for applications requiring a low cost time signal source and can be ordered with a variety of time code and rate outputs. A high-stability internal oscillator assures maintenance of time accuracy of one second for periods of up to one month. Available outputs include serial time codes, parallel BCD or binary time, precision DC rates, and sinewave rates.

TIME CODE GENERATOR MODEL 8390

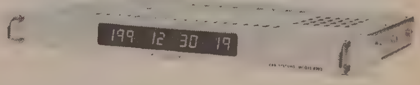
- MICROSYNCHRONIZATION PACKAGE
- FULL THUMBWHEEL PRESET
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8391 Time Code Generator incorporates all of the features required in a precision time generating instrument and can be ordered with a variety of time code rate outputs. The unit is designed to operate from a precision external frequency standard and may be optionally ordered with a high-stability internal oscillator. Automatic start from a WWV tick or an external start pulse is provided. Resynchronization to WWV to compensate for oscillator drift can be accomplished using only the front-panel ON TIME indicator and SLEW controls. With an external atomic frequency standard, outputs remain within microseconds of a primary synchronizing source for periods of many months. Parallel and rate signal output coherence is 50 nanoseconds or less and serial code coherence is 200 nanoseconds or less.

TIME CODE GENERATOR MODEL 8391

- AUTOMATIC FORWARD/REVERSE
- AUTOMATIC ERROR BYPASS
- READS DISTORTED CODES
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8392 Time Code Reader incorporates all of the features required for reading time codes from magnetic tape recorders. Analog and digital filtering combined with automatic error bypass provide for reading of distorted codes. Codes are coherently read in both the forward and reverse directions and, for most commonly used codes, direction detection is automatic. With automatic error bypass and automatic direction detection, no operating front-panel controls are required and operation time is minimized. Codes can be read over a wide dynamic input amplitude and frequency range. A variety of parallel outputs can be provided as options.



TIME CODE READER MODEL 8392

- TWO MODES OF OPERATION
- HIGH-STABILITY INTERNAL STANDARD
- FULL THUMBWHEEL PRESET
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8393 Time Code Translator/Generator is specifically designed for applications that require a reliable low cost time signal source capable of being synchronized to an incoming time code and can be ordered with up to three serial time code outputs and/or a variety of parallel and rate outputs. The basic unit incorporates a high-stability internal oscillator. Time can be manually preset to within one second of a local time standard in the generate mode.

In the translate mode, the instrument fully synchronizes to a serial time code (normally IRIG B) input and is designed for operation with time code inputs having a frequency precision close to that of the time base being used as a basic countdown input. For operation with less precise sources (such as instrumentation tape recorders), a code-lock option is available.

TIME CODE TRANSLATOR/GENERATOR MODEL 8393

- TWO MODES OF OPERATION
- INCLUDES MICROSYNCHRONIZATION PACKAGE
- FULL THUMBWHEEL PRESET
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8394 Time Code Translator/Generator incorporates all of the features required in a time code generating instrument and can be ordered with a variety of time code and rate outputs. The unit is designed to operate from a precision external frequency standard and may be optionally ordered with a high-stability internal oscillator. In the Generate mode, the unit may be manually synchronized with either a WWV transmission or an external start pulse.

When synchronizing with WWV, only the front-panel ON TIME indicator and SLEW controls are needed to maintain the outputs to within one millisecond of WWV. With an external atomic frequency standard, outputs are maintained to within 0.5 microseconds of the synchronizing source. Parallel and rate signal output coherence is 50 nanoseconds or less and serial code coherence is 200 nanoseconds or less.

In the Translate mode, the Model 8394 fully synchronizes to a serial time code (normally IRIG B) input, and is designed for operation with time codes having a frequency precision close to the time base being used for internal clocking. For operation with less-precise sources (such as tape recorders), a code-lock option is available.

TIME CODE TRANSLATOR/GENERATOR MODEL 8394

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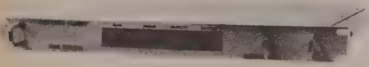
TRAK® SYSTEMS DIVISION OF **TRAK® MICROWAVE**

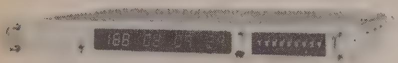
Timing Instruments Slimline Series



TIME CODE READER MODEL 8395

- INPUT SIGNAL FILTERING
- READS DISTORTED CODES
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS FOR EASE OF MAINTENANCE
- 115 OR 230 VAC OPERATION (RFI FILTERED)

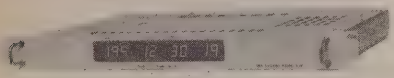
TRAK Systems' Model 8395 reads serial time code outputs from time code generators or tape reproducters, displays time in days, hours, minutes, and seconds, and optionally provides serial and parallel outputs to other equipment. The Model 8395 may be ordered to read all commonly used time codes and with multiple-code inputs. The Model 8395 is also ideal as a remote display in systems where the cost of long multi-conductor cables is prohibitive.



TIME CODE GENERATOR/READER MODEL 8396

- TWO INSTRUMENTS IN ONE
- AUTOMATIC ERROR BYPASS
- READS DISTORTED CODES
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS

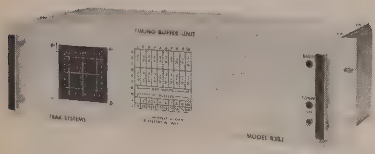
TRAK Systems' Model 8396 Time Code Generator/Reader functions either as a time code generator or as a time code reader. In the Generate mode, the Model 8396 may be used to record a time code, and in the Read mode, time may be read from tape at on-line and fast forward speeds. In the standard configuration, the unit generates and reads IRIG B in days, hours, minutes, and seconds. A unique error bypass circuit allows the unit to produce correct and coherent outputs for any number of frames containing coding errors. Reliable reading is assured by power line and signal input filtering, error bypass circuits, and a decoder which reads through single-cycle dropouts and extra pulses on coded bits.



TIME CODE TRANSLATOR MODEL 8397

- AUTOMATIC ERROR BYPASS
- PHASE LOCKS TO CODE
- HIGH-INTENSITY LED DISPLAY
- PLUG-IN CIRCUITS

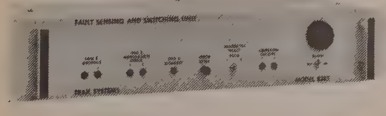
TRAK Systems' Model 8397 Time Code Translator provides precision translation of serial time code inputs from range devices and instrumentation tape recorders. The Model 8397 can be ordered with up to three serial time code outputs and/or a variety of parallel and rate outputs. A code-lock circuit phase locks the instrument to the carrier frequency of the incoming code to assure precision translation.



TIMING BUFFER UNIT MODEL 8383C

- REPLACEABLE PC ASSEMBLIES
- UP TO 40 SERIAL OR 120 PARALLEL OUTPUTS
- DC TO 5 MHz SERIAL CHANNELS
- SINGLE & DIFFERENTIAL PARALLEL CHANNELS
- OPTIONAL PATCHBOARDS

TRAK Systems' Model 8383C Timing Buffer Unit accepts time code and rate inputs and provides multiple outputs capable of driving long lines and low impedance loads. Typically, voltage gain is unity or less. This unit is designed to meet the requirements of timing systems having a moderate number of serial time code, rate, and parallel outputs. Space is provided for up to four buffer card assemblies, with each assembly having 10 linear buffers or 30 TTL buffers. Combinations of linear and TTL driver cards may be ordered. A variety of patching variations are available using the optional 100-position patchboard or by fixed internal programming.



FAULT SENSING/SWITCHING UNIT MODEL 8385

- TRIPLE-REDUNDANT SENSING
- AUTOMATIC SOURCE SENSING
- FAILSAFE DETECTORS AND POWER SUPPLY
- FAULT ISOLATION INDICATORS

TRAK Systems' Model 8385 Fault Sensing/Switching Unit (FSSU) accepts time code and rate inputs from three time code generating sources (TCG A, TCG B, and TCG C), compares these inputs, and provides a single set of outputs from TCG A or TCG B. TCG A normally provides the outputs, with TCG B providing a backup in the event of TCG A failures: TCG C provides the capability to isolate signal and phase disagreements to a specific souce (TCG A, TCG B, or TCG C) and to automatically switch from TCG A to TCG B in the event of a failure. All signal disagreements and dropouts are individually indicated on front panel lamps and a common audible alarm sounds for any fault.

To assure proper fault sensing even when one source has failed, all signals critical to signal comparison are derived from voting circuits having inputs from all three sources.

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TRAK. SYSTEMS DIVISION OF TRAK. MICROWAVE

Timing Instruments Custom Line Series

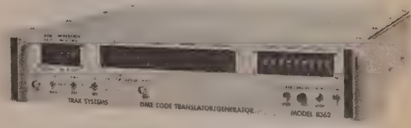
- TWO MODES OF OPERATION
- FULL THUMBWHEEL PRESET
- MICROSYNCHRONIZATION PACKAGE
- PLANAR GAS DISCHARGE DISPLAY
- PLUG-IN CIRCUITS
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8362 Time Code Translator/Generator incorporates all of the features required in a time code generating instrument and can be ordered with a variety of time code and rate outputs. The unit is designed to operate from a precision external frequency standard and may be optionally ordered with a high-stability internal oscillator.

In the Generate mode, the unit may be manually synchronized with either a WWV transmission or an external start pulse.

When synchronizing with WWV, only the front-panel ON TIME indicator and SLEW controls are needed to maintain the outputs to within one millisecond of WWV. With an external atomic frequency standard, outputs are maintained to within 0.5 microseconds of the synchronizing source. Parallel and rate signals output coherence is 50 nanoseconds or less and serial code coherence is 200 nanoseconds or less.

In the Translate mode, the Model 8362 fully synchronizes to a serial time code (normally IRIG B) input, and is designed for operation with time codes having a frequency precision close to that of the time base being used for internal clocking. For operation with less-precision sources (such as tape recorders), a codelock option is available.

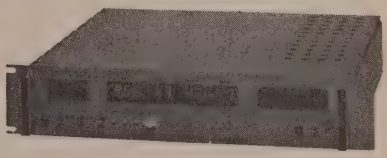


TIME CODE TRANSLATOR/GENERATOR MODEL 8362

- GENERATES SIX IRIG CODES
- MICROSYNCHRONIZATION
- FULL THUMBWHEEL PRESET
- GAS PLANAR DISPLAY
- PLUG-IN CIRCUITS FOR EASE OF MAINTENANCE
- BATTERY BACKUP PROVISION

TRAK Systems' Model 8365 Universal Time Code Generator incorporates all of the features required in a time-code generating instrument. This truly universal instrument simultaneously generates all six IRIG standard codes in DC level-shift form. Modulated code outputs can be ordered with the unit or can be added by you later simply by inserting plug-in modules. A variety of output options are available.

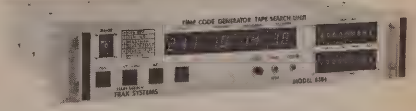
The unit is designed to operate from a precision external frequency standard and may be optionally ordered with a high-stability internal oscillator. Automatic start from a WWV tick or an external start pulse is provided. Resynchronization to WWV to compensate for oscillator drift can be accomplished using only the front-panel ON TIME indicator and SLEW controls. With an external atomic frequency standard, outputs remain within microseconds of a primary synchronizing source for periods of many months. Parallel and rate signal output coherence is 50 nanoseconds or less and serial code coherence is 200 nanoseconds or less.



UNIVERSAL TIME CODE GENERATOR MODEL 8365

- THREE INSTRUMENTS IN ONE
- FORWARD AND REVERSE GENERATE MODES
- AUTOMATIC TAPE TRANSPORT CONTROL
- AUTOMATIC DIRECTION DETECTION AND ERROR BYPASS
- READS DISTORTED CODES

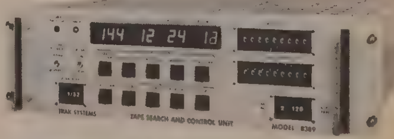
TRAK Systems' Model 8384 Time Code Generator/Tape Control Unit combines three instruments in a single chasis. In the Generate mode, the Model 8384 may be used to record a time code on magnetic tape. Forward and reverse generate modes are provided. During tape playback, the unit automatically reads the time code over a wide range of amplitudes and tape speeds while automatically controlling the tape transport in several modes of operation. Fully coherent reverse reading and automatic error bypass are featured. A unique error bypass circuit allows the unit to produce correct and coherent outputs, once in synchronization, for any number of frames containing errors. Reliable reading is assured by power line and input signal filtering, error bypass circuits, and digital noise rejection circuits.



TIME CODE GENERATOR/TAPE SEARCH UNIT MODEL 8384

- MICROPROCESSOR CONTROLLED
- REMOTE COMPUTER I/O
- AUTOMATIC SEARCH/PLAYBACK FILTER SELECTION
- AUTOMATIC ERROR BYPASS
- PLUG-IN FUNCTIONAL CARDS AND PLUG-IN IC'S
- BCD, BINARY, AND SERIAL OUTPUTS

TRAK Systems' Model 8389 Tape Search and Control Unit provides fully automatic tape search of magnetic tape recorders. Both manual and remote computer control of all set-up parameters are provided. Operation of the unit is under control of an internal microprocessor. The time code translator front-end of the unit features a wide dynamic amplitude and frequency range, full range of search and playback analog filtering, digital filtering, and error bypass.



TAPE SEARCH AND CONTROL UNIT MODEL 8389

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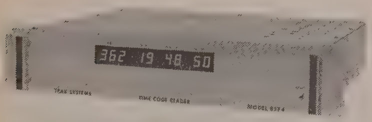
TRAK® SYSTEMS DIVISION OF TRAK® MICROWAVE

Timing Instruments

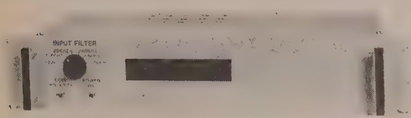


TIME CODE READER MODEL 8374

- SERIAL CODE READER
- GAS PLANAR DISPLAY
- ONE-INCH DISPLAY OPTIONAL
- PLUG-IN CIRCUITS FOR EASE OF MAINTENANCE
- MANY OPTIONS AVAILABLE

TRAK Systems' Model 8374 reads serial time code outputs from time code generators or tape reproductors, displays time in days, hours, minutes, and seconds, and optionally provides serial and parallel outputs to other equipment.

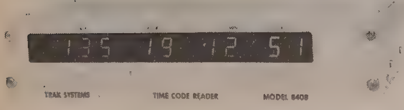
The Model 8374 may be ordered to read all commonly used time codes and with multiple-code inputs. The Model 8374 is also ideal as a remote display in systems where the cost of long multi-conductor cables is prohibitive. The high reliability of the instrument is assured by employing the design and workmanship standards specified in MIL-STD-454 to incorporate TRAK Systems' field-proven circuits. Reliability is further enhanced by using low-power TTL Schottky integrated circuits to minimize power consumption and to lower the operating temperature. Digital and analog circuits plug into wire-wrapped backplanes for ease of maintenance.



TIME CODE READER MODEL 8408N

- READS XR3 AND 2137 CODES
- AUTOMATIC FORWARD/REVERSE
- AUTOMATIC CODE RECOGNITION
- AUTOMATIC ERROR BYPASS
- READS DISTORTED CODES
- FUNCTIONALLY IDENTICAL TO ID-2234/U

TRAK Systems' Model 8408N Time Code Reader decodes and displays serial modulated XR3 and 2137 time codes at on-line speeds and during high-speed forward and reverse tape playback. Code format and direction detection is automatic, eliminating the need for operator intervention when processing tapes. A front panel switch selects the optimum low pass filter frequency for processing noisy tapes. A buffered output of the input code provides for "daisy chaining" many units.

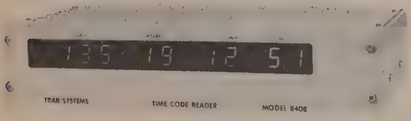


TIME CODE READER MODEL 8408A

- MULTIPLE-CODE READER
- INPUT FILTER AND AGC
- AUTOMATIC ERROR BYPASS
- LARGE INDICATORS
- AUTOMATIC CODE RECOGNITION

TRAK Systems' Model 8408A Time Code Reader decodes serial modulated time codes and displays the encoded time on a 0.8-inch LED display readable at 30 feet minimum.

With the one-inch gas discharge display option, viewing distance is 55 to 65 feet. The universal time display provides for viewing of special countdown and elapsed time formats as well as standard time of year. A variety of multicode input options are offered. Included are IRIG family, NSA family, NASA 36-Bit, FDME (BUDX), MILA, and combinations of these codes. The IRIG code reader automatically recognizes IRIG A, B, or G, without switch selection, and the NSA reader automatically recognizes XR3 and 2137 without switch selection. Parallel BCD time of year in seconds through days at TTL logic levels is provided.

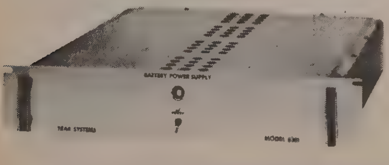


TIME CODE READER MODEL 8408B

- MULTIPLE-CODE READER
- INPUT FILTER AND AGC
- AUTOMATIC ERROR BYPASS
- GAS PLANAR INDICATORS
- AUTOMATIC CODE RECOGNITION

TRAK Systems' Model 8408B Time Code Reader decodes serial modulated time codes and displays the recorded time on a 1" Gas Planar display readable at 60 feet minimum.

The universal time display provides for viewing of special countdown and elapsed time formats as well as standard time of year. A variety of multicode input options are offered. Included are IRIG family, NSA family, NASA 36-Bit, FDME (BUDX), MILA, and combinations of these codes. The IRIG code reader automatically recognizes IRIG A, B, or G without switch selection, and the NSA reader automatically recognizes XR3 and 2137 without switch selection. Parallel BCD time of year in seconds through days at TTL logic levels is provided.



BATTERY POWER SUPPLY MODEL 8381

The Model 8381 Battery Power Supply is designed to smoothly and instantaneously supply all of the necessary DC voltages to TRAK Timing Equipment in the event of loss of primary AC power. The unit has the capacity to power the Slimline and Custom series of Generators for up to 36 hours, depending on the number of options in the Generator.

The salient specifications of the unit are as follows:

ELECTRICAL	
Output voltage:	11 to 14 VDC
Capacity:	36 ampere-hours
PHYSICAL	
Weight:	55 pounds
Mounting:	Standard 19 inch rack
Size:	19 inches wide x 3.47 inches high x 22 inches deep

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MINIGLOSSARY

BASIC ASCII CODE

Bit positions 4, 3, 2, 1
Second Hexadecimal Digit

First Hexadecimal Digit
Bit Positions 6, 5
Bit Positions 8, 7

		00				01				10				11			
		00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	0	NUL	DLE			SP	0					@	P			`	P
0001	1	SOH	DC1			!	1					A	Q			a	q
0010	2	STX	DC2			"	2					B	R			b	r
0011	3	ETX	DC3			#	3					C	S			c	s
0100	4	EOT	DC4			$	4					D	T			d	t
0101	5	ENQ	NAK			%	5					E	U			e	u
0110	6	ACK	SYN			&	6					F	V			f	v
0111	7	BEL	ETB			'	7					G	W			g	w
1000	8	BS	CAN			(	8					H	X			h	x
1001	9	HT	EM			)	9					I	Y			i	y
1010	A	LF	SUB			*	:					J	Z			j	z
1011	B	VT	ESC			+	;					K	[			k	{
1100	C	FF	FS			,	<					L	\			l	¦
1101	D	CR	GS			-	=					M	]			m	}
1110	E	SO	RS			.	>					N	^			n	~
1111	F	SI	US			/	?					O	_			o	DEL

Control Character Representations

NUL	Null
SOH	Start of Heading (CC)
STX	Start of Text (CC)
ETX	End of Text (CC)
EOT	End of Transmission (CC)
ENQ	Enquiry (CC)
ACK	Acknowledge (CC)
BEL	Bell
BS	Backspace (FE)
HT	Horizontal Tabulation (FE)
LF	Line Feed (FE)
VT	Vertical Tabulation (FE)
FF	Form Feed (FE)
CR	Carriage Return (FE)
SO	Shift Out
SI	Shift In
DLE	Data Link Escape (CC)
DC1	Device Control 1
DC2	Device Control 2
DC3	Device Control 3
DC4	Device Control 4
NAK	Negative Acknowledge (CC)
SYN	Synchronous Idle (CC)
ETB	End of Transmission Block (CC)
CAN	Cancel
EM	End of Medium
SUB	Substitute
ESC	Escape
FS	File Separator (IS)
GS	Group Separator (IS)
RS	Record Separator (IS)
US	Unit Separator (IS)
DEL	Delete

(CC)	Communication Control
(FE)	Format Effector
(IS)	Information Separator

Special Graphic Characters

SP	Space
!	Exclamation Point
|	Logical OR
"	Quotation Marks
#	Number Sign
$	Dollar Sign
%	Percent
&	Ampersand
'	Apostrophe
(	Opening Parenthesis
)	Closing Parenthesis
*	Asterisk
+	Plus
,	Comma
-	Hyphen (Minus)
.	Period (Decimal Point)
/	Slant
:	Colon
;	Semicolon
<	Less Than
=	Equals
>	Greater Than
?	Question Mark
@	Commercial At
[	Opening Bracket
\	Reverse Slant
]	Closing Bracket
^	Circumflex
¬	Logical NOT
_	Underline
`	Grave Accent
{	Opening Brace
¦	Vertical Line (This graphic is stylized to distinguish it from Logical OR)
}	Closing Brace
~	Tilde

ΞXICO

MAGNETIC STRIPE CARD PRODUCTS

READERS • ENCODERS • SYSTEMS

Electronic Features

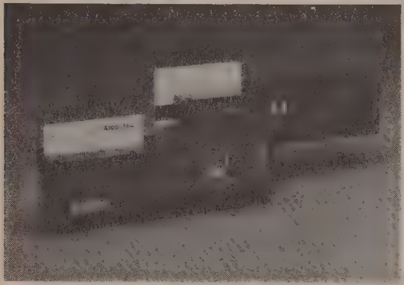
- Microcomputer accuracy & reliability
- Broad range of speed & acceleration
- Exceeds ANSI/ISO jitter specs
- Digital E/M transient filter

Mechanical Features

- Full gimbal head assembly
- Precision engineering plastic body
- Low card wear, long module life
- Rugged, virtually immune to damage

Output Features

- Differential data & strobe
- Real-time or buffered
- Serial or 8-bit parallel
- Direct connect to host I/O

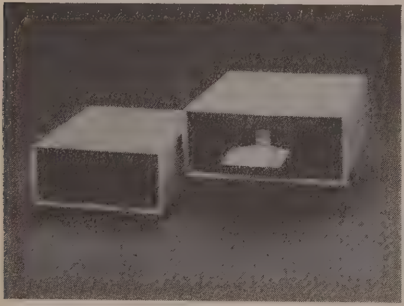


Series 6000 Swipe Reader

Hand-swipe modules for reading magnetically encoded data from cards, badges and passbooks. Available in all ANSI/ISO track combinations, for both standard and custom encoding densities. Eight standard body configurations offer end or top card entry, swipe-thru or swipe-to-stop, and swipe in either direction, to fit any system orientation. Easy mounting and interfacing. Exceptionally rugged and human factors tolerant. Performs reliably for over a million passes.

Series 7000 Insertion Reader
Series 7500 Insertion Reader/Encoder

Manual insertion & withdrawal modules. **Series 7000** for reading data on cards and badges with single or dual magnetic strips; all ANSI/ISO track combinations; standard or custom encoding density; dual heads yield six data tracks. **Series 7500** for both reading & encoding, e.g. read on insertion and encode on withdrawal, on dual stripe cards and badges; ANSI/ISO Tracks #1 and #2 for data, #3 for encode timing; standard or custom encoding density; auto-verification read during encode; requires serial data & strobe input.



Series 4700 Reader Terminal
Series 4750 Reader/Encoder Terminal

Integrated magnetic stripe card terminal with either Series 7000 Reader or Series 7500 Reader/Encoder. Transforms ANSI/ISO credit card or custom data formats into ASCII. EIA RS-232-C communication port with selectable baud rate and parity. Monitors 2 sense circuits. Controls 2 device circuits. Has 4 status LEDs. Attractive, compact case for counter top or bracket mounting. Companion plug-in power supply.

Designed for OEM, system and industrial applications, including:

Credit and Debit Cards

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Data Collection Cards

Time & attendance systems
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Access Control Cards

Security gates and doors
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Computer terminals

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COMPUTER A/D-D/A SUBSYSTEMS

FOR MULTIBUS

INDUSTRY STANDARD 12-BIT A/D-D/A

- Runs directly from Intel RMX-80 software
- 12 binary bits, 20μS A/D conversion
- Differential PGA
- Crystal Pacer interrupt clock
- 4-20 mA loop I/O

ST-711: 32S 16D A/D In
ST-732: 32S 16D A/D In plus 2 D/A Out
ST-724: 4 D/A Out

8 LOOP DAC's INDUSTRIAL

- 4 or 8 D/A channels with selectable 4-20 mA loops
- 8/16-bit data transfer, 16/20-bit addressing (8086-series compatible)
- Runs directly from Intel RMX-80 software
- Floppy disk diagnostic program and listing available
- 12-bit resolution, .05% accuracy
- Optional DC/DC power converter

ST-728 SERIES

HIGH RESOLUTION, 14-BIT DAC'S

- 4 or 8 D/A channels
- 8/16-bit data transfer, 16/20-bit addressing (8086-series compatible)
- Accuracy .005% of FSR
- Optional DC/DC power converter
- Floppy disk diagnostic program and listing available

ST-716 SERIES

Without a Passport, your digital computer won't be welcome in an analog world.

- Passport is Datel's SDAS-8 miniature Data Acquisition Microsystem
- 8 Differential A/D Channels
- Measures only 4″ x 6″ x 0.4″
- Simple ASCII RS-232-C connection to personal and microcomputers
- Includes thermocouple software
- Includes PGA, real-time clock, auto-scan start clock
- Multidrop 32D channels thousands of feet between isolated stations.

SDAS-8

Send for your free brochures

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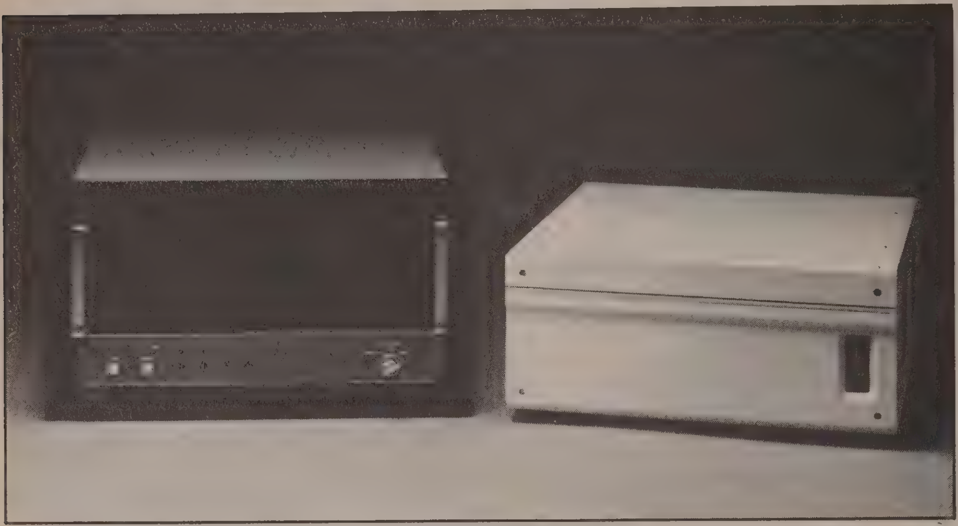
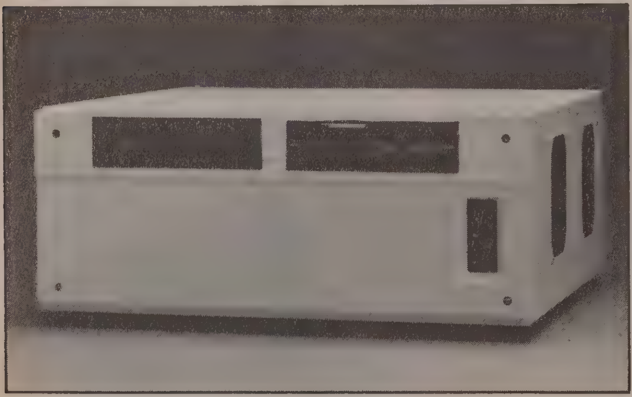
SYSTEM ENCLOSURES—7 TO 15 SLOTS



MC6010 and MC6015B



SE607

All you need to add are the boards! Here's everything ready to go—rack mountable or tabletop enclosures, 7 to 15 slot low-noise backplanes, multiple-output power supply, dual fan cooling and control panel. All meet FCC Part 15 Class A EMI/RFI.

Choose from 3 different styles:

1. The all-new SE 607 System Enclosure has a front-access 7-slot card cage with room for two 5¼" half-height peripherals. Plenty of power for floppys, Winchesters or tape drives.
2. The MC6010 ten slot model is a modular design with front card access and provision for multiple rear I/O connections. Handles, ears and slides are available for rack mounting.
3. The 12 and 15 slot models offer top access to cards, with rear I/O access connections and a wide choice of power supply sizes.

All have RFI filtering and transient voltage suppression, overload and short circuit protection for all outputs, and ACLO signal for power fail software execution.

Model	No. of Slots	Card Loading	Card Center Spacing	Vertical Rack Height
SE607	7	front	0.6″	7″
MC6010	10	front	0.6	7
MC7512B	12	top	0.75	10½
MC6015B	15	top	0.6	10½

For more information call toll free (800) 854-7086.
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POWER SUPPLIES
FOR THE MULTIBUS

Multiple-output linear and switching dc supplies available in five power ranges. Excellent line/load regulation and stability, foldback current limiting and overvoltage protection on all outputs. Power fail (ACLO) indication. Input on linears 100/115/215/230V, 47-63Hz; on switchers 90-132/180-264V 47-440Hz.

Model	Swi/ Lin	Output Voltage +5V	+12v	−12v	−5v
MP514	Lin	14A	2.0A	0.8A	0.9A
MP530	Lin	30	4.5	1.75	1.75
MP540	Swi	40	5	5	—
MP560	Swi	60	5	5	—
MP580	Swi	80	8	8	—

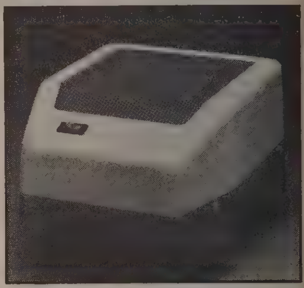
Combinations of the MP514 and MP530 are available in five rack mounting configurations.

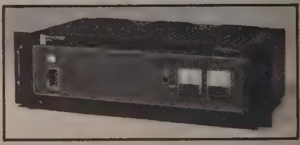
Rack Mounting Supplies:
RP-1 (1)MP 514
RP-2 (1)MP 530
RP-3 (2)MP 514
RP-4 (2)MP 530
RP-5 (1)MP 514 + (1)MP 530

POWER CONDITIONERS
250 TO 1000VA

Help make your computer system error-free with these triple protection line conditioners.

- **Regulation for slow variations**
- **Transient and noise suppression**
- **Isolation for CMR, ac ground loops**





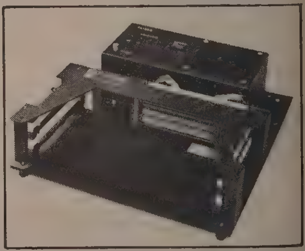
All are 115V nominal, 60Hz in/out, with ±3% output for −10%+20% input. Three power levels are available in the portable model, 500VA available in rack mount.

ES250P	250VA portable
ES500	500VA rack mount
ES500M	500VA rack mt w/meters
ES500P	500VA portable
ES1000P	1kVA portable

MULTIBUS TEST SET

Get your Multibus system up and running with a minimum of cost and effort with this combination 4-slot card cage and 75W switching power supply. Includes power switch, fan and line cord.

Model TS-604 Four slot test set



All Electronic Solutions chassis, cards and card cages feature full THREE YEAR WARRANTY

the Multibus ELECTRONIC SOLUTIONS.

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Electronic Solutions

MULTI-CAGE® CARD CAGES

These rugged, durable anodized aluminum card cages are available with just the right capacity for your needs—from 3 slots to 26 slots, 0.6″ or 0.75″ spacing, plus accommodation for iSBX™ or wirewrap cards. The single mother board backplane increases reliability and minimizes connections.

Auxiliary (P-2) backplanes are available on all models. Parallel priority resolution circuitry (PPRC) is available on 8-slot and larger models. All models have multiple backplane power supply terminals, and the 21-slot and larger cages have an optional power distribution board for single point, high current power connections.

All models
14.2″W × 8.5″H × depth shown below

Models with .6 inch Card Centers				
Model	No. of Slots	No. of iSBX slots available*	No. of w-w slots available*	Depth (in.)
ESBC 604	4	0	1	3.34
SBC 604A	4	1	0	3.34
ESBC 614G	4	0	1	3.34
SBC 605	5	0	1	3.94
SBC 606	6	0	1	4.54
SBC 608	8	2	2	6.68
SBC 609	9	1	1	6.68
SBC 619	9	0	1	6.68
SBC 6012	12	3	4	10.02
SBC 6012B	12	0	1	8.04
SBC 6013B	13	0	1	8.69
SBC 6014	14	1	2	10.02
SBC 6015	15	0	1	10.02
SBC 6016	16	5	5	13.36
SBC 6020	20	1	1	13.36
SBC 6024	24	2	3	16.7
SBC 6026	26	0	1	16.7

Models with .75 inch Card Centers				
Model	No. of Slots:	No. of iSBX slots available*	No. of w-w slots available*	Depth (in.)
SBC 753	3	0	1	3.34
SBC 754	4	0	1	3.94
SBC 755	5	0	1	4.54
SBC 757	7	1	1	6.68
SBC 7512	12	0	1	10.02
SBC 7516	16	1	1	13.36
SBC 7521	21	0	1	16.7

*Without using additional slots.

CARD CAGE/ ENCLOSURE ACCESSORIES

P2 BUS:

Backplanes for implementation of the Multibus P2 bus (x = no. of slots) 4-26 slots at 0.6″ spacing, 3-21 slots at 0.75″ spacing

P2-60x-P	PC board only, 0.6″ spacing
P2-75x-P	PC board only, 0.75″ spacing
P2-60x-C	Board w/connectors, 0.6″ spacing
P2-75x-C	Board w/connectors, 0.75″ spacing

PARALLEL PRIORITY RESOLUTION CIRCUITRY

PPRC8	For up to 8 masters
PPRC16	For up to 16 masters

CAGES WITH POWER DISTRIBUTION BOARDS

Piggyback board to Multibus backplane, simplifies power connections. Add "-PDB" suffix to models in table (21 slots & up)

FANS FOR CARD CAGES

A30390-10	4.5″ 68cfm
A30769-10	4.5″ 50cfm
A30473-10	3″ 35cfm

RACK MOUNT CARD CAGES

Choose from a selection of models with either horizontal (3-15 slots) or vertical (12-26 slots) card mounting. All are ready for standard 19″ rack mounting, in the vertical rack space shown in the tables. Horizontal mount versions include removable front cover and mounting area for fan. Vertical mount versions have hinged front cover. All have optional parallel priority resolution circuitry and P-2 (auxiliary) backplane or connectors.

VERTICAL RACK MOUNTS

Vertical rack space for all models 15-3/4″

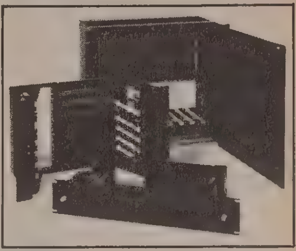
Models with .6 inch Cord Centers

Model	No. of Slots	No. of iSBX slots available*	No. of w-w slots available*
SBC 6012V	12	4	4
SBC 6014V	14	2	2
SBC 6015V	15	1	1
SBC 6016V	16	5	5
SBC 6020V	20	1	1
SBC 6024V	24	3	3
SBC 6026V	26	0	1

Models with .75 inch Cord Centers

Model	No. of Slots	No. of iSBX slots available*	No. of w-w slots available*
SBC 7512V	12	0	1
SBC 7516V	16	1	1
SBC 7521V	21	0	1

*Without using additional slots.



HORIZONTAL RACK MOUNTS

Models with .6 inch Cord Centers

Model	No. of Slots	No. of ISBX slots available*	No. of w-w slots available*	Vertical Rack Space
ESBC 604H	4	0	1	3.5
SBC 604AH	4	1	0	3.5
SBC 605H	5	0	1	5.25
SBC 606H	6	0	1	5.25
SBC 608H	8	2	2	7.0
SBC 609H	9	1	1	7.0
SBC 6012H	12	3	4	10.47
SBC 6014H	14	1	2	10.47
SBC 6015H	15	0	1	10.47

Models with .75 inch Cord Centers

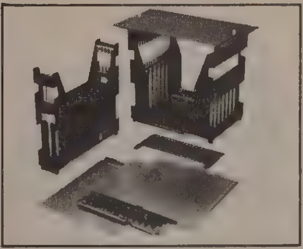
Model	No. of Slots	No. of ISBX slots available*	No. of w-w slots available*	Vertical Rack Space
SBC 753H	3	0	1	3.5
SBC 754H	4	0	1	5.25
SBC 755H	5	0	1	5.25
SBC 757H	7	1	1	7.0
SBC 7512H	12	0	1	10.47

DOUBLE HEIGHT

CAGE AND CARD SYSTEMS.

The Electronic Solutions 2X Multibus system uses 12x12 inch cards, offering double the useful circuit area of a standard size card. Or even more than double, considering the bus interface "overhead" on each card.

Double Height cards are particularly useful for batch I/O processing, configured with the I/O ports and memory on the same card. An on-board μC can process large blocks of data without the delays of bus arbitration and data transfer.



CARD CAGES

All card cages and rack mounting card cages are available in double height versions. Add "2X" before model number.

DEVELOPMENT CARDS

2XPR100	Double Height Prototyping Card
2XPR100A	Double Height Slave Interface/Prototyping Card
2XPR100M	Double Height Master Interface/Prototyping Card
2X80EX	Double Height Extender Card
DHA80	Single Height to Double Height Card Adapter

More . . . Multibus Memory and Designers Cards
VMEbus System Components ⇨

Electronic Solutions

9255 Chesapeake Drive
San Diego, CA 92123
(619) 292-0242/(800) 854-7086
In Calif. (800) 772-7086
Telex II (TWX): 910-335-1169

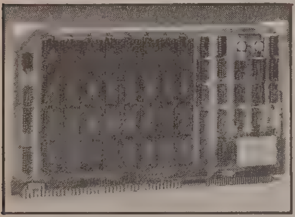
Everything for the Multibus

(continued)

NON-VOLATILE MEMORY

Add non-volatile, low power read/write memory with Electronic Solutions' EEPROM and battery-backed CMOS memory cards. There are also a wide variety of PROM/EPROM board types available to match your firmware perfectly into your system.

Battery-backed RAM-C series. Up to 64K of non-volatile CMOS RAM with on-board NiCd battery for up to 96 hr. data retention. 8/16 bit data bus, 20 bit addressing, 300ns access time. Power fail detection signals are supported. Available complete and tested with 64K, partially populated or unpopulated. Unused sockets are fully compatible with 2716 type EPROM and allow full read/write operation of X2816A (5V) EEPROM.



RAM-64C	64K CMOS RAM Board
RAM-xC	Partially populated x = 8(K) to 56(K) CMOS RAM
RAM-OC	Unpopulated Board

Static RAM/EEPROM/EPROM Combination RAM-S series. Load this board with up to 64K total any combination of Static RAM, 2716 type EPROM, and X2816A type 5V EEPROM. Static RAM gives you that fast memory access without refresh wait states. EEPROM is supported for both read and write. Versatile 20-bit addressing and address deselection make it easy to fit any system. Data bus is 8/16 bit.

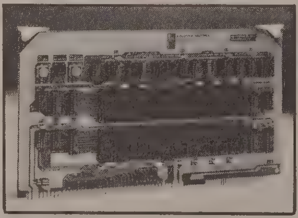
RAM-64S	64K Static RAM Board
RAM-xS	Partially populated x = 8(K) to 56(K) Static RAM
RAM-OS	Unpopulated Board

EEPROM is finding new applications daily, for storing configuration tables, security and access codes, and for program development or downloading. The EEPROM-32 supports all currently available 16K-bit EEPROM devices, has on-board +21Vpp supply for read/write operation. 2716 EPROMs may be used on the same board. (X2816A EEPROMs may also be used in the RAM-S series, above.)

EEPROM32	32K EEPROM Board (unpopulated)
EEPROM32-32K	32K EEPROM Board with 2816-type EEPROMs

ROM/PROM/EPROM Boards. Up to 256K of read-only memory. Easy hex-switch address selection and versatile address deselection makes upgrading these boards a snap. Both have 8/16 bit data bus. The PROM-64/256 has 24-bit addressing (16Mb), the PROM-32/64 address with 20-bit (1Mb). ROM/PROM/EPROM boards each hold 16 devices.

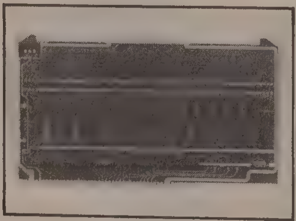
PROM64/256	(16) 27128, 2764 or 2732
PROM32/64	(16) 2732, 2716 or 2532



I/O BOARDS

The Switch Input Module board monitors the on-off status of 64 single-ended inputs. Schmitt trigger inputs provide excellent noise rejection for most applications, and capacitors may be added on any or all channels for additional noise filtering in very noisy environments.

SIM-64	64-input Switch Input Board



Multibus Packaging: Enclosures and Cages

SYSTEM DEVELOPMENT BOARDS

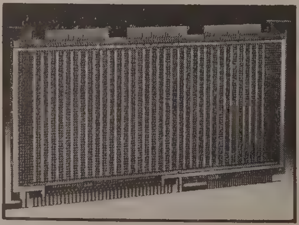
PR-100A SLAVE INTERFACE/PROTOTYPING BOARD

Save development time with this prototyping board that has all the bus logic already built in. The interface circuitry supports up to eight I/O devices, each with eight registers, and with full 8-level interrupt support. Data bus supports 8/16-bit operation.

PR-100M MASTER INTERFACE/PROTOTYPE BOARD

To develop your smart card this prototyping board has 8288/8289 bus interface circuits and arbitration for your on-boad CPU. It interfaces directly with 8086/8088 processors, has an 8/16 bit data bus and 24-bit addressing.

PR-100H PROTOTYPING BOARDS

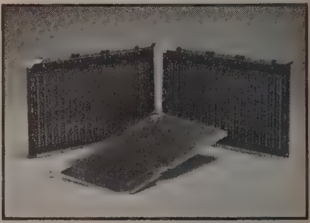


Prototyping card with holes in 0.1" spacing, and room to mount 85 16-in DIPs plus discrete components, or 90 16-pin DIPs only. There are 34 undedicated bus strips for power, and a ground bus around the perimeter of the card. Three gold-plated 50-pin I/O connectors and P2 connector are provided.

PR-100W STANDARD WIREWRAP BOARD

Mounting pattern of 36 columns by 50 pins, capacity up to 108 16-pin DIPs.

PR100WTGH	Tin wirewrap leads with header I/O connector
PR100WGH	Gold wirewrap leads with header I/O connector
PR100WTGE	Tin wirewrap leads with edge connector
PR100WGE	Gold wirewrap leads with edge connector



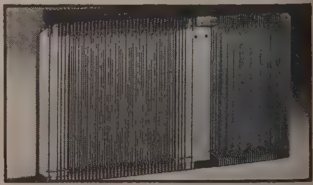
PR-200W HI-DENSITY WIREWRAP BOARD

Mounting pattern of 44 columns by 53 pins, capacity up to 132 16-pin DIPs.

PR200WTGH	Tin wirewrap leads with header I/O connector
PR200WGH	Gold wirewrap leads with header I/O connector

80EX-3 EXTENDER CARD

Universal Multibus extender card



For more information call

toll free (800) 854-7086.

(In California (800) 772-7086)

VME:

Electronic Solutions Makes it Easy

9255 Chesapeake Drive
San Diego, CA 92123
(619) 292-0242/(800) 854-7086
In Calif. (800) 772-7086
Telex II (TWX): 910-335-1169

Electronic Solutions

CARD CAGES

VMEasy™

Electronic Solutions VME cages are ideal for system development and OEM applications. It's easy to match OEM mounting configurations, since each card cage can be mounted on the bottom or any side. Unique center adapters convert double size slots into two single size slots, making it easy to configure systems with both slot sizes.

Electronic Solutions' single size VME card cages are ideal for I/O expansion applications in VME systems, as well as for complete single size VME or Eurocard systems.

All cages are constructed of sturdy, durable anodized aluminum with a single mother board backplane for the VME bus and separate connectors for the I/O channel. Fans and fan mounting hardware are available for each cage.

No. of Slots	Double Size Model	Single Size Model
5	VME-805	VME-405
7	VME-807	VME-407
9	VME-809	VME-409
12	VME-812	VME-412
16	VME-815	VME-415
20	VME-820	VME-420

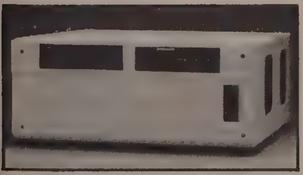
SYSTEM ENCLOSURES

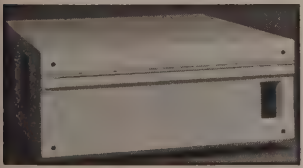
Just add VME boards to make a complete system with one of these full-featured system enclosures.

The SE805 has a five-slot card cage and room for two 5¼ half-height drives. The 225-watt switching power supply has plenty of power for boards as well as peripherals.

The MC807 has a seven-slot card cage in the same overall size, also with the 225W supply.

Both are suitable for either tabletop or rack mounting, and both meet FCC Part 15 class A requirements for EMI/RFI.





SE805	Five Slot VME System Enclosure
MC807	Seven slot VME Enclosure

VME TEST SET

Get your VME system up and running with a minimum of cost and effort with this combination 5-slot card cage and 75W switching power supply. Includes power switch, fan and line cord.

Model TS805	Five slot test set

ACCESSORIES

VME-CA	Center Adapter: Converts double size slot to two single size slots
FMB-3	Standard fan mounting bracket kit
A30390-10	Torin Fan: 68 cfm
A30769-10	Torin Fan: 50 cfm

I/O Channel Connectors:

VME9-123	2-level wire wrap
VME8-123	3-level wire wrap
VME1-224	IDC (for cable connection)

68000 SINGLE BOARD COMPUTER

Make this high-performance 10 MHz 68000-based Single Board Computer the center of your VME system. Full 16 Mbyte (24-bit) addressing with optional 68451 memory management unit (MMU). Two RS-232C serial ports and a user configurable parallel/printer port (68230) are on board.

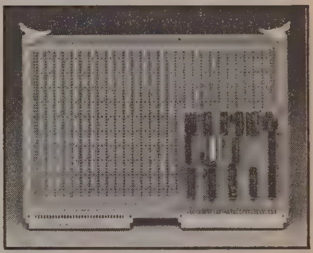
Multimaster capability is supported, with multilevel bus arbitration.

VME68CP	10MHz 68000 Single Board Computer, without MMU
VME68CPM	10MHz 68000 Single Board Computer, with MMU

DESIGNER'S CARDS

BUS INTERFACE/ PROTOTYPING BOARD

VME68AD	Double size Prototyping board with VMEbus interfacing circuitry installed. Responds to VME Short I/O space, provisions for Standard I/O space. 7 level interrupt request. Buffered data bus supports 8- and 16-bit transfers.

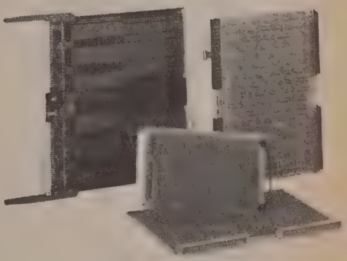


VME68AD

PROTOTYPING BOARDS

VME/Eurocard

VME68HD	Double size, 57 x 86 hole pattern with 0.1" spacing.
VME68PD-G	(Gold Connectors)
VME68PD-TG	(Tin Gold Connectors) Double size, 2-level wire wrap. Provided with 20 columns of 81 pins.
VME68HS	Single size, 57 x 34 hole pattern with 0.1" spacing.
VME68PS-G	(Gold Connectors)
VME68PS-TG	(Tin Gold Connectors) Single size, 2-level wire wrap. Provided with 14 columns of 50 pins.



EXTENDER CARDS

VME68ED	Double size VME/ Eurocard Extender Card
VME68EX	Single size VME/ Eurocard Extender Card

STATIC MEMORY

CMOS RAM, EPROM, EEPROM 8K TO 128K WITH BATTERY BACK-UP

This is the only memory board you may need to satisfy many varied memory requirements. Sockets are provided for 16 24/28-pin JEDEC devices including byte-wide static/CMOS RAM, EPROM, or EEPROM from 2k to 32k bytes. The sockets are arranged in 4 banks of 4 sockets each, with separate precision timing on each bank so up to four different type devices may be used. User selection of supervisor/non-privileged access.

VME68MM	Static Memory Board

Vantage Point®
Computer System

THE VANTAGE POINT COMPUTER™ SERIES

The ICD Vantage Point Computer™ is the first production microcomputer that is specifically designed to interact with the "real world," without sacrificing the performance of a business-class desktop microcomputer. Custom interface circuitry has been incorporated into the hardware design to provide physical monitoring and control capabilities for use in energy management, security, industrial control, and other similar functions. Through a unique "Foreground/Background" software tasking technique, developed by ICD, the Vantage Point Computer™ can be configured to run both standard CP/M™ compatible software, and basic monitoring and control software, "simultaneously", without noticeably affecting the on-screen task.

The unique analog interface, memory management, disk control, and timing attributes of the Vantage Point Computer™ have proven ideal for many OEM and custom applications, including process control, fire, smoke, and gas detection, audio/video/lighting control systems, robotics, "computer homes," and many others. The built-in 12-slot motherboard will accommodate plug-in ICD BUS function cards, including an EPROM/RAM Card, Hard Disk Controller, EPROM Programmer, and additional memory and analog I/O cards. Access to telecommunications systems may be gained through a plug-in Modem/Autodial Card, as well as through built-in Serial and Parallel interface ports.

CP/M is a registered trademark of Digital Research Corporation

Vantage Point Computer, Vantage Point Computer System, & Silent Partner are registered trademarks of Industrial Computer Designs, Inc.

VANTAGE POINT COMPUTER™ FEATURES:

- 4 MHz. Z80A Processor Standard
- Built-In Analog Interface provides 16 Input, 16 Output Channels for monitoring and control applications (In-chassis expandable to 128 Analog Input/Output Channels)
- Will run standard CP/M™ compatible software, including word processors, spreadsheet accounting programs, database managers, etc.
- 12-Slot Motherboard allows expansion through Plug-In ICD BUS Cards — over fifteen different function cards available, including an EPROM Programmer, Hard Disk Interface, Stepper Motor Controller, and many others.
- 128 KByte Random-Access Memory (RAM) Standard, Expandable to 1 Megabyte through Plug-In Memory Cards.
- Two Built-In 1 Megabyte Floppy Disk Drives (5¼" Standard, 1 Megabyte Unformatted, 730 KByte Formatted)
- Green-Screen CRT Unit provides 80 x 24 (Character x Column Lines) Display
- Adjustable Display Screen allows 5 tilt positions for optimum viewing angle and comfort
- Detachable Keyboard includes 93 Sculptured Keys, 6' Coiled Extension Cord
- Twenty (20) Shift-Selectable Function Keys can be custom-configured to provide one-touch access to programs or monitoring and control functions
- Full-Featured Scientific Calculator Mode can be accessed directly from keyboard during normal operation
- Built-in battery-backed-up Realtime Calendar/Clock provides accurate timekeeping functions, may be used for data logging, report generation, elapsed time calculation, etc.
- Bottom-of-Screen (25th Line) Status Line Display provides continuous Time/Date/Day of Week Readout, can be programmed to show energy management system status, etc.
- Central Processor Unit (CPU), Memory, Interface, Disk Drive Units and Power Supply housed in rugged, RFI-shielded enclosure
- Flow-Through Ventilation System ensures proper cooling of all components, reduces dust contamination
- Front Panel-Mounted Lighted Master On/Off Switch
- Display/Keyboard Unit may be remotely located
- Printer and auxiliary communications ports standard
- 19" Rack Mount Option

OTHER VANTAGE POINT COMPUTER™ PRODUCTS:

- R.O.S.E. Realtime Office Security & Energy Management System
- The Silent Partner™ — Intelligent Standalone Data Acquisition & Control Unit. Communicates with host computer via Serial Port.
- Over fifteen plug-in ICD BUS cards allow expansion of the Vantage Point Computer™ & Silent Partner™.

Industrial Computer Designs

31121 Via Colinas #1005
Westlake Village, California 91362
Phone: (818) 889-3179

The ICD BUS — "Building Blocks" for Computer Solutions

ICD has developed a new computer buss structure which has been designed to support a complete line of compact board level products aimed towards the needs of the Engineer/Designer, OEM System Packager, and Hobbyist Retailer.

ZPM-8 MICROPROCESSOR, MEMORY & I/O CARD: Utilizes a Z80A microprocessor operating at 4 MHz. 2K EPROM System Monitor. 2K Static RAM, with sockets for an additional 4K EPROM/RAM. On-board 8255 Programmable I/O chip provides three 8-Bit parallel ports.

SCC-3 SERIAL/CALENDAR/CLOCK CARD: Provides three RS-232 Serial I/O Channels. Baud rates are jumper-selectable. Long-term battery backed-up Calendar/Clock.

PRC-16 EPROM/RAM CARD: Supports up to 16K in 2K blocks. Accepts any combination of 24-pin, 2716 EPROM or RAM 2K Memory ICs.

RMMC-64 RAM MEMORY MASTER CARD: Provides 64 KBytes of Random-Access Memory.

RMMC-128 RAM MEMORY MASTER CARD: Provides 128 KBytes of Random-Access Memory. Provides buss access and control of up to seven Memory Slave Cards, Model RMSC-128.

RMSC-128 RANDOM-ACCESS MEMORY SLAVE CARD: Companion memory slave card provides additional system memory in 128 KByte blocks.

FDC-4A FLOPPY DISK CONTROLLER: Will operate up to four drives of differing formats and sizes (both single and double densities/sided).

HDAC-1S HARD DISK ADAPTER CARD: Allows the use of a hard disk drive via the SASI Interface Standard.

CMC-16/8 CONVERTER MASTER CARD: Provides both 16 channel A/D and 16 channel D/A conversion with 8-bit accuracy over a 0 to +5 VDC range. Master Card will provide control and buss access functions for up to 15 companion Converter Slave Cards.

CSC-16/8 CONVERTER SLAVE CARD: Up to fifteen (15) Slave Converter Cards may be controlled by one Master Converter Card, to a total of 256 channels of A/D-D/A conversion on the ICD Bus.

CRDD—16 16 CHANNEL CONTROL RELAY/DIRECT DIGITAL INPUT CARD: Contains 16 SPDT relays for low power control applications and 16 direct digital inputs for switch closure sensing and event monitoring applications.

EPC-4 FOUR EPROM PROGRAMMER CARD: Designed to allow programming of 2K EPROMS (used in ZPM-8 Processor Card and PRC-16 EPROM/RAM Card). Under software control, can program up to four 2716 EPROMs simultaneously with the same start address, or sequentially.

SMCC-2 DUAL STEPPER MOTOR CONTROLLER CARD: Intelligent Z80A-Based Controller Card for ICD BUS is configured to control two four-phase stepper motors in a micro-positioning mode which will allow 51,200 steps/revolution.

KCCW-8 EIGHT CHARACTER DISPLAY/KEYBOARD CONTROL CARD: May be used to display a complete 128 ASCII Alphanumeric Character Set held in EPROM on the card. A full ASCII keyboard or a custom keyboard may be attached to the card for operator input.

MCP-12 MOTHERBOARD CHASSIS W/POWER SUPPLY: Chassis with Faraday shielded 12-Slot ICD BUS Motherboard and ICD BUS Power Supply installed.

CMBK-4 4-SLOT MOTHERBOARD KIT: Faraday shielded ICD BUS Motherboard provides slots to accommodate up to four (4) ICD BUS Cards.

CMBK-12 12-SLOT MOTHERBOARD KIT: Faraday shielded ICD BUS Motherboard provides slots to accommodate up to twelve (12) ICD BUS Cards.

PTB-1 PROTO BOARD KIT: Allows design prototyping and experimentation on the ICD BUS.

EXB-1 EXTENDER BOARD KIT: Plugs into single ICD BUS slot, extends all buss connections 3.8" above Motherboard.

Sensors by ICD: Electrical Input From The "Real World"

RTS-1 REMOTE TEMPERATURE SENSOR: Single Temperature-to-Voltage Converter. Will convert 20 to 120 degrees Fahrenheit to +0.8 to +4.8 VDC.

RLS-1 REMOTE LIGHT SENSOR: Single Light Level-to Voltage Converter. Can be used for relative light-level monitoring. Will convert light levels from complete darkness to full bright into a 0 to +5 VDC representation.

RMS-1 REMOTE MOISTURE SENSOR: Single Moisture-to-Voltage Converter. Can be used for relative ground moisture level monitoring. Will convert ground moisture levels from dry to full saturation into 0 to +5 VDC.

RSDA-1 REMOTE SMOKE DETECTOR ALARM: Single Smoke Detector Sensing/Sending Unit. Includes built-in high level alarm buzzer.

ALS-1 AUDIO LEVEL SENSOR: Converts analog audio information provided by a standard dynamic microphone into a 0 to +5 VDC representation. Includes a professional-bandwidth (typically 20-20 KHz. range) microphone preamplifier.

RACT-1 REMOTE ALTERNATING CURRENT TRANSPONDER: Allows relative alternating electrical current measurements to be made without passing the current through the device. Provides a linear 0 to +5 VDC output.

RDCT-1 REMOTE DIRECT CURRENT TRANSPONDER: The RDCT-1 will convert Direct Current (DC) flow readings into a 0 to +5 VDC representation.

Controllers by ICD: The "Muscle" Needed To Perform "Real World" Tasks

HVAC-1 REMOTE CONTROLLER: Single Heating/Ventilation/Air Conditioning System Controller. Inserts in line between standard thermostat and any HVAC unit, allowing either local or computer control.

ADV-07 thru -14 AIR DUCT VALVES: Heating/Ventilation/Air Conditioning Duct Damper Valve. Allows air flow through duct to be electrically controlled. Two-position. Available in standard duct sizes from 7-Inch to 14-Inch.

PDM-5 thru -6K POWER DIMMER MODULES: Allows low-voltage control of high-power non-inductive loads, such as lights, DC motors (through rectifier), etc. Maximum power dissipation from five-hundred (500) Watts to six-thousand (6000) Watts at 120 VAC, Models PDM-5 to PDM-6K.

VCA-1 VOLTAGE-CONTROLLER ATTENUATOR: Allows adjustment of line-level audio signals with a small (0) to +5 VDC range) control voltage. The device will control signals of professional bandwidth (20 Hz. to 20 KHz.), through a 90 dB range.

NOTE: ICD-manufactured sensors & controllers (excepting Air Duct Valves) require +8 VDC.

Industrial Computer Designs

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Westlake Village, California 91362
Phone: (818) 889-3179

MAGNUM OPUS CUSTOM ELECTRONIC ENGINEERING

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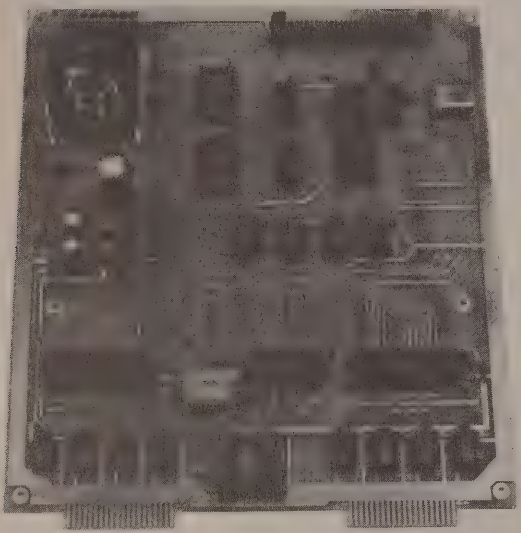
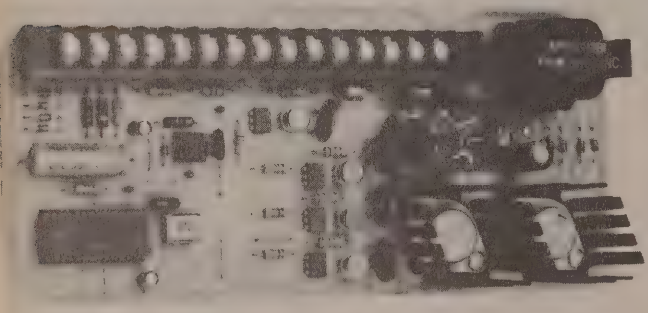


6502GP MICROCOMPUTER

- **CPU** • 6502 • 1 MHz Crystal Oscillator
- **ROM** • 2 Slots • 2K/4K • +5V EPROM/ROM
- **RAM** • 1K • Additional 2K in ROM 2 Slot
- **SERIAL** • 6551 • RS232 • RS232C • Parity
  - Full or Half Duplex • Control Signals
  - 15 Baud Rates • Echo Mode
- **PARALLEL** • (2) 6522 • 32 I/O Lines
  - Four 16 Bit Timer/Counters
  - Latched I/O Registers • 2 Serial Data Ports
- **PARALLEL** Output Buffering • Spare Selects
- **DC** Power Supply +5V, +12V, −12V (Less XFMR)
- **EXPANDABLE** Via a 50 Pin Connector
- **CONFIGURED** to Users Requirements

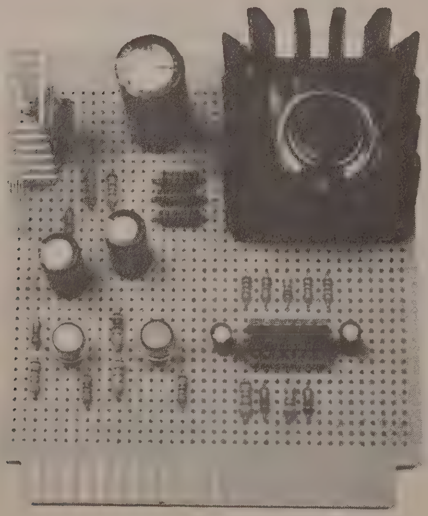


DETECTAVERSE™

MOTOR CONTROLLER

Detectaverse™ is a controller for mechanical overload detection in both uni and bi-directional rotating machinery. It provides motor sequencing upon overload detection. Power is removed from the motor if the programmable number of overloads is reached within a 30 second limit. An alarm output is then enabled.

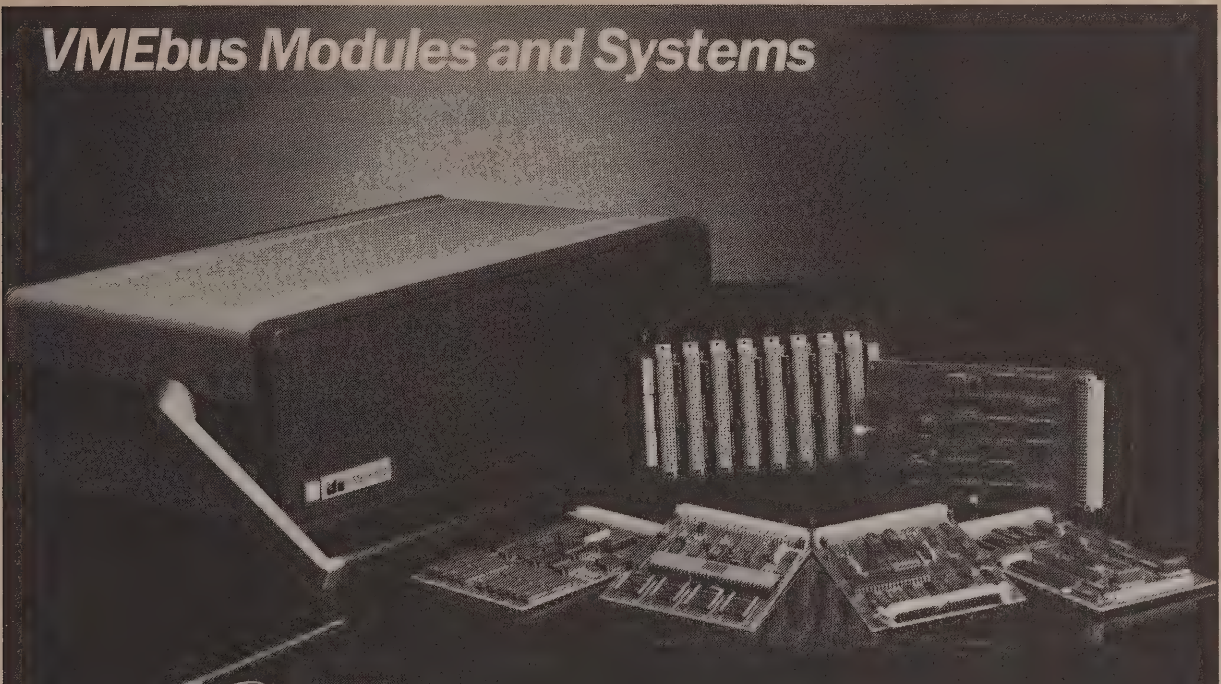
Available: Controller or System.



CUSTOMS

- Analogue
- Digital
- Microprocessor
- Audio
- Video
- Signal Processing
- Controllers
- Robotics
- Interface
- Microcomputers
- Television
- Encoders
- Decoders
- Auto. PC Testers
- Power Supplies
- Timers
- Simulators
- Research
- Development
- Consulting
- Hardware
- Software
- Service Dept.
- Circuits
- Systems
- Products

VMEbus Modules and Systems



Hit the ground running

Designing a VMEbus system? In just 48 hours you can have Mizar's proven VMEbus modules and software development systems for evaluation. In just 5 weeks we will deliver production quantities.

Single Height Modules

Powerful 16-bit single height modules (100mm x 160mm) are easy to package and inexpensive. Performing a single function on each board, these modules can be assembled to "tailor make" your system without incurring the expense of features neither used nor desired.
A complete selection of modules includes a system controller, motherboard, two CPU modules, 128K byte RAM, byte wide memory, quad serial port, quad parallel port, counter-timer module, real time clock, floppy disk controller, SCSI interface, GPIB interface, GPIB TLC with DMA interface, analog input module, analog output module and video controller module.

Double Height Modules

These larger size modules (233mm x 160mm) allow more functions per board, giving you the capability of implementing a high performance computer system configured to the user's needs. Performance is improved because fewer bus accesses are needed. Call Mizar for double height VMEbus modules including a 68010 CPU module with serial and parallel ports. EPROM sockets, dual ported dynamic RAM and system controller functions, a 1 Mbyte dynamic RAM module, a Winchester and floppy disk controller, CMOS battery-backed RAM, Dual Channel GPIB Controller and a graphics module offering 3 planes of display memory with 1024 by 1024 resolution.

Software and Systems

CP/M-68K™ is a single user system for the VME9000 or the VME9100 based on Digital Research's popular 8 bit CP/M. CP/M-68K has been completely rewritten to run on the 68000 and offers built-in commands, including DIR, DIRS, ERA, REN, SUBMIT, TYPE and USER. Standard utilities include DDT-68K, ED, PIP, STAT, archive (AR68), DUMP, relocation (RELOC), SIZE68 and SENDC68. Programming tools include a 68000 assembler (AS68), an object file linker (LO68) and a "C" Compiler.

For those users who need a real-time multi-tasking operating system, Mizar offers OS9/68000™ from Microware Systems Corp. OS9/68000 is a Unix-like operating system that has been optimized for low-cost, high performance applications in personal computers, industrial control systems and general-purpose multi user systems. OS9/68000 offers such features as hierarchial disk directory structure, ROM-able code for use with or without a disk system, UNIX™ software compatibility at C source code level and language support for Basic, C, Pascal and Fortran 77.

CP/M is a trade name of Digital Research
OS9/68000 is a trade name of Microware Systems Corp.
UNIX is a trade name of Bell Labs

MIZAR INC.
302 Chester Street, St. Paul, MN 55107
Phone (612) 224-8941 • Telex 469542

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SEMICONDUCTORS

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MICROCOMPUTER PRODUCTS

VME/10 Microcomputer System

The VME/10 is a new desktop microcomputer that is among the most advanced and capable 16/32-bit desktop systems available. The system is intended for three specific markets.

1) for OEMs for scientific, engineering, laboratory and industrial microcomputer needs — including instrumentation control, data acquisition/analysis and communications.

2) for system integrators requiring a powerful basic microcomputer that will accept the appropriate add-on modules to customize it for their specific system application.

3) for system OEMs who require a complete development system for 8/16/32-bit systems.

The VME/10 Microcomputer is powered by the MC68010 MPU. Its full 16-bit data bus, 32-bit internal architecture, and powerful instruction set make it the highest performance, yet easiest to use microprocessor in the industry. Coupling the MC68010 with the MC68451 Memory Management Unit (MMU) permits several concurrent development tasks — editing, program development, system debugging — with full protection for each task. This fundamental processor/memory architect also provides the features required in multitasking OEM systems where security and protection of both data and programs are essential.

Much of the VME/10 appeal is based on its adherence to P1014/VMEbus standards, which are being widely adopted as an international standard for machines with 8-bit to 16-bit capabilities. In the VME/10 System, the VMEbus is supported by an additional I/O Channel, an architectural element that increases the speed of multiprocessor applications by relieving the VMEbus of the time-consuming tasks of servicing local peripherals. Using the built-in expandability features of the VME/10, up to nine additional modules may be added to tailor the system for your specific end use, utilizing the VMEmodules and I/Omodules for instant implementation.

MOTOROLA
VME/10

The basic VME/10 Microcomputer System consists of three interconnected physical elements — the Systems Control Unit, the Keyboard and the 15-inch display unit. The System Control Unit is the basic source of the flexibility and expansion capabilities of the system. It contains a System Control Module (together with VMEbus and I/O Channel interface circuits), a 5, 15, or 40 MB fully formatted floppy disk drive, and a chassis (with power supply) that permits system expansion. The VME/10 System also includes the VERSAdos Real-Time, Multi-Tasking Operating System and optionally System V/68 Operating System.

SYSTEM V/68 Operating System

Motorola's SYSTEM V/68 Operating System is the standard UNIX-derived Operating System for the M68000 Microprocessor Family. SYSTEM V/68 is derived from AT&T Technologies' UNIX V; it is the generic M68000 port. This powerful operating system contains all system calls, commands and utilities included in AT&T Technologies' UNIX System V Operating System, except those features dependent upon hardware not supported by Motorola. It offers a small compact kernel, which provides process scheduling and I/O facilities to all programs. In addition, a powerful command shell for interactive system controls and an extensive set of utility programs for many tasks, such as program development, text processing, electronic mail, and networking support are included.

In addition to the SYSTEM V/68 Operating System Software several unique features can be added to enhance its usefulness as a host operating system for the EXORmacs and VME/10 Systems. These additional features include a Pascal Optimizing Compiler, UNIX-to VERSAdos tool kit and support software for the HDS-400 Hardware/Software Development Station.

M68000
SYSTEM V/68

To enhance the value of the SYSTEM V/68 Operating System to the customer, Motorola offers a total support package to SYSTEM V/68 users. Included in this package is a problem reporting system, software and documentation update service, a product support newsletter and a toll-free "hotline." Additionally, specialized consultant services will be offered on a contract basis.

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MICROCOMPUTER PRODUCTS

VMEmodules

VMEmodules from Motorola incorporate the high performance MC68000, the internationally accepted Eurocard format, the defacto industry standard 16-bit VMEbus, and the new and flexible I/O Channel, all combined in the most versatile and latest state-of-the-art approach to the modular systems concept.

The MC68000 MPU

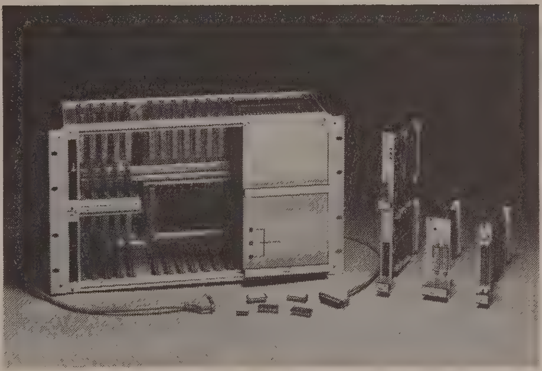
You've seen the benchmarks, and the results — MC68000 has emerged as the acknowledged microprocessor leader in the 16-/32-bit performance class. Its architecture is designed for optimal support of the latest high-level languages, and it directly addresses 16 Megabytes of memory (instead of one Megabyte for most of the competition). Its 32-bit internal features mean easy growth to full 32-bit capability as your needs grow into the future. VMEmodule products put the MC68000 MPU to work in a modular structure that has achieved worldwide acceptance and support, both by users and manufacturers of microcomputer subsystems.

Eurocard Format — Developed as the standard in Europe, this card format is gaining worldwide acceptance in modular applications in a broad range of engineering, laboratory, and industrial automation environments. Available in both single (160 x 100mm) and double sized (160 x 233.4mm) formats and card cages, they offer a convenient size, plus the two 96-pin/socket bus connectors provide an extra margin of reliability.

8-/16-/32-Bit VMEbus — The VMEbus does not limit designers to today's technologies; its inherent flexibility and capabilities allow adaptation to any number or types of popular processors for true multi-processing applications. It allows mixing of as many bus masters as your system may desire. The VMEbus enables mixing of 8-, 16-, or 32-bit processors in the VME backplane, operating at high speeds, asynchronously, and providing seven interrupts and four levels of bus priority arbitration.

RMS68K and VERSAdos Software Support — VMEmodule products are designed for accurate response to multiple random events. The RMS68K Real-Time Multi-Tasking Executive software for the VMEmodule Monoboard Microcomputer provides a nucleus for real-time applications. Where large data files and mass storage resources are required, the VERSAdos Operating System provides efficient execution.

Multiple Worldwide Sources — Development of the VMEbus represents the combined technical efforts of Motorola and a number of other major international electronics companies (Signetics/Philips, and Mostek for example). The original participants are being joined by an increasing number of companies supplying compatible products. These sources are united by the VMEbus Manufacturer's Group Meeting four times each year to ensure continued compatibility from a diversified list of suppliers.



VMEmodule Line

VMEmodules — VMEbus compatible, Double Eurocard Format.

MVME101 — MC68000 Monoboard Microcomputer with two serial ports and one parallel port on board.

MVME110 — MC68000 Monoboard Microcomputer with I/O Channel support for extended I/O functions.

MVME200/201 — 64K byte and 256K byte Dynamic RAM Modules with data parity check.

MVME210 — Static RAM/ROM Board providing up to 128K bytes storage capacity.

MVME300 — GPIB Controller meeting full IEEE 488-1978 standard.

MVME310 — Universal Intelligent Peripheral Controller with 35% of board area in wirewrap for customer applications.

MVME315 — Intelligent DMA SASI interface and floppy disk controller.

MVME330 — VMEbus Ethernet Node Processor/Lan Controller Communications Module provides high performance 10 Mbps Ethernet Interface.

MVME930 — VMEbus Extender Board

MVME931 — VMEbus Wirewrap Board

Software

MVMEBUG — Debugging Packages for VMEmodule Monoboard Microcomputer with single-line Assembler/Disassembler.

M68KORMS68K — M68000 Real-time Multitasking Executive provides task scheduling and synchronization for any number of tasks.

M68KOVDOS — OEM VERSAdos Operating System is a real-time multitasking MC68000 based system oriented to hard disk operation.

Packaging

VMEmodule and I/Omodule Card Cages, Chassis, Power Supplies and Backplanes.

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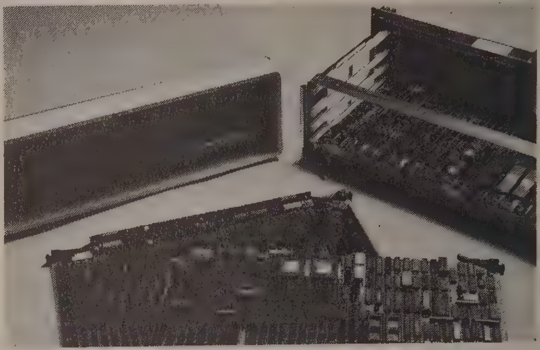
MICROCOMPUTER PRODUCTS



VERSAmodules

VERSAmodule circuit boards are microcomputer building blocks from Motorola, based on the state-of-the-art 16-bit MC68000 Microprocessor. They are part of a family of modular building block products that provide the system designer ready-to-run hardware and software. VERSAmodule building blocks drastically reduce the total cost of bringing together a fully configured custom microcomputer-based system . . . by saving development time, engineering talent, and money as well.

With VERSAmodule products, you minimize the risks of design limitations and system obsolescence while keeping your system tied to the leading edge of technology. Your system is built around the most advanced 16-bit microcomputer available today . . . incorporating sophisticated architectural features to enhance system performance. The full range of available software products and applications development tools assure early system completion. And Motorola's experienced support staff is available to help, any time.

Most Advanced 16-Bit — The VERSAmodule Monoboard Microcomputers are the most powerful and versatile 16-bit single-board microcomputers available. They achieve a higher degree of computing power, memory capacity and tailorability by combining the MC68000 MPU with other on-board features. Such on-board features as I/O Channel interface, VERSAbus interface, bus arbitration logic, dual port RAM, multiprotocol serial I/O, parallel I/O, programmable timer/counters, and RAM with battery back-up capability enable these VERSAmodule Monoboards to handle applications ranging from those using a single processor through those requiring complex multiprocessing structures.

VERSAbus Architecture — VERSAmodule boards are interconnected in a system using the VERSAbus interconnect standard. The high-speed VERSAbus interconnect is characterized by asynchronous operation supporting direct memory addressing and true multiprocessor operation. Unlike other popular bus structures, VERSAbus architecture does not limit the number or types of processors that can be used in multiprocessing applications. The number of "bus masters" or main processor boards is limited only by the number of card slots in the particular VERSAbus backplane being used. Furthermore, several lines within the VERSAbus structure enhance system reliability and integrity by providing for efficient self-diagnosis . . . resulting in minimum system downtime.

I/O Channel — The I/O Channel is an advanced architectural feature of VERSAmodule Systems that allows greater system flexibility and low incremental cost for I/O expansion. The I/O Channel has a 12-bit address bus, 8-bit bidirectional data bus, 4K Bytes of memory-mapped I/O, and a data transfer rate of up to 2 Megabytes per second.

VERSAmodule CIRCUIT BOARDS

Monoboard Microcomputers

VM01A Monoboard Microcomputer — MC68000 MPU, 32/64K Byte RAM, Sockets for 64K Byte ROM, four parallel I/O ports, two serial I/O ports.

VM02 Monoboard Microcomputer — MC68000 MPU, 128K Byte dual-port RAM, Sockets for 64K Byte ROM, two Multiprotocol serial I/O ports, I/O Channel Interface.

VM03 Monoboard Microcomputer — MC68010 MPU at 10 MHz, MC68451 MMU, 256K DRAM, Sockets for 64K Byte ROM, two Multiprotocol serial I/O ports and I/O Channel Interface.

Memory Modules

VM10 Random Access Memory — 128K Byte Dynamic RAM, Byte Parity, 16-bit data/word length.

VM11 Random Access Memory — 256/512K Dynamic RAM, Error detection and correction, 16/32-bit data word length.

VM80 Combination ROM/RAM/I-O — 0/128K Byte Dynamic RAM, Sockets for 256K Byte ROM, six parallel I/O ports, two Multiprotocol serial I/O ports.

Controllers

VM20 Floppy Disk Controller — Up to 4 floppy disks, 2M Byte formatted floppy capacity, On-board IPC with data buffer.

VM60 Universal Intelligent Peripheral Controller — 4K Bytes on-board RAM, Up to 32K Bytes ROM, DMA data transfers, Wirewrap area for custom user interface.

VM21 Universal Disk Controller — Up to 4 floppy disks, Up to 2 SMD compatible hard disks, Up to 516M Byte formatted disk capacity, On-board IPC with data buffer.

VM30 Multi-Channel Communications Module — Four RS-232C serial I/O ports, One parallel printer port, ON-board IPC with data buffer.

VM33 Ethernet Node Processor/Lan Controller — Communications module provides high performance 10Mbps Ethernet Interface.

Support

RSC1 Remote Serial Conversion Module — RS-232C to RS-449 or multidrop port, Synchronous or asynchronous operation, Half or full duplex, Eurocard form factor.

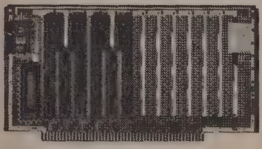
System Packaging and Accessories — 5¼ inch Chassis, Stand-Alone Card Cage, Power Supplies, Cabling Options, I/Omodule Card Cage, Mass Storage Enclosure, Industrial Card Cage System Package, VERSAbus Adapter Module.

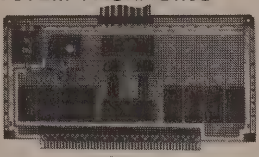
MICROCOMPUTER PRODUCTS

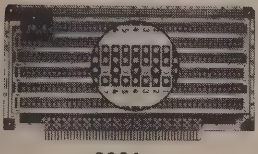
Prototyping Boards • Rack Mount Card Cages • Mother Boards • Connectors • Drop-In Card Racks • Extenders • Enclosures

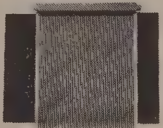
Vector

S100 AND IEEE 696 SYSTEM PACKAGING


8800V


8801


8804


3690-12

Plugbords for interface, memory expansion, breadbording. Nickel/gold plated contacts, 50 each side on 0.125" centers. 0.042" holes on 0.10" grid for DIP sockets, push-in terminals and socket pins. Fire retardant epoxy glass composite material.

8804: "ANY DIP" -- full power and ground planes back-to-back on opposite board sides with offset pads. Two regulator positions provided, one heat sink furnished. Holds 70 16-pin DIPs.

8800V: Power distributed to each DIP location by heavy copper tinned power and ground planes on opposite board sides for low impedance. Prewired regulator circuit and two heat sink provisions. Holds 36 16-pin DIPs.

8801: Individual tinned square pads surround most holes. Heavy tinned power and ground buses are provided and prewired regulator position. Pads for mounting I/O connectors. Holds 82 14-pin DIPs.

8801-1: No etched circuitry except plug contacts. Holds 121 14-pin DIPs.

3690-12: Provides 7.5" long extension to facilitate testing. Mounted connector.

Connectors with 50/50 gold/nickel plated contacts on .125" centers:

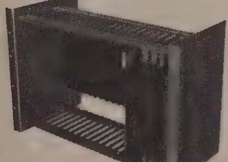
R681 Dip Solder Tail. **R681-1** Wrap Post Tail. **R681-2** for mother board use.

MOTHER BOARDS

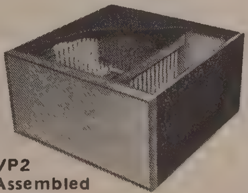
8803-6-1

Hi speed - up to 10MHz, shielded, two-sided, plated thru holes, FR4 epoxy glass, .000050" gold plated connector contacts, liberal decoupling capacitors, "reset" switch wiring pads, fully assembled.

8803-6-1 6-position **8803-18-1** 18-position.

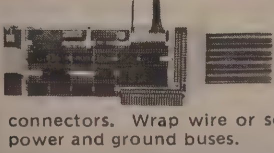

CCK100
Rack Mounting Cage

Especially designed to accommodate S100, Exorciser and Micromodule Plugbords. 19" w. x 12.2" h. x 8.9" d. Furnished with 21 pairs of guides. Adjustable rear struts mount mother boards or connectors.


VP2
Assembled Case

Sturdy blue vinyl finished aluminum, fully assembled, with card guides, mounting for mother board or connectors. Power supply chassis plate, and I/O rear connector panel with 10 cutouts for DB25S connectors included.

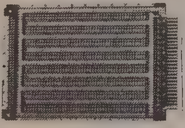
APPLE II • SUPERKIM



4609 Plugbords: Hi capacity, mounts 18 16-pin DIPs .1" grid of .042" holes. 7.7" x 3.06". Two gold plated I/O card edge connectors. Wrap wire or solder. Tinned 2 oz. copper power and ground buses.

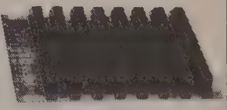
STD BUS

Plugboards for interface, memory expansion, experimentation. Flame retardant epoxy glass composite 1/16" × 4.5" × 6.5" with 2 oz. tinned copper buses and pads. 28/56 nickel/gold plated contacts on .125" centers. Power and ground bus terminations per STD Bus .042" dia. holes on 0.1" grid. I/O connector pads.

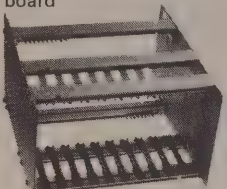

4610

4610 for soldering or wire wrapping
4610-2 for wire wrapping
4610-1 no etched curcuitry except for plug contacts
3690-16 extender board has nickel/gold contacts connected to mounted receptable.

MOTHER BOARDS


4610-8-1

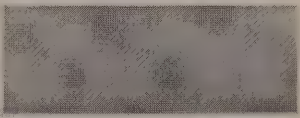
Hi speed—up to 10MHz, shielded, 2-sided, plated thru holes, FR4 epoxy glass, .000050" gold plated connector contacts, liberal decoupling capacitors, ● **4610-8-1** 8-position board ● **4610-16-1** 16-position board


CCK19S

CCK19S "drop in" card rack, all aluminum 5¼" h. × 8¼" × 8½" d. 20 nylon card guides supplied for card mounting on .250" increments, rear cross members for mother board or connector mounting.

CCK19SMB8: CCK19S rack with 4610-8-1 motherboard.

IBM PERSONAL COMPUTER


8006

8006 Pad-Per-Hole Circbord: Measures 13.25" × 5" × .062" overall, 16-pin DIPs, up to 154, pad size .080" d. on .1" × .1" grid, .043" d. holes drilled & plated thru. Gives unlimited freedom in component mounting without the expense of edge connectors

PROTOTYPING PLUGBOARDS

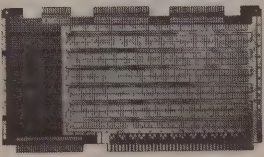
4613

4613: 3-hole Pad and Bus Board
4613-1: Bare Board with Peripheral Buses
4613-2: Wire Wrapping Bus Board
4613-3: Pad-Per-Hole
3690-22: Extender Board

COMMON FEATURES

● Full size boards: 13.23" × 4.2" × .062" overall. ● Accept any width DIP Ics. ● 31/62 gold plated contacts on 0.100" centers. ● Card guide & universal mounting bracket included for use with or without I/O connector. ● Component lead holes on 0.1" grid. ● Buses terminate to connector per IBM standards.

MULTIBUS


4608-1

4608 Plugbord: Series 80 size, shape, and connectors. Solder or wrap wire. .042" dia. holes on 0.1" grid. Prewired for regulator. Dual bus for power and ground.

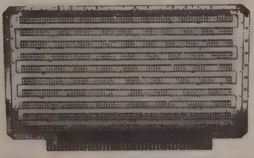
4608-1: Same size and connectors as 4608 but no other etched circuitry.

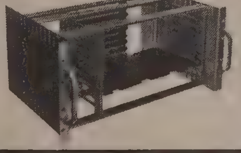
4608-4-1: motherboard, 4-slot with passive termination, gold plated expansion connector, reset switch pads, provision for optional 60-pin connector.

CCK20: 4-slot anodized aluminum card rack for stand alone or chassis mounting.

CCK20MB4: CCK20 rack assembled with 4608-4-1 motherboard.

MOTOROLA EXORCISOR - MICROMODULE


4611



4611 Plugbord: 3-hole pads + 2 buses per Motorola standard, 43/86 nickel/gold contacts on .156" centers. Epoxy glass composite with .042" dia. holes on 0.1" grid for solder or wrap wire.

4611-1: Same as 4611 except no etched circuits except plug contacts.

CCK80 HORIZONTAL CARD CAGE

CCK80 horizontal card cage for S100 Bus - Multibus - Motorola Exorcisor, Micromodule

10 card positions. Fully assembled.

Many other models available -- contact your local distributor or factory. For wiring terminals and tools, see Sec. 1700, P. 2•1082.

VECTOR ELECTRONIC COMPANY, 12460 Gladstone Avenue, P.O. Box 4336, Sylmar, CA 91342-0336 Phone (818) 365-9661

WINTEK

Wintek Corporation — your complete source of hardware and software products for the 6800, 6801, 6805, and 6809 microprocessor families:

- *Micro Modules for R & D efforts and for the OEM*
- *Software Development Systems*
- *Resident and Cross-Software*
- *Custom Hardware and Software*
- *Microprocessor Consulting*
- *Hands-on Microcomputer Short-Courses and Workshops*

Items listed on this page are just a sample of Wintek's wide product line. Request a complete catalog of Wintek products and services.

WINTEK CORPORATION
1801 SOUTH STREET
LAFAYETTE, IN 47904-2993

Micro Modules

All modules are 4.5 by 6.5 inch. Unit prices are listed. Quantity discounts for micro modules are 10-24 10%, 25-49 20%, 50-99 30%, 100-499 40%, 500+ 50%.

MCH18	6809 MPU, 2K RAM, 3 ROM sockets, 2 RS-232 serial ports, 4 parallel ports, watchdog timer, real-time clock	$285
MCH38	6809 MPU, 6K RAM, 1 ROM socket, 2 RS-232 serial ports, 4 parallel ports, watchdog timer, real-time clock	325
MCH68	6809 MPU, 24K RAM, 1 ROM socket, 2 RS-232 serial ports, 4 parallel ports, watchdog timer, real-time clock	885
MCL10	6800 MPU, 128 bytes RAM, 1 ROM socket	101
MCL45	6800 MPU, 0.5K RAM, 1 ROM socket, serial port, 4 parallel ports	182
MAI04	16-channel, 12-bit A/D Converter module	229
MAI20	2-channel, 8-bit D/A Converter module	99
MCI11	16 button keypad with 15 7-seg. displays	199
MCM81	2K bytes CMOS RAM with battery	189
MCS00	Cassette tape & RS-232 interface for 6800 Control Module	109
MCT10	Counter/timer module with battery	129
MDS08	Driver/Sensor module with 8 optically isolated inputs	111
MDS44	Driver/Sensor module with 4 optically isolated inputs and 8 open-collector drivers	107
MDS80	Driver/Sensor module with 16 open-collector drivers	103
MFC04	Floppy disk controller for 4 drives	199
MGP00	IEEE-488 Bus interface	199
MPB00	Breadboard with parallel interface	49
MPI08	64-line parallel I/O	179
MRO16	ROM module for 2708, 16 bytes	89
MRO17	ROM module for 2716, 32K bytes	89
MRO18	ROM module for 2732, 32K bytes	89
MSI08	8-port RS-232 serial interface	249
ABP04	4 slot backplane	66
ABP07	7 slot backplane	114

Development Systems

SDP10	Development Pac 1 — semi-kit with 6800 MPU, 16K RAM, cassette-based editor/assembler	$749
SDP23	Development Pac 2 — semi-kit with 6800 MPU, 48K RAM, cassette-based editor/assembler and BASIC, EPROM programmer	1399
SSP32	Sprint 68 — 6800 MPU with dual 8″ disks, 48K RAM, operating system, editor, assembler, BASIC, and Small-C; optional C-compiler, FORTRAN, Pascal, cross-assemblers, EPROM programmer	3949
SVC00	6801 VICE — Development and test system for 6801/68701 MPU with 6K RAM, debugger, virtual in-circuit emulation, and 68701 programmer	695

Sprint 68 Software

Supplied on diskette for Sprint 68 Development System

RDA00	6800 Macro Assembler	$150
RDA01	6801 Macro Cross-Assembler	150
RDA05	6805 Macro Cross-Assembler	150
RDA09	6809 Macro Cross-Assembler	150
RDC00	6800 C-Compiler	495
RDL00	Linker	75
RDU00	UCSD p-System with FORTRAN & Pascal	675

Cross-Software

Written in ANSI FORTRAN for PDP-11, VAX, IBM, CDC, etc. computers. Request license and media forms before ordering.

CAS00	6800/6801 Macro Cross-Assembler	$1000
CAS50	6805 Macro Cross-Assembler	1000
CAS90	6809 Macro Cross-Assembler	1000
CFP00	6800 Floating-Point Package	500
CLL00	Cross-Linker	400
CPL00	6800 PL/W Compiler	1400
CPL90	6809 PL/W Compiler	1400
CSM00	6800 Simulator	800
CSM10	6801 Simulator	800
CCC00	Pkg: CAS00, CFP00, CLL00, CPL00 & CSM00	3400

TELEX 70-9079 (WINTEK CORP UD)

PHONE (317) 742-8428

Software to Control Motion by Microcomputer Interfaces and Hardware to Make it Simple!

SOFTWARE

EASYMOVER

Software Package for
S-100, IBM PC, APPLE 2

INTERFACE

SMARTBOX

DC-Motor Interface Hardware
for any GP computer

HARDWARE

ACTUATORS

Linear
Rotary
Servo

APPLICATIONS

Microelectronic Equipment
High-Precision Robots
Medical Instrumentation
Optical Research Environments
Laser Pointing Control
Process-Control Machinery
Rotary Indexing Tables
Micro-machining Equipment
Automated Microscope Stages
Substitute for Micrometer Movements

Modular DC-Motor Motion System for Microcomputers

EASYMOVER

Installed in popular microcomputer, EASYMOVER is a sophisticated machine-language program for full position control of DC motors coupled to a position encoder. Designed specifically for TSP's Model 1000/1100/1400 Actuators, EASYMOVER works through a Motor Driver Board installed in the computer's expansion slot. EASYMOVER links to BASIC, FORTRAN, or PASCAL to transmit motion commands and receive position/status information by calling various subroutines such as EZGO, EZPOS, EZSTATUS, EZPAUSE, EZJOG, EZDEF.

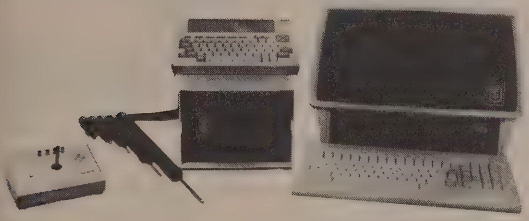
With EASYMOVER and the Motor Driver Board controlling the motions in the background, the computer is free to perform other machine control tasks such as: Activate relays; Acquire data from machine transducers; Perform statistical calculations on acquired data; Manage operator display screens; Manage peripherals; Communicate with host computers.

(Example of typical EASYMOVER program segment.)

```
5470 '
5480 '  Actuator motion routine (and error processor)
5490 '
5500 CALL EZGOWAIT:STAT%=0:CALL EZSTAT(STAT%) ' do motion
5510 IF STAT%=0 THEN RETURN
5520 IF STAT% > 2 AND STAT% < 7 THEN 5530
5525 MSG$="SYSTEM ERROR - Stage init req'd": STGSET=0:
     GOTO 5540
5530 IF CMDX=2 OR CMDX=3 THEN RETURN
5532 ON STAT&-2 GOSUB 5620,5630,5640,5650
5535 MSG$=DIR$+ "LIMIT ("+AXIS$+"-AXIS)"
5540 GOSUB 5270:PRINT "Press any key to continue";
5545 '  Loop until keyboard input
5550 GOSUB 5240
5560 PRINT AT(20,0)CHR$(17);
5565 STAT%=0:CALL EZRESET(STAT%)
5580 RETURN
```

"EASYMOVER" SOFTWARE

- For S-100, IBM PC, APPLE II.
- Links to BASIC, FORTRAN, PASCAL
- Simple motion commands.
- Full position servo
- Automatic backlash compensation



"SMARTBOX" INTERFACE

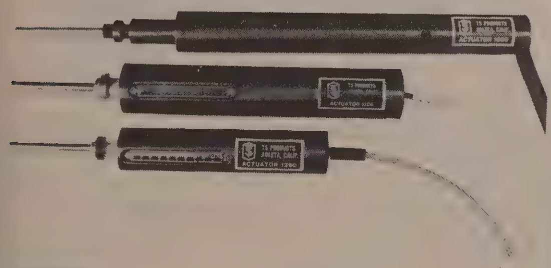
- RS-232C/IEEE-488 Interface.
- Acts like a printer peripheral.
- Low-cost, modular.
- Automatic backlash compensation.
- Internal power supply.
- Internal mini-motion program storage.
- Built-in vectorial motion option.

SMARTBOX

CONTROL2 "SMARTBOX" manages motions of DC motors with incremental encoders as feedback elements. It is a low-cost modular interface permitting any computer to Control 2, 4, or 6 axes of either TSP's precision linear and rotary Actuators or any servo-controlled DC motor with encoder position feedback. In addition, TSP offers a velocity servo for DC motors requiring up to 5 amps.

CONTROL2 simultaneously controls 6-axes of independent motion while assimilating simultaneous commands via both the parallel IEEE-488 and serial RS-232C communications ports. In addition, CONTROL2 can be controlled by a variety of low-cost briefcase-sized portable computers.

CONTROL2 operates much like a CNC controller. Several models have internal memory for storing simple motion programs to free the host computer from monitoring repetitive motions. If you can use a printer on your computer, you can use the CONTROL2 "SMARTBOX."



ACTUATORS

LINEAR

- High-precision. (Typ.=.000004 inches
- High-thrust. (Typ.=30 lbs.)
- Sealed and integrated package.
- Responsive DC-Motor drive with built-in velocity servo.
- Built-in Position Information.
- Built-in Limit Sensing.

ROTARY

- Torques to 600 oz-in. (Typical 20 oz-in)
- Built-in overload sensing.
- Built-in overload sensing.

SERVO

- DC-Motor current to 5-amps.
- Encoder preshaping.
- Bi-polar operation.
- Limit/end-of-travel sensing.

ACTUATORS

Series-1000 High-Precision Linear Actuators feature a small size, integrated and sealed package with a non-rotating plunger, built-in position sensing, and velocity servo.

- 13 resolutions from .08 to 160 microinches.
- Thrusts from 3 to 100 lbs.
- 5 travels from .5 to 6-inches.
- Speeds from .0000006 to .6-inches/sec.

Series-1100 Moderate-Precision Linear Actuators feature even smaller package size but with a rotating plunger, built-in position information, and velocity servo.

- 13 resolutions from .08 to 160 microinches.
- Thrusts from 3 to 100 lbs.
- 8 travels from .25 to 12-inches.
- Speeds from .0000006 to .6-inches/sec..

Series-1200 Linear Actuators feature low-cost, smallest package, with a rotating plunger but without built-in position sensing nor velocity servo.

- Speeds from .0000005-in./sec. to .4-in./sec. Thrusts from 3 to 100-plus lbs.

Series-1400 Rotary Actuators feature responsive ironless DC motors and gearheads together with integral optical encoders. With built-in velocity servo and position information, they provide a rotating output shaft for coupling to external hardware. Available maximum torques range from typical 20 oz-in to 710 oz-in. Speeds range from 1.5 to 2500 RPM.

Series-1000SER Velocity Servos accommodate common ironless and permanent magnet DC-Motors together with integral or independent quadrature position encoders. Controls DC motors up to 60 watts and receives encoder information from either preshaped TTL phase signals or simple photocell/LED-sensor/light sources.

Call for free consultation on applying our products to meet your need. We do OEM specials!

TS PRODUCTS

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A
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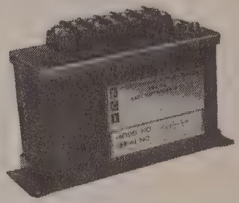
MEASUREMENT AND CONTROL

"an advanced line of transducer and sensor instrumentation utilizing state-of-the-art techniques providing high performance economically . . ."

PHASE ROTATION/PHASE LOSS MONITOR/CONTROLLER

Model 4331: 3φ Voltage — 50-400 Hz
Temperature: −20°C to +71°C
Size: 7½" x 1½" x 3"
Output Relay: DPDT 1 Amp



FREQUENCY TRANSDUCER/CONTROLLER

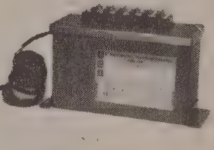
Model 3750: 50 - 60 - 400 Hz
Output 1: 0-1 or 0-5 VDC
Output 2: Solid State or Relay adjustable Hi and Lo limits
Time Delay: Adjustable 0 to 2½ SEC.
Accuracy: 1%
Linearity: .05% center frequency
Temperature: −20°C to +71°C
Size: 6½" x 1½" x 3"

D.C. CURRENT SENSOR/CONTROLLER

Model 4502

Current Ranges: 0-10 MA **Thru** 0-100 Amp
Excitation: 28 VDC ±4 VDC
Output 1: 0-5 VDC
Output 2: Solid State or Relay
Accuracy: 0.5%
Size: 4½" x 1½" x 3"

Undercurrent
or
Overcurrent



A.C. CURRENT SENSOR/CONTROLLER

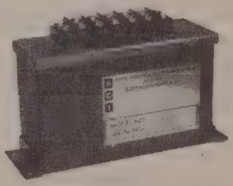
Model 4025: 50-400 Hz
Excitation: 115 or 220 VAC
Output 1: 0-1 or 0-5 VDC
Output 2: Solid State or Relay adjustable Hi and Lo limits
Time Delay: Adjustable 0 to 2½ SEC.
Temperature: −20°C to +71°C
Size: 6½" x 1½" x 3"

A.C. CURRENT MONITOR — ECONOMY

Current Ranges: 0-1 Amp **Thru** 0-100 Amp

Model 4101	**Model 4210**
Output: 0-5 VDC	**Output Relay:** SPDT
Temperature: −20°C to +71°C	
4½" x 1½" x 3"	6½" x 1½" x 3"

50-400 Hz



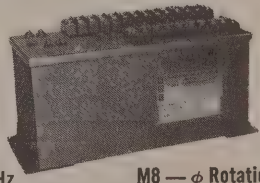
A.C. VOLTAGE TRANSDUCER/CONTROLLER

Model 9601: 50-400 Hz
Input: 90-140 VAC
Output 1: 0-1 or 0-5 VDC
Output 2: Solid State or Relay adjustable Hi and Lo limits
Accuracy: 1%
Response: Less than 0.25 Hz
Time Delay: Adjustable 0 to 2½ SEC.
Size: 6½" x 1½" x 3"

POWER LINE MONITOR/CONTROLLER

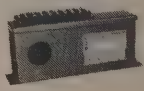
Model 4301: 1φ Voltage and Frequency
Model 4302: 2 or 3φ Voltage and Frequency
Voltage Band: 95 - 135 VAC
Frequency Band: ±10% center frequency
Hi-Lo Limits: Adjustable to any points within Band
Output Relay: SPDT or 3PDT 10 Amp
Time Delay: Adjustable 0 to 2½ SEC.
Temperature: −20°C to +71°C
Size: 7½" x 3" x 3½"

50-60-400 Hz



M8 — φ **Rotation**
MS — mil qual

WATTS/TRUE POWER TRANSDUCER CONTROLLER



Model 9401 **50-60-400 Hz**
Input: 90-150 & 160-250 VAC — 0-500 W to 0-100 kW
Output 1: 0-1, 0-2 or 0-5 VDC
Output 2: Solid State or Relay adjustable Hi and Lo limits
Size: 6½" x 1½" x 3"
Watts Ranges: 0-500 W, 0-1 kW, 0-2 kW, 0-5 kW, 0-10 kW, 0-20 kW, 0-50 kW, 0-100 kW

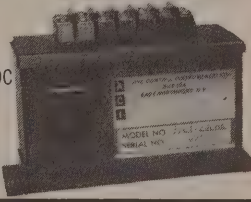
D.C. CURRENT SENSORS

Pass-Thru

Model 6001 — Model 6002 Bi-Directional

Thru-Current Ranges:
0-10 MA
0-20 MA
0-50 MA
0-100 MA
0-200 MA
0-500 MA
0-1 Amp
0-2 Amp
0-5 Amp
0-10 Amp
0-20 Amp
0-50 Amp
0-100 Amp

Excitation: 28 VDC ±4 VDC
Output: 0-5 VDC
Accuracy: 0.5%
Response: 1 MSEC
Temp.: −20°C to +71°C
Size: 4½" x 1½" x 3"



CURRENT SENSOR

Model 7101
Excitation: ±15 VDC
Output: 0 to ±5 VDC
Response: DC to 10 KHz
Thru-Current Ranges: 0-10 Amp
0-20 Amp
0-50 Amp
Size: 4½" x 1½" x 3"

Bi-Directional:
0-100 Amp
0-200 Amp
0-500 Amp

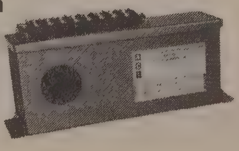
D.C. CURRENT SENSOR

Pass-Thru
50 KV Isolation

Model 6011

Thru-Current Ranges:
0-10 MA
0-20 MA
0-50 MA
0-100 MA
0-200 MA
0-500 MA
0-1 Amp
0-2 Amp
0-5 Amp
0-10 Amp
0-20 Amp
0-50 Amp
0-100 Amp

Excitation: 115 VAC ±10%
50 - 400 Hz
Output: 0-5 VDC
Accuracy: 1%
Response: 0.5 Sec.
Temp.: −20°C to +71°C
Size: 6½" x 1½" x 3"



D.C. CURRENT SENSOR/CONTROLLER

Model 4560

Thru-Current Ranges:
0-10 MA
0-20 MA
0-50 MA
0-100 MA
0-200 MA
0-500 MA
0-1 Amp
0-2 Amp
0-5 Amp
0-10 Amp
0-20 Amp
0-50 Amp
0-100 Amp

Excitation: 115 VAC ± 10%
50-400 Hz
Output 1: 0-5 VDC
Output 2: Solid State or Relay adjustable Hi and Lo limits
Accuracy: 1%
Temp.: −20°C to +71°C
Size: 6½" x 1½" x 3"

Telephone or write for individual detail sheets, prices and applications assistance.

Indicators

Commercial Elapsed Time Indicators

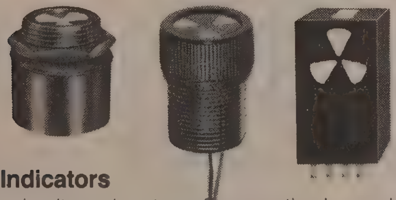
Maintain record of equipment on/off time and provide utilization time information for maintenance, billing, etc. Many different models and mounts. Up to 6 digit readouts.

Type	Series No.	Operating V ac	Styles
Standard Commercial	K42200	6-230, 50 or 60 Hz	Round and rectangular
Microminiature Commercial	K49200	115 60 or 400 Hz	End or side readout

Microminiature Events Counters

Meet MIL-M-7793 environmental requirements. Up to 6 digit display, depending on model. Non-resettable and resettable types. Many standard mountings.

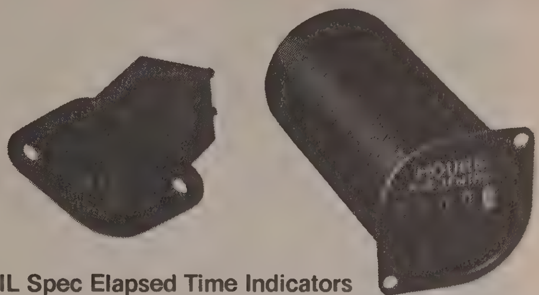
		Series No.		
Type	Digits	28V dc	115V 60 Hz	115V 400 Hz
Non-resettable	4	K19502	K19511	K19501
	5	K19504	K19513	K19503
	6	K19506	K19515	K19505
Resettable	3	LM19502	LM19511	LM19501
	4	LM19504	LM19513	LM19503



Fault Indicators

Monitor circuits and systems for operation beyond design parameters. Contrasting flag indicates fault condition. Magnetically latched until manually or electrically reset. Units with internal switches for remote signalling.

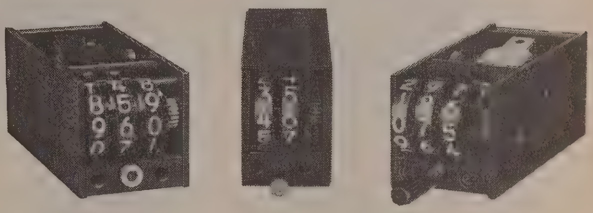
Type	Series	MIL Ref.	Vdc	Operating Time
Round-Manual Reset. Internal Sw.	A21682	MIL-I-83287	0-30	50ms
Round-Electric Reset	K21600	MIL-M-83287	17-29	50ms
Round-Manual Reset	L21603/01	MIL-M-83287	3-30	50ms
Round-Electric Reset	L21603/02	MIL-M-83287	10-30	50ms
Rectangular-Electric Reset	K21500	MIL-E-5400J	17-29	50ms



MIL Spec Elapsed Time Indicators

Meet MIL-M-7793 environmental requirements. In either subminiature (5-digit) or microminiature (4-digit) sizes. White numerals on black, "tenths" digit red on white. Hermetically sealed.

Type	Series No.	Operating Voltage
Subminiature	K4200	28V dc
	K23200	115V ac, 60 Hz
	K25200	115V ac, 400 Hz
Microminiature	K19200 (Square) K19220 (Round)	24 or 120V ac 400 Hz
	K19760 (Square) K19780 (Round)	28V dc



Subtractive and Additive Events Counters

Two- and three-digit military grade counters. Meet MIL-STD-202C. Maximum count rate 1000 pulses per minute. Additive (count up) and subtractive (countdown) models. Presettable. Operates on 21-29 Vdc pulses.

Type	Digits	Serial No.	Operating Voltage
Subtractive	2	K-4702-P1	21-29V dc
	3	K-4701-P1	
	3	K-4703-P1	
Additive	2	K-4702-P2	
	3	K-4701-P2	
	3	K-4703-P2	

Laboratory Stop Clocks

Provide a wide selection of timing ranges, voltages and mountings. Operate from panel switch or by remote control. All models have timed outlets. Write for information.

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2
3
4
6
START
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ROCKER & PADDLE ACTUATED POWER SWITCHES — Lighted and unlighted — Single and double pole.

ISOLATION RELAYS — Multi-purpose relays with energy-limited control circuit.

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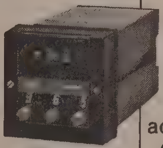
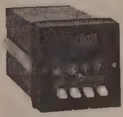
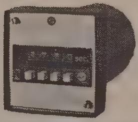
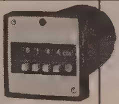
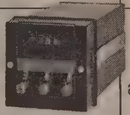
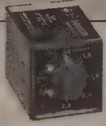
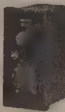
atc® TIMERS, COUNTERS, TDRs

	Input Voltage	Ranges	Operating Mode	Load Relay	Temp. Range	Repeat Accuracy	Cycle Indicator	
TIMERS							Ind.	Non Ind.
365 LONG-RANGER Computing Timer 	ac or dc	Switch selectable: 0-9.99, 99.9 or 999 seconds, minutes or hours	Interval, Delay or Pulse	DPDT, 1 Instant 1 Delayed 7A at 120, 240 or 24V ac 3A at 240V dc 1½ A at 48V dc ½A at 125V dc	32-140°F	±0.01 second on all ranges	X	
335 SHAWNEE IC Digital GP Reset Timer 335B	ac	0.01-99.99 seconds or minutes. Field convertible.	Interval, Delay or Pulse	DPDT, 1 Instant 1 Delayed 5 A at 120V ac 2 A at 240V ac 0.1 A at 125V dc	32°-140° F	±0.01 second		X
335D		0.01-99.99 seconds or minutes. 0.1-999.9 seconds or minutes. Field convertible.					X	
355 SHAWNEE II Compact IC Digital GP Reset Timer 	ac	0.01-99.99 seconds or minutes. 0.1-999.9 seconds or minutes. Field convertible.	Interval, Delay or Pulse	DPDT, 1 Instant 1 Delayed 5 A at 120V ac 2 A at 240V ac 0.1 A at 125V ac	32°-140° F	±0.01 second	X	X
325 TANKARD Digital Motor-Driven Reset Timer 	ac	0-999.9 seconds, minutes or hours.	Interval or Delay	Two SPDT's 10 A at 125V ac 5 A at 250V ac 0.5 A at 125V dc 0.25 A at 250V dc	32°-120° F	±0.005% of range	X	
COUNTERS								
336 SHAWNEE IC Digital GP Predetermining Counter 336B	ac	1 to 9999.	Interval, Delay or Pulse	DPDT 5 A at 120V ac 2 A at 240V ac 0.1 A at 125V dc	32°-140° F	100% (±0 count)		X
336D		1 to 9999 or 10 to 99,990 in 10 count increments.					X	
356 SHAWNEE II Compact IC Digital GP Predetermining Counter	ac	1 to 9999 or 10 to 99,990 in 10 count increments.	Interval, Delay or Pulse	DPDT 5 A at 120V ac 2 A at 240V ac 0.1 A at 125V dc	32°-140° F	100% (±0 count)	X	X
326 TANKARD Digital Predetermining Counter 	ac	1 to 9999.	Interval or Delay	Two SPDT's 10 A at 125V ac 5 A at 250V ac 0.5 A at 125V dc 0.25 A at 250V dc	32°-120° F	100% (±0 count)	X	
366 LONG-RANGER Computing Counter 	ac or dc	Switch selectable; 1 to 999 10 to 9990 100 to 99900	Interval, Delay, or Pulse	DPDT, 1 instant 1 Delayed 7 A at 120, 240 or 24V dc 3 A at 240V dc 1½ A at 48V dc ½ A at 125V dc	32° - 140°F	100% (±0 count)	X	
TDRs								
319D Multi-range Octal base TDR 	ac or dc	Multi-range Five ranges from 0.3 sec. to 30 min. Three ranges from 1 sec. to 100 sec. & 1 min. to 100 min.	On Delay	DPDT 7 A at 120V ac, 240V ac, 24V ac, 24V dc	32°F - 158°F	Varies with changes in line voltage & ambient temperature but not with reset time — from ±1% to ±6%		X
328 MOS TDR Multi-Range TDR 	ac or dc	Multi-range. Six switch-selectable ranges from 1 second to 10 hours.	On Delay, Off Delay, Interval	DPDT 7 A at 120/240V ac 1/10 hp at 120V ac 7 A at 24V ac	0°-150° F	Varies with changes in line voltage & ambient temperature but not with reset time— from ±1% to ±5%.		X
322 TDR Motor-Driven Cycle Progress TDR	ac	12 ranges from 5 seconds to 5 hours.	Interval, Delay or Pulse	Two SPDT's 10 A at 120V ac 5 A at 240V ac	32°-120° F	±2% of range	X	

Automatic Timing & Controls Co. • King of Prussia, PA 19406 / **Call: 800-441-8245** (In PA: 215-337-5500)

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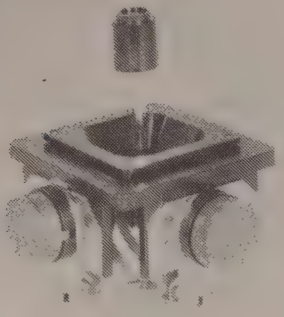
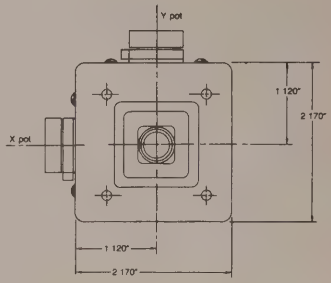
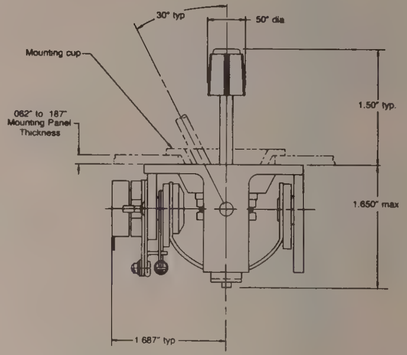
CUSTOMIZED TO INDIVIDUAL NEEDS




Y pot
X pot
1 120"
2 170"
1 120"
2 170"


30° typ
.50" dia
Mounting cup
.062" to .187" Mounting Panel Thickness
1.50" typ.
1.650" max
1 687" typ

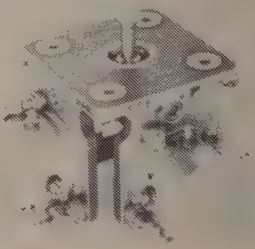
Proportional rate control of such operations as slewing in motors, setting fire control systems, controling cursor movement on computer display terminals and other types of positioning in X & Y coordinates are some applications of Bowmars Joysticks.

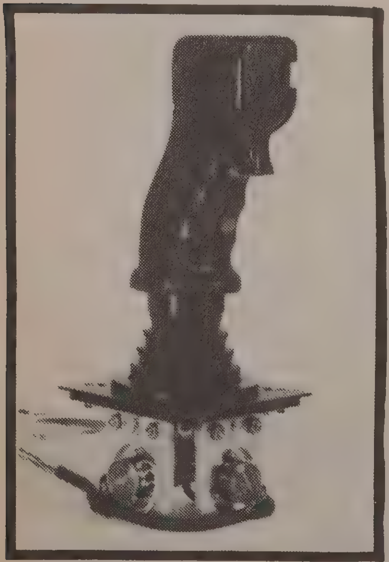
Deflection of handle in either the X or Y directions results in corresponding rotation of output means, which could be Potentiometers, Pulse Generators, Encoders or Synchros.

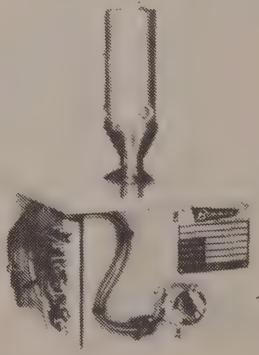
Special Bowmar Joysticks incorporating a third (Z) axis can be designed to meet special requirements.

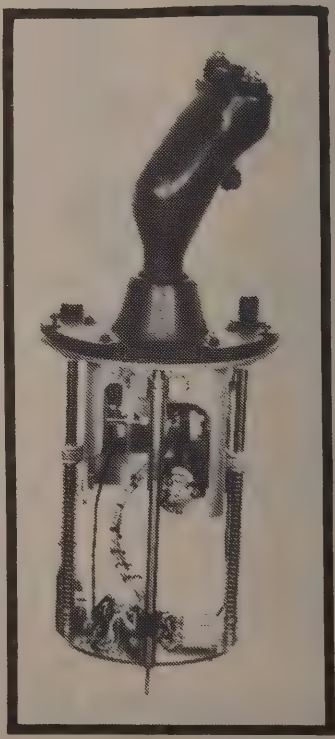
The Joysticks may be specified either self centering or non self centering and may or may not have a "dead man" thumb switch on top of the handle specified. Joysticks may be specified with detent switches for "Axis Recognition" of position of handle.

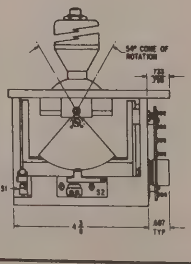
The units are designed to withstand military environmental conditions of shock and vibration and operate in a temperature range of -30°C to +71°C.

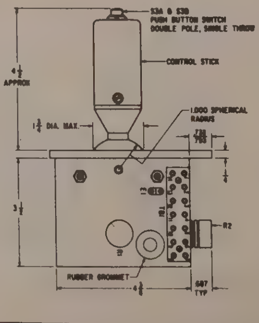






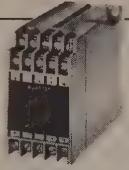



54° CONE OF ROTATION
.733 .703
S1
S2
4 3/8
.687 TYP


S3A & S3B PUSH BUTTON SWITCH DOUBLE POLE, SINGLE THROW
CONTROL STICK
4 1/2 APPROX
1 3/4 DIA. MAX.
1.000 SPHERICAL RADIUS
.733 .703
3 1/2
R2
RUBBER GROMMET
4 3/8
.687 TYP

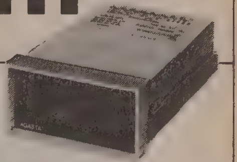
AGASTAT® SOLID-STATE TIME-DELAY RELAYS...

DSC Surface mount

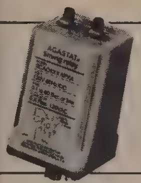


DIGITAL QUARTZ TIMER/COUNTERS

Employ microcomputer and digital-timing technology to provide every essential TDR function in a single compact unit with unprecedented accuracy and stability. Solid-state pulse-counting circuit. Crystal-controlled pulse-generator. Thumbwheel switches set delay. 4-digit optional display shows time remaining or counting progress. Six timing, five counting modes and four timing ranges field-selectable. Instantaneous plus timed 10 amp. output relays.



DPC Panel mount



SCA

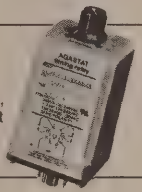
Series SCA provide dual timing ranges, field-convertible from seconds to minutes, and AC/DC operation with reverse-polarity protection, plus "Coarse" and "Fine" delay-setting knobs.

SRC

Series SRC are repeat-cycle timers for applications requiring high-accuracy repetitive ON/OFF cycles of independently variable durations, permitting industrial-control designers to simplify and cost-reduce their systems.

SCB

Series SCB may be used directly, without external contactors, to control solenoids and other inductive loads to 345 VA at 120 VAC, meeting a broad range of industrial requirements.

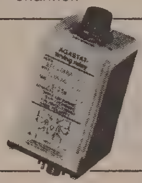


SSA

Series SSA use MSI-chip IC logic to achieve the highest reliability and long-term accuracy in its moderate price class. Fits in a single space on a standard 300V machine-tool relay channel.

SCC

Series SCC with mating socket (supplied) are UL-listed under Standard 508 (Ind'l. Control Equip.) for "pilot duty" in the Auxiliary Devices category (the most stringent) whether field or factory wired.



SSC

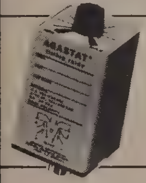
Series SSC are highly reliable TDRs with transient protection circuitry that achieves exceptional immunity to noise and transients. These low-cost TDRs combine premium components with high-quality workmanship.

SCD

Premium quality in one of the lowest-cost timers in their class. UL-recognized, available for on-delay or interval timing applications, with DPDT load switching.

STA

Series STA provide all of the performance features of the UL-Listed Series SCC plus maximum contact density. They occupy 1/3 less panel space than most solid-state TDR's and plug into popular tab-style sockets.



SCE

Features "True off-Delay" timing, with no operating voltage required during the timing cycle, with delays up to ten minutes and competitive pricing.

VTM-1

Model VTM-1 is a compact in-line timing module of exceptional simplicity and unprecedented application flexibility. Wired in series in a load circuit, it will control inductive loads of up to 1A, RMS or DC at power circuit voltages from 24V to 240V RMS AC or DC.

Type	Operating Mode Options	Operating Voltages DC	Operating Voltages AC (50 — 60Hz)	Number of Timing Ranges
DSC/DPC	01, 02, 03, 04, 09, 11, 50, 51, 52, 53, 54*	12, 24, 125**	120, 240	4 (see below)*
SCB	01, 02, 03	12, 24, 48, 125	24, 48, 120, 240	13 (0.1 sec. to 60 min.)
SCC	01, 02, 03	12, 24, 48, 125	24, 48, 120, 240	13 (0.1 sec. to 60 min.)
SCD	01, 03	24, 120	24, 120	3 (0.1 sec. to 300 sec.)
SCE	22	24, 48	24, 48, 120	6 (0.1 sec. to 10 min.)
SSA	01, 02, 03, 04, 09	12, 24	24, 48, 115/120, 230/240	12 (0.1 sec. to 60 min.)
STA	01, 02, 03, 09	12, 24, 48, 125	24, 48, 120	13 (0.1 sec. to 48 hr.)
SSC	1. 2. 3	12, 24, 48, 125	24, 48, 120, 240	13 (0.1 sec. to 60 min.)
SCA	01, 02	24, 120	24, 120, 240	2 (0.1 to 60* sec. or min.)
SRC	7	12, 24, 48, 125	24, 48, 120, 240	13 (0.1 sec. to 60 min.)
VTM-1	1	24 to 240	24 to 240	infinite (see below)

*field-selectable **125V — DSC only

Operating Mode

Code	
01	On-Delay
02	Off-Delay
03	Interval
04	Latching Interval
07	Repeat Cycle
09	Accumulating On-Delay
11	Latching On-Delay
22	True Off-Delay
50	Count down ext. reset
51	Count down auto reset
52	Count up ext. reset
53	Count up auto reset
54	Count up-down, reset by removal of power

Standard Timing Ranges

0.1 to 3 sec.	10.0 to 300 sec.
0.1 to 10 sec.	0.33 to 10 min.
0.5 to 15 sec.	0.5 to 15 min.
1.0 to 30 sec.	1.0 to 30 min.
2.0 to 60 sec.	2.0 to 60 min.
4.0 to 120 sec.	2.0 to 48 hrs.
6.0 to 180 sec.	6.0 to 180 cycles

(All ranges not available in all models. Request specific series catalogs.)

Series SCA Timing Ranges

0.1 to 60 sec. or 0.1 to 60 min. field convertible

Model VTM-1 Timing Ranges

Infinite @ 10kΩ/sec. (1.0 to 1,000 sec.)

Series DSC/DPC Timing Ranges
(field-selectable)

0.01 — 99.99 sec.
0.10 — 999.9 sec.
1.00 — 9999 sec.
10 — 99,990 sec.

Available through your local distributor.

All specifications, dimensions, and photographs subject to change without notice.

amerace

CONTROL PRODUCTS DIVISION

Amerace Corporation, Control Products Division, Union, NJ 07083 U.S.A.
AGASTAT® Time-Delay Relays, Control Relays, & Programmable Switches.
BUCHANAN® Terminal Blocks, Barrier Strips, & I/O Connectors.
AGASTAT SENTINEL™ Proximity Sensors, Undervoltage Relays, and Power Quality Monitors.

125D

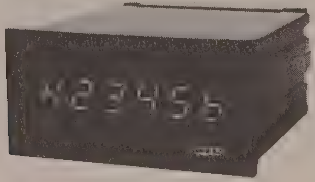
C-TEK
INCORPORATED

ELECTRONIC COUNTERS AND DISPLAYS
COUNTING SYSTEMS—DIGITAL COMPARATORS
NUMERICAL POSITION READOUTS—DIGITAL CLOCKS
DATA LOGGING PRINTERS—RATE METERS
TOTALIZERS—DIGITAL PANEL METERS
SPECIAL SYSTEMS TO YOUR SPECIFICATIONS

C-TEK, Inc. 617-246-1720
4 Railroad Avenue, Wakefield, Mass. 01880

PRODUCT GUIDE

PANEL MOUNTED COUNTERS AND DISPLAYS



DIN/NEMA CASE 3.78'' x 1.89'' x 3.75'', Cutout 3.6'' x 1.8''

Series 2020 Digital Displays
Accepts parallel BCD, up to six full digits or 5½ digits with ± sign. With or without internal power supply. Latch input to hold display. Digit height .56'' Standard, .8'' height optional (4 digits or less).

Series 2120 Digital Displays
Same as Series 2020, except that 2120 accepts bit parallel, character serial information.

Series 2220 Digital Displays
Accepts up to six full digits of parallel BCD from 3 to 48 volts DC logic level. Can be configured for normal or complementary BCD code. Designed for use with programmable controllers with relay or O.C. type outputs. Otherwise similar to Series 2020.

Series 3020 Up Counter
Five, six or seven digit up-counter, up to 5 MHZ count rate. Input filter standard for slow count rate or noisy inputs. Optional internal line power supply, optional internal battery backup to hold count in event of line power loss. Applications include event counting, batch counting, mechanical counter replacement. Optional BCD outputs. Digit height .56'' Red LED, except .3'' LED digits in seven digit model.

Series 3120 Up-Counter
Two to four and one-half digit up-counter, up to 300 KHZ input rate, input filter standard for slow count rates. Internal line power supply and bit parallel, character serial, BCD outputs standard. .56'' LED displays. .8'' LED displays optional.

Series 3320 Presettable Up-Down Counter/Comparator
Two to six digit field selectable up or down counter with front panel thumbwheel presets. Internal comparators allow selection of two setpoints, plus zero detect. Optional line power supply. Optional time base card allows use as presettable interval timer. Many other useful features. .56'' LED displays.

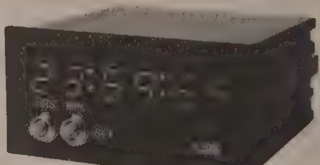
Series 3920 Totalizer (BCD Adder)
Accepts parallel BCD and converts to total counts. Upon command, present BCD input is added to existing reading. Useful in weighing systems or any application where it is desired to convert successive BCD signals into total counts. 5, 6 or 7 digits. .56'' or .3'' LED display. Internal line power supply. BCD outputs and battery backup optional.

Series 4020 Up-Down Counter
For count rates to 1 MHZ, or with input filter for slower signals. Requires separate count line and up-down control line, or can have separate up and down count lines. With option card can have quadrature inputs. Optional internal line power supply. Tri-State parallel BCD outputs for control applications. .56'' LED digits, up to 6½ digits.

Series 4120 Up Counter
Similar to 4020 Series Up-Down Counter except factory set for up counting only. Two to six digits. Tri-State parallel BCD output standard.

Series 5720 Rate Meters
Two to six digits. Internal line derived or optional crystal controlled time base can be scaled to display measurement in engineering units. Standard input requires logic level signals, low level input amplifier optional. .56'' LED digits, optional internal supply and BCD outputs. For rate measurement, tachometers, RPM, speedometers, flow measurement.

DIGITAL CLOCKS AND INTERVAL TIMERS



DIN/NEMA CASE 3.78'' x 1.89'' x 3.75'', Cutout 3.6'' x 1.8''

Series 8020-A Digital Clock
12 or 24 hour clock, reads in hours and minutes or minutes and seconds. Line derived or crystal time base, optional internal supply and/or battery backup. BCD outputs standard. Front panel and rear connector time sets. .56'' LED digits. .8'' height digits available on 4 digit clocks.

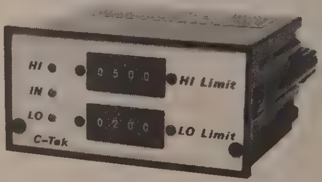
Series 8120-A Interval Timer
Similar to Series 8020 Digital Clock except that it is set up as interval timer with Reset and Hold inputs. Reads in Hours and Minutes; Minutes and Seconds; or Hours, Minutes, and Seconds.

Series 8220 Calendar Clock
Dual display digital clock. Top row .3'' LED digits display month, day, year. Bottom row .56'' LED digits display hours-minutes-seconds. Parallel BCD output, bus compatable output and RS-232 output available as options. Crystal time base, Standard, line power supply and battery backup options.

Series 8320 Interval Timers
Two to six digit interval timers with start-stop and reset inputs. Crystal controlled time base. Field settable options allow resolutions of .1, .01, .001 seconds, to 1 micro second. Also can be supplied with minutes or hours time base. Optional Tri-State BCD outputs. .56'' LED digits. Optional line power supply.

Series 8520 Timer Controllers
Digital Clock combined with one or more digital comparators to provide control outputs at preset times or preset intervals. Can be configured for many different applications.

PANEL MOUNTED DIGITAL COMPARATORS
SET POINT CONTROLLERS



DIN/NEMA CASE 3.78'' x 1.89'' x 3.75'', Cutout 3.6'' x 1.89''

Series 6620 Digital Comparator
Two to six digits, thumbwheel switches for setpoint, parallel BCD input with or without ± sign, 3 front panel LED lamps for ''Below'', ''Equals'', and ''Above''. Relay drive outputs standard, other outputs optional. Mates with most panel meters, useful with any parallel BCD source.

Series 6720 Digital Comparator
Same as Series 6620, except that 6720 accepts bit parallel character serial BCD data.

Series 6820 Dual Comparator
Two channel comparator, two to six digits each channel, with or without ± sign. Can be set up as two independent comparators, or as one ''window'' comparator, with ''Low'', ''In Band'', and ''High'' relay drive outputs and front panel indicator lamps.

C-TEK, Inc. • **4 Railroad Avenue** • **Wakefield, MA 01880** • **(617) 246-1720**

ELECTRONIC COUNTERS AND DISPLAYS
COUNTING SYSTEMS—DIGITAL COMPARATORS
NUMERICAL POSITION READOUTS—DIGITAL CLOCKS
DATA LOGGING PRINTERS—RATE METERS
TOTALIZERS—DIGITAL PANEL METERS
SPECIAL SYSTEMS TO YOUR SPECIFICATIONS

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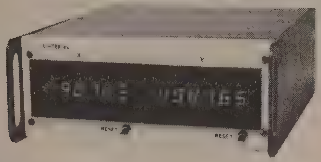
C-TEK
INCORPORATED

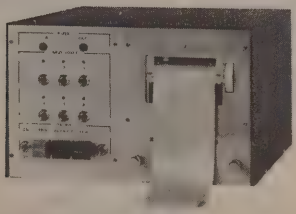
PRODUCT GUIDE



Series ACR-101 Counter Controller
Series LIN-101 Single and Multi-Axis Counters

The LIN and ACR Series are C-Tek instruments packaged into one system. The LIN 101 and 102 Series are single and dual axis bi-directional counter displays, based on the 4020 Series Up-Down counters and a CTP power supply, enclosed in an attractive aluminum case 8'' x 8'' x 3''. For use with X-Y stages and tables, supplied complete with encoders and cables.

The ACR-101 Controllers are similarly packaged and combine counters, comparators and power supplies for system application. Send for details.



SERIES 1601 PRINTER— MULTIPLEXER

FOR DATA LOGGING APPLICATIONS

Series 1601 Printer-Multiplexer

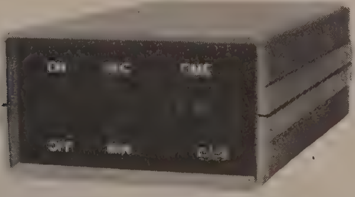
Accepts up to six channels of parallel BCD data. Quiet, non-impact; alpha characters available. 5 x 7 dot matrix, 16 columns, uses aluminized paper.

Series 1670 Weighing System Totalizer-Printer

Printer-Totalizer-Event Counter combination for electronic scales with BCD output. Serializes and prints each weight measurement, accumulates total weight and prints on command.

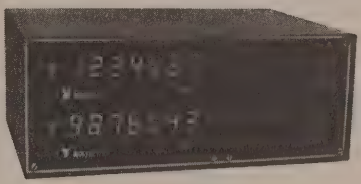
Series MR 19'' Rack Mount Panels

Various combinations of C-Tek instruments and power supplies mounted on standard EIA 19'' panels for inclusion into your system console. Typical system is six Series 4025 up-down counters with quadrature input mounted on 10'' x 19'' panel. Power supply for counters and encoders mounted behind panel. Tri-State BCD output is bus-able for communicating with users' computer. Many combinations of various C-Tek instruments possible. Send us your requirements.



Series 6060 Timer

Hand held digital timer for shop, lab or school use. Up to 99 minutes or 99 seconds, switch selectable. Set time with miniature thumbwheels. Loud buzzer at time-out. Battery operated.



Series DDC Bi-Directional Counter

Intended for high quality machine tool readout applications, for use with rotary or linear optical encoders. 4 to 8½ digits, ± sign. One to three axis, with or without preset. Full floating zero, optional BCD outputs, many other standard or optional features. .8'' LED digits.

Series MPC Micro Processor Controlled Bi-Directional Counter

Up to 8½ digits. Can be configured for linear or angle counting. Dual Real-Time digital comparators and zero detect. Bi-directional data bus and RS-232 outputs. Keyboard selection of parameters and features. One to six axis.

Series MPD Numerical Digital Display Terminal

Multi-Axis display with RS-232 full duplex data port. Can be used as remote display terminal for Series MPC counter-controller or as a specialized computer terminal.

DEGREES
C-TEK

Series DAC Angle Counter

For use with rotary optical encoders, 3 to 7 digits, degrees, minutes and seconds, or decimal degrees. Many standard and optional features. .8'' LED digits.

Series CTP Power Supplies

Type 20 - Card type 2.5 watt and 5 watt output linear supplies compatable with C-Tek panel mounted counters and displays. Can be used separately or can be mounted in plastic counter/display case. 110-220 volt 50-60 Hz selectable input. Output 5 volts at 500 ma or 1 amp, 0.5% regulated. Other voltages or multiple voltage outputs available.

Type 101 - Open frame type 10 watts and 25 watt output linear supplies, single or multiple outputs, 110-220 volt 50-60 Hz inputs, up to 5 amps at 5 volts output. Fused, screw terminal connectors.

Series SYM-101 Gauge Wheel Encoders

High resolution Bi-directional encoder-Pulse generators, for linear measurement of sheet and film materials and textiles. Resolutions to .010 inch. When used with C-Tek counters and input processors measurement can be in inches, feet, yards, MM, CM, meters or switchable English-metric, or switchabel resolution, single or dual wheel models, accurate metal wheels with or without rubber friction surface. Easy turning ball bearings. TTL, CMOS (10V, 15V or 24V) or line driver outputs.

Specials

C-Tek has designed and manufactured many special systems involving measurement, counting, and control, including interfacing to computers and programmable controllers. Many of these systems were modifications to existing C-Tek products, others were completely new designs. Consult C-Tek on your next requirement.

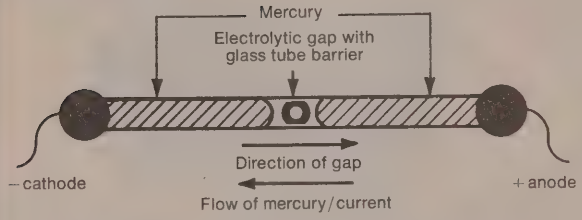
C-TEK, Inc. • 4 Railroad Avenue • Wakefield, MA 01880 • (617) 246-1720

CURTIS

ANALOG ELAPSED TIME INDICATORS

Smallest-size, Lightest-weight, Lowest-cost AC or DC at any Voltage

HOW THEY WORK



Two columns of mercury in a capillary glass tube separated by an electrolytic gap containing a barrier of glass tube. In the presence of pure or pulsed DC signal at the terminals, mercury electrochemically crosses the gap at a time rate proportional to the current. The gap travels the tube's length as a function of the current-time integral.

TYPICAL APPLICATIONS FOR CURTIS

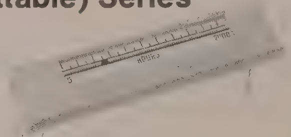
WARRANTY & P/M SCHEDULING—Provides a low-cost means of monitoring actual use time of equipment.

RELIABILITY ENGINEERING—Provides MTBF data or subsystem replacement-time data without costly, unreliable logging.

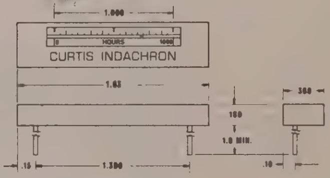
TEST EQUIPMENT UTILIZATION/CALIBRATION—Provides utilization data for savings in capital investment for test instruments, tools, etc., as well as a means for calibration scheduling.

LNA & LC (non-resettable) Series

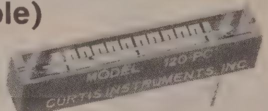
CURTIS
520-LNA



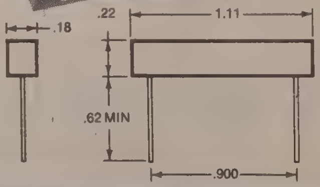
Easily-readable, very low-cost units used by OEM for warranty-by-use and P/M scheduling in office equipment, test instruments, etc. AC and DC with various time scales and electrical ratings. LNAs are adhesive-mounted, LCs via circuit board pins.



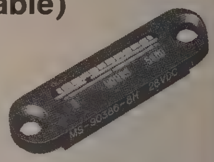
120PC (non-resettable) Series



Specially designed with circuit board pins for PC cards, components and subassemblies, 120PCs are totally encapsulated in epoxy for optimum reliability. Run from DC current with customer-supplied series resistor to achieve desired time frame.



620PC, 620N (non-resettable) MIL Series



CURTIS MIL spec units in two configurations: 620Ns meet MS-90386 and are provided with voltages available in the box—5VDC—as well as 28VDC and 115 VAC. 620PCs meet MS-3311 (AS), are designed for repairable modules and subassemblies, and run from DC current.

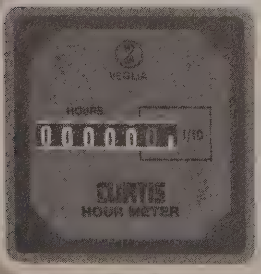
CP3 (resettable) Series

Instantly resettable in the field, CP3s are suitable for P/M scheduling, e.g., contract field servicing of equipment, replacement of life-limited components. Scales for any type of scheduling. Available in AC and DC.

STARTING 1984—
CURTIS' ARE UNSHOCKABLE

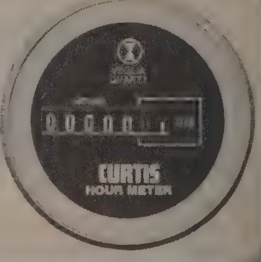
After 23 years of use-time monitoring for warranties, P/M scheduling, MTBF testing, etc., CURTIS Analog ETIs have come of age. *No longer vulnerable to careless handling.* Gap loss due to carelessness in shipping, receiving and stocking is prevented.

NEW AC & QUARTZ DC CURTIS VEGLIA HOUR METERS



AC units employ a high-efficiency, low-power synchronous motor for low-power consumption and instantaneous response with no rundown error. Low voltage 6V and 12V units reduce shock hazard. Also 24V and 115V, 230V units, all UL listed.

Quartz DC units employ electronic quartz circuitry for fail-proof operation and instantaneous response with no rundown error. When possible, use of DC, rather than AC, hour meters facilitates monitoring of actual use time rather than simply power-on time. Permits standardization on one meter without concern for voltage or frequency when product is exported.



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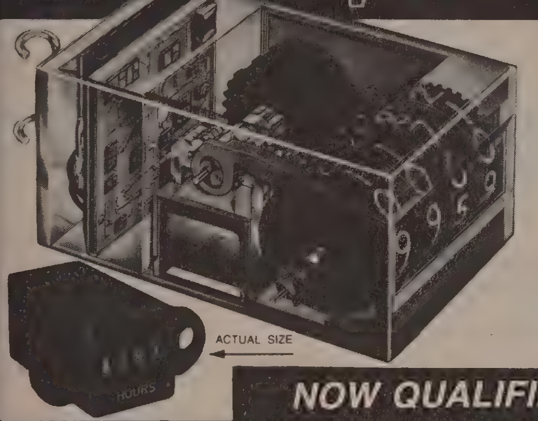
THE DYNATIME Series



SUBMINIATURE ELAPSED TIME INDICATORS

The NEW INDUSTRY STANDARD in ETI technology . . . with CMOS microelectronics that delivers precisely controlled power to the patented stepper drive module. Summarily, a remarkably efficient system that has proven its versatility. For example, Models D76 and TTL-compatible D46 are proven performers from logic buss or low-voltage DC power. Or take advantage of Model D16's stability between 10 and 34 VDC. It is now qualified to new MIL-M-7793E, as is the down-sized 60 Hz Model D92. All are POWER MISERS, with expanded voltages to match today's tougher equipment specs. And the SHORT CASES will SAVE SPACE, too. That's DYNATIME versatility . . . you can rely on it.

NOW QUALIFIED TO NEW MIL-M-7793E

MODEL D16 (12 & 28 VDC)	MODEL D92 (115V/60 Hz)	MODEL D95 & D25 (400 Hz)
New M7793/1 & /2, Short New MS21341A (Short) & B (Long) New M7793/5, Long (was MS17321)	New M7793/3 & /4, Short	New M7793/6 (was MS17322) D95 to MS27651 (115V) D25 to MS27650 (26V)

BASIC MODEL	DYNATIME FEATURES	INPUT VOLTAGE RANGE	INPUT VOLTAGE NOMINAL	NOMINAL POWER, MW	MAX. CASE LENGTH, IN.	TYPICAL MODEL NO.'S	FIG. NO.	TYPICAL MILITARY NO.'S
D16	The SHORT CASE, EXPANDED VOLTAGE RANGE, VERY LOW POWER, QUARTZ ACCURACY . . . All these proven features are now requirements for the new MS21341A, M7793/1 and /2 meters. And Model D16 is fully qualified!	10/34 VDC	12VDC & 28 VDC	13 (AVG) & 85 (AVG)	1.094 SHORT	D16C8C2 D16C8C*-136 D16C8C*-16 D16D8A	1 2 2 3	M7793/1-001 M7793/1-** MS21341A-** NONE
16	Delivers Model D16 performance, but is qualified in the traditional long case per MS21341B and M7793/5 specs.				2.062	16C8C2 16C8C*-16	1 2	M7793/5-002 (was MS17321-10) MS21341B-**
D46	Proven performance from your TTL buss or other regulated low-voltage DC power, and needs only 3 MW (Avg)!	4.5/6.5 VDC	5 VDC	3 (AVG)	1.094 SHORT	D46C8C2 D46C8C* D46D8A	1 2 3	NONE
D76	Another POWER MISER, keeps accurate time from 12 VDC or other logic buss power down to 6.5 VDC.	6.5/13 VDC	9VDC	8 (AVG)		D76C8C2 D76C8C* D76D8A	1 2 3	NONE
D92	MICROELECTRONICS ACCURACY, EXPANDED VOLTAGE RANGE, VERY LOW POWER—All packed into a SUBMINIATURE CASE, and now qualified to new M7793/3 and /4 specs.	75/150 60 Hz	115	300		D92C8C2 D92C8C*-136 D92D8A	1 2 3	M7793/3-001 M7793/3-** NONE
		NOTE: FOR 50 Hz METER, REPLACE D92 ABOVE WITH D91.						
D95	A new choice, with improved MICROELECTRONICS ACCURACY, EXPANDED VOLTAGE RANGES, and VERY LOW POWER compared to our motor-driven meters—D95 saves 50 percent, while D25 saves 90 percent! Both meters are now qualified to existing MS27650, 27651 and M7793/6 specs, but you can reply on the DYNATIME performance ratings you see here.	75/150 400 Hz	115	300	1.094 SHORT	D95C8C2 D95C8C*-16	1 2	M7793/6-002 (was MS17322-10) MS27651-**
D25		15/40	26	40		D25C8C*-16	2	MS27650-**

NOTES: 1. Also available—Other 4 & 5 DIGIT READOUTS, MOUNTS, ROUND CASE per M7793/2, /4, /5, /6.
2. *Denotes "X" Dim.; A = Flush, B thru T in .031" steps, then U thru Z in .062" steps.
3. **Denotes Mount setback & type. See applicable Military Drawings.
4. Code "-136" in Model No. defines tin-plate mount face; "-16" is same plus added testing.

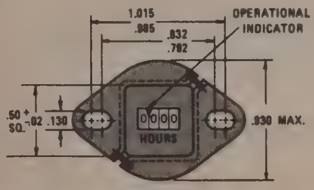


FIG. 1 ADJUSTABLE "C2"

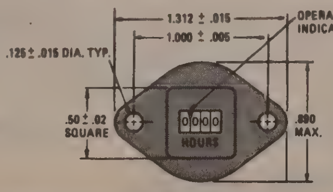
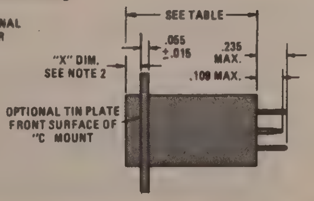


FIG. 2 "C" MOUNT



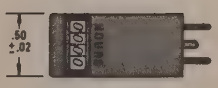


FIG. 3 SIDE-READING

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28 VDC EVENTS COUNTERS

REPLACES MS21228 M8974/2-		M8974/1A-	
CASE LENGTH 1.094" MAX.		CASE LENGTH 1.333" MAX.	
CATALOG NO.	DASH NO.	CATALOG NO.	DASH NO.
B16C8A-245	-001	B16C8A-312	-001
B16C8CE-245	-002	B16C8CE-312	-002
B16C8A-232	-003	B16C8A-313	-003
B16C8CE-232	-004	B16C8CE-313	-004

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EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

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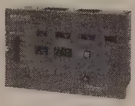
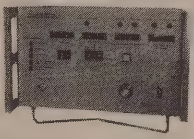


CP-641 — 16 Channel



CP-640 — 32 Channel

SINGLE-ZONE TEMPERATURE CONTROLLERS

- Proportional plus automatic reset plus rate with overshoot limiting. Eliminates temperature 'droop' and ensures close temperature control.
- Reliable. Latest integrated circuitry ensures highest reliability and long life.
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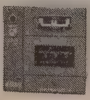

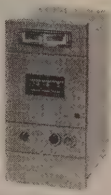

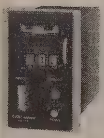

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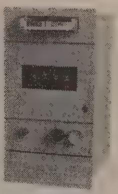

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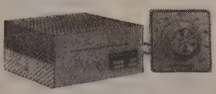

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Total Control of industrial processes. Includes transducers, interfaces, programming and application Engineering.

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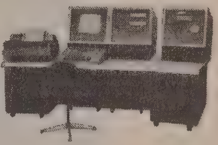

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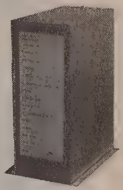

TEMPERATURE, PRESSURE, OF RPM INDICATORS & ALARMS

Display temperature, pressure, or RPM digitally. One or two process alarms for high, low, or dual stage alarm.

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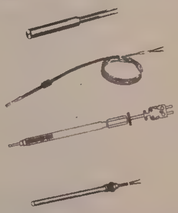
A complete line of temperature sensors. Patch type for surface measurement, tubular, bayonet mount, air sensing, etc.



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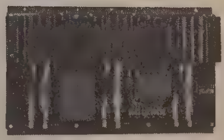

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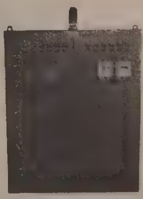
Complete panels for industrial processes. Includes temperature, pressure and closed loop controls. Computer control optional.



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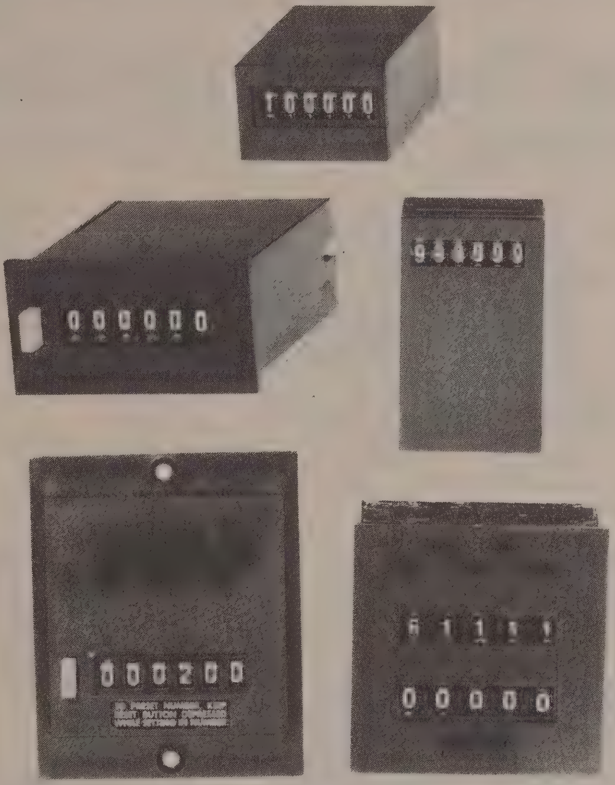

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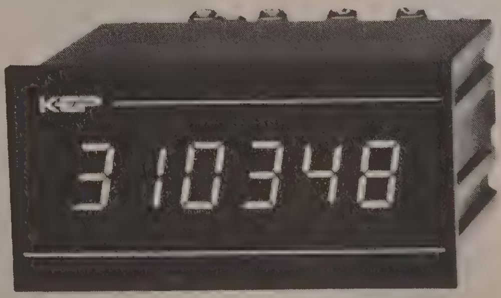

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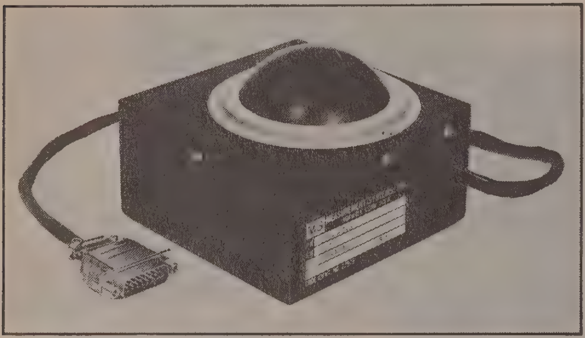
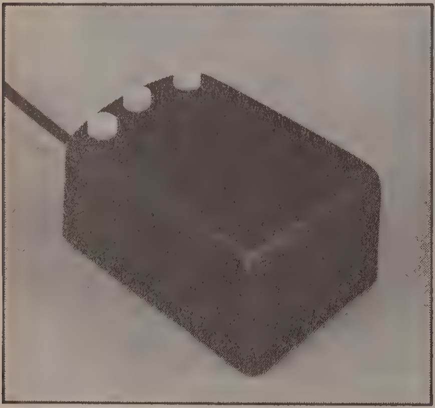
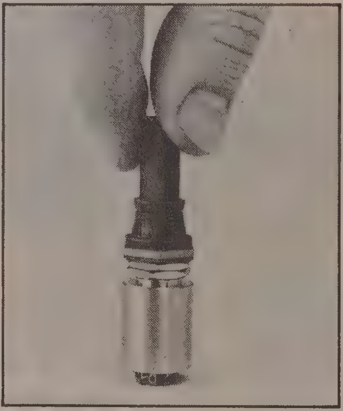


Model 636 3 Axis Trackball

- ☐ Joysticks - Force Operated, Miniature (Finger Operated) to Large (Hand Operated)
- ☐ Joysticks - Displacement, Potentiometer, Switching. All Sizes
- ☐ Trackballs - 2, 3 or 3½ inch sizes, Mice, Incremental Encoders
- ☐ Control Grips
- ☐ Analog or Digital Interfaces



Model 122 Mouse



Model 469B Miniature Joystick

Model 544 Gimbal Joystick

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Model 531 Displacement Joystick

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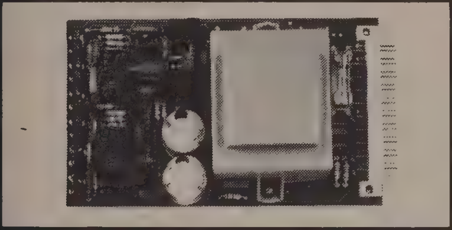
D.C. MOTOR CONTROL

MICRO MO KITS FOR SPEED & POSITION CONTROL

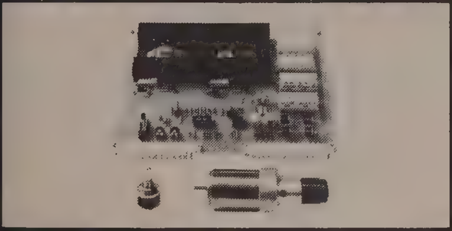
FEATURES
- ★Torques up to 7 ft.-lbs.
- ★Nominal Speeds of 3,000 RPM.
- ★Outputs up to 3,000 Watts.
- ★Separate Components Available.

Kits generally include servocontroller, cooling (when needed), power supply, motor with feedback device and control potentiometers. Additional add-ons include appropriate gearing, optical encoders, and digital controllers.

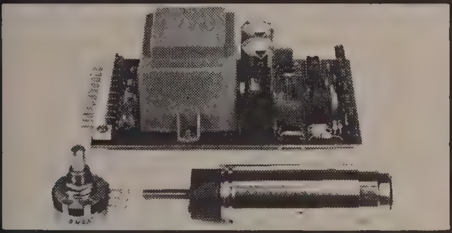
At the higher dissipations the controllers use **pulse width modulated (PWM) amplifers.** All incorporate fail-safe mechanisms and are designed for user-friendly operation. Their modular and thermally stable design yields long life and easy serviceability.



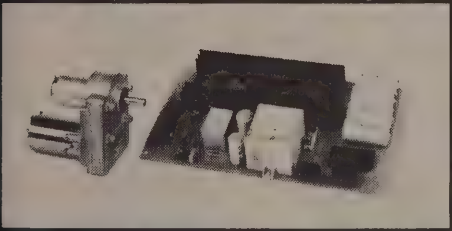
AR1B



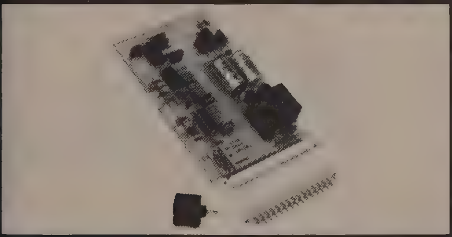
AR3



AP1



AP3



MATEL 100

SPEED & POSITION CONTROL

AR1B:
1 amplifier/power supply **MAR 9/03**; 1 Speed "set" pot.; 1 Motor-Tachometer (2251, 12V). **Specifications:** Rotation: bi-directional (4 quad.); Output torque, Motor: 0.42 oz.in. Gearhead: up to 57 oz.in.; ± 3800 RPM max., motor; Max. power output: 2.4W.; Speed range: 10,000:1.

AR2:
1 Motor-Tachometer (3557, 12V); 2 pot.; 1 amp. **MAR 24/1-E1**; 1 Power supply **MAR 24/1-E2**; 1 Transformer (output 26-0-26V/1.5A; 2 connectors. **Specifications:** Rotation: bi-directional (4 quad.); Output torque (motor): 3.5 oz.in.; ± 3800 RPM max., motor; Max. power output: 12W.; Speed range: 3,000:1.

AR3:
1 Motor-Tachometer (3557, 6V); 1 pot.; 1 amp/power supply **(MAR 6/4)**; 1 Transformer (output stage, 8-0-8V/4A); **Specifications:** Rotation: bi-directional (4 quad.); Output torque (motor): 4.2 oz.in.; ± 3800 RPM max. motor; Max. power output: 12W.; Speed range: 3,000:1.

AP1:
Servo/power supply **(MAR 9/03)**; 1 Motor-Gearhead-Pot. combination; 1 pot.; 1 connector. **Specifications:** Rotation: bi-directional (4 quad.); 300° total travel; repeatability within ±1°; 15 RPM max.; Gear ratio: 308:1; Output torque: 14 oz.in.; Max. power output: 2.7W.

AP3:
1 Servo amp/rectifiers **(MANR 6/4)**; 1 Transformer; 1 pot;; 1 Motor-Gearbox-Pot. combination. **Specifications:** Rotation: bi-directional; 300° total travel; repeatability within ±1°; Gear ratio: 100:1; 36 RPM max., (0-300°); Output torque: 275 oz.in.; Max. power output: 12W.

SPEED & POSITION INDICATING

MICRO MO OPTO-ELECTRIC TACHOMETER KIT (MATEL 100)
Converts frequency to linear voltage with respect to speed (30-15,000 RPM), polarity depends on encoder direction of rotation. Output voltages are ± 4.5V or ± 9V. Kit contains: Circuit board/power supply; 1 connector; 1 Optical (10A/1 in. dia.) encoder.

SYNCHRO-DC TACHOMETER MOTOR FEEDBACK ELEMENT WITH ELECTRONICS (KIT MADRE 2)
Transmitter is coupled with DC tachometer and electronic controller. Kit requires DC motor and power amp. to drive selected motor (see below). Resolve both shaft position and velocity. Precise 360° positioning while providing ability to slave phase one or more motor shafts to a reference signal. Reference signal can be taken from electronics or an external source. **Contents:** 1 Potentiometer-Tachogenerator unit; 1 Control Potentiometer; 1 circuit board (optional connector).

OTHER MICRO MO CONTROLLER PRODUCTS

DIGITAL CONTROLLERS MADIS 15 forward counter and motor control. MADIS 2000 fully configured position controller.

POWER SUPPLIES: DC current source: MAST 24/3: 0-24V, 3A, **72W**; MAST 40/2: 0-40V, 2A, **80W**; MAST 24/6Z: 0-24V, 2A, **144W**; MAST 24/12Z; 83/6Z: 0-24, 44 & 83V; 12, 8 & 6A; up to **500W**.

PWM SERVO AMPLIFIERS: Servo Amp (4 quadrant) MTR 35/12 & MTR 63/12: 0-35V, 0-63V; 12A; up to **700W.** (4 quadrant) MTRB 700/1200: 0-42, 52, 92 & 125V; 10, 18, 12 & 10A; up to **1.2KW.** (4 quadrant) MTLR: 0-245V, 10A, up to **2.4KW.** (single quadrant) MTST: up to **11KW.** (4 quadrant) MTR 2800: 0-60/100/170V, 6A; & 0-60/100/170V, 17A; up to **6.8KW.** (4 quadrant) MTLR 5000: 0-60/100/170V, 25A & 0-60/100/170V, 40A; up to **6.8KW.** (4 quadrant) MTR 20K: 150/200V, 50A; 150-200V, 70A; 150-200V, 100A; up to **20KW.**

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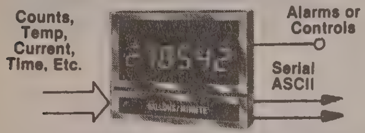
Volts, Temp, Counts, Time, Etc.
TEMPERATURE °F

These meters accept a wide range of inputs such as volts, amps, watts, temp, counts, etc. Setpoint outputs allow alarm or control capability. Serial ASCII outputs are also featured.

• 2 to 6 digit models • Preset models available • Colons and decimal points available • Baud ratges 110-9600 • Non-volatile memory • Large, bright LED or LCD display • Surface mounting • 3-year warranty • Price: $150 - $395

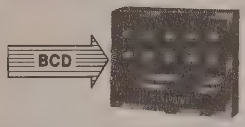
METERING WITH SETPOINTS & SERIAL DATA


Counts, Temp, Current, Time, Etc.
Alarms or Controls
Serial ASCII
-10542

These meters feature serial ASCII output and full message formatting. Setpoint outputs provide alarm or control capabilities. Microprocessor-based Ratemeter measures DC pulses from one per hour to 3 kHz.

• Full 6-digit display • Scale factor .000000001 to 59999 • Baud rates 110-9600 • Non-volatile memory • Full instrumentation input • Threshold adjustment • Setpoint outputs • 3-year warranty • Price: $295 - $425

COMPARATOR WITH BCD INPUTS



These units take standard BCD outputs, compares it against built-in switches and gives output status signals. Less than, equal to and greater than outputs allow extreme versatility and more powerful output signals than normally found.

• Single or dual limit models • Polarity switches • Removable front knobs for manual setting • Uncommitted red and green LED indicators • Cascade output for unlimited number of digits • 3-year warranty • Price: $207 - $290

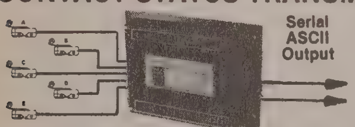
SERIAL / PARALLEL CONVERTERS

Serial ASCII In
Parallel
Serial ASCII Out
Parallel

Convert common parallel data (such as BCD) to serial ASCII with the Transmitter Bustle® or convert serial ASCII to parallel data with the Receiver Bustle®. Transmit data or provide input to PC's, computers, printers, terminals, etc.

• Convert ASCII data to up to 6 digits BCD data or 24 bits • 100 unit addressing capability • 2-digit switch-selectable ID number • 110-9600 baud rate • RS232, RS422, 20/60 mA formats • Price: $296 - $303

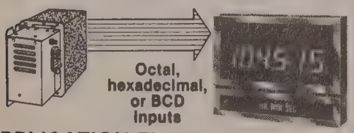
CONTACT STATUS TRANSMITTER


Serial ASCII Output

These transmitters accept up to 25 individual contact closures at up to 24 VDC. These units are all self-contained and built rugged reliable. These transmitters provide standard serial ASCII output.

• Directly compatible with CRT's, printers, etc. • Self-contained • CMOS, TTL compatible • Accepts up to 25 contact closures • Accepts up to 24 VDC; others available • RS232, RS422, 20/60 mA formats • Price: $290 - $350

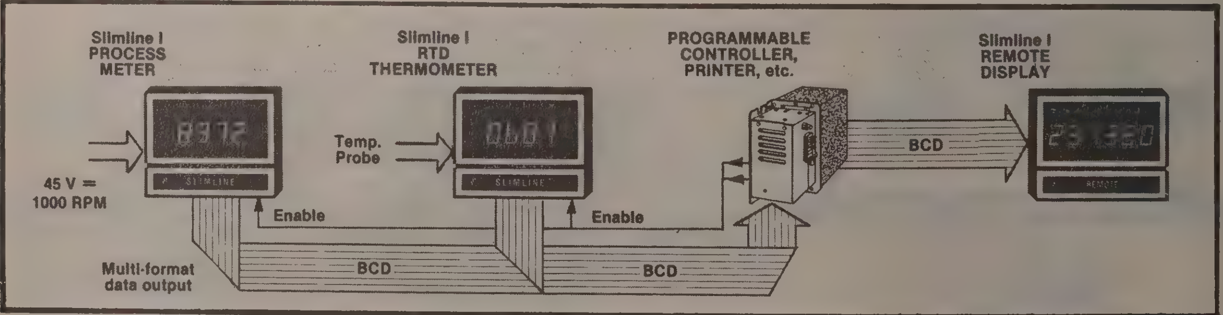
LOCAL & DISTANT READOUT


Octal, hexadecimal, or BCD inputs
1045 15

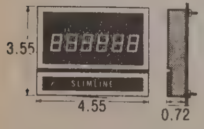
Meters accept BCD, octal, hexadecimal or 2-wire serial ASCII inputs. Display up to 6 digits with LCD's or LED's. ASCII command switches provide remote control or alarm capabilities. Displays are easily read even in bright light.

• Parallel, octal, hexadecimal or BCD inputs • Serial ASCII inputs • Latch capability • 2 to 6 digit models • Baud rates 110-9600 • Flexible addressing capability • Surface mounting • Easy wiring • 3-year warranty • Price: $156 - $500

APPLICATION EXAMPLE:


Slimline I PROCESS METER
Slimline I RTD THERMOMETER
PROGRAMMABLE CONTROLLER, PRINTER, etc.
Slimline I REMOTE DISPLAY
8372
0601
Temp. Probe
BCD
45 V = 1000 RPM
SLIMLINE
SLIMLINE
REMOTE
Enable
Enable
Multi-format data output
BCD
BCD

SLIMLINES' UNIQUE FEATURES


3.55
888888
SLIMLINE
4.55
0.72

Size: 4.55″ x 3.55″ x 0.72″. Panel surface mounting means easy & fast installation. Also fast wiring – no soldering needed.

High Quality: Less downtime, long useful life. Much better investment: socketed parts and highest quality components. Conservative design; works well in harsh factory environments, not like other meters that are made to only work in a laboratory.

Who Uses: With over 1 million meters shipped, NES is recognized as the leader in high quality industrial meters. Some users are: the Space Shuttle, Air Force 1, virtually all of the Fortune 1000's and tens of thousands of others.

Other Products: NES designs & manufactures over 3,000 different products from Broadcast Automation Computers to the broadest range of panel meters available.

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1536 Brandy Parkway, Streamwood, IL 60103 • (312) 289-8820

For other products in EEM from NES, see Sections 2000, 2325, 2450 & 2950.

CONTROL SYSTEMS For

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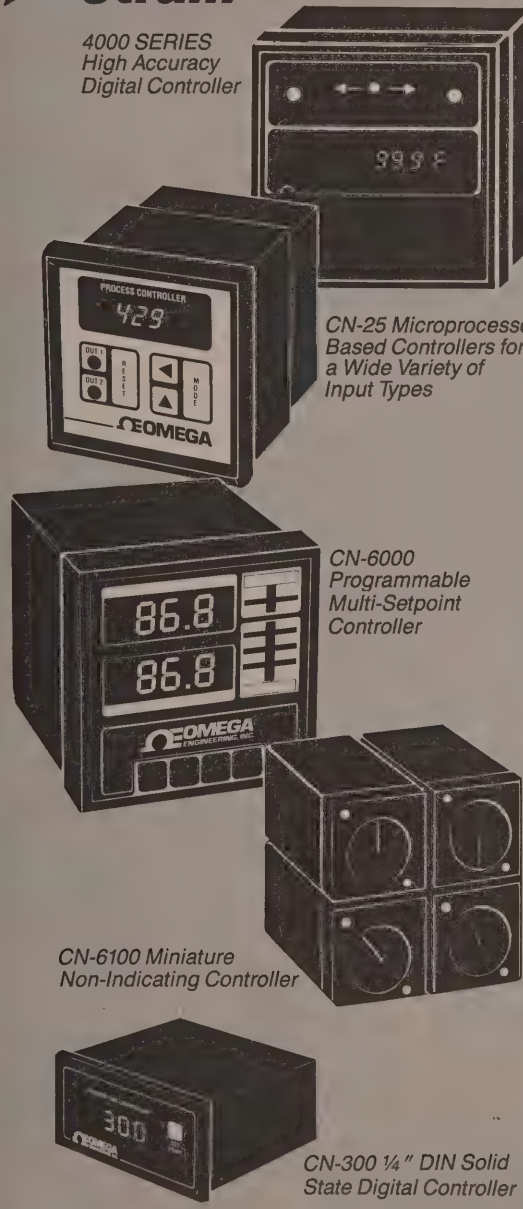
- ✓ *Pressure*
- ✓ *Strain*


99.9 F
PROCESS CONTROLLER
429
OUT 1
OUT 2
RESET
MODE
OMEGA
86.8
86.8
OMEGA ENGINEERING, INC.
300

4000 SERIES High Accuracy Digital Controller

CN-25 Microprocessor Based Controllers for a Wide Variety of Input Types

CN-6000 Programmable Multi-Setpoint Controller

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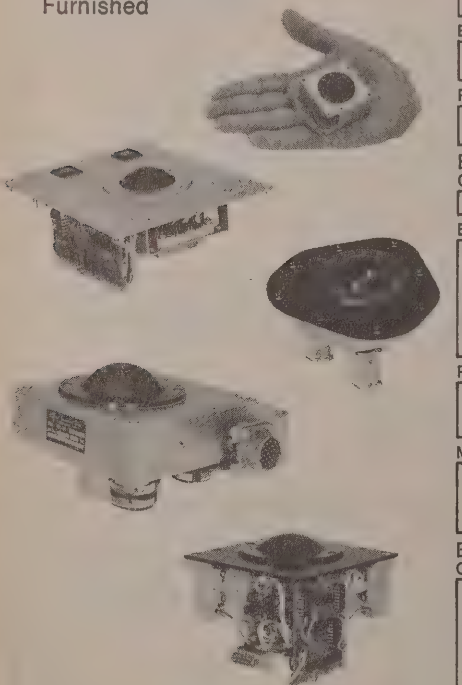
BALL TRACKERS — 1", 2", 2.5", 3" SIZES

Ball Trackers Can Include Output Interfacing Cards With . . .

- Pulse Train and Direction Outputs
- Binary Counter Outputs
- Independent Pulse Train Outputs
- 90 Degree Phase Shifted Outputs
- Differential Line Drivers
- Anti Dither and Hystersis Networks
- Frequency Switch-Multiplier Networks

RS-232-C Interface Micro Boards Featuring

- Selectable Baud Rates
- Custom Protocals Can Be Furnished



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CATALOG

BALL TRACKER SYSTEMS

Orbit Part No.	Approx. Dimensions L	W	D	Unit Connector	Nature of Pulses	Pulses/ Revolution	Push Button	General Remarks
BALL TRACKERS — 2-INCH DIAMETER BALL								
OPTICAL ENCODER — LAMPS								
55713**	3.00	3.80	4.90	Direct to Board	Square	120 ±10%	—	
55749*°†	6.94	6.31	3.31	348-40E14-37P1	Square	256-275	5 P.B.	Single Ended Line Driver
55751‡	3.95	3.61	3.00	MM-11-22PGDSLB	4 Ind. Pulse Trains	480 ±10%	—	Pulses Approximately 40 µs Wide +, —Dir. "X", +, —Dir. "Y"
55782*°†	6.50	6.50	2.70	MRAC-34P-G7	Square	256-275	2 P.B.	With 10 Bit Up-Down Counter
55784*°†	4.30	3.80	3.00	MS18174-1	Square	64	—	
55795*°†	4.12	6.12	2.30	DAMM-15P	Square	256-275	2 P.B.	
55800*°	5.00	4.80	3.12	Direct Wire	Square	200 ±20	—	Single Axis
55829*°†	4.12	5.60	2.30	65692-007	Square	256-275	2 P.B.	Single Ended Line Driver
OPTICAL ENCODER — L.E.D.								
55815*°†	4.30	3.86	3.00	MS18174-1	Square	64	—	
55832†	3.50	3.50	2.06	MS24308/8-1	4 Ind. Pulse Trains	~267 ±10%	—	+, —Direct Pulse Lines Per Axis/Pulse 40 µs
55847**†‡	3.59	3.61	2.31	WTB-20PCSY	Square	384 ±10%	2 P.B.	
BRUSH ENCODER								
57147	3.80	3.80	5.50	MS3116E 22-55P	Square	1 Rev. of Ball = 2 Revs. Comp.	2 P.B.	12-Bit V-Scan Binary
POTENTIOMETER								
55752	5.00	4.88	2.70	Direct to Pot	Linear	1 Rev. of Ball = 1.5 Revs. of Pot	—	10 Turn, 5000 Ohm
BALL TRACKERS — 2½-INCH DIAMETER BALL								
OPTICAL ENCODER — LAMPS								
55731**	4.50	5.25	2.90	Screw Term.	Square	2048 ±10%	—	4 Revolutions of Encoder
BRUSH ENCODER								
55728	5.75	5.75	3.25	DAMM-15P	4 Phase	100 NOM	3 P.B.	1 Rev. of Ball = 1.87 Rev. Component Size 23 Encoder
55831	6.40	5.60	2.70	88023-1	4 Phase 4 Pulse	115 ±15P	4 P.B.	Each Track Has 32 "On" Segments In 360°
55841	4.50	4.00	2.70	MS3112E14-19PX	4 Phase	115 ±15P	—	86-128 Pulses/Channel
57400	4.50	4.50	2.87	MS3112E14-19PX	4 Phase 4 Pulse	115 ±15P	—	1 Rev. of Ball = 1.76 Revs. of Component
POTENTIOMETER Tracking Ratio Ball to Pot = 1:2; 1.5 Rev. of Ball = 1 Rev. of Pot								
55753	4.50	4.50	3.00	Direct to Pot	Linear		—	Single Turn of Pot = 2000 Ohms ±5%
55760	4.50	4.50	4.25	Direct to Pot	Linear		—	Pot, Clutch Spring Center
MAGNETIC ENCODER								
55720	5.75	5.75	2.90	MS3112E14-19PV	4 Phase	100 NOM	3 P.B.	1 Rev. Ball = 1.87 Rev. Component ±10%, Size 23 Encoder
57025	4.50	4.50	2.90	Dir. to Encoder	4 Phase	240	—	3 Revolutions of Encoder
BALL TRACKERS — 3-INCH DIAMETER BALL								
OPTICAL ENCODER — LAMPS								
55743**	6.30	6.30	3.20	MRAC-14PG7	Square	512-580	1 P.B.	With or Without Adjustment Pots
55778**†	5.00	5.00	3.19	M28748/3-C00F 2A	Square	512-580	—	Differential Line Drives
55817*°†‡	6.19	9.00	3.50	M28748/3-D00F 2A	Square	512-580	2 or 4 P.B.	100,000 MTFB MIL-STD-810B
55826**	4.91	4.29	3.65	P.C. Board Terms	Square	512-580	—	Pot Adjustable 75,000 Hour MTBF
55845**	6.20	7.20	3.53		Square	512-580	2 P.B.	With or Without Swivel Caster Ball Support
OPTICAL ENCODER — L.E.D.								
55848**†‡	4.29	4.91	3.09	MS18268-2	Square	288 ±25P	—	Differential Line Driver Airborne Qualified
BRUSH ENCODER								
55712	7.60	7.40	3.30	MRAC-20-PGV	4 Phase	262 ±5%	2 P.B.	4 Brushes Common Output
55714	7.90	7.90	3.20	Terminal Block	4 Phase	6-7 Revs. = 2048P	—	4 Brushes Common Output
55719	6.00	5.00	3.30	MS3112E14-19PX	4 Phase	250-350	—	4 Brushes Common Output
SYNCHRO ENCODER								
55727	6.60	5.20	3.30	MS3112E14-19PX	—	1 Rev. of Ball = 1.64 Revs. ±10%	—	3 Wire Synchro Output
POTENTIOMETER								
55715	7.90	7.90	3.75	Terminal Block	Linear	6-7 Revs. of Ball = 1 Rev. of Pot	—	500 Ohms, 10 Turn Pot

* SINGLE PULSE ** 2-90° PULSES ° DIRECTION CODE
† HYSTERESIS ‡ ANTIDITHER

RENCO CORPORATION

DIVISION OF ELECTRO-CRAFT CORPORATION

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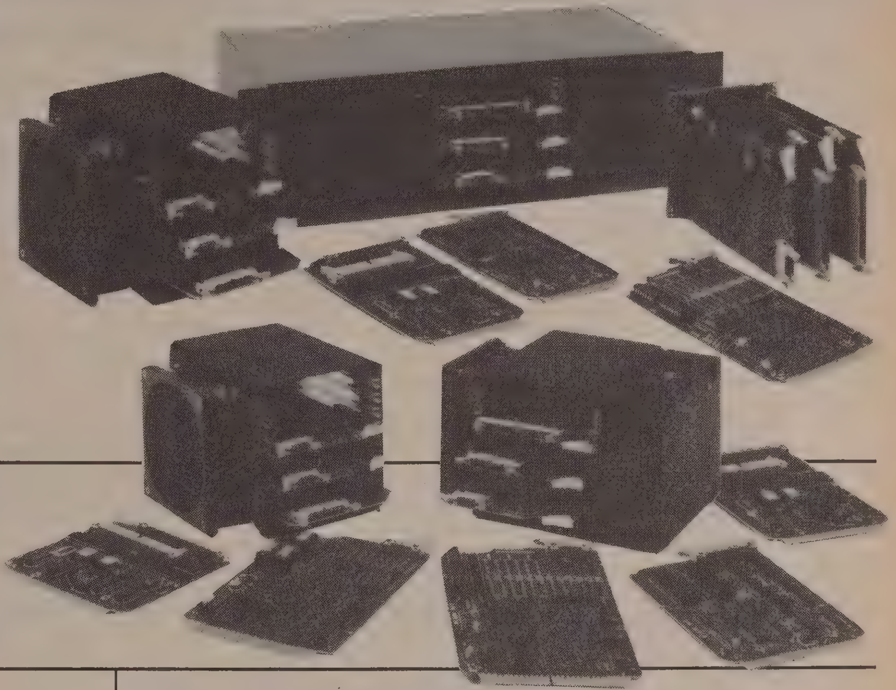
STD BUS MODULES FOR INDUSTRIAL AUTOMATION

The STD BUS is used by over 100 card manufacturers to standardize the physical and electrical aspects of 8-bit microprocessor systems. The bus is dedicated to internal communications; all external communications are through I/O interface connectors on the outer edge of the card. The STD BUS is used for both independent devices and as an I/O subsystem for larger computers.

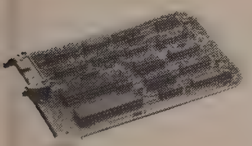
Ideally suited for factory automation in many industries, benefits provided by the STD BUS include:

- Modularity by function and physical specification
- Card slot independence
- Separate buses for power, data address and control signal

Renco Corporation offers the industrial automation engineer a wide selection of STD BUS card modules and accessories which include: Quad 12-bit digital-to-analog convertors; Quad TTL encoder interface; communications interface with IEEE-488, RS-232 and parallel I/O; intelligent servo control. Additional motion control related modules and systems are soon to be released.



STD BUS SERIES RSTD-ENCODE4 QUAD ENCODER INPUT



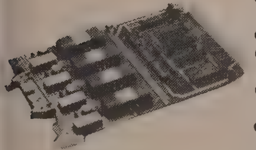
FEATURES

- Full STD BUS compatibility
- Four 16-bit or two 32-bit counters
- X1, X2, or X4 encoder count multiplier
- Direction sensing
- Error detection
- Binary or BCD counting
- Count rates up to 2 MHz
- Time of day clock option
- 5 volt operation
- Switch selectable addressing

The RSTD-ENCODE4 provides direction sensing and error detection for up to four quadrature encoder signals. Count rate may be 1, 2, or 4 times the encoder line count, software selectable or jumpered. Separate 16-bit count registers are provided for forward and reverse counts of each encoder.

TTL input signals may be strobed with the system clock, or an optional crystal oscillator may be used to obtain clock rates up to 5 MHz. When using three encoders, the unused count registers may be configured as a time of day clock.

STD BUS SERIES RSTD-DAC4 QUAD DIGITAL TO ANALOG CONVERTER

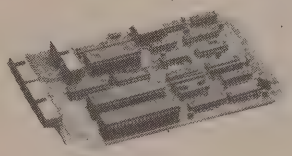


FEATURES

- Full STD BUS compatibility
- 12-bit accuracy
- ±10V, ±5V, or 0-10V output voltage range
- Switch selectable addressing
- Memory mapped, or I/O select
- 3×10^{-6} sec settling time
- $13 \times 10^{+6}$ volt/sec slew rate

The Renco RSTD-DAC4 board provides four independent analog control signal outputs each with a range of ±10 volts, ±5 volts, or 0 to 10 volts at the user's option. Command word is 12 bits. Switch selectable addressing. Optional use of IORQ, MEMEX, IOEXP, or MEMRQ. Timing is user selectable for Z80, 8085, 6800, or 6809 microprocessors. The unit is assembled on a single STD BUS compatible card. The analog outputs are presented through a 20 pin IDC connector at the front of the card.

STD BUS SERIES RSTD-COM IEEE-488, RS-232, 16 BIT PARALLEL, TIMER

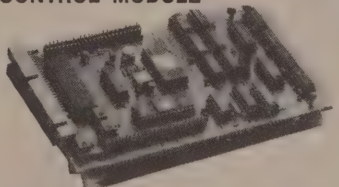


FEATURES

- IEEE-488
  Listener/Talker/Controller
  8-bit address switch port
  6809 assembly language
  Utilities
- RS-232 ACIA
  Programmable 50-19, 200 baud
- VIA
  16-bit parallel I/O
  Two timers
  Serial port
- SWITCH SELECTABLE BOARD ADDRESS
  8- or 16-bit address, MEM or IOREQ

One economical communications card handles multiple I/O tasks for STD BUS systems. T.I. TMS9914 IEEE-488 interface handles listener, talker and controller functions. Assembly language 488 utilities for 6809 are provided as programming examples. An 8-bit switch port is provided to input the 488 device address and RS-232 baud rate. A 6551 ACIA provides programmable baud rate for RS-232. The RS-232 port may be configured as needed with wire wrap jumpers. The 6522 VIA provides 16 I/O lines, two timers and another serial port. Signal connectors are standard ribbon cable headers.

RSTD PROPOS PROGRAMMABLE POSITIONER AND MACHINE CONTROL MODULE



FEATURES

- Non-volatile memory of user programs and parameters
- Program position, velocity, acceleration
- Time delays, conditional waits
- Looping and branching
- Program with RS-232 terminal 300, 1200, 9600 baud STD BUS Interface with 128 bytes dual port RAM
- Dual STD BUS card set
- Optically coupled encoder inputs A, B, Index up and down 1x, 2x, 4x direction sensing, 16-bit counter, 12-bit DAC provides ±10V output ot motor amplifier, Forward and reverse limit switch, home switch
- 8 user input/output lines
- Programmed outputs
- Conditional branching on Input state
- Low cost machine controller
- Rotary tables
- Cut to length
- Point to point positioning

The RSTD-PROPOS is a broad level programmable position controller for DC Servo motors, providing high performance motion profile control and eight user programmable input/output lines for control of external machine function.

RSTD-PROPOS can be easily installed in an STD BUS computer, several PROPOS cards can be combined with a STD CPU CARD to configure an intelligent multi-axis controller. ANY personal computer can be interfaced with this intelligent multi-axis controller through the RSTD-COM CARD.

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HIGH-PERFORMANCE DATA CONVERSION PRODUCTS

Our product line includes both standard and custom A/D's and D/A's, signal conditioning amplifiers, distortion suppressors, and custom signal conditioning/data acquisition subsystems. A representative sampling is included in the listing on these pages.

Integrating A/D Converters

Product	Notes, Features, Characteristics	Resolution	Conversion Rate	Relative Accuracy	Input Ranges	Size
MP8037	Fastest, most accurate and stable integrating ADC.	17 Bits Binary	250/Sec.	±1 LSB	±10V	2" x 4" x 0.44" (51 x 102 x 11 mm)
MP2344	Versatile (BC/Binary), highly isolated, line-synchronous integration.	±39,999 counts (16 bits binary, 4¾ decimal digits)	3/Sec. to 30/Sec.	±1 count	±4V	2" x 3" x 0.45" (51 x 76 x 11 mm)
MP2321	Highest performance/ratio in a premium, balanced input, 12-bit ADC.	±1999 (3½ digits decimal)	100/Sec.	0.05% rdg. ±1 count	±1.999V or ±199.9mV	2" x 4" x 0.49" (51 x 102 x 12 mm)
MP2322		12 Bits Binary	100/Sec.	0.05% rdg. ±1 count	±100mV ±200mV ±1V, ±2V	2" x 4" x 0.49" (51 x 102 x 12 mm)
MP2316	Universal, Floating Point Programmable-Gain Converter Processor	16 Bits	37/Sec.	±.006% FSR.	Selectable ±10mV to ±50V	2" x 3" x 0.5" (51 x 78 x 13 mm)

Successive-Approximation A/D Converters

	Product	Notes, Features Characteristics	Resolution Binary Bits	Conversion Time	Relative Accuracy of FSR	Input Ranges	Size
NEW	AH8022	Exceptionally high-speed State-of-the-Art A/D in small package	12	500ns	±0.025%	0-10V, ±10V	1.00" x 2.4" x 0.3" (25.4 x 60.8 x 7.6 mm) 48 pin DIP
	MP8016	Most advanced ADC's currently available in this speed range; truly "state-of-the-art" designs, at modest prices.	16	32 μs	±0.0015%	+10V, ±10V	3" x 4.6" x 0.375" (76 x 117 x 10 mm)
	MP8015		15	15 μs	±0.003%		
	MP8014		14	10 μs	±0.006%		
	MP2734	Improved performance at higher speed, yet at lower cost.	14	7 μs	±0.006%	+5V, +10V ±5V, ±10V	2" x 4" x 0.44" (51 x 102 x 11 mm)
	MP2735-2	High speed, accurate, superb linearity around zero crossing. Low power.	15	5 μs	±0.005%	±5V	3" x 4" x 0.44" (76 x 102 x 11 mm)

Sampling ADC's (Successive-Approximation with Built-In S/H)

NEW	A/D/A/M-812	Two channel simultaneously sampling 12-bit ADC, 5ns skew max. between channels	12	19.5 μs/2 ch. 11.0 μs/1 ch.	±0.012%	±5V, ±10V 0-10V	2" X 3" X 0.375" (50.8 X 76.2 X 9.53 mm)
	A/D/A/M-822	Two channel simultaneously sampling 12-bit ADC; 5ns skew max. between channels	12	39 s/2 ch. 21 μs/1 ch.	±0.012%	±5V, +10V ±10V	2" x 3" x 0.375" (50.8 x 76.2 x 9.53 mm)
NEW	A/D/A/M-826	Fastest ADC available, 16-bit performance; Sampling(S), Buffered(B) and Unbuffered(U) versions	16	2.3 μs (S) 2.0 μs (B) 1.5 μs (U)	±0.0015% ±0.0015% ±0.0015%	+10V, ±10V	3" x 5" x 0.44" (76.2 x 127.0 x 11.17 mm)
	A/D/A/M-825	Highly stable sampling ADC's. Include S/H, tri-state buffers, in fully shielded case, tested as a complete sampled-data subsystem.	15	18 kHz	±0.003%	+5V, +10V ±5V, ±10V	2" x 4" x 0.44" (51 x 102 x 11 mm)
	A/D/A/M-824		14	20 kHz	±0.005%		
	A/D/A/M-724		14	6.8 μs (100 kHz thruput)	±0.006%		3" x 4.6" x 0.375" (76 x 117 x 10 mm)
	A/D/A/M-834	Highly stable sampling converters featuring low noise, low power, and tri-state output buffered extended temperature range −25° to +85°C.	14	60 μs 16.6 kHz thruput	±0.005%	+5V, +10V ±5V, ±10V	2" x 4" x 0.39" (51 x 102 x 10 mm)
	A/D/A/M-835		15	60 μs 16.6 kHz thruput	±0.003%	+5V, +10V ±5V, ±10V	2" x 4" x 0.39" (51 x 102 x 10 mm)
	MP2735-1	High speed, accurate, superb linearity around zero crossing. Low Power.	15	8 μs (125 kHz thruput)	±0.005%	±5V	3" x 4" x 0.44" (76 x 102 x 11 mm)
	SHAD-2	High speed simultaneous dual channel sampling, ultra low noise and distortion, audio digitizing board product.	15	57 kHz (dual channel)	±0.005%	±5V	4.62" x 5.78" x 0.55" (117 x 147 x 14 mm)

Sample & Hold Amplifiers

Product	Notes, Features, Characteristics	Acquisition Time for 20V Step	Aperture Uncertainty Time	Sample-Mode Non-Linearity, ± 10V range	Pedestal Non-Linearity, ± 10V range	Hold Mode Droop Rate	Size
MP272	Very high speed inclusive of input buffer settling time.	350ns max. to 0.01%	± 50 ps	± 0.005% max.	± 0.005% max.	5 μV/μs max.	2" x 2" x 0.44" (50.8 x 50.8 x 11.2mm)
MP271	Fastest, most accurate S/H in high-throughput class.	271 μs max. to 0.01%	± 0.2 ns	± 0.003% max.	± 0.002% max.	2 μV/μs	2" x 2" x 0.39" (51 x 51 x 10 mm)
MP270	Same high speed as MP271.	270 μs max. to 0.01%	± 0.2 ns	± 0.005% max.	± 0.005% max.	2 μV/μs	2" x 2" x 0.39" (51 x 51 x 10 mm)
MP260	Moderate speed, most accurate, small size.	5.0 μs max. to 0.003%	± 0.5 ns	± 0.002% max.	± 0.003% max.	0.2 μV/μs max.	1" x 2" x 0.44" (25 x 51 x 11 mm)
MP261	Optimized for simultaneous S/H high-accuracy systems.	15 μs max. to 0.003%	± 0.5 ns	± 0.002% max.	± 0.002% max.	20 μV/ms max.	1" x 2" x 0.44" (25 x 51 x 11 mm)
MP282A	High speed, dual channel internal MUX and gain ranging amplifier designed as audio/PCM front end.	3.5 μs max. to 0.005% for 10V step	± 0.2 ns	± 0.002% max. (± 5V range)		0.4 μV/μs max.	2" x 2" x 0.44" (51 x 51 x 11 mm)

Digital-to-Analog Converters

Product	Notes, Features, Characteristics	Resolution Binary Bits	Relative Accuracy of FSR	Full Scale Maximum Settling Time Voltage Output	Output Ranges	Size
MP8116	State-of-the-Art accuracy, stability, linearity	16	± 0.00023% typ. ± 0.00037% max. (3 σ)	25 μs to ½ LSB	± 10V, + 10V ± 5V, ± 1mA	3.9" X 7.1" X 0.5" (99 X 180 X 13 mm)
MP1916TC	Ultra-high stability, accuracy, and speed. Temperature-controlled.	16	± 0.001%	20 μs to 1 LSB	± 10V, ± 5V + 5V, + 10V ± 2mA – 4mA	2" X 4" X 0.44" (51 X 102 X 11 mm)
MP1915TC		15	± 0.0015%	17 μs to 1 LSB		
MP1914TC		14	± 0.003%	15 μs to 1 LSB		
MP1926A	Sign/magnitude internal architecture; excellent linearity and stability near zero.	16	± 0.0015% max below ± ⅛ FSR ± 0.004% max above ± ⅛ FSR	3 μs to 0.01% for a 5V step	± 5V, ± 10V – 5V magnitude output	2" X 4" X 0.44" (51 X 102 X 11 mm)
MP1926S	Ultra-stable	16	± 0.0015% max below ± ⅛ FSR ± 0.004% max above ± ⅛ FSR	40 μs to 0.01% for a 5V step	± 5V, ± 10V – 5V magnitude output	2" X 4" X 0.44" (51 X 102 X 11 mm)

Video Digital-to-Analog Converters (8-bit resolution)

Product	Notes, Features, Characteristics	Relative Accuracy of FSR	Major Carry Glitch Area	Update Rate	Input Logic Rate	Size
AH8308E	Fastest available, lowest power (1.0 watt max.)	± 0.02%	35 pV-S	150MHz	ECL	0.79" X 1.305" X 0.3" (33.14 x 20.06 X 7.62 mm)
AH8308T	Lowest power available (1.1 watt max.)	± 0.02%	35 pV sec	65MHz	TTL	0.79" X 1.305" X 0.3" (33.14 x 20.06 X 7.62 mm)
NEW AH8308TC	Triple 8-bit, low power (3.3 W max.)	± 0.02% each ch.	35 pV-S	65MHz	TTL	1.00" x 2.4" x 0.3" (25.4 x 60.8 x 7.6 mm)
MP8308	Very fast, glitchless, low, cost design generates full composite video signal.	± 0.2%	50mV-ns	40MHz	TTL	2" X 3" X 0.35" (51 X 76 X 9 mm)
MP8308ECL	Ultra-fast, glitchless, low-cost design generates full composite video signal.	± 0.2%	50mV-ns	100MHz	ECL	2" X 3" X 0.35" (51 X 76 X 9 mm)
MP8318	Very fast, glitchless, low-cost video DAC; 40MHz update	± 0.2%	75mV-ns	40MHz	TTL	2" X 3" X 0.35" (51 X 76 X 9 mm)
MP8318ECL	Ultra-fast, glitchless, low-cost video DAC; 100MHz update	± 0.2%	75mV-ns	100MHz	ECL	2" X 3" X 0.35" (51 X 76 X 9 mm)

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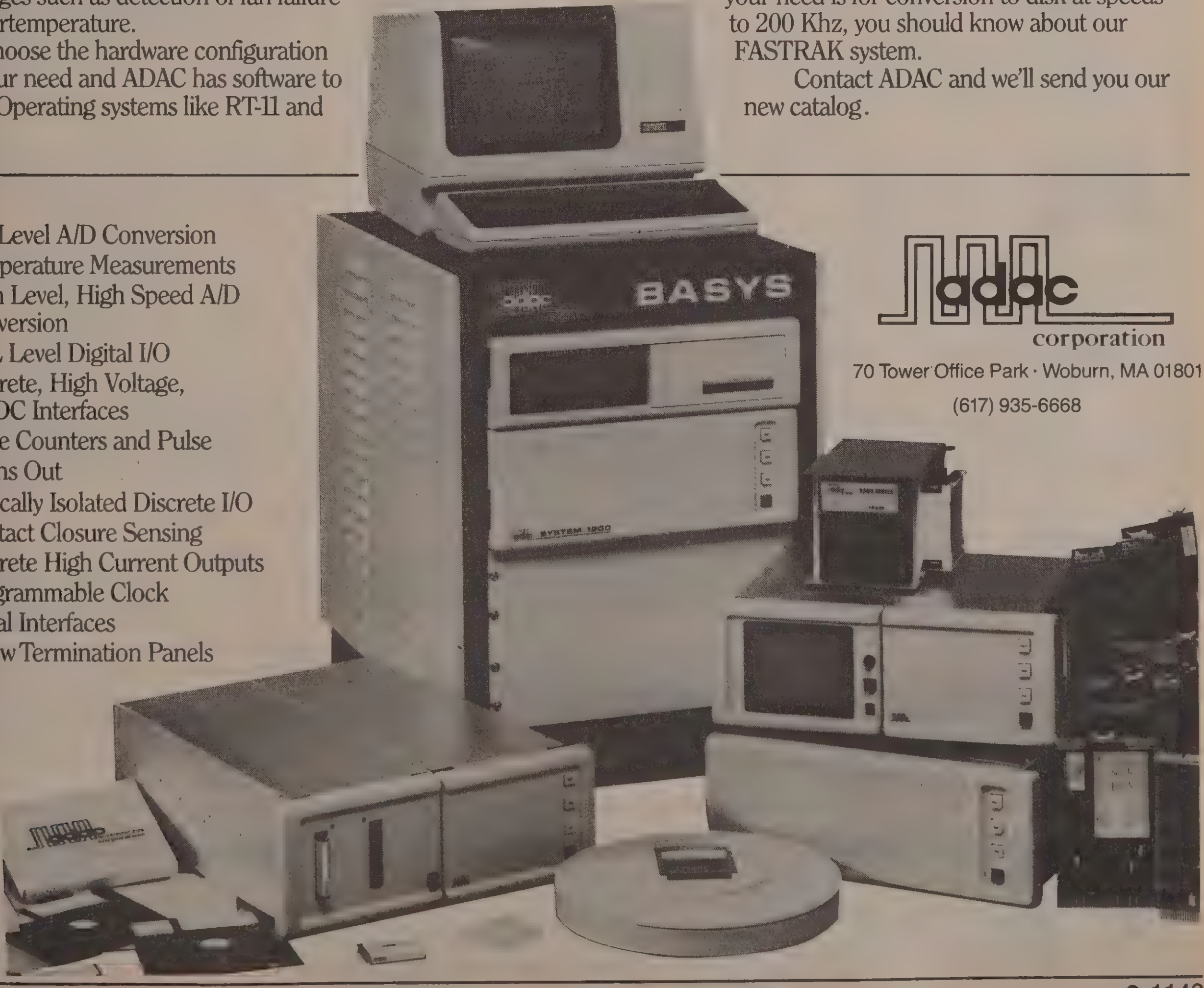

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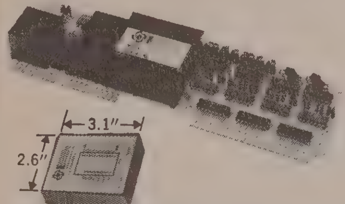
SYNCHRO CONVERTERS/DISPLAYS/ENCODERS

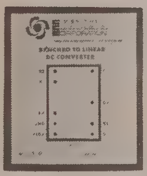
STANDARD LOW COST UNITS TO SATISFY ALMOST ANY SYNCHRO/RESOLVER OR SHAFT INTERFACING REQUIREMENT

SYNCHRO/RESOLVER TO DIGITAL Series SDC40/60



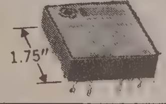
INPUT: 11.8/90 vrms L-L, 60 or 400 Hz. Ref: 26/115 vrms. **OUTPUT:** 16, 14, 12, or 10 Bits parallel binary or BCD. **ACCURACY:** ±1, ±4, ±6 or ±30 minutes of arc. **PACKAGE:** (A) 2.6" x 3.1" x .42"h Module (B) 2.6" x 3.1" x .82"h or (C) 4.5" x 6.5" x .75"h repairable PC card.

SYNCHRO/RESOLVER TO LINEAR DC Series SLD200



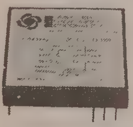
INPUT: 11.8/90vrms L-L, 60 or 400 Hz., Ref: 26/115vrms. **OUTPUT:** (A) −10 to +10 vdc linear with angles from −180° to +180° (standard) (B) 0 to +10V DC linear with angle from 0° to 360° (special) (C) −10 to +10 vdc linear with angles from −90° to +90°. **ACCURACY:** ±6 minutes of arc at input speeds up to 1440°/sec, or ±15, ±30, ±60 minutes of arc. **PACKAGE:** (A) 2.6" x 3.1" x .82" Module; (B) 3.06" x 2.6" x 3.18"H Can; (C) 4.5" x 6.5" x .75"H repairable PC card.

SYNCHRO/RESOLVER TO SINE-COSINE DC Series SD100



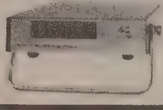
INPUT: 11.8/90 vrms L-L, 60 or 400 Hz. Ref: 26/115 vrms. **OUTPUT:** ±10 sin θ vdc; ±10 cos θ vdc. **ACCURACY:** ±2 or ±4 minutes of arc. **PACKAGE:** 1.75" x 1.75" x .6"h or 3" x 3" x .625"h Module.

INVARIANT SYNCHRO/RESOLVER TO SINE-COSINE Series SD100 I



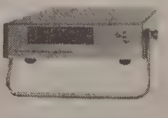
INPUT: 11.8/90 vrms L-L, 60 or 400 Hz. Ref: 26/115 vrms. **OUTPUT:** ±10 sin θ vdc, ±10 cos θ vdc. **ACCURACY:** ±4 minutes of arc. **INVARIANCY:** A ±10% change in the input or reference voltage results in a ±.5% change in the individual DC outputs. **PACKAGE:** 3" x 3" x .625"h Module.

SYNCHRO ANGLE INDICATOR Series AI400



INPUT: 11.8V/90 vrms L-L, 60 or 400 Hz, Ref: 26/115 vrms. Single speed or multispeed (1x36) (2x36). **OUTPUT:** 5 or 6 Digit Display + BCD data. **ACCURACY:** ±.01°, ±.03°, ±.05° or ±.1°. **PACKAGE:** 9.5"w x 1.75"h x 12" deep-Bench or Rack Mounting.

BINARY ANGLE INDICATOR (BINARY TO BCD) Series BAC100



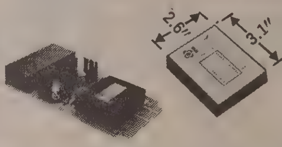
INPUT: Up to 16 bits of parallel binary data, TTL compatable. **OUTPUT:** 5 digit display of angle (0° to 359.99°) OR ANY OTHER SCALE FACTOR DESIRED FROM 0 TO 99999 REPRESENTING ENCODER POSITION, RANGE, PRESSURE, WEIGHT, ETC. **ACCURACY:** ±.01° (±1 lsb). **PACKAGE:** A) 7.0"w x 1.75"h x 8.25" deep — Bench or Rack Mounting B) 4.5" x 6.5" x 1.8"h PC Board requiring +5 vdc at 1 amp C) 2.6" x 3.1" x .82h Module.

PROGRAMMABLE LIMIT SWITCHES Series DLS

359
DIGI SHAFT

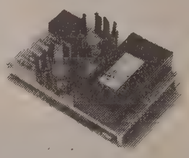
INPUT: Shaft angle position.
LIMITS: (A) Dwell (From-to): 8 per unit
(B) Set Point — 16 per unit
(C) Closure — 16 per unit
OUTPUTS: (A) Logic Levels
(B) Power Transistor
(C) Relay
(D) Display (LED)
ACCURACY: Up to ±.1°
PICKOFF: Resolver (size 15 or 11)
PACKAGE: (A) 19" x 12" x 8.75"h
(B) NEMA 12 — 16" x 12" x 8"

DIGITAL TO SYNCHRO/RESOLVER Series DSC40/60



INPUT: 14, 12 or 10 bits parallel binary and 26/115 vrms reference. **OUTPUT:** 11.8/90 vrms L-L, 60 or 400 Hz capable of driving 1VA, 2VA, 5VA (up to 3 TRS) or 25VA loads. **ACCURACY:** ±4, ±15 or ±30 minutes. **PACKAGE:** A) 2.6" x 3.1" x .6"h. B) 2.6" x 3.1" x .82"h module. C) PC card with edge connector (5VA and 25VA units).

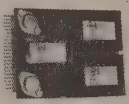
DC ANGLE TO SYNCHRO/RESOLVER Series LDS500



INPUT: ±10 vdc or ±100 vdc representing ±180° of angle. **OUTPUT:** 11.8/90 vrms L-L, 60 or 400 Hz capable of driving up to three size 11 T.R.'s (75 ohms L-L). **ACCURACY:** ±15 or ±30 minutes of arc.

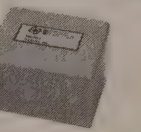
PACKAGE: (2) 4.5" x 9.25" x 2.0"h repairable PC Board with 22 pin edge connector.

DC SIN COS TO SYNCHRO DRIVERS Series DCS400



INPUT: ±10 vdc representing sin θ and cos θ. **OUTPUT:** 11.8/90 vrms L-L, 60 or 400 Hz capable of driving up to three size 11 T.R.'s (75 ohms L-L). **ACCURACY:** ±6, ±15, ±30 minutes of arc. **PACKAGE:** A) 4.5" x 6.5" x .8"h repairable PC Card. B) 4.5" x 9.25" x 1"h PC Card.

RECTANGULAR TO POLAR Series RP600



INPUT: R sin θ and R cos θ from 50 mv to 10 vdc. **OUTPUT:** R and θ. **ACCURACY:** θ: ±15 minutes at R = 10, R: ±.1% F.S. **PACKAGE:** 3.2" x 3.4" x 1.8"h Module.

ADDITIONAL PRODUCTS

- Hi Speed Multiplexed Synchro to Digital
- Multiplexed Encoders
- Multiplexed Synchro to Linear DC
- Digital Sine/Cosine to Synchro
- Modular Encoders
- Two Speed Digital to Synchro
- Synchro Reference Supply
- Selsyn to Digital/DC
- Azimuth Change Pulse Conv.
- BCD to Binary Converters

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SYNCHRO CONVERTERS/DISPLAYS/ENCODERS

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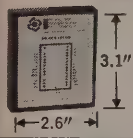
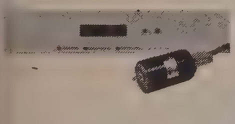
SYNCHRO/RESOLVER TO BCD Series SBC



INPUT: 11.8/90vrms L-L, 60 or 400 Hz. Ref. 26/115vrms **OUTPUT:** 3 or 4 decade BCD — scaleable unipolar or bipolar. **ACCURACY:** ±30 or ±6 minutes of arc ±1 LSB. **PACKAGE:** 2.6″ x 3.1″ x .82″ H Module. **OPTIONS:** Choice of Scale factors, Zero offset adjustments (±5%).

MULTITURN ABSOLUTE ENCODERS Series MDS90



INPUT: MULTI-TURN Shaft angle position. **OUTPUT:** 4, 5, or 6 Digit LED Display + BCD or Binary Data. **ACCURACY:** Up to ±1 pt. in 100,000. **PACKAGE:** Size 23 Pickoff with full or half rack electronics. **OPTIONS:** Zero Offset, NEMA 12 Housings, Presets, power supplies.

TYPICAL UNITS

Multiturn Encoders	Output Code	Resolution Counts/360°	Revolution for Full Count	Data Range
MDS90-DBC-16	Binary	2^{10}	64	2^{16}
MDS90-DBC-10	BCD	1000	10	10,000
MDS90-DBC-100	BCD	1000	100	100,000

LOW COST ANGLE INDICATOR Series AI540

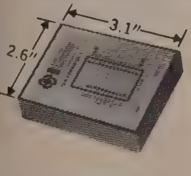
COMPUTER CONVERSIONS CORPORATION

INPUT: 11.8/90vrms L-L, 60 or 400 Hz, Ref: 26/115vrms +115V 60 Hz power: **OUTPUT:** 4 digit or 3 digit, .5″H LED DISPLAY (unipolar or bipolar). **ACCURACY:** ±6 or ±30 minutes of arc ±1 LSB: **PACKAGE:** (A) 5.5″W x 7.5″L x 2.0″H PANEL MOUNT (DC supplies included): (B) 9½″W x 1¾″H, half rack mounting (DC supplies included. **OPTIONS:** Choice of scale factors, Zero offset adjustment (±5°).

MULTIPLEXED SYNCHRO TO DIGITAL Series MSH

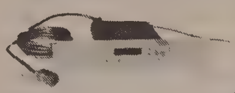
INPUT: 11.8/90vrms L-L, 60 or 400 Hz., Ref: 26/115v rms, up to 128 channels; **OUTPUT:** 12 bit parallel binary or 4 decade BCD (unipolar or bipolar: **ACCURACY:** ±6 minutes of arc ±1 LSB: **PACKAGE:** (A) Central converter — 2.6″ x 3.1″ x .82″H module, (B) Input Module — 1.5″ x 2.0″ x .6″H, (C) Transformer Module — 1.5″ x $\frac{13}{16}$″ x .6″H (Scott "T" — 400 Hz) +1″ x 1″ x .8″H (Ref.). **OPTIONS:** (A) choice of scale factor on BCD output, (B) Linear DC output, (C) Systems mounted on PC boards and/or racks.

MULTISPEED SYNCHRO TO DIGITAL Series TSD



INPUT: 11.8/90 vrms L-L, 60 or 400 Hz., Ref: 26/115 vrms: **SPEEDS:** 8, 16, 32, 9, 18, and 36: **OUTPUTS:** 16 to 19 bits parallel binary: **ACCURACY:** ±.02, ±.01 or ±.005 degrees: **PACKAGE:** One, Two or Three 2.6 x 3.1 x .82″H or .42″H modules. **OPTIONS:** (A) Systems packaged on PC Cards or in racks; (B) 5 digit display.

ABSOLUTE ENCODERS Series DS90



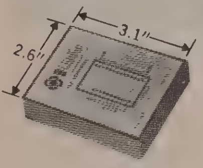
INPUT: Shaft angle position coupled to "DIGI-SHAFT" system: **OUTPUT:** four digit (.5″H) LED display (0 to 9999) +BCD or Parallel binary data (ANY SCALE FACTOR DESIRED): **ACCURACY:** ±1 part in 3600 (single turn) From shaft input to digital output: **PICKOFF:** Resolver (Size 8, 11, or 15): **PACKAGE:** (A) 5.44″W x 7.00″ x 1.75″H: (B) Full or half rack: **OPTIONS:** Multichannels, Zero offset, Presets, DC output, Multiturn units with 5 digit (99999) output, NEMA 12 Housings.

TYPICAL UNITS (single Turn)

Pt. No.	Output	Counts/360°
DS90-DB-12	Binary Data	2^{12}
DSR90-36-BC	0-3599 display +BCD data	3600
DSR90-10	0-999 display	1000
DSR90L-25-BC	0 to ±2500 display +BCD data	±2500

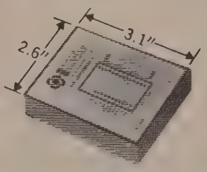
FULL SCALE OUTPUTS OF UP TO 9999 AVAILABLE
MULTITURN UNITS WITH UP TO 999999 FULL SCALE OUPUTS AVAILABLE

SOLID STATE CONTROL TRANSFORMER Series SCT



DIGITAL INPUT ANGLE (ϕ): 14, 12, or 10 bits parallel binary. **SYNCHRO/RESOLVER INPUT ANGLE** (θ): 11.8/90vrms L-L, 60 or 400 Hz. **OUTPUT:** E out=(V ref ±7%) sin $(\theta-\phi)$ Sin wt: **GRADIENT:** .4 or 1vrms/degree. **RANGE:** ±7 or ±12.5 degrees: **ACCURACY:** ±4, ±15, or ±30 minutes of arc. **PACKAGE:** 2.6″ x 3.1″ x .82″H Module.

SOLID STATE CONTROL DIFFERENTIAL TRANSFORMER Series SCDX



DIGITAL INPUT ANGLE (ϕ): 14, 12, or 10 bits parallel binary. **SYNCHRO/RESOLVER INPUT ANGLE** (θ): 11.8/90vrms L-L, 60 or 400 Hz. **OUTPUT:** (1) 9.2K (ϕ) Sin $(\theta-\phi)$ Sin wt. [7vrms.] (2) 9.2K (ϕ) Cos $(\theta-\phi)$ Sin wt. [7vrms.] **ACCURACY:** ±4, ±15 or ±30 minutes of arc. **PACKAGE:** 2.6″ x 3.1″ x .82″H.

MODULATORS Series MOD500

INPUT: 0 to ±10 or ±100 VDC and 26V/115Vrms reference: **OUTPUT:** 0 to 7vrms (other voltages available. **ACCURACY:** ±.2% F.S.: **NULL:** ±.1% F.S. **PACKAGE:** 2.6″ x 3.1″ x .625″ Module. **OPTIONS:** Gain+Zero Adjust, external output transformers.

DEMODULATORS Series D400

INPUT: 0 to 5, 10, 25 or 100vrms, 400 to 5000 Hz, 5/26vrms reference. **OUTPUT:** 0 to ±5 or ±10VDC. **ACCURACY:** ±.2, .3 or .5% F.S. **NULL:** ±.1% F.S. **PACKAGE:** (A) 1.75″ x 1.75″ x .6″H Module. (B) 2.75″ x 1.4″ x .75″H Module.

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GENERAL DATA

The series 168 is a family of "type II" tracking converters which feature no velocity error and only minor acceleration errors. Their high input impedance and inherent noise immunity insure trouble-free system integration. Converters will operate with sine or square wave inputs with no degradation in performance.

No cost options include user selectable input voltages from 3 to 130 volts rms, a variety of logic types, dc output proportional to velocity and nonstandard tracking rates. Most 12 and 16-bit models may also be ordered with carry/borrow and/or up/down outputs for multiturn operation.

SINGLE SPEED TRACKING

series 168F100/200/300 industry standard 10, 12, 14 bit s/d(r/d)

- Accuracies to ±4 minutes
- 1000% overvoltage protection
- 47 to 1200 Hz operation
- Tracking to 70 revs/sec

series 168L100/200/300 ultra high speed 10, 12, 14 bit s/d(r/d)

- Ultra high acceleration constants
- 1000% overvoltage protection
- 2600 Hz operation
- Tracking to 360 revs/sec

series 168L400 serial output 4000 count r/d(i/d)

- Inductosyn™ or resolver inputs
- Resistive input scaling
- 5000 Hz operation
- Tracking to 100 revs/sec
- Direction/zero crossing outputs

series 168L500 parallel output 12 bit r/d(i/d)

- Inductosyn™ or resolver inputs
- Resistive input scaling
- 360 Hz to 10 kHz operation
- Direction/ripple carry outputs
- Tracking to 170 revs/sec
- Integral active filter (velocity)

series 168H100 high accuracy 16 bit s/d(r/d)

- Tracking to 3 revs/sec
- 1000% overvoltage protection
- 47 to 440 Hz operation
- Synthesized reference
- ±1.3 minute accuracy

series 168H200 low cost-high repeatability 16 bit s/d(r/d)

- Tracking to 5 revs/sec
- 1000% overvoltage protection
- 360 to 2600 Hz operation
- ±1.8 minute repeatability (0 to 50°C)
- $195 (100 quantity)

series 168T300 three-state output 12 bit s/d(r/d)

- Tracking to 50 revs/sec
- 1000% overvoltage protection
- 47 to 2600 Hz operation
- 8 bit byte/12 bit parallel outputs

series 168T400 high accuracy velocity 12 bit s/d(r/d)

- Tracking to 87 revs/sec
- 1000% overvoltage protection
- 47 to 2600 Hz operation
- Three-state ouputs
- 1% linearity, 1% accuracy (velocity)

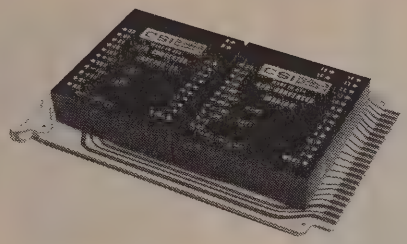
series 168C650/750 bcd output 3 or 4 decade s/d(r/d)

- Tracking to 15 revs/sec
- 1000% overvoltage protection
- 3 or 4 decade BCD output
- Unipolar (0-360°) or bipolar (±180°) output
- 47 to 2600 Hz operation

TM Farrand Controls - Valhalla, New York

CONTROL SCIENCES INCORPORATED
9509 VASSAR AVENUE • CHATSWORTH, CA 91311-4199 • (818) 709-5510

synchro/resolver/inductosyn™ to digital converters CSI



192.38
032.39
088.60

TWO SPEED TRACKING

series 168F500 **low profile set**
16 bit s/d(r/d)

- Tracking to 2 revs/sec
- 1000% overvoltage protection
- 47 to 1200 Hz operation
- 1:36, 2:36 or binary speed ratios
- ±0.41 minute accuracy

series 168H500 **single module**
16 bit s/d(r/d)

- Tracking to 2.75 revs/sec
- 1000% overvoltage protection
- 47 to 3000 Hz operation
- 1:36 or binary speed ratios
- ±0.41 minute accuracy

series 167B100 **combiner module**
19 bit s/d(r/d)

- Combines output to two S/D (R/D)
- 1:36, 1:18 or 1:9 speed ratios
- 19 bits resolution

series 168C300 **converter combiner**
10 bit coarse s/d(r/d)

- Coarse synchro or resolver input
- Functions with standard 10 to 16 bit S/D (R/D)
- 1:8, 1:16, 1:32 or 1:64 speed ratios
- Up to 22 bits resolution
- Up to ±3.3 seconds accuracy

MULTIPLEXED

series 160B100 **low cost multiplexed**
12 bit s/d,r/d,i/d

- Four synchro, resolver, inductosyn™ inputs
- 1000% overvoltage protection
- 100 microsecond conversion time
- 47 to 5000 Hz operation
- Expandable to 40 channels
- $50/axis for 12 channel system (100 qty)

series 160B400 **four-channel expander**
s/d,r/d,i/d

- Four synchro, resolver, inductosyn™ inputs
- Sample and hold - all inputs
- 3 arc-minute accuracy

synchro/resolver systems

The SCB series is a family of 4¼" x 6¼" system converter boards. In addition to the units listed below, CSI manufactures a variety of compatible boards to meet most customer needs.

series SCB-15 **two-speed converter**
16 to 22 bit s/d(r/d)

- 1000% overvoltage protection
- 47 to 2600 Hz operation
- 1:36, 1:8, 1:16, 1:32 or 1:64 speed ratios
- Accuracy to ±3.3 seconds
- Automatic phase correction optional

series SCB-24 **single-speed converter**
12 to 16 bit s/d(r/d)

- 1000% overvoltage protection
- 360 to 5000 Hz operation
- Integral reference oscillator
- Accuracy to ±1.3 minutes

series SCB-25 **encoder output**
8 to 16 bit s/d,r/d,i/d

- 1000% overvoltage protection
- 360 to 5000 Hz operation
- Integral reference oscillator
- Quadrature (A Quad B) outputs

series 800B200 **angle position indicator**
5 decade display

- Synchro, resolver or encoder inputs
- Single, dual or three-channel models
- Single or two-speed synchro or resolver inputs
- User selectable binary or BCD outputs
- Full 360° thumbwheel offset controls
- 2.5 microsecond display update time
- Real time conversion

™ Farrand Controls - Valhalla, New York

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CSI digital to synchro/resolver converters

192 SERIES

The Series 192 is a family of TTL/LSTTL/CMOS compatible digital to synchro/resolver converters with 1.5 VA to 125 VA output power ratings. Natural parallel binary angle data is continuously converted to analog AC form. . . either as 3-wire synchro or 4-wire resolver signals capable of driving most control transformers or torque receivers. All models are short circuit and overload protected.

series 192B500 **1 to 2 va**
14 bit

- ±4 minute accuracy
- Industry standard pinouts
- Single module for 400 Hz: 3.12" x 2.62" x 0.8"
- External transformer module for 60 Hz

series 192E500 **5 va**
12 bit

- ±6 minute accuracy with control transformer loads
- ±12 minute accuracy with torque receiver loads
- Overtemperature cutoff
- "Locked rotor" prevention circuitry
- Industry standard pinouts
- 400 Hz: 3.12" x 2.62" x 0.8"
- External transformers for 60 Hz

series 192E600 **5 va**
14 bit

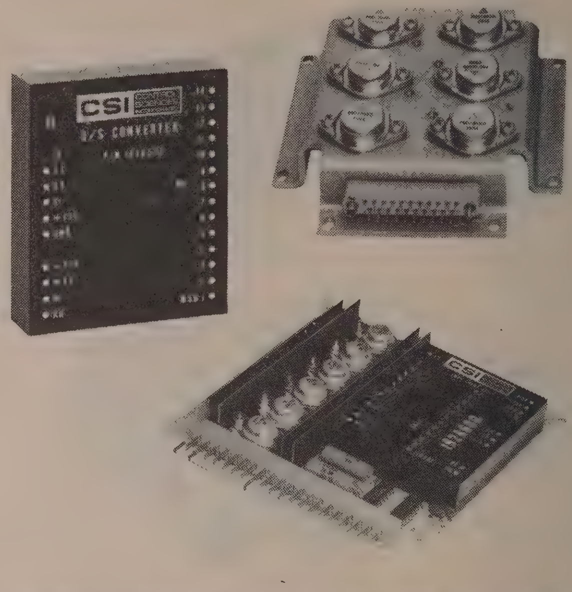
- 14 bit resolution version of the 192E500
- Specifications identical except ±4 minutes when driving control transformers

series 192A600 **25 va**
12 bit

- Input TTL data latches
- ±10 minute accuracy with control transformer loads
- ±21 minute accuracy with torque receiver loads
- Overtemperature cutoff
- Card mounted module and power stage
- External tranformer isolation is optional

series 192A650 **125 va**
12 bit

- Input TTL data latches
- ±10 minute accuracy with control transformer loads
- ±21 minute accuracy with torque receiver loads
- Overload sensing
- Automatic overload cutoff and reset
- "Locked rotor" prevention circuitry
- Thermal cutoff
- External amplifier included
- External transformer isolation is optional



related synchro/resolver products

series 180A100/200/300 **solid-state CT**
10, 12, 14 bit

- Analog input angle Φ (synchro or resolver)
- Digital input angle Θ (binary)
- Output AC voltage = sin (Φ - Θ)
- ±4 to ±15 minutes of arc
- 0.4 or 1.0 volts rms per degree

series 169 **binary angle/BCD converters**
3 to 6 decade

- Five models
- 9 to 19 bits of natural binary angle inputs

series 196 **BCD/binary angle converters**
16 and 19 bits

- Five or six decade BCD inputs
- CMOS or LSTTL logic models

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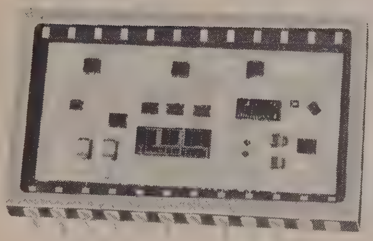
MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

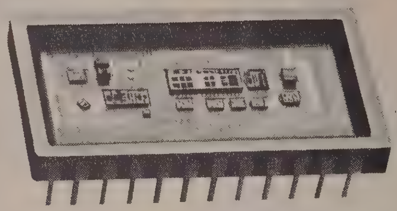
WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms	**1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code	**3**•1103
Batteries, Product Selection Guide	**3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide	**2**•1003
Capacitors, Basic Formulas	**1A**•1093
Capacitors, Miniglossary	**1A**•1069
Capacitors, Product Selection Guide	**1A**•1003
Circuit Boards (Printed), Product Selection Guide	**2**•1089
Coils, Chokes, & Inductors, Product Selection Guide	**1A**•1219
Connectors, Miniglossary	**2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide	**2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide	**1A**•1309
Delay Lines, Product Selection Guide	**1A**•1445
Discrete Semiconductors, Product Selection Guide	**1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide	**1B**•1021
EBCDIC Code	**3**•1153
Encapsulation, Miniglossary	**2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide	**2**•1801
Filters, Product Selection Guide	**1A**•1577
Instruments, Graphic Recording, Product Selection Guide	**3**•1381
Instruments, Panel Meters, Product Selection Guide	**3**•1321
Instruments, Test & Measuring, Product Selection Guide	**3**•1182
Interconnection Systems, Product Selection Guide	**2**•1873
Keyboards & Keypads, Product Selection Guide	**1B**•1759
Microwave Components, Product Selection Guide	**1A**•1685
Military Qualified Products Lists	**1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide	**1B**•1121
Opto Semiconductors, Miniglossary	**1B**•1218
Oscilloscopes, Product Selection Guide	**3**•1361
Panel Hardware, Product Selection Guide	**2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide	**1A**•2017
Power Supplies, Miniglossary	**3**•1455
Power Supplies, AC, Product Selection Guide	**3**•1815
Power Supplies, DC, Product Selection Guide	**3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide	**1B**•1255
Relay Contact Forms	**1B**•1317
Relays, Electromechanical, Miniglossary	**1•B**1292
Relays, Product Selection Guide	**1B**•1289
Resistor Color Codes	**1A**•1791
Resistors, Product Selection Guide	**1A**•1789
Servo Components, Miniglossary	**3**•1935
Solenoids, Product Selection Guide	**1B**•1481
Switches, Product Selection Guide	**1B**•1499
Thyristors/High Power Diodes, Miniglossary	**1A**•1652
Transducers & Encoders, Product Selection Guide	**1B**•1827
Transformers, Product Selection Guide	**1A**•2115
Wire & Cable, Product Selection Guide	**2**•1935

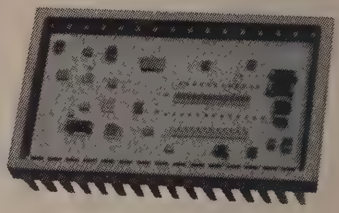
DATA ACQUISITION



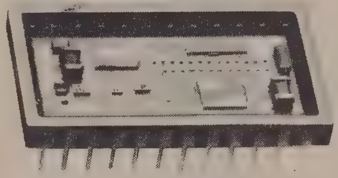
12 BIT D/A WITH INPUT REGISTER
5 Output Voltage Ranges
Binary, BCD, or
Two's Complement
Voltage Output
20 ppm/°C Gain Tempco
DAC-HK12BGC



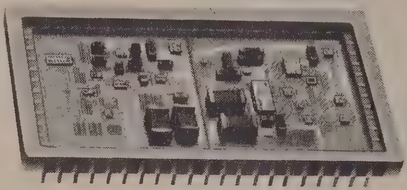
16 BIT D/A WITH 0.003% LINEARITY
15 μsec max. Output Voltage
Settling
15 ppm/°C Max. Gain Tempco
Internal Output Amplifier
Binary or BCD Models
DAC-HP16BGC



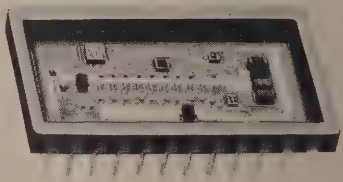
HIGH SPEED 12-BIT A/D CONVERTER
2 μS Conversion Time
Internal Input Buffer
Industry Standard Pin-Out
ADC-810MC



ULTRA-FAST D/A CONVERTERS
8, 10 and 12 Bit Resolution
25, 25 and 50 nsec max.
Settling Time
5 mA Current Output
DAC-HF SERIES



12 BIT DATA ACQUISITION SYSTEM
16 Single Ended or
8 Differential Channels
50 kHz Throughput Rate
3-State Byte-Organized
Outputs
HDAS-16MC



ULTRA-FAST 8 BIT A/D
700 nsec Maximum
Conversion Time
6 Input Voltage Ranges
No Calibration Required
ADC-815MC

DATEL
11 CABOT BOULEVARD, MANSFIELD, MA 02048/TEL. (617)339-9341/TWX 710-346-1953/TLX 951340
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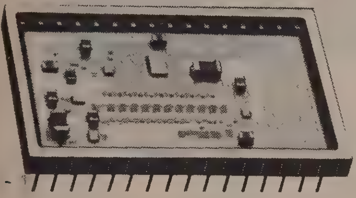
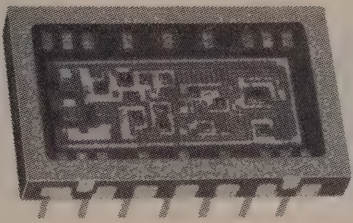
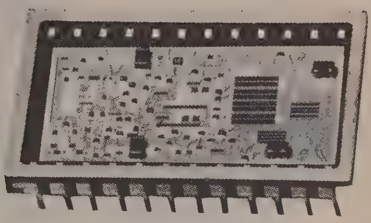
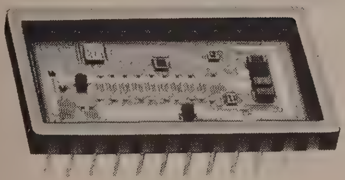
• OVERSEAS: DATEL (UNITED KINGDOM) TEL. BASINGSTOKE (256)69085 • DATEL (FRANCE) TEL. 602 57 11
• DATEL (GERMANY) TEL. (89) 530741 • DATEL (JAPAN) TOKYO TEL. 793-1031 • DATEL (JAPAN) OSAKA TEL. 06-3542025

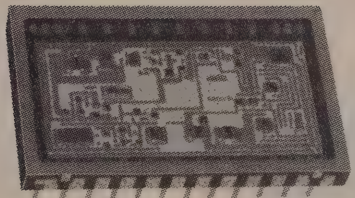
HYBRID COMPONENTS











DATEL
SHM-9MC
MADE IN USA

DATEL

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DATA ACQUISITION MODULES

DATEL
ADC-874

ULTRA FAST 16-BIT A/D CONVERTER
- 2.5 μSec Conversion Time
- 14-Bit Resolution
- 3-State Output

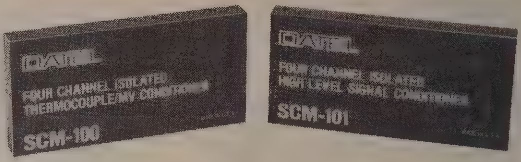
ADC-874

DATEL
ULTRA-HIGH SPEED
12 BIT A/D CONVERTER
ADC-868

ULTRA HIGH SPEED 12-BIT A/D CONVERTER
- 500 nSEC Conversion Time
- 3-State Output
- No Missing Codes Over Full Operating Temp. Range

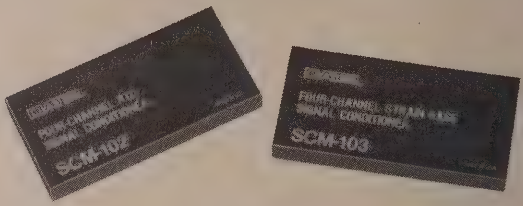
ADC-868

SIGNAL CONDITIONING MODULES


DATEL
FOUR CHANNEL ISOLATED
THERMOCOUPLE/MV CONDITIONER
SCM-100
DATEL
FOUR CHANNEL ISOLATED
HIGH LEVEL SIGNAL CONDITIONER
SCM-101

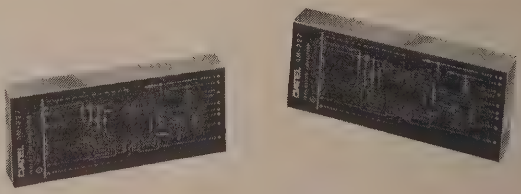
ISOLATED SIGNAL CONDITIONING MODULES
- Wide Input Span Range
- 1000V pk Isolation Voltage
- 4 Channel Operation
- 156 dB CMRR

SCM-100, SCM-101


DATEL
FOUR CHANNEL RTD
SIGNAL CONDITIONER
SCM-102
DATEL
FOUR CHANNEL STRAIN GAGE
SIGNAL CONDITIONER
SCM-103

RTD, STRAIN GAGE SIGNAL CONDITIONING MODULES
- 4 Channel Operation
- 3000 Chan/Sec Scanning Speed
- ±0.01% Maximum Nonlinearity
- Low Cost

SCM-102, SCM-103


DATEL
AM-227

ULTRA-STABLE ISOLATION AMPLIFIER
- 0.005% Gain Nonlinearity
- Long Term Stability of 2 μV/Year
- Gain Range of 10 to 1000
- 1000VDC Common Mode Isolation Voltage

AM-227

DATEL

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• DATEL (GERMANY) TEL. (89) 530741 • DATEL (JAPAN) TOKYO TEL. 793-1031 • DATEL (JAPAN) OSAKA TEL. 06-3542025

MINIGLOSSARY
BASIC EBCDIC CODE

Bit Positions 4, 5, 6, 7	Second Hexadecimal Digit	Digit Punches	00				01				10				11				Bit Positions 0, 1
			00	01	10	11	00	01	10	11	00	01	10	11	00	01	10	11	Bit Positions 2, 3
			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	First Hexadecimal Digit
			12				12	12		12	12	12		12	12				Zone Punches
				11				11	11	11		11	11	11		11			
					0		0		0	0	0		0	0			0		
			9	9	9	9	9	9	9	9									Digit Punches
0000	0	8-1	① NUL	② DLE	③ DS	④	⑤ SP	⑥ &	⑦ -	⑧					⑨	⑩	⑪	⑫ 0	8-1
0001	1	1	SOH	DC1	SOS				⑬		a	j			A	J	⑭	1	1
0010	2	2	STX	DC2	FS	SYN					b	k	s		B	K	S	2	2
0011	3	3	ETX	TM							c	l	t		C	L	T	3	3
0100	4	4	PF	RES	BYP	PN					d	m	u		D	M	U	4	4
0101	5	5	HT	NL	LF	RS					e	n	v		E	N	V	5	5
0110	6	6	LC	BS	ETB	UC					f	o	w		F	O	W	6	6
0111	7	7	DEL	IL	ESC	EOT					g	p	x		G	P	X	7	7
1000	8	8		CAN							h	q	y		H	Q	Y	8	8
1001	9	8-1		EM							;	r	z		I	R	Z	9	9
1010	A	8-2	SMM	CC	SM		¢	!	⑮	:									8-2
1011	B	8-3	VT	CU1	CU2	CU3	.	$	,	#									8-3
1100	C	8-4	FF	IFS		DC4	<	*	%	@									8-4
1101	D	8-5	CR	IGS	ENQ	NAK	(	)	_	'									8-5
1110	E	8-6	SO	IRS	ACK		+	;	>	=									8-6
1111	F	8-7	SI	IUS	BEL	SUB	|	¬	?	"									8-7
			12				12				12	12		12	12	12		12	Zone Punches
				11				11				11	11	11		11	11	11	
					0				0		0		0	0	0		0	0	
			9	9	9	9									9	9	9	9	

Card Hole Patterns

①	12-0-9-8-1
②	12-11-9-8-1
③	11-0-9-8-1
④	12-11-0-9-8-1
⑤	No-Punches
⑥	12
⑦	11
⑧	12-11-0
⑨	12-0
⑩	11-0
⑪	0-8-2
⑫	0
⑬	0-1
⑭	11-0-9-1
⑮	12-11

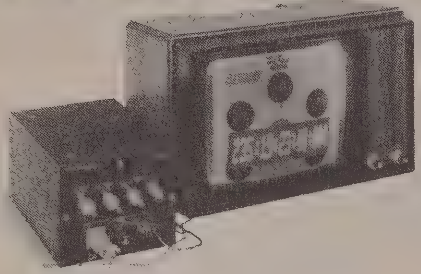
Control Character Representations

ACK	Acknowledge
BEL	Bell
BS	Backspace
BYP	Bypass
CAN	Cancel
CC	Cursar Control
CR	Carriage Return
CU1	Customer Use 1
CU2	Customer Use 2
CU3	Customer Use 3
DC1	Device Control 1
DC2	Device Control 2
DC4	Device Control 4
DEL	Delete
DLE	Data Link Escape
DS	Digit Select
EM	End of Medium
ENQ	Enquiry
EOT	End of Transmission
ESC	Escape
ETB	End of Transmission Block
ETX	End of Text
FF	Form Feed
FS	Field Separator
HT	Horizontal Tab
IFS	Interchange File Separator
IGS	Interchange Group Separator
IL	Idle
IRS	Interchange Record Separator
IUS	Interchange Unit Separator
LC	Lower Case
LF	Line Feed
NAK	Negative Acknowledge
NL	New Line
NUL	Null
PF	Punch Off
PN	Punch On
RES	Restore
RS	Reader Stop
SI	Shift In
SM	Set Mode
SMM	Start of Manual Message
SO	Shift Out
SOH	Start of Heading
SOS	Start of Significance
SP	Space
STX	Start of Text
SUB	Substitute
SYN	Synchronous Idle
TM	Tape Mark
UC	Upper Case
VT	Vertical Tab

Special Graphic Characters

¢	Cent Sign
.	Period, Decimal Point
<	Less-than Sign
(	Left Parenthesis
+	Plus Sign
|	Logical OR
&	Ampersand
!	Exclamation Point
$	Dollar Sign
*	Asterisk
)	Right Parenthesis
;	Semicolon
¬	Logical NOT
-	Minus Sign, Hyphen
/	Slash
,	Comma
%	Percent
_	Underscore
>	Greater-than Sign
?	Question Mark
:	Colon
#	Number Sign
@	At Sign
'	Prime, Apostrophe
=	Equal Sign
"	Quotation Mark

DATUM/FTS ADVANCEMENTS IN PRECISION TIMING, VIDEO AND FREQUENCY PRODUCTS



TIME AND DATA INSERTION IN THE VIDEO RASTER

- Inserts a time word with optional second line alphanumeric message in standard video signals for recording and display.
- Up to 16 characters per row with serial or parallel data input.
- Multiple independent video signal inputs and outputs.

AUTOMATIC MAGNETIC TAPE SEARCH SYSTEMS

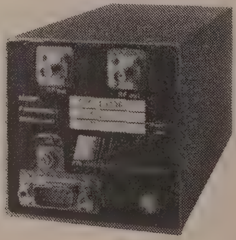
- Connect to and control most instrumentation magnetic tape recorders/reproducers.
- Occupy as little as 3½ inch panel height in a standard 19 inch wide equipment cabinet.
- High speed, automatic searching and playback of pre-recorded magnetic tapes at selected start and stop times.
- Standard computer compatible digital interfaces available for complete remote control of search operations.

OTHER TIMING PRODUCTS

- Airborne/portable time code generator.
- Time code generators and decoders in modules and on PC cards.
- Combination time code generator/translators.
- Central timing system with dual and triple redundancy.
- Distribution amplifiers for time code and DC level shift signals.
- VBI data encoding and decoding instruments.

MODULAR CESIUM BEAM FREQUENCY AND TIME STANDARDS

- Ultra-stable atomic frequency and time standards in modular enclosures.
- Suitable for land-mobile, airborne and marine applications.
- Two independent 5-MHz sinusoidal, and one 1-pps output.
- Accessible control and monitor connections.



QUARTZ CRYSTAL OSCILLATORS

- High stability, low noise.
- Ideal as local oscillators in microwave multiplier chains, phase noise calibration and test equipment, and frequency standards.
- Designed for both laboratory and hostile environments.
- Independently buffered outputs of 5 MHz, 5.115 MHz, 10 MHz and 10.23 MHz.

OTHER FREQUENCY PRODUCTS

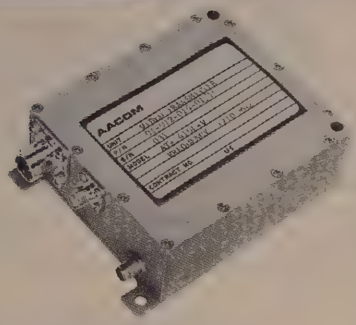
- Quartz frequency standards
- Satellite timing receivers
- Digital Clocks
- Control and Monitor modules
- Battery supplies
- Multi-channel phase comparators

datum inc TIMING DIVISION
2430 STANWELL DRIVE, SUITE 190, CONCORD, CA 94520
(415) 827-4784
TWX 910-592-1289

FTS
FREQUENCY AND TIME SYSTEMS, INC.
34 TOZER ROAD, BEVERLY, MA 01915
617-927-8220/Telex No. 94 0518 FTS BVLY.

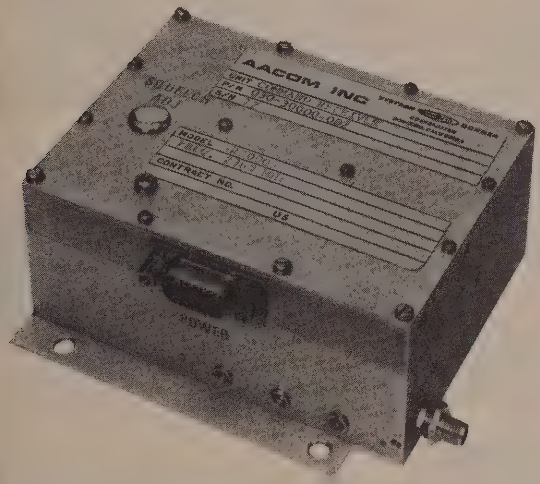
TD 113

DATUM|AACOM ADVANCEMENTS IN TELEMETRY AND VIDEO DATA TRANSMITTERS AND RECEIVERS AND COMMAND CONTROL SYSTEMS


AACOM
UNIT
P/N
S/N
MODEL
CONTRACT NO.
US

MINIATURE RF TRANSMITTERS

- Reliable operation in very severe environmental conditions.
- Transmission frequencies from 135 to 6000 MHz.
- Output power ratings up to 50 watts.
- All solid state electronics with output isolators.
- Up to 10 MHz information bandwidth.

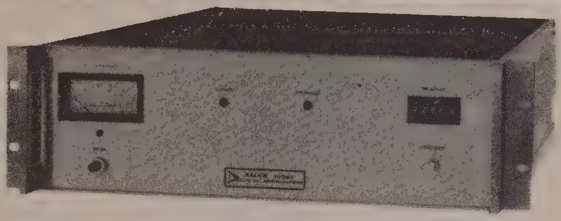

AACOM INC
SQUELCH ADJ
UNIT
P/N 010-30000-002
S/N
MODEL
FREQ.
CONTRACT NO.
US
POWER

PORTABLE COMMAND RECEIVERS

- Minimum size and weight for mobile applications.
- Reliable operation in severe environmental conditions.
- Receiving frequencies up to 6000 MHz.
- Remote frequency selection capability.
- All solid state construction with input polarity reversal protection

OTHER AACOM PRODUCTS

- RF transmitters and receivers specifically designed for distribution of standard IRIG time code signals.
- FM television transmitters and receivers.
- Synthesized RF signal generators with wideband modulation characteristics.



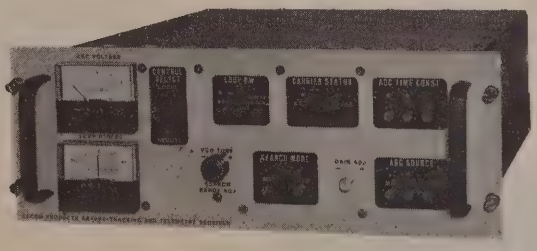
GROUND STATION TELEMETRY RECEIVERS

- State-of-the-art performance.
- Excellent frequency stability.
- User frequency channel selection capability.
- Optional AM demodulator for operation with single channel monopulse autotracker.
- Modular, mechanically rugged, solid state construction.

SYSTEM 81
GROUND DATA PROCESSOR
COMMAND
TELEMETRY

COMMAND CONTROL SYSTEMS

- Uplink and downlink components for complete remote control systems.
- Air-to-air, ground-to-air and ground-to-ground control applications.
- Functional, solid state, modules available.


AGC VOLTAGE
CONTROL SELECT
LOOP BW
CARRIER STATUS
AGC TIME CONST
VCO TUNE
SEARCH MODE
GAIN ADJ
AGC SOURCE
TRACKING AND TELEMETRY RECEIVER

SATELLITE EARTH STATION RECEIVER

- 2 Hz tuning resolution in 2200-2300 MHz band.
- Automatic search-lock functions for carrier acquisition and tracking.
- Simultaneous AM, PM and/or FM demodulation.
- Automatic bandwidth switching for fast signal acquisition.

datum inc AACOM DIVISION

2430 STANWELL DRIVE, SUITE 190, CONCORD, CALIFORNIA 94520
(415) 827-4784 TWX 910-592-1289

AD101

Digitec Data Acquisition & Control

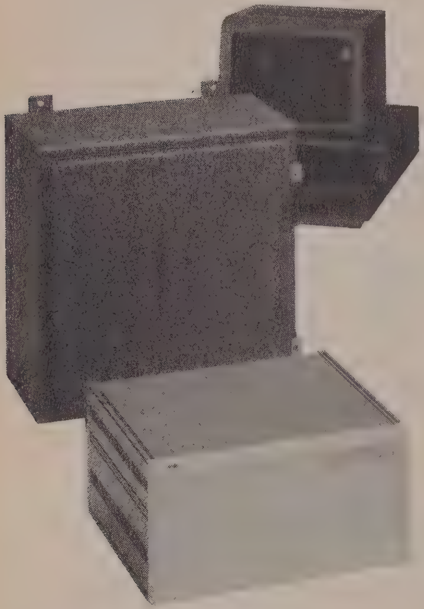
Model 3500 Supervisor

Digitec data acquisition and control systems provide everything needed for monitoring and controlling complex or simple industrial tests, machinery, and processes.

Model 3500 Supervisor – Bulletin 5035

Recording controller provides sophisticated I/O and internal processing, making it superior to many data loggers and programmable controllers for monitoring and control of industrial machinery such as generators, engine test cells, or extruders.

- Simple menu programming.
- Advanced control capabilities.
- High noise rejection: 60dB normal mode.
- Powerful I/O.
- Accurate: ±40,000 counts.
- Full hardware math.
- Analog, temperature, strain gage, and more.
- Historical memory.
- Built-in printer, tape drive, CRT.



Model 7500 MagnumPC™ DAC

Model 7500 MagnumPC System – Bulletin 7500-1

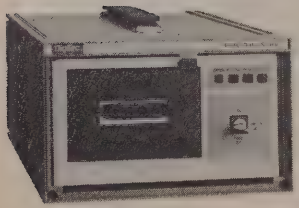
The IBM Personal Computer becomes a powerful data acquisition and control system with Digitec's new MagnumPC system. The MagnumPC's own microprocessor makes it easy to scan, process, and send reduced data up to 1000 feet to memory for further manipulation or storage.

- MagnumPC enhancement board plugs directly into IBM PC mainframe.
- Easy fill-in-the-blanks setup of inputs, control and data outputs.
- 500V isolation between computer and inputs and outputs.
- I/O processing is transparent to user.
- System capability from 10 to 1000 analog and digital I/Os.
- Inputs: TC, RTD, AC/DC volts & current, strain gage, resistance, and more.
- 0-10V and 4-20mA analog outputs.
- Digital outputs: open collectors, relays, zero crossing opto-relays.
- NEMA 12 I/O enclosures for industrial applications.

Model 6010 Data Store – Bulletin 4960

Record and playback data for computer processing. Model 6010 interfaces with all RS-232 computers, data loggers, and peripherals for convenient mass storage of data.

- Two-motor auto-reverse drive.
- Records over 800,000 bytes on standard cassettes.
- Read after write and internal self-diagnostics.
- Auto-reverse drive for unattended recording. Dual RS-232 ports.
- Completely remote controllable.



Model 6010 Data Store

Digitec Corporation, 918 Woodley Road, P.O. Box 458,
Dayton, Ohio 45401, Tel. (513) 254-6251. Telex (310) 687-4219.

DigiTec

Digitec Data Loggers

Model 2500 Commander

Model 2500 Commander – Bulletin 5025
Monitor, display, and record analog or digital signals from transducers, transmitters, temperature sensors or switch contacts. The 2500 offers relay control and low-cost flexibility.

- Easy setup – no complex programming.
- Built-in printer. Optional independent RS-232-C/20mA port.
- Four prioritized limits per channel with messages and optional relays.
- From 10 to 1000 channel capacity. 37 different input types.

Model 1101 Data Logger

Series 1100 Data Loggers – Bulletin 5000-1
Portable data loggers packed with value. Four models handle a wide range of applications. All scan at 40 channels/second, and can be configured for 20 or 40 channels. Series 1100 data loggers accept all common input types including TC, RTD, and process transmitters and transducers.
For versatile alarming, each input channel can be assigned a high and low setpoint. Front panel LEDs indicate channels in alarm. Standard alarm relay output included; per channel relay outputs optional. Front panel pushbuttons simplify setup, and provide versatile data output selection.

Model 1101 Data Logger

- Built-in printer.
- Selectable formats and parameters.
- Optional 9-35V DC input power.

Model 1102 Alarm Sentinel

- Alarm scanning and monitoring.
- Choice of I/O ports: IEEE-488 or RS-232-C.
- Optional columnized data output.

Model 1103 Data Scanner

Model 1103 Data Scanner

- Smart A/D computer front end.
- Completely remote-programmable.
- Standard RS-232-C/20mA port.

Model 1104 Data Recorder

- Built-in digital tape deck.
- Stores up to 45,000 readings.
- ANSI/ECMA format on standard cassettes.
- Optional 9-35V DC input power.

Model 1104 Data Recorder

Digitec Corporation, 918 Woodley Road, P.O. Box 458,
Dayton, Ohio 45401, Tel. (513) 254-6251. Telex (310) 687-4219.

DigiTec

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC	alternating current
A/D	analog to digital
ADC	analog to digital converter
ADP	automatic data processing
AF	audio frequency
AFC	automatic frequency control
ALGOL	algorithmic language
AM	amplitude modulation
AND	a logical operator
AQL	acceptable quality level
ASCII	American national standard code for information interchange
AWG	American wire guage

B

BALUN	balanced to unbalanced
BASIC	beginners' all-purpose symbolic instruction code
BCD	binary-coded decimal
BNC	baby "N" connector
BUS	basic utility system

C

CAD	computer aided design
CAM	computer aided manufacture
CATV	cable television or community antenna television
CERMET	ceramic metal element
Comm.	communications
CMOS	complementary metal-oxide semiconductor
CPS	characters per second
CPU	central processing unit

D

D/A	digital to analog
DAC	digital to analog converter
DC	direct curent
DIL	dual in-line
DIP	dual in-line package
DPM	digital panel meter
DTL	diode transistor logic

E

EDP	electronic data processing
EBCDIC	extended binary coded decimal interchange code
EEPROM	electrically erasable PROM
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EPROM	electrically programmable ROM
ESR	equivalent series resistance

F

FEP	fluorinated ethylene propylene Copolymar, 200° Teflon
FET	field-effect transistor
FM	frequency modulation
FORTRAN	formula translator

G

GaAsFET	gallium arsenide field effect transistor
GPIB	general purpose interface bus

H

HF	high frequency (3 to 30 MHz)
HIPOT	test, measurement and diagnostic equipment
HLL	high level language
HV	high voltage
Hz	Hertz

I

IC	integrated circuit
IF	intermediate frequency
IO	input/output (devices)
IR	insulation resistance (or) infrared

J

JFET	junction field effect transistor
JMOS	junction metal oxide semiconductor

K

kHz	kilohertz (10^3 hertz)
KSR	keyboard send receive

L

LC	inductance capacitance
LCD	liquid crystal display
LED	light-emitting diode
LF	low frequency (30 to 300 kHz)
LSI	large scale integration
LVDT	linear velocity displacement transformer

M

MATV	master antenna television
μF	microforad
MHz	megahertz
MOS	metal oxide semiconductor
MOSFET	metal oxide semiconductor field effect transistor
MOV	metal oxide varistor
MPU	microprocessor unit
MSI	medium scale integration

N

NBS	National Bureau of Standards
NIM	nuclear instrumentation module
NOR	not OR

O

OEM	original equipment manufacturer
OR	a logical operator

P

pF	picofarad
PC	printed circuit
PCB	printed circuit board
PIN	positive-intrinsic-negative (transistor)
PLA	programmable logic array
PPI	plan position indicator
PROM	programmable read only memory
PUT	programmable unijunction transistor

Q

QAM	quadrature amplitude modulation
Q (meter)	quality-factor meter

R

RAM	random access memory
RC	resistance-capacitance
RFI	radio frequency interference
RMS	root mean square
ROM	read only memory
RF	radio frequency
RFC	radio-frequency choke
RFI	radio-frequency interference
RTD	resistance-temperature detector
RTL	resistor transistor logic
RTV	room temperature vulcanizing
RW	read/write

S

SAS	silicon asymmetrical switch
SBC	single board (micro) computer
SBS	silicon bilateral switch
SCR	silicon-controlled rectifier
SIP	single in-line package
SSI	small scale integration
SSR	solid state relay
STL	Schottky transistor logic

T

TC	temperature coefficient
TCXO	temperature compensated crystal oscillator
TFE	tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL	transistor-transistor logic
TTY	teletypewriter

U

UHF	ultra high frequency (300 MHz to 3 GHz)
UL	Underwriters Laboratory
UPS	uninterruptible power supply

V

VAC	volts (of) alternating current
VAR	volt-ampere reactive
VCR	video cassette recorder
VDC	volts (of) direct current
VHF	very high frequency
VHSIC	very high speed integrated circuit
VLF	very low frequency (3 to 30 kHz)
VLSI	very large scale integration
VRM	voice recognition module
VTVM	vacuum tube volt meter
VU	volume unit
VSWR	voltage standing wave ratio

W

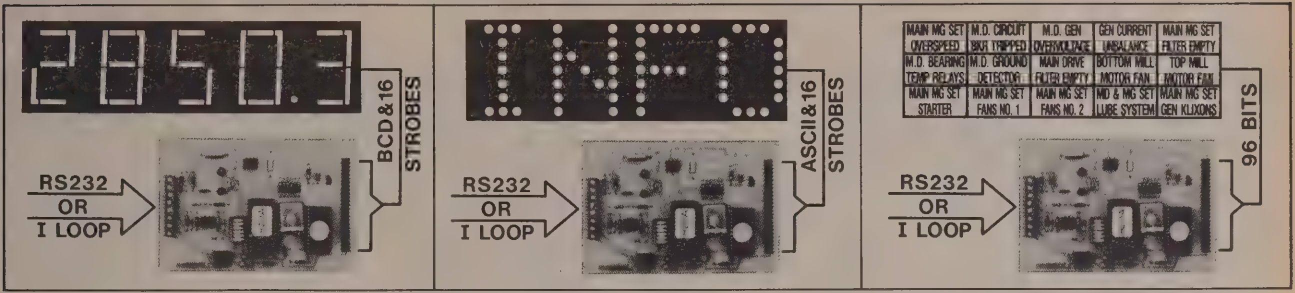
WPS	word processing software

Y

YIG	yttrium iron garnet

SERIAL ASC11 RECEIVERS & TRANSMITTERS

FOR REMOTE DISPLAYS, CONTROLS & TELEMETRY


2850.3
BCD&16 STROBES
RS232 OR I LOOP
INFO
ASCII&16 STROBES
RS232 OR I LOOP
MAIN MG SET OVERSPEED
M.D. CIRCUIT BKR TRIPPED
M.D. GEN OVERVOLTAGE
GEN CURRENT UNBALANCE
MAIN MG SET FILTER EMPTY
M.D. BEARING TEMP RELAYS
M.D. GROUND DETECTOR
MAIN DRIVE FILTER EMPTY
BOTTOM MILL MOTOR FAN
TOP MILL MOTOR FAN
MAIN MG SET STARTER
MAIN MG SET FANS NO. 1
MAIN MG SET FANS NO. 2
MD & MG SET LUBE SYSTEM
MAIN MG SET GEN KLIXONS
96 BITS
RS232 OR I LOOP

FEATURES

- Receive or transmit ASCII data on 2 wires.
- RS232 or current loop.
- 16 Character capacity (16 X 6 bits).
- Autobaud from 110-1200 baud; fixed data rates from 1200-9600 baud.
- Up to 64 address locations on a single data buss.
- 6805 u.p. based design for flexibility, reliability & cost performance.
- Designed for heavy industrial environments.

APPLICATIONS

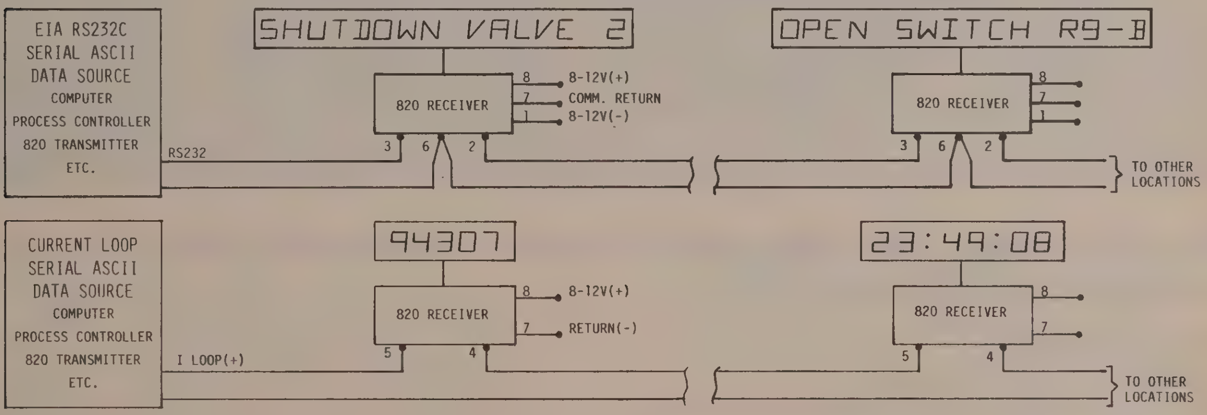
NUMERIC: Time, Temperature, Pressure Length, Speed, Angle, Volts, etc.

ALPHA-NUMERIC: System Condition, Status Indication, Fire Alarm, System Mounting, Prompting, etc.

ANNUNCIATOR: Process Controls, Map-Boards.

MISCELLANEOUS: Printer Controls, Computer Inputs, Data Terminal Controls.

TYPICAL MULTILOCATION LAYOUTS


EIA RS232C
SERIAL ASCII
DATA SOURCE
COMPUTER
PROCESS CONTROLLER
820 TRANSMITTER
ETC.
RS232
SHUTDOWN VALVE 2
820 RECEIVER
8 8-12V(+)
7 COMM. RETURN
1 8-12V(-)
3
6
2
OPEN SWITCH R9-B
820 RECEIVER
8
7
1
3
6
2
TO OTHER LOCATIONS
CURRENT LOOP
SERIAL ASCII
DATA SOURCE
COMPUTER
PROCESS CONTROLLER
820 TRANSMITTER
ETC.
I LOOP(+)
94307
820 RECEIVER
8 8-12V(+)
7 RETURN(-)
5
4
23:49:08
820 RECEIVER
8
7
5
4
TO OTHER LOCATIONS

GENERAL

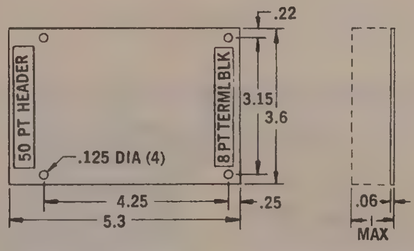
The DIO-REY 820 Series Serial to Parallel and Parallel to Seriel Converters are microprocessor based and are primarily intended for driving remote display decoders.

RECEIVER: The input to the 820 Receiver is a Serial ASCII coded data stream at either RS232 or current loop levels. The 820 Receiver automatically adapts itself to incoming data rates over the range of 110 to 1200 baud. Fixed baud models are available for data rates of 1200 thru 9600. In addition, it features a six position DIP switch which allows selective addressing of up to 64 separate receivers on one data link. The output of the receiver is six bits of data and sixteen strobe lines. The receiver, therefore, can drive either sixteen numeric or alphanumeric characters per receiver or up to 96 points in an annunciator system. Input power is 100ma at 8 to 12 volts, unregulated but filtered (an on-board regulator is provided). Input connections are via terminal strip; Outputs are through a 50 pin header (signals with alternating grounds).

TRANSMITTER: The 820-7/8 Transmitter accepts parallel, 7-bit ASCII (monocase) and converts it into a serial data format (RS232 or current loop) compatible with the receiver. Alternately an array of sixteen, 6-bit registers may be sequentially inputed to the 820-3/4A Transmitter and converted to the same serial output, for annunciator systems. In either transmitter, the data rate is DIP switch selectable from 110 to 1200 baud and the address is fixed at 00.

For assistance in your application, contact DIO-REY or your area representative.

DESCRIPTION	PART NO.
Receiver, RS232 with Repeater or Current Loop 110-1200 auto baud.	820-1/2A
Receiver, RS232 with Repeater or current Loop Fixed Baud; 1200 -1; 2400 -2; 4800 -3; 9600 -4.	820-5/6A-X
Transmitter, RS232 or Current Loop 16 X 6 input.	820-3/4A
Transmitter, RS232 or Current Loop 7 Bit Parallel ASCII Monocase input.	820-7/8


.22
50 PT HEADER
8 PT TERML BLK
3.15
3.6
.125 DIA (4)
4.25
5.3
.25
.06
MAX

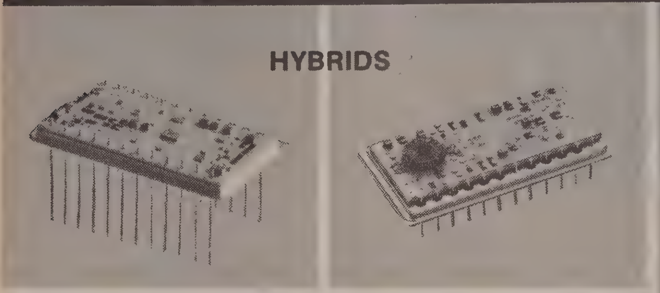
SEE EEM SECTION 2450 FOR MATING LIGHTED DISPLAY DATA.

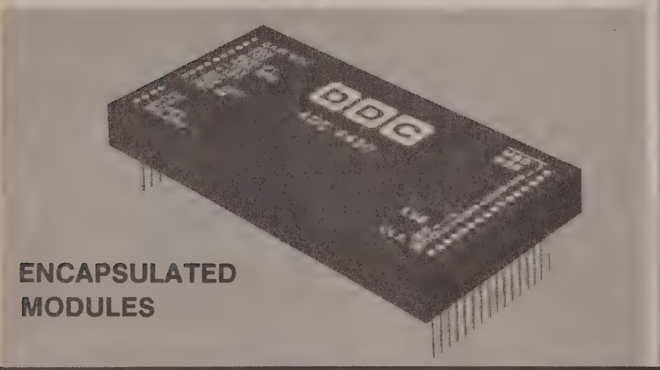
DIO-REY
THE INFORMATION DISPLAY DIVISION
INFO-LITE CORPORATION

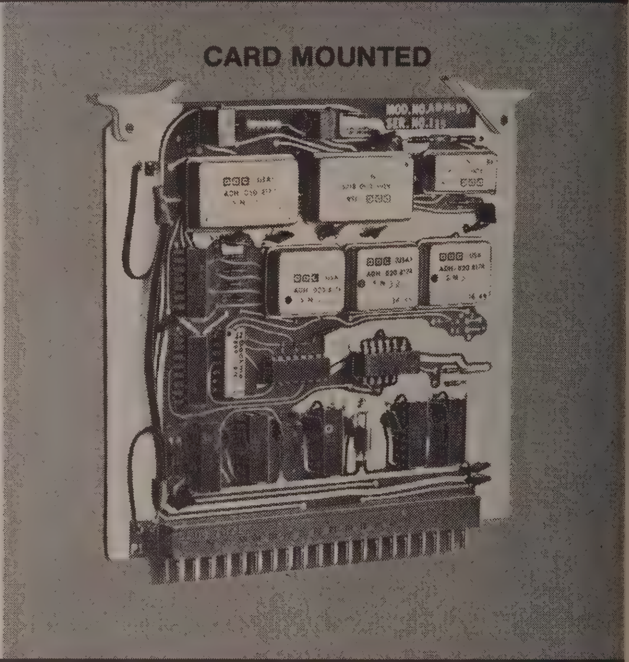
"LINKS BETWEEN MAN AND MACHINE"
422 Cliff Street • Fairview, NJ 07022
(201) 941-4455

DDC Data Conversion Products

A/D and D/A Converters; S/H and T/H Amplifiers; Data Acquisition Systems







High Accuracy and High Speed State-of-the-Art Products manufactured in quantity.

A/D Converters

- High speed, high resolution
- S/H or T/H input
- Internal or external clock and reference

D/A Converters

- Low glitch and deglitched
- Resolution 8 to 16 bits
- Linearity error to ±0.003% F.S.R.
- Settling times to 15 ns
- Pin-programmable voltage and current output ranges
- Fixed reference or four quadrant multiplying

S/H and T/H Amplifiers

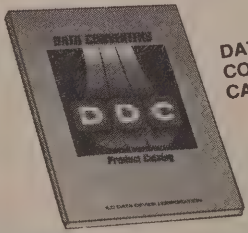
- Acquisition times to 10 ns
- Aperture uncertainty to 20 ps
- Linearity error to 0.0125% F.S.R.
- Small signal bandwidth to 100 MHz

1553 Bus Products

- MIL-STD-1553 RTU's and bus controllers
- Testers and exercisers
- Components, cards, and subassemblies
- VME and Unibus I/O's
- McDonnell Douglas A3818, A5690, A5232, and A4905
- Standard or custom designs

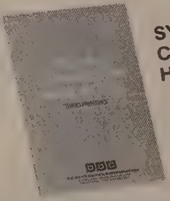
FREE Design Literature from DDC

Write on your Company's letterhead to request copies of any these useful engineering references.



DATA CONVERSION CATALOG

Contains 386 pages of the latest technical and applications data covering DDC's complete product line.



SYNCHRO CONVERSION HANDBOOK

Now in its third printing, the Handbook clearly presents the whys and wherefores of synchro conversion.

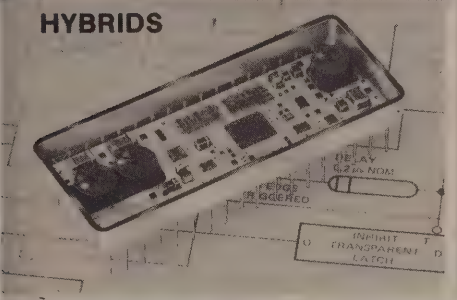
MIL-STD-1553
DDC

1553 DESIGNER'S GUIDE

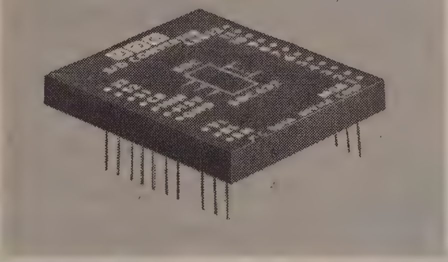
Explores the MIL-STD-1553 data bus spec in depth and offers helpful insights to its implementation.

DDC Synchro Conversion Products

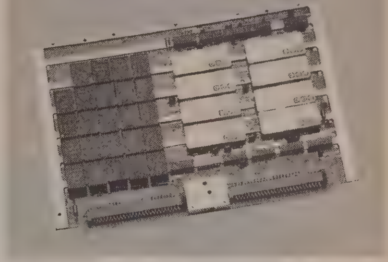
HYBRIDS



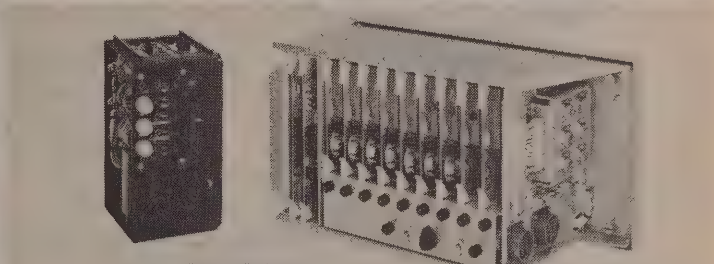
ENCAPSULATED MODULES



CARD MOUNTED



INSTRUMENTS


SYSTEMS

A complete line of Synchro Products manufactured in quantity from the Leader in Synchro Conversion and Pioneer in Hybrid Designs

S/D & R/D Tracking Converters

- Resolution to 18 bits or 5 decades BCD
- Accuracy to ±20 arc seconds (single speed)
- All standard synchro and resolver formats
- Transformer isolation or solid state input
- Tracking rates to 400 rps
- Multispeed
- Multiplexed with accuracies to ±5.4 minutes

D/S & D/R Converters

- Resolution to 20 bits
- Accuracy to ±10 seconds
- Synchro or resolver output
- High power output for torque receiver loads

Synchro Instruments

- Programmable BCD angle indicators with resolution to ±0.001°
- Programmable multispeed angle indicators
- Custom scale factor shaft angle encoders
- Angle simulators with accuracies to ±10 arc seconds
- IEEE-488 data bus adapters

Other Synchro Products

- Solid state control transformers
- Solid state control differential transmitters
- Synchro/resolver to linear DC converters
- Synchro/resolver to sine/cos DC converters
- Inductosyn to digital converters
- Industrial resolver to digital encoder

Related Products

- Custom hybrids
- Custom synchro interface and retransmission systems
- SEM qualified modules
- Custom miniature transformers

Representatives worldwide. Call or write for information and applications assistance.

DDC®

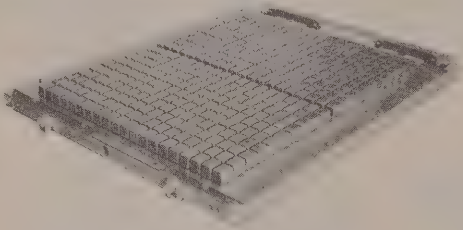
ILC DATA DEVICE CORPORATION

105 Wilbur Place, Bohemia, New York 11716
516 • 567 • 5600, TWX: 510 • 228 • 7324

iti

THE SWITCHING COMPANY

MATRIX BOARDS



- Latching and Non-Latching Crosspoints
- Choice of Matrix Sizes
- 1 through 6 poles per Crosspoint
- Wired Rack-Mounting Enclosures
- Forms A, B or C Switches
- Matched Impedance Matrices
- Expand Matrix as required with Plug-in Relays

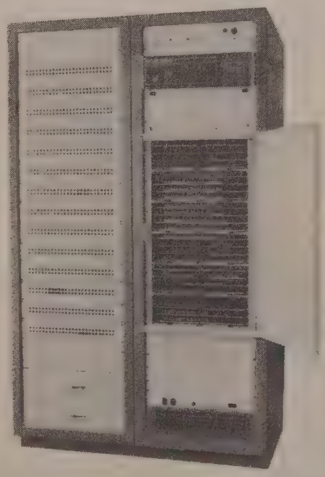
BUILD YOUR OWN SYSTEM WITH ITI PRODUCTS

CONTROLS

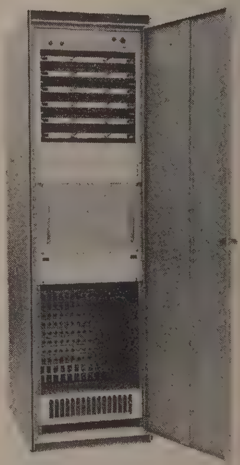
- Manual
- Remote Options — Parallel BCD Address
  IEEE 488-1975 (GPIB) Bus
  RS-232-C Interface
  20 mA Loop

— OR LET ITI DO IT !

SYSTEMS



- DC to 10MHz
- Manual or Computer Control
- Latching or Non-Latching
- Optional Bridging and/or Non-Blocking
- Positive Crosspoint Verification
- Single or Multi-Stage Switching
- Passive or Compensated Paths
- Self Diagnostics
- Programmed Security Access



INFORMATION TRANSFER INDUSTRIAL, INC.

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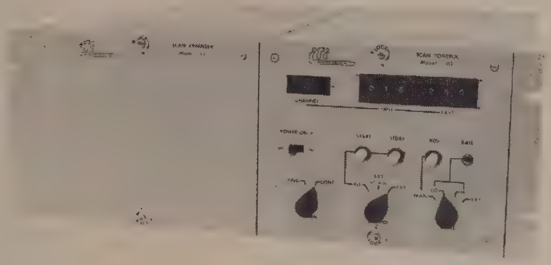
THE SWITCHING COMPANY

7100 SERIES SCANNER/MULTIPLEXERS



Request Bulletin 7100

SWITCHES	CONTROLS
Low Thermal	Front Panel
General Purpose	IEEE 488-1975
High Voltage	RS-232-C
Dry or Mercury	Parallel BCD
1-2-3 or 4-pole	

- Ten years of Proven Field Reliability
- As Many as 400 Channels in a Half Rack
- Expandable to 10,000 Channels
- Adjustable Scan Rate
- Sequential and Random Address
- Programmable Pole Selection

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UNIT UNDER TEST (UUT)

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Signal Generators
Millivolt Sources
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Counters
Multimeters
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Scopes

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- Latching and Non-Latching Switches Available
- IEEE-488 Interface
- RS-232-C Interface
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Request Bulletin 8000

INFORMATION TRANSFER INDUSTRIAL, INC.

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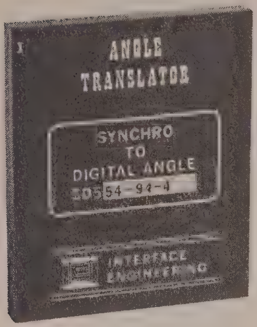
ANGLE TRANSLATORS (617) 344-7383

MODULES



UNITS CONVERSION

CODE CONVERSION

ANGLE COMBINERS COMPARATORS

TRIG FUNCTIONS

DIGITAL SERVOS

SYNCHRO TO DIGITAL

SYNCHRO TO DC

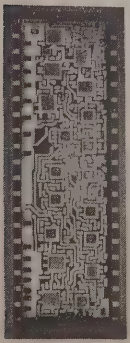
DIGITAL TO SYNCHRO

COORDINATE CONVERSION

SERIAL-OPTICAL DATA LINKS

FAST MATH OPERATORS

ANGLE DISPLAYS



HYBRIDS

ANGLE CODE CONVERTERS

Function	Model	Input	Output	FS/Rate	Accuracy	Size	Bulletin
Binary Angle to BCD Degrees	DD107-4 to -7	12,16,20,21 bits	4 to 7 digits	359.9° to 359.9995°	±0.6 LSD	C A	570115 370226
Binary Angle to BCD Radar Mils	DD124-4 to -7	12,16,20,21 bits	4 to 7 digits	6399 to 6399.997	±0.6 LSD	A	370630
BCD Degree to Arcmin. + Sec.	DD132	.999° BCD	4 digit BCD	59′57″	±1 arcsec	A	371204
Binary Angle to Bipolar Angle	DD117-16-21	17 or 21 bits	±17 or 21 bits	±180° — .3 µs	±0	C	370607
Binary Angle Combiner	DD118	16 bit θ & 16 bit ϕ	16 bit θ + ϕ or θ — ϕ	.35 µs	±0	C	470221
Binary Angle Comparator	DD119	16 bit θ & 16 bit θ ± ϕ	±16 bit ϕ shortest path	.4 µs	±0	A	370815
BCD Degrees to Binary Angle	DD127-4, 5	4, 5 digit BCD	13, 16 bits	359.9° to 359.99°	±.6 LSD	A	370915
BCD Degrees to Binary Angle	DD227-6	6 digit BCD	20 bit angle	359.999°	±.7 LSD	B X	180314
Dual Speed Combiner	DD115A	X1 — 7 its X36 — 14 bits	19 bit angle	0.25 µs	±.0013°	E	471120
Dual Speed Expanders	DD113B	17-21 bits	X36-12/16 bits	0.2 µs	±1 LSB—X36	D	471215
TRIG FUNCTIONS							
Binary Angle to Sin and Cos	DD108/109	12, 15, 18 bits	±16 bit sine and cosine	360°, .9 to 1.5 µs	±.005° to .001°	A BX	270928 570812
Binary Angle to Sin and Cos	DD175	12 bits	±12 bit sine and cosine	360°, .1 µs	.007°	A	870317
Binary Tan to Angle	DD130A, B	10 or 13 bits	16 bit angle	45°, 1.2 µs	±.0025°	A BX	371105 371105
Arcsin or Arccos	DD108/137	16 bits S or C	16 bit angle	90°, 20 µs	±.001°	A/BX	670915
Binary Angle to Tan.	DD130/137	16 bit angle	16 bit tan.	45°, 20 µs	±.0025°	A/BX	670915
DC Angle to S & C	SA840A,B,C	+10 v = 360°	10 sinθ, 10 cosθ	500/sec	±.3° to ±.1°	A	371214
DC S & C to Angle	SA880A,B,C	10 sinθ, 10 cosθ	+10 v = 360°	500/sec	±.3° to ±.1°	A	770320
SYNCHRO-DIGITAL							
Synchro to Digital	SD552/566	synchro	10 bit angle	4800 RPM	±22′	F1	770522
Synchro to Digital	SD553/567	synchro	12 bit angle	1800 RPM	±8′	F1	870317
Synchro to Digital	SD554/568	synchro	14 bit angle	480/720 RPM	±4′	F1	770415
Synchro to Digital	SD555	synchro	16 bit angle	75 RPM	±1′	F	980522
S-D Multichannel	SD532	to 64 channels	13 bit angle	100 µs min.	±5′	D-A	770318
S-D 4 Channel	SD528	4 ch. synchro	13 bit angle	0.2 µs access	±4′	D/BX	671120
S-D Dual Speed	SD556/560	X1, X36 synchro	16-19 bit angle	X1 — 20 RPM	±.01 to .002°	F1	770715
Synchro to BCD	SD570	synchro	3 or 4 digit	ext. scaling	to ±0.1° ±1 LSD	F	970815
Synchro to BCD	SD575/576	synchro	3 or 4 digit	359,359.9	1° and .1°	FX/F	870220
Synchro to BCD and Binary	SD580/581	synchro	3 or 4 digit & 10/14 bit binary	359,359.9 to 80/10	.1° and ±4′	FX/F	871018
DIGITAL-SYNCHRO							
Digital to Synchro	DS340/341	14 bit angle	1-2 vA	360°	±4′	F	761215
Digital to Synchro	DS350	14 bit angle	4 or 10 VA	360°	6′ to 10′	F/H	770212
Digital to Resolver	DR320-A to E	10 to 20 bits	7 v resolver	360°	10′ to 10″	C	670815
Digital to TR	TD355/356	12 bit angle	250 VA pk.	360°	6′ to 20′	—	970730
Solid State CT	DS360/361	synchro vs 14 bit angle	null/error .4 to 1 vac/°	±7 vac	±4′	F/F1	770324
Solid State CDX	DS370	14 bit angle	resolver	±7 vac	±4′	F	970515
SYNCHRO-ANALOG							
Synchro to Linear DC	SA810A,B,C	synchro	+10 or ±10 vdc	0-360°, ±180°	±.25° to ±.1°	A	370612
Synchro to DC Sin & Cos Abs	SA820A,B,C SA822	synchro	10 sin θ 10 cos θ	60 or 400/sec	±.35° to ±.15°	B/F	371114
Synchro to DC Sin & Cos-Ref. scaled	SA830	synchro	10 sin θ 10 cos θ	60 or 400/sec	±.1°	C	371123

INTERFACE ENGINEERING

Function	Model	Input	Output	FS/Rate	Accuracy	Size	Bulletin
Binary Add/Subtract	DD129	16 bit A & B	16 bit A ±B	.4 μs	±0	C	370726
Binary Multiply	DD123/DP	16 bit A & B	18/32 bit AB	10 μs	±0	A	470515
Binary Divide	DD163/DP	16/32A & 16B	18/32 bit A/B	10 μs	±0	A	570719
Square Root	DD123/137	16 bit A	16 bit √A	160 μs	±0	A/A	670915
Floating Point	DD154	16A + 4 bit X	8 modes	.3 μs/shift	±0	A	570622
Complements	DD112	12-20 bit A	ones, two's, direct-thru	.25 μs	±0	C	370918
Inverse Function	DD137	16 bit X	16 bit f (X)	16 X slave	tol. of slave	A	470303
Inverse Function	DD141-20-28	20 or 28 bit X	16 or 24 bit f (X)	.3 μs/count	tol. of slave	C	570210
COORDINATE CONVERTERS							
DC Polar to Rectangular	SA850A,B,C	.1 to 10 v R 0 to 10 v θ	Rsin θ Rcos θ	500/sec	.125 to .5° .1 to .4%	A	371222
DC Rectangular to Polar	SA860A,B,C	.1 to 10 Rsin θ & Rcos θ	+10 v = 360° abs. .1 to 10 R	500/sec	.125 to .5° .1 to .4%	A	371224
Polar to Analog Rectangular	DR320-A to E	10 to 20 bits θ ±10 v R	Rsin θ Rcos θ	2 μs	10′ to 10″ .1 and .3%	C	571022
Optically Isolated Serial Data Link	DD128T & DD128R	Accepts and delivers 24 bit parallel data at up to 20K words/sec. Serial transmission via low cost twisted pair up to 1 mile.				C C	371115 371115
Panel Display Kits	DD120-4 to -6	4 to 6 digit .55″ numerals, complete with bezels, decoders, etc.				PI	371019

Notes: 1) Synchro translators Interface 90 v/60 Hz (-96), 2) Cases: 90 v/400 Hz (-94), and 11.8 v/400 Hz (-114) synchros. Contact IEI for resolver interfaces.

A) 3″x4″x.4″
B) 3″x4″x.8″
Bx) 3″x4″x.675″
C) 2″x4″x.4″
D) 2″x3″x.4″
E) 2″x4″x.8″
F) 2.625″x3.125″x.8″
Fx) 2.625″x3.125″x1.0″
F1) 2.625″x3.125″x.4″

FAST 16 BIT MATH

- Add
- Subtract
- Multiply
- Divide
- Square Root
- Sine
- Arc Sine
- Cosine
- Arc Cosine
- Tangent
- Arctan
- Inverse Functions
- Floating Point
- Complements

COORDINATE CONVERSION

SERIAL DATA LINKS

PANEL DISPLAYS

MAINFRAME SUBSYSTEMS

MAINFRAMES are integrated modular subsystems optimized by the selection of functions, resolutions, and speeds for the specifics of each application. Typical groups are outlined below. Serial, parallel, bidirectional, IEC, and IEEE-488 interface options available. Contact IEI for additional information.

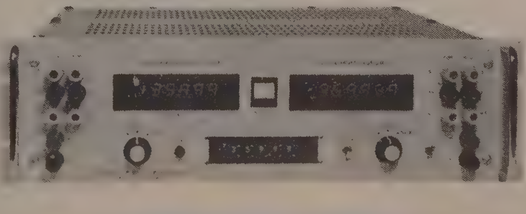
ANGLE DISPLAYS: The DD135 series accepts, converts, displays, and delivers angles in a variety of forms including binary, BCD, synchro, resolver, dual speed, mils, degrees, arc-minutes and seconds and distance in any unit of linear measure at resolutions to 21 bits and accuracies to ±.0003°. Options include bipolar operation and programmable offsets and scaling factors.

CONTROLLERS: Integrated Interface-Controllers complete with motor drive providing manual or computer control of rate and position.

STABILIZATION COMPUTERS: Satellite microcomputer controllers converting Space to Ship and Ship to Space Coordinates. Feature 16 bit floating point precision, computing speed, and dynamic accuracy.

RADAR REMOTERS: Up-link control of Remote radar. Down link reporting of radar trigger, video, Az, El, rate, and status.

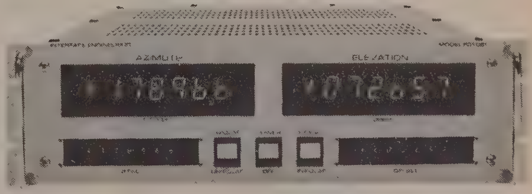
SYNCHRO-RESOLVER: Instruments, displays, simulators.

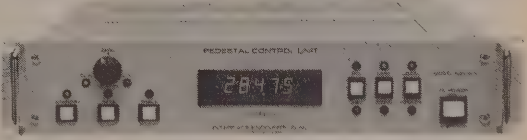


SYNCHRO SIMULATOR/DISPLAYS

AZIMUTH
ELEVATION

ANGLE DISPLAY - INTERFACES





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- Process Monitoring and Annunciation
- Quality Assurance and Compliance
- Machinery Protection
- Energy Management and Accounting
- Production Monitoring

Features:

- Full-width Page Printout with Headers
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- Programmable Alarm Messages
- Capacity to 128 Channels
- RS232 and Current-loop Computer Interface
- English Language Programming
- Engineering Conversion including Thermocouples
- Full Mathematical Capability
- Cassette Program Loading Capability

DIGI-LINK . . .

Applications:

- Remote-site Data Acquisition and Control
- Machinery Protection
- Distributed Process Monitoring and Control
- Energy Management
- Factory Automation

Features:

- Full ASCII Communications Capabilities
- Local or Remote Programming
- Automatic Dial and Answer for Modem Connections
- Local Display
- Engineering Conversions
- Alarms
- Full Mathematical Capability
- English Language Programming
- Multiple RS232 and Current-loop Ports
- Capacity to 128 Channels

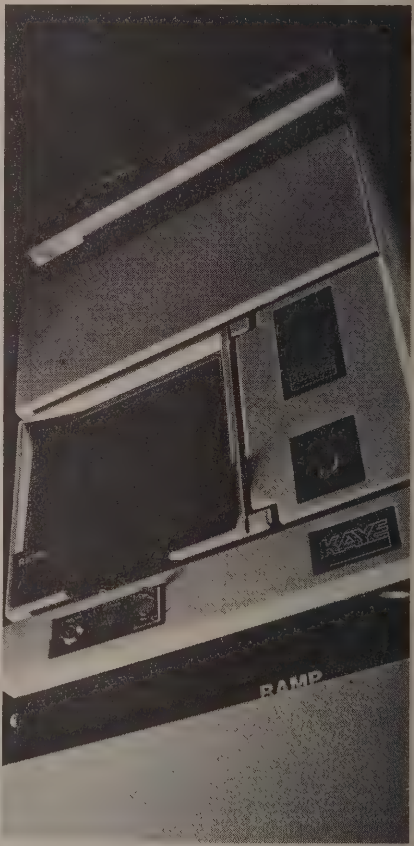
RAMP . . .

Applications:

- Stand-alone Process Monitor
- Computer Front-end
- Distributed Analog Data Acquisition
- Process Annunciator
- Machinery Protection

Features:

- Remote Multiplexing
- Capacity to 640 Channels
- Programmable Alarm Limits and Relay Closures
- English Language Programming
- Engineering Conversions including Thermocouples
- Accessories for Frequency and Digital Inputs and Analog Outputs
- User-formattable Serial Interface
- Cassette Program Loading Capability



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DISPLAY TO TELEMETRY

METERING WITH PARALLEL DATA

Parallel or Strobed
Volts, Temp, Counts, Time, Etc.
1197
TEMPERATURE °F

These meters accept a wide range of inputs such as process signals, counts, temperature, time, etc. The data is then displayed and outputted in either full parallel or digit strobed. Large, bright displays are highly visible, even in bright light.

• 2, 3½, 4, 5 or 6 digits in either analog or digital models • Input conditioning • Tri-state and open collector outputs • Scaling factor • Large LED display • Panel surface mounting • Easy wiring • 3-year warranty • Price: $156 - $400

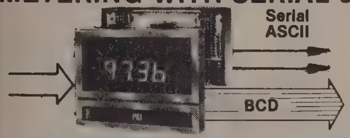
METERING WITH SERIAL DATA & SET POINTS

Counts, Temp, Current, Time, Etc.
Alarms or Controls
Serial ASCII
278542
GALLONS/MINUTE

These meters feature serial ASCII output and full message formatting. Setpoint outputs provide alarm or control capabilities. Microprocessor-based Ratemeter measures DC pulses from one per hour to 3 kHz.

• Full 6-digit display • Scale factor .000000001 to 59999 • Baud rates 110-9600 • Non-volatile memory • Full instrumentation input • Threshold adjustment • Setpoint outputs • 3-year warranty • Price: $295 - $425

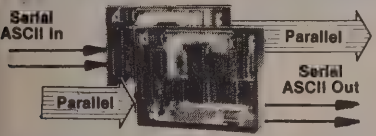
METERING WITH SERIAL & PARALLEL DATA


Serial ASCII
BCD
9736

Slimline meter in combination with the ASCII Bustle® accept a wide range of inputs and provide serial ASCII and parallel data outputs. Full parallel, tri-state parallel, tri-state multiplexed and open collector data outputs for any application.

• Variable noise filtering • 0.2 - 80 VDC threshold adjustment • Open collector (up to 48 VDC maximum) or tri-state outputs • High transient, high electrical noise immunity • 110-9600 baud rate • Price: $410 - $650

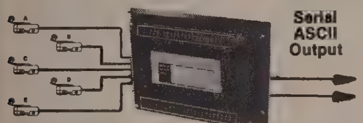
SERIAL/PARALLEL CONVERTERS


Serial ASCII In
Parallel
Serial ASCII Out
Parallel

Convert common parallel data (such as BCD) to serial ASCII with the Transmitter Bustle® or convert serial ASCII to parallel data with the Receiver Bustle®. Transmit data or provide input to PC's, computers, printers, terminals, etc.

• Convert ASCII up to 6 digits of BCD data or 24 bits • 100 unit addressing capability • 2-digit switch-selectable ID number • 110-9600 baud rate • RS232, RS422, 20/60 mA formats • Price: $296 - $303

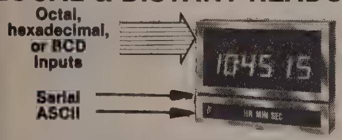
CONTACT STATUS TRANSMITTER


Serial ASCII Output

These transmitters accept up to 25 individual contact closures at up to 24 VDC. These units are all self-contained and built rugged and reliable. These transmitters provide standard serial ASCII output.

• Directly compatible with CRT's, printers, etc. • Self-contained • CMOS, TTL compatible • Accepts up to 25 contact closures • Accepts up to 24 VDC; others available • RS232, RS422, 20/60 mA formats • Price: $290 - $350

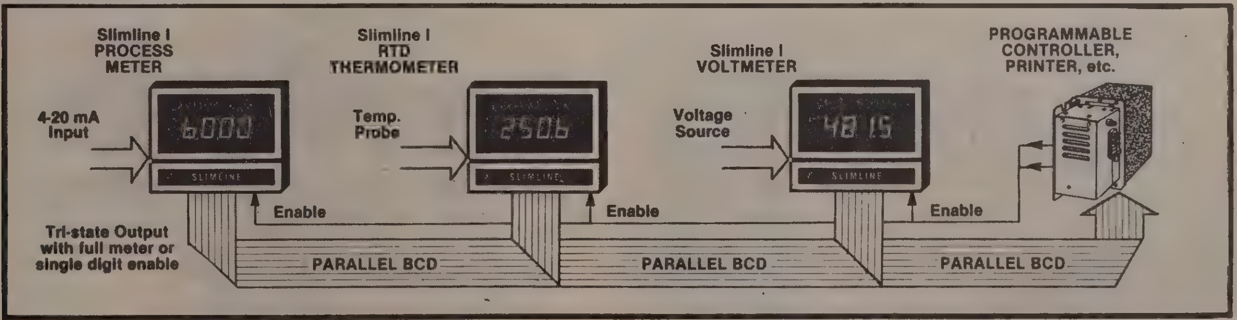
LOCAL & DISTANT READOUT


Octal, hexadecimal, or BCD Inputs
Serial ASCII
1045 15
HR MIN SEC

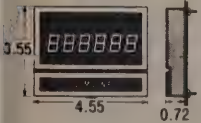
Meters accept BCD, octal, hexadecimal or 2-wire serial ASCII inputs. Display up to 6 digits with LCD's or LED's. ASCII command switches provide remote control or alarm capabilities. Displays are easily read even in bright light.

• Parallel, octal, hexadecimal or BCD inputs • Serial ASCII inputs • Latch capability • 2 to 6 digit models • Baud rates 110-9600 • Flexible addressing capability • Surface mounting • Easy wiring • 3-year warranty • Price: $156 - $500

APPLICATION EXAMPLE:


Slimline I PROCESS METER
Slimline I RTD THERMOMETER
Slimline I VOLTMETER
PROGRAMMABLE CONTROLLER, PRINTER, etc.
4-20 mA Input
Temp. Probe
Voltage Source
6000
2506
48 15
SLIMLINE
Enable
Enable
Enable
Tri-state Output with full meter or single digit enable
PARALLEL BCD
PARALLEL BCD
PARALLEL BCD

SLIMLINES' UNIQUE FEATURES


3.55
888888
4.55
0.72

Size: 4.55″ x 3.55″ x 0.72″. Panel surface mounting means easy & fast installation. Also fast wiring – no soldering needed.

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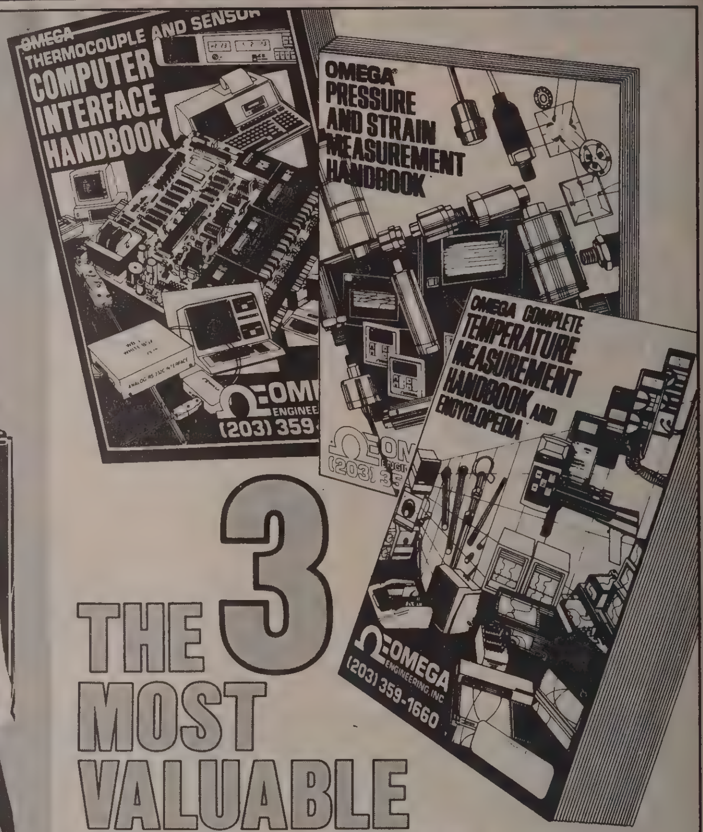
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SYNCHRO AND RESOLVER DATA CONVERTERS

MODULES • MUX S/D SYSTEMS • IEEE-488 ANGLE INDICATORS AND SIMULATORS

DESCRIPTION	Input Availability	Output	Static Accuracy	Size
ANGLE POSITION INDICATORS: Dual channel, RS232C or IEEE-488 compatible.	Autoranging 10-90 V L-L 50-10KHz	To 6 Decade BCD	To ±.003°	19″ x 1¾″ x 11″
SYNCHRO/RESOLVER SIMULATORS: Dynamic mode, RS232C or IEEE-488 compatible.	5 Decade BCD	11.8/26/90 V L-L	±.01°	19″ x 3½″ x 13″
INTEL MULTIBUS: D/S and S/D. Two-speed or multiplexed.	As required	As required	±.01°	PC 12″ x 6.75″
TRACKING SYNCHRO/RESOLVER TO DIGITAL: Full transformer isolated units with jitter free output. NO-15VDC required. Valid data immediately available at trailing edge of CB.	Freq.: 50 to 1600Hz L-L V_{RMS}: 5 to 90 Ref. V_{RMS}: 10 to 115	Model 1663: 18 bits Model 1661: 16 bits Model 1651: 14 bits Model 1651B: 12 bits Model 1652: 10 bits	±.005° ±.01° ±4.0′ ±8.5′ ±21′	3.1″ x 5.1″ x 1.0″ 3.1″ x 2.6″ x 0.82″ 3.1″ x 2.6″ x 0.82″ 3.1″ x 2.6″ x 0.82″ 3.1″ x 2.6″ x 0.82″
AUTORANGING TRACKING S/D. Model 1653: Transformer isolated. Reference and L-L voltages may vary independently of each other.	Ref.: 44-1500Hz Ref. V_{RMS}: 5-125 L-L V_{RMS}: 5-115	12 bits	±ILSB	3.1″ x 2.6″ x 0.82″
TRACKING S/D WITH BCD OUTPUT. Model 1662: Transformer isolated units with jitter free output. 036° or ±179.9°	Ref.: 50-1500Hz Ref. V_{RMS}: 10-115 L-L V_{RMS}: 5-90	4 Decade BCD	±0.1°	3.1″ x 2.6″ x 0.82″
14 BIT SAMPLING SYNCHRO OR SIN/COS TO DIGITAL. Series 1623F: Includes ±5° offset capability.	Freq.: 50Hz to 10KHz L-L V_{RMS}: 5 to 90 Ref. V_{RMS}: 10 to 115	14 bit parallel binary or 4 decade BCD. TTL, DTL compatible.	±4′	3.125″ x 2.625″ x 0.82″
TWO SPEED SYNCHRO/RESOLVER TO DIGITAL. Series 1512 Single module combines binary or non-binary gear ratios from a two-speed system. Velocity output. Ratios: 9:1, 16:1, 18:1, 32:1, 36:1, 64:1, etc.	Freq: 50-1500Hz L-L V_{RMS}: 1.3-90 Ref. V_{RMS}: 5-115	16 bits binary parallel	±0.005°	3.125″ x 6.0″ x .82″
MULTIPLEXED SYNCHRO TO DIGITAL. Series MUX: Simple, noise immune, small and inexpensive Modular system, up to 128 channels.	Any combination of Synchros and Resolvers.	14 bits binary parallel to 75 μs conversion.	±5′	3.125″ x 2.65″ x 0.82″ + 1.85″ x 0.85″ x 0.82″ per channel
ANGLE POSITION INDICATOR, SOLID STATE. Series 2623: Includes ±5° offset capability. Rugged, compact, accurate and economical. With or without built-in power supplies. Internal reference available.	Freq.: 50Hz to 10KHz L-L V_{RMS}: 5 to 90 Ref. V_{RMS}: 10 to 115	Readout: 359.9, ±179.9 or 9999. Others available.	±0.1°	5.5″ x 1.75″ x 5.5″ deep
SYNCHRO OR SIN/COS TO LINEAR DC. Series K678-1637: Converts synchro or resolver inputs to linear DC output proportional to the angle. Connector termination available. Output voltage may be offset.	Freq.: 50Hz to 10KHz L-L V_{RMS}: 5 to 90 Ref. V_{RMS} 10 to 115	±10VDC for angles −180° to +180°	6′, 15′, 30′ or 1°	**K678:** 3.1 x 2.6 x .82 **K6678:** 3.1 x 2.6 x .42 **1637:** 2.5″ x 3.2″ x 0.78″
SYNCHRO/RESOLVER TO SINE/COSINE DC. Series 655/697: Generates sine and cosine DC outputs proportional to the angle.	Freq.: 60 or 400Hz L-L V_{RMS}: 11.8 or 90 Ref. V_{RMS}: 26 or 115	−10 volts to +10VDC, representing the sine and cosine of the input angle.	±6′	**400Hz:** 1.85″ x .85″ x .82″
SYNCHRO TO SINE/COSINE DC (non-variant). Series 655NV: Generates sine and cosine DC outputs proportional to the input angle. Insensitive to synchro reference and line voltage. Ideal for displays.	Freq.: 60 or 400Hz L-L V_{RMS}: 11.8 or 90 Ref. V_{MRS}: 26 or 115	−10 volts to +10VDC representing the sine and cosine of the input angle.	±6′	3.44″ x 3.19″ x 0.82″
DIGITAL TO SYNCHRO/RESOLVER. Series 1667:	16 bits TTL, levels binary coded angle.	Freq.: 50Hz to 10KHz L-L V_{RMS}: 5 to 90	±1′	3.125″ x 3.625″ x 1″
DIGITAL TO SYNCHRO/RESOLVER. Series 1673: Miniaturized, 1.5 VA, short circuit proof. 0.1% Max. amplitude variation.	14 bits, TTL levels binary coded angle.	Freq.: 50Hz to 10KHz L-L V_{RMS}: 5 to 90	±4′ ±8′	3.125″ x 2.625″ x 0.82″
BCD TO SYNCHRO/RESOLVER Series F1673:	4 Decade BCD	50Hz-10KHz 5-90 V L-L	±.1°	3.1″ x 3.6″ x .82″
DC TO SYNCHRO/RESOLVER. Series D1673	±10VDC ±180°	400Hz 26-90VL-L	±12′	3.12″ x 3.625″ x .82″
DIGITAL TO SYNCHRO/RESOLVER. Series 1680: Low cost, medium resolution version of our popular Model 1673.	10 bits, TTL levels binary coded angle.	Freq.: 50Hz to 10KHz L-L V_{RMS}: 5 to 90	±21′	3.125″ x 2.625″ x 0.82″
DIGITAL TO SYNCHRO/RESOLVER. Series B1670: Drives 3 TR's High power, solid state device converts a 14 bit input into a 3 wire synchro or 4 wire resolver output. Overload and short circuit protected.	14 lines representing angles 0 to 360°	L-L V_{RMS}: 11.8 or 90 Ref. V_{RMS}: 26 or 115 Freq.: 60Hz or 400Hz	±4′	**PC:** 4.5″ x 8″ x .68″ above PC
ACP TO SINE/COSINE DC (non-variant). Series 1502: Model 1502-1 is ACP to Synchro.	4096 ACP & 1 ARP	±10VDC, as the sine and cosine.	±5′	3.1″ x 3.6″ x .82″
DIGITAL TO SINE/COSINE DIGITAL. Series 1500: Model 1500-1 has tristate outputs and MUX sine and cosine over 12 lines.	14 lines representing angles 0 to 360°	12 bits sine and cosine, also quadrant signs.	±2′	3.0″ x 4″ x 0.4″
DIGITAL TO SINE/COSINE DC (non-variant). Series 1501: 0.05% max. amplitude variation.	14 lines representing angles 0 to 360°	±10VDC, as the sine and cosine.	±4′ or ±15′	3.125″ x 2.625″ x 0.42″
DIGITAL VECTOR GENERATOR. Model 1504: High speed multiplying trigonometric D/A. Converts 14 bits of digital input and analog R into R sin θ and R cos θ.	14 lines representing angles 0 to 360°	±10V max. Reference will accept any wave form.	±4′	3.125″ x 2.625″ x 0.42″
DIGITAL TO RESOLVER. Series 1503: 0.035% max. amplitude variation.	14 lines representing angles 0 to 360°	2 AC voltages, 20V P-P, as the sine and cosine.	±4′	3.125″ x 2.65″ x 0.62″
CONTROL TRANSFORMER, SOLID STATE. Series 1682: Fully transformer isolated unit. 1.0% max. amplitude variation.	Synchro and 16 bits Natural parallel binary.	±5 V_{RMS} representing ±12.5°	±1′	3.125″ x 2.626″ x 0.42″
CONTROL DIFFERENTIAL TRANSMITTER, SOLID STATE. Series 1681: Model 1685 offers Synchro or Resolver output	Synchro and 14 bits Natural parallel binary.	6.5 V_{RMS}, sine/cosine or synchro/resolver	±4′	3.125″ x 2.625″ x 0.82″
SINE/COSINE TO SYNCHRO DRIVERS. Series B676: Solid state device designed to handle large current surges of TR's. Will drive three 11TR4s to a low null. Overload and short circuit protected.	±10VDC, representing the sine and cosine of the required angle.	L-L V_{RMS}: 11.8 or 90 Ref. V_{RMS}: 26 or 115 Freq.: 60Hz to 400Hz	±10′	**PC:** 4.5″ x 8.0″ x 1″
LINEAR DC TO SINE/COSINE DC. Series C670: Converts a DC voltage, representing an angle, into two output voltages that are proportional to the sine and cosine of that angle.	±10VDC representing angles from −180° to +180°	K sin θ and K cos θ K = 10VDC	±10′	3.44″ x 3.19″ x 0.82″
COORDINATE ROTATOR. Series A689: Rotates (X-Y) coordinates proportional to a linear DC input.	$Y = R \cos \theta$ $Y = R \sin \theta$ $R = \pm 10$VDC	$R \sin (\theta + \beta)$ $R \cos (\theta + \beta)$	±10′	3.19″ x 3.44″ x 0.82″
POLAR TO RECTANGULAR. Series A1618: Converts polar coordinates (R, θ) into rectangular (X, Y).	R: ±10VDC θ: ±10VDC	$X = R \cos \theta$, $Y = R$ sine θ R = ±20MV to ±10VDC	±10′	3.19″ x 3.44″ x 0.82″
RECTANGULAR TO POLAR. Series 695: Converts rectangular coordinates (X, Y) into polar (R, θ).	$X = R \cos \theta$ $Y = R \sin \theta$	$R = \sqrt{X^2 + Y^2}$ $\theta = \tan^{-1} Y/X$	±10′	3.19″ x 3.44″ x 1.78″
DEMODULATORS: Phase Sensitive Transformer isolated, single or dual channel.	840: 0 to 5 V_{RMS} 9318: To cust. spec	0 to ±4.3VDC As requested	.1% .1%	3.1″ x 1.9″ x 0.5″ 1.63″ x 1″ x 1″

Other frequencies and voltages available. Units available for either 0 to +70°C or −55°C to +105°C operation. Most units are hermetically sealed for extra protection.

TRANSMAGNETICS, INC. DEPT. EM, 210 ADAMS BOULEVARD, FARMINGDALE, NEW YORK 11735
PHONE NO. (516) 293-3100 • TWX 510-224-6420

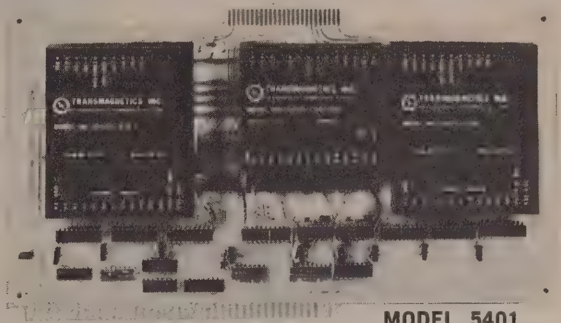
SYNCHRO AND RESOLVER DATA CONVERTERS

MODULES • MUX S/D SYSTEMS • IEEE-488 ANGLE INDICATORS AND SIMULATORS

MODEL 1663:
18 BIT S/D OR R/D ±20 ARC SECONDS ACCURACY.

MODEL E1661:
16 BIT S/D OR R/D ±40 ARC SECONDS ACCURACY.

MODEL 1667:
16 BIT D/S OR D/R 1.3 VA ±30 ARC SECONDS ACCURACY.



MODEL 5401

INTEL MULTIBUS 8085/8086 COMPATIBLE SYNCHRO/RESOLVER-TO-DIGITAL AND DIGITAL-TO-SYNCHRO/RESOLVER SYSTEM. ±30 ARC SECONDS ACCURACY.

MODEL 2623CC-34H/488

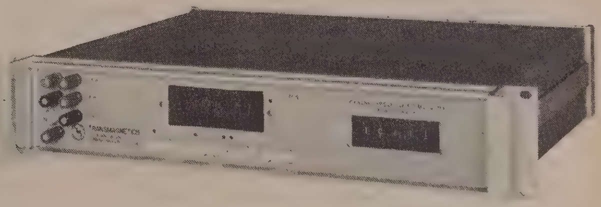
SYNCHRO/RESOLVER, AUTORANGING, IEEE-488 COMPATIBLE ANGLE POSITION INDICATOR.
47-2045 Hz ±1 MINUTE ACCURACY.

MODEL 3800C-1

DUAL CHANNEL SYNCHRO/RESOLVER SIMULATOR.
50-2045 Hz ±30 ARC ACCURACY.

MODEL 3800C-8

SYNCHRO/RESOLVER SIMULATOR.
±30 ARC SECONDS ACCURACY.
PROGRAMMABLE VIA IEEE-488 FOR STATIC ANGLES OR CW/CCW ROTATION BETWEEN ±0.5° TO 360°/SEC.

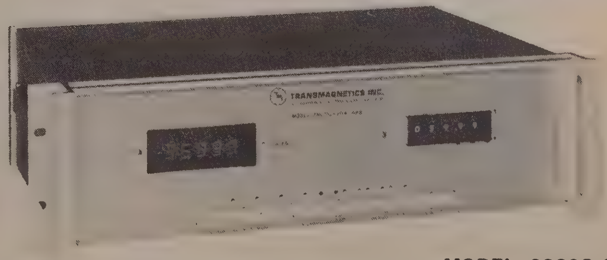


MODEL 3800C-6

SYNCHRO/RESOLVER SIMULATOR.
IEEE-488 PROGRAMMABLE.
50-2045 Hz ±30 ARC SECONDS ACCURACY.

MODEL 2623CC-39

TWO ANGLE POSITION INDICATORS WITHIN ONE ENCLOSURE. IEEE-488 COMPATIBLE, LATCHING CAPABILITY AND SYN/RSVR PROGRAMMABLE.



MODEL 3800C-10

SINGLE OR TWO-SPEED (18:1/36:1) SYNCHRO/RESOLVER SIMULATOR, IEEE-488 PROGRAMMABLE, DYNAMIC MODE, 50-2045 Hz ±30 ARC SECONDS ACCURACY.

TRANSMAGNETICS, INC.
DEPT. EM, 210 ADAMS BOULEVARD, FARMINGDALE, NEW YORK 11735
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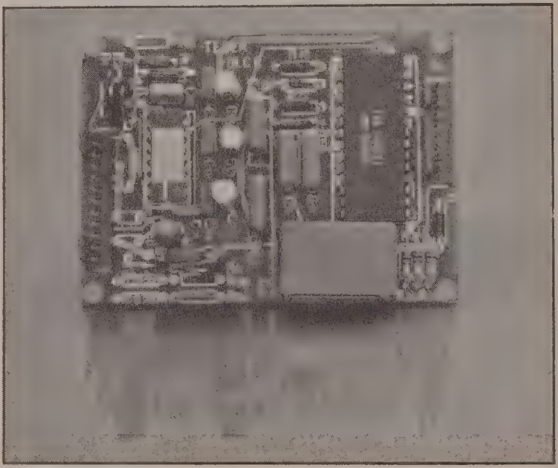
PROBLEM: Reliable, Stable, High Resolution Analog to Digital Conversion for Your Transducer at an Affordable Price

SOLVED



FEATURES

- Single power supply accommodates both the DLCC and the transducer it serves
- Resolution, adjustable, up to ± 1 count in 40,000
- Non-linearity: 0.01%
- Stable through a wide range of temperature changes:
  - — Zero Stability 0.005%/°C
  - — Span Stability 0.001%/°C
- Useable with any wheatstone bridge type transducer whose output ranges to 5.25 mV/V full scale
- Serial and multiplexed parallel outputs
- Ratiometric measurement method

The DLCC-LSI is a state of the art electronic unit which is the only link necessary between your transducer and a microprocessor. Combining sophisticated design with simple installation, the DLCC can accommodate either single or multiple transducers. It converts the inherently low transducer output into a digital signal of approximately 32,000 counts.

The DLCC operates ratiometrically. Thus, it requires only a single inexpensive 12 VDC low-current power supply to serve both its own power needs and those of the transducer.

Both the output of the DLCC (at zero input) and its span are factory adjusted: the zero to approximately −16,500 counts, and the span for net 30,000 counts at 2 mV/V signal. This output is provided in two digital formats: pulsed stream serial output, and multiplexed BCD parallel output. Zero adjustment and span adjustment can be carried out quite simply by the user.

SPECIFICATIONS

Inputs:	
Power supply	V_{supply} = 12 VDC ±5%
Current drain	20 mA + transducer current
Signal input range (full scale)	−0.0625 mV/V at maximum span adjustment to +5.357 mV/V at minimum span adjustment
Input impedance	10^6 Megohms
Reference (Sense)	Taken at transducer junction
Reference input impedance	10^3 Megohms
Outputs:	
Clock	120 KHz ±5 KHz, TTL*
Busy	TTL*
Polarity	TTL*
D_1, D_2, D_3, D_4, D_5	TTL
B_1, B_2, B_4, B_8	TTL
Conversion rate	3/sec
Conversion transfer function	7,000 to 40,000 counts/mV/V (adjustable)
Output for zero input	−19,999 counts to 0 counts/ mV/V parallel −30,001 counts to −10,001 counts/ mV/V serial
Overload indication	Parallel: display blinks Serial: display indicates ±30,001
Performance:	
Nonlinearity	±0.01%
Noise	±1 count
Environmental:	
Compensated oper. temperature range	−10°C to +40°C
Storage temperature range	−20°C to +80°C
Humidity	85% RH +20°C to +50°C
Physical characteristics:	3.25″ × 2.35″ × .60 max.

*These signals comprise serial communication.

TEDEA USA

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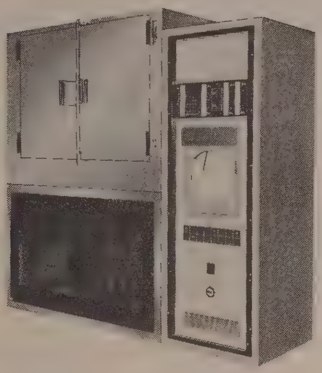
Telex: ITT 4998137 CELESCO CNPK

SUBSIDIARY OF hcc INDUSTRIES

BLUE M

ADVANCED CHAMBERS FOR CRITICAL WORK



FULL RANGE TEMPERATURE/HUMIDITY CABINETS

Feature PRO-CON Microprocessor-Based Programmer-Controller providing: dry bulb entry and digital display in °F. or °C. with 0.1° accuracy; direct R.H. input; zero crossover firing; split range control with dual P.I.D.; 98% R.H. truly obtainable; automatic refrigeration function; energy-efficient design. RS-232C computer interface, printer and wattage dissipation capability optional. Range: −18°C. to +93°C. (+200°F.) Popular sizes. Representative of a complete line of temperature/humidity chambers including exclusive air-cooled models.

MICROPROCESSOR CONTROLLED CHAMBERS

State-of-the-art instrumentation makes fully automated programmed operation a matter of pushing buttons. The only limitations in programming flexibility are the inherent capabilities of the chambers, and they, in turn, have been engineered to be completely compatible with the instrumentation. These facilities thus represent perfectly matched systems providing the finest, most reliable performance available today.

The list below shows the variety of Blue M chambers now available with this remarkable instrumentation. The Full Range Temperature/Humidity, described in detail above, is another, and typifies the quality of them all. Full information on them is available from your local Blue M Branch Office or from our headquarters.

VERSA-RANGE® TEST CHAMBERS — Standard and High-Powered high-low cabinets.

DUAL THERMAL SHOCK TEST CABINETS

INERT GAS OVENS — Standard (to +316°C.) and Ultra-Temp® (to +593°C.)

ULTRA-TEMP OVENS — to +704°C.

MECHANICAL CONVECTION HIGH-POWERED OVENS — to +343°C.

HIGH-POWERED INDUSTRIAL BATCH OVENS — to +316°C.

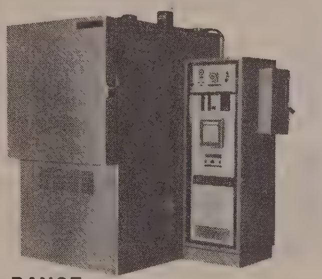
PHOTOELASTICITY OVENS

STABIL-GLOW® INDUSTRIAL BOX TYPE FURNACES — to +1177°C.

RAD-O-GLOW® GLOBAR® FURNACES — to +1450°C.

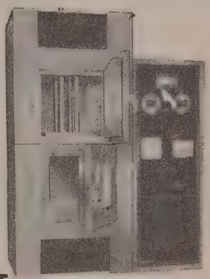
TEMP-O-LOY ANNEALING OVENS — to +704°C.

STABIL-THERM® LN_2 CONSTANT TEMPERATURE ENVIRONMENTAL CABINETS — from −120°C. to +300°C.



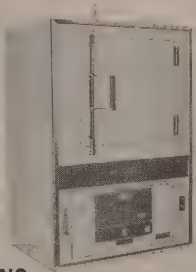
VERSA-RANGE REFRIGERATED TEST CHAMBERS

Two versatile ranges: −73°C. to +204°C. and −40°C. to +121°C. Sizes from 3 to 64 cu. ft. Also high powered microprocessor models, chest type chambers, and LN_2 units.



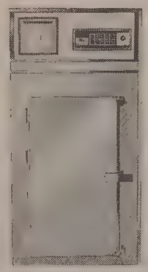
THERMAL SHOCK TEST CHAMBERS

Dual cabinets for Mil 202 and 883. Work chamber moves automatically between hot and cold chambers for in-spec performance. Also baths for liquid-to-liquid shock tests.



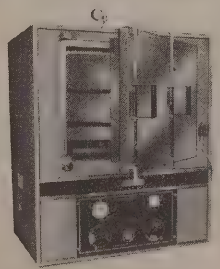
CLEAN ROOM OVENS

Provide Class 100 — or better — first air; 99.97% filtering of particles to 0.3 microns. Push-button operation. Also new Step Curing Epoxy Ovens for semiconductor industry processing.



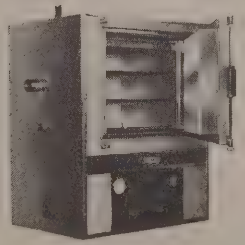
REDESIGNED BURN-IN OVENS

Ready for fixturing with all needed engineering, operational, and safety features built-in. Exclusive Digital Setpoint SCR Control has zero crossover SCR firing, balanced 3-phase operation.



INERT GAS OVENS

Complete line — from manual to fully automated control. To +593°C., sizes to 24 cu. ft. Also Life Test Ovens — manual or programmed, and Class A Batch Ovens.



FRICTION-AIRE, OVENS WITHOUT HEATERS

Air turbulence heats to +260°C. Three models U.L. Listed for Class 1, Group D service have +150°C. range. Others built to N.E. Code for Class 1, Group D locations.

BLUE M
A UNIT OF GENERAL SIGNAL

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EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

Built for Performance. Competitively Priced.

Temperature Chambers
Commercial Temperature
Commercial Temperature - High Performance
Military Temperature
Agree-Vibration
Temperature Cycle Burn-In
Bench Top Temperature Chambers
Cloud and Pour Chambers
Viscosity Test Chamber

Ovens
Burn-In
Refrigerated

Humidity Chambers
Commercial Temperature/Humidity
Military Temperature/Humidity
Bench Top Humidity Chambers
Panel Walk-In
Standard Construction Walk-In
Steady State High Humidity
Low Relative Humidity

Physical Test Chambers
Tensile Test Chambers
Impact Test Chambers
Wire Test Chambers
Insulated Wire Cold Bend
Freeze - Thaw Chambers

Remote Conditioners
Direct Expansion Modules
Air Temperature
Air Temperature/Humidity
Process Condensing Units
Hot & Cold Fluids
Equipment Cooling Air Units

Cold Traps
U.F.6 Processing Stations
Evacuation Processes
-120ºF Mechanically Refrigerated Systems

Walk-Ins
Calrimeters
Burn-In Chambers, Panel & Std. Construction
Temperature Chambers, Panel & Std. Construction
Automotive Cold Start
Drive-In Temperature/Humidity
Material Storage
Package Testing

Thermal Shock
2 Zone Air-to-Air, Military & Commercial
3 Zone Air-to-Air, Military & Commercial
2 Zone Liquid-to-Liquid, Military & Commercial
Multi-Zone Liquid-to-Liquid

Calibration Stands
Liquid
Air

Liquid Baths
Commercial
Military
Fluoro - Inert Systems
Production Chilling

Automotive Test Systems
Combustion Air Units
Sensor Stands
Carburetor Stands
Clutch Test Stands
Temperature/Altitude
Voltage Regulator Tester
Brake Test Systems

Process Chillers
Oil
Brine
Air
Special Fluids

Freezers
Biological:
Tissue Storage and Blood Processing Freezers
Industrial:
Epoxy & Aluminum Rivet Storage

Light Duty Production Chilling (-120°F)
Medium Duty Production Chilling (-120°F)
Heavy Duty Production Chilling (-120°F)
Mechanically Cooled Co$_2$ and Ln$_2$
Liquid Production Chilling

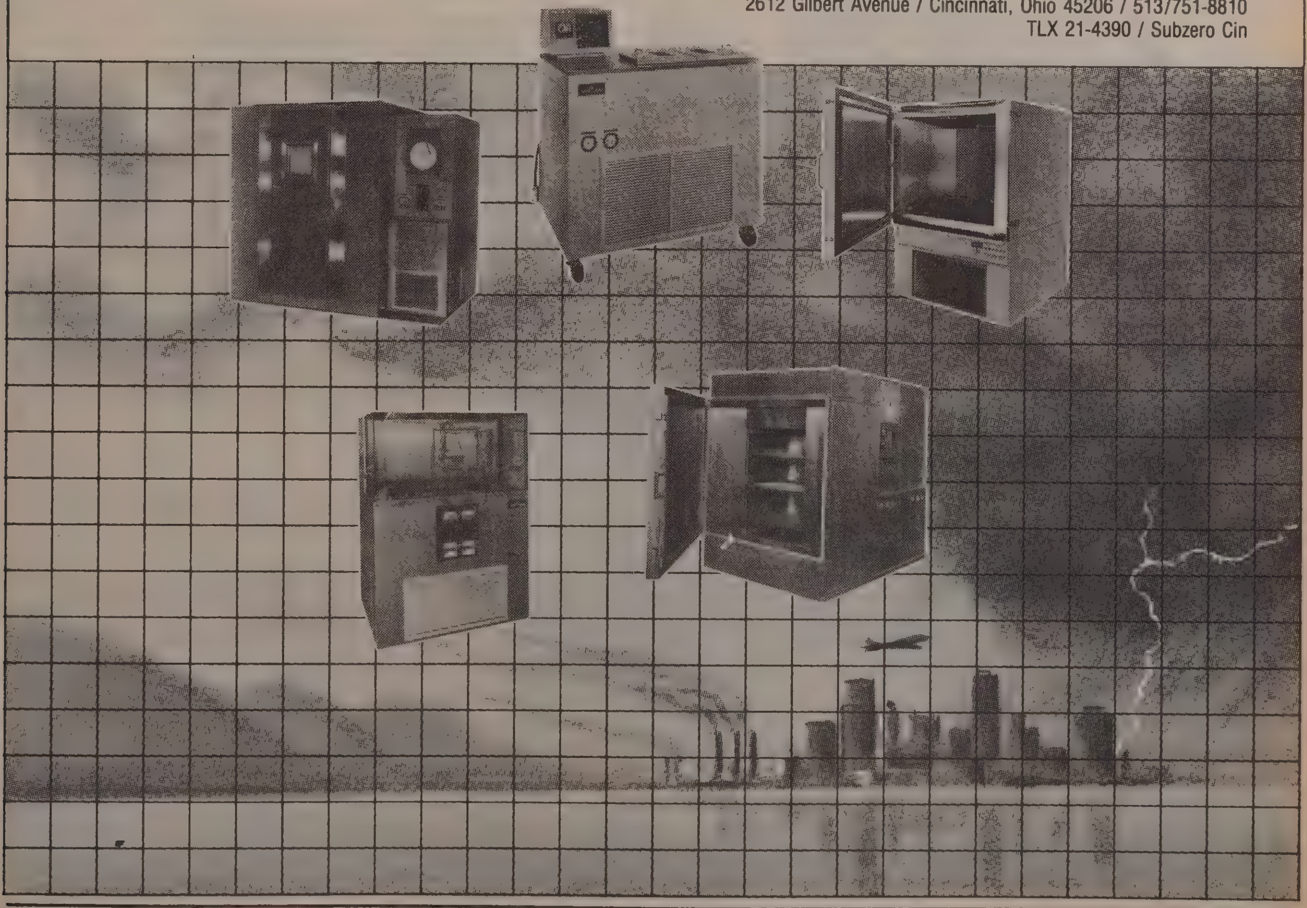
Custom Designs
High Temperature to +1000°F
S.A.E. Dust Chambers
Rain Chambers
Turnkey Systems

Production Systems
Valve Seat Freezers
Expansion Assembly/Shrinking Processes
Process Chillers
Conveyor Systems
Laser Coolers

Adverse Environment
Explosion Proof, Class I Group D
Radioactive
Corrosive

Cincinnati Sub-Zero

2612 Gilbert Avenue / Cincinnati, Ohio 45206 / 513/751-8810
TLX 21-4390 / Subzero Cin



MODEL 810 TEST-BENCH THERMO-PROBE

Puts exact heat where you want it for your IC tests

Model 810 Thermo-Probe lets you heat-test integrated circuit components with constant ease and accuracy. No ovens; no heat chambers. Everything's out in the open, where you're in control, where you can prevent damage to circuitry.

With Thermo-Probe you apply heat that is ±2°C accurate — or better — to integrated circuits, diodes, resistors, capacitors, and transistors, or any other kinds of components. You pinpoint heat-drift and thermo-electric problems. In just 60 seconds you have precise heat from +25 to +250°C right on your test bench.

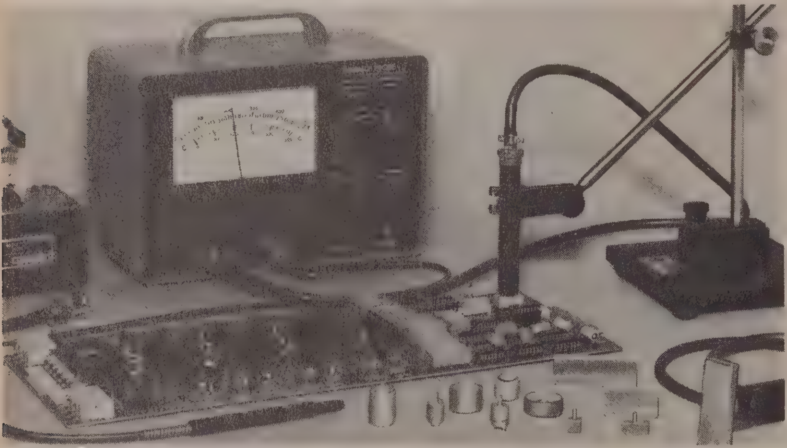
A reliable solid-state controller continuously monitors the probe temperature and regulates it to your setting on the control knob. You monitor the feedback circuit right on the direct-reading 4 x 4½-inch pyrometer. This analog readout lets you fine-tune the tip temperature when there's a difference between it and the overall probe.

The meter, by the way, has a shunt across the terminals to protect the instrument in transit, or any time there's no probe in place.

A separate thermocouple circuit can be used to read temperatures at the heat probe tip or at any spot along the thermal path. Or it can be used simply as a separate temperature-reading tool.

Tips are available for nearly any electronic component. Custom tips can be supplied to meet your special requirements.

All probes and tips are ordered separately.



SPECIFICATIONS: MODEL 810 THERMO-PROBE

AVAILABLE PROBES; C8229A (9 watt) and C8230A (35 watt). TC831 thermocouple sensing probe.

PROBE TEMPERATURE: +25 to +250°C.

ACCURACY: ± 2° Centigrade or better.

ELECTRICAL: 9 or 35 watts, 120 volts AC. (240V on request.)

CASE SIZE: 5 inches high, 6 inches wide, 9 inches deep (127.0 x 152.4 x 228.6 mm).

SHIPPING WEIGHT: 9 pounds (4.082 kg).

MODELS 35B & 35AB PRODUCTION-LINE THERMO-PROBES

Heat-test integrated circuits without production slowdown

Now you can heat-test semiconductor and individual electronic components right on the production line. And you can do it without expensive, cumbersome ovens or heat chambers.

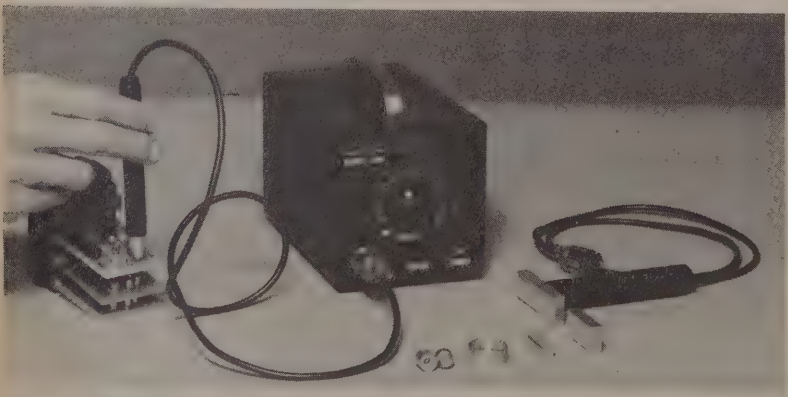
Thermo-Probe — Model 35B or 35AB — puts heat where you want it, right now. And it does so without risking oven-heat damage to expensive components.

Let Thermo-Probe go to work for you. Apply heat that is ±2°C accurate — or better — direct to integrated circuits, diodes, resistors, capacitors, and transistors to pinpoint heat-drift and thermo-electric problems. You now have accurate heat from +25 to +225°C (Model 35AB) right on your bench.

A reliable solid-state controller continuously monitors the probe temperature and regulates it to the temperature you set on the control knob. It takes no more than 60 seconds to bring the probe to this setting from ambient temperature (for Model 35AB; 40 seconds for 35B).

Tips are available for nearly any electronic component. Custom tips can be supplied to meet your special requirements.

All probes and tips are ordered separately.



SPECIFICATIONS: THERMO-PROBE MODELS 35B & 35AB

AVAILABLE PROBES: C229A (9 watt) and C230A (35 watt)

PROBE TEMPERATURE, MODEL 35B: +25 to +150°C.

PROBE TEMPERATURE, MODEL 35AB: +25 to +225°C.

ACCURACY: ±2° Centigrade or better.

ELECTRICAL: 9 or 35 watts, 120 volts AC. (240V on request.)

CASE SIZE: 4 by 4 by 6 inches deep (101.6 x 101.6 x 152.4 mm).

SHIPPING WEIGHT: 7 pounds (3.175 kg).

MTI MICRO-TECHNICAL INDUSTRIES

23666 BIRTCHER DRIVE, SUITE B, LAKE FOREST, CA 92630 • (714) 855-4326 • TWX: (910) 595-1745 • MICROTECH

SPECIAL TIPS FOR THERMO-PROBE COMPONENT HEATERS

TIPS FOR TRANSISTOR CASES

Case	Max. Case Dimensions inches (millimeters)	Part No.*	Case	Max. Case Dimensions inches (millimeters)	Part No.*
TO-1	.240 Dia. x .410 L (6.09 x 10.40)	01-109	**TO-54**	.200 Dia. x .010 L (5.08 x 0.25)	54-109
TO-2	.135 Dia. x .255 L (3.42 x 6.48)	02-109	**TO-55**	.340 Dia. x .195 L (8.64 x 4.95)	55-109
TO-3	.800 Dia. x .125 L (20.30 x 3.18)	03-135	**TO-56**	.195 Dia. x .140 L (4.95 x 3.56)	56-109
TO-5	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-57**	.425 Dia. x .155 L (10.80 x 3.94)	57-109
TO-7	.360 Dia. x .375 L (9.14 x 9.53)	07-109	**TO-58**	.245 Dia. x .290 L (6.22 x 7.37)	58-109
TO-8	.524 Dia. x .170 L (13.30 x 4.32)	08-135	**TO-66**	.505 Dia. x .215 L (12.80 x 5.46)	66-135
TO-9	.335 Dia. x .100 L (8.51 x 2.54)	09-109	**TO-70**	.240 Dia. x .020 L (6.09 x 0.51)	47-109
TO-11	.375 Dia. x .300 L (9.53 x 7.62)	11-109	**TO-73**	.335 Dia. x .185 L (8.51 x 4.70)	73-109
TO-12	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-74**	.335 Dia. x .185 L (8.51 x 4.70)	73-109
TO-16	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-75**	.335 Dia. x .185 L (8.51 x 4.70)	73-109
TO-18	.195 Dia. x .210 L (4.95 x 5.33)	18-109	**TO-76**	.335 Dia. x .185 L (8.51 x 4.70)	73-109
TO-22	.340 Dia. x .190 x .320 L (8.64 x 4.83 x 8.13)	22-109	**TO-77**	.335 Dia. x .185 L (8.51 x 4.70)	73-109
TO-23	.115 Dia. x .100 L (2.92 x 2.54)	23-109	**TO-78**	.335 Dia. x .105 L (8.51 x 2.67)	78-109
TO-24	.187 Dia. x .250 L (4.75 x 6.35)	24-109	**TO-79**	.335 Dia. x .105 L (8.51 x 2.67)	78-109
TO-28	.195 Dia. x .350 L (4.95 x 8.89)	28-109	**TO-84 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-29	.322 Dia. x .360 L (8.18 x 9.14)	29-109	**TO-85 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-33	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-86 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-36	1.000 Dia. x .187 L (25.40 x 4.75)	36-135	**TO-88 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-37	.320 Dia. x .260 L (8.13 x 6.60)	37-109	**TO-89 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-38	.500 Dia. x .375 L (12.70 x 9.53)	38-135	**TO-90 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-39	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-92**	.205 Dia. x .210 L (5.21 x 5.33)	92-109
TO-40	.240 Dia. x .459 L (6.10 x 11.60)	40-109	**TO-95 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-41	.880 Dia. x .300 L (22.40 x 7.62)	41-135	**TO-96**	.335 Dia. x .185 L (8.51 x 4.70)	73-109
TO-42	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-97**	.335 Dia. x .105 L (8.51 x 2.67)	78-109
TO-43	.335 Dia. x .260 L (8.51 x 6.60)	05-109	**TO-98**	.195 Dia. x .055 L (4.95 x 1.40)	98-109
TO-44	.240 Dia. x .459 L (6.09 x 11.60)	40-109	**TO-99**	.335 Dia. x .105 L (8.51 x 2.67)	78-109
TO-45	.360 Dia. x .375 L (9.14 x 9.53)	07-109	**TO-100**	.335 Dia. x .105 L (8.51 x 2.67)	78-109
TO-46	.200 Dia. x .030 L (5.08 x 0.76)	46-109	**TO-101**	.335 Dia. x .105 L (8.51 x 2.67)	78-109
TO-47	.240 Dia. x .020 L (6.09 x 0.51)	47-109	**TO-116 (Flat Pak)**	.660 L x .220 W (16.80 x 5.59)	116-109
TO-52	.200 Dia. x .085 L (5.08 x 2.16)	52-109	**TO-126 (Flat Pak)**	.330 L x .240 W (8.38 x 6.10)	84-109
TO-53	.685 Dia. x .300 L (17.40 x 6.85)	53-135	**TO-220 (Flat Pak)**	.500 L x .405 W (12.7 x 10.29)	220-109

TIPS FOR INTEGRATED CIRCUITS

Case	Max. Case Dimensions inches (millimeters)	Part No.*
Dual Inline 8 Pin	.500 L x .275 W (12.7 x 6.98)	DIC 8-109
Dual Inline 14-16 Pin	.750 L x .260 W (19.10 x 6.60)	DIC 14-16-109 DIC 14-16-135
Dual Inline 18 Pin	.875 L x .275 W (22.23 x 6.99)	DIC 18-109 DIC 18-135
Dual Inline 24 Pin	1.300 L x .600 W (33.00 x 15.20)	DIC 24-135
Dual Inline 40 Pin	2.00 L x .625 W (50.8 x 15.87)	DIC 40-135

TIPS FOR DIODE CASES

Case	Max. Case Dimensions inches (millimeters)	Part No.*
Tophat **DO-1**	.280 Dia. x .260 L (7.11 x 6.60)	01-209
DO-2	.280 Dia. x .260 L (7.11 x 6.60)	01-209
DO-3	.280 Dia. x .260 L (7.11 x 6.60)	01-209
Subminiature **DO-7**	.107 Dia. x .300 L (2.72 x 7.62)	07-209

TIPS FOR MISCELLANEOUS COMPONENTS

Case	Max. Case Dimensions inches (millimeters)	Part No.*
¼W Resistor		07-209
½W Resistor		1R-309
1W Resistor		2R-309
2W Resistor		3R-309
Submin. Xtal	.172 x .422 x .516 (4.36 x 10.72 x 13.10)	1C-309
Min. Xtal	.530 x .220 x .574 (13.50 x 5.60 x 14.60)	2C-309 2C-335

PROBES

Model	Probe	Part Number	Temperature
810	9-Watt Probe	C8229A	+25°C to +250°C
810	35-Watt Probe	C8230A	+25°C to +250°C
810	Thermocouple	TC831	+25°C to +250°C
35B	9-Watt Probe	C229A	+25°C to +225°C
35B	35-Watt Probe	C230A	+25°C to +225°C
35AB	9-Watt Probe	C229A	+25°C to +225°C
35AB	35-Watt Probe	C230A	+25°C to +225°C

*Last two digits indicate wattage of probe best suited for this tip.

Tips to fit many components not listed can also be supplied, per your sketch or drawing. If the desired size is not listed or if case type is unknown, order by component manufacturer's part number or describe as fully as possible giving maximum sizes.

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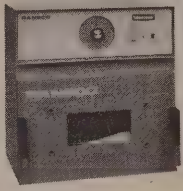
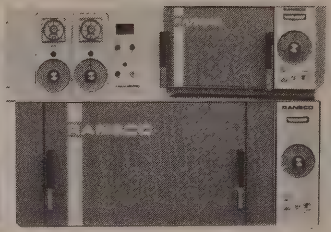
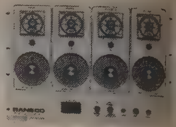
ENVIRONMENTAL SIMULATION EQUIPMENT

- Temperature: -300° to +1000°F
- Humidity: 5% RH to 95% RH
- Altitude: Ambient to 300,000 Ft.
- Sizes: 0.4 Cu. Ft. to 5000 Cu. Ft.

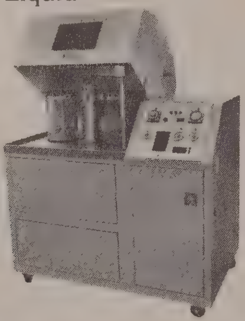




BENCH TEMPERATURE CHAMBERS

8 Models • Programmers • Fixtures

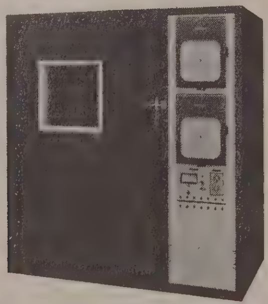
THERMAL SHOCK-TEMPERATURE CYCLING

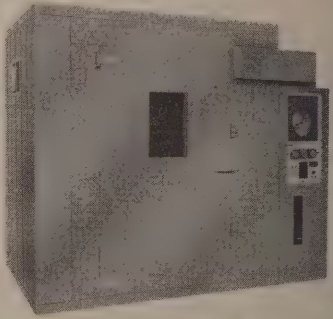
Liquid to Liquid
Air to Air
Vertical
Rotary



ENVIRONMENTAL SIMULATION CHAMBERS AND ROOMS

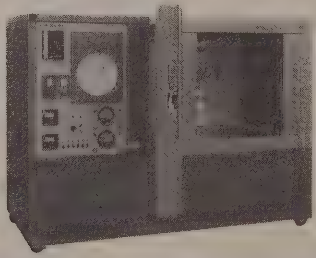
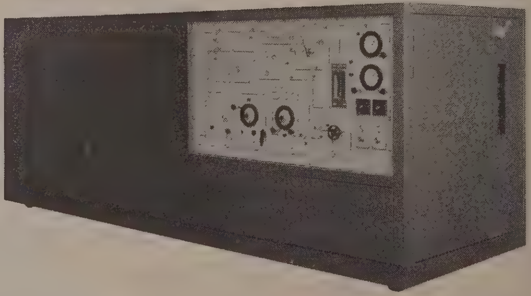
Temperature-Humidity
Temperature





CUSTOM DESIGN

Air or Fluid Conditioners
Temperature Processing
Product Testing
Vibration
Altitude

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A Subsidiary of **DESPATCH** INDUSTRIES, INC.

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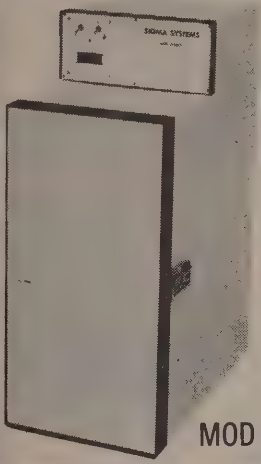
Sales and Service Offices in Principle Cities

TEMPERATURE BURN-IN/CYCLING LIFE TEST

CHAMBERS

THERMAL PLATFORMS "COLD PLATES"

PROGRAMMABLE BY: DIGITAL THUMBWHEEL-RESISTANCE-VOLTAGE - CYCLE TIMER

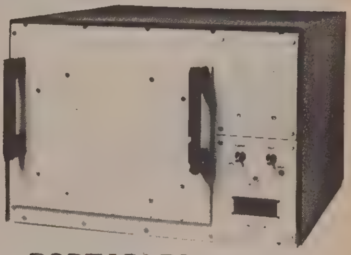


MOD 52

BENCH MODELS

42, 1.48 ft³
52, 1.83 ft³
100, 3.5 ft³
170, 6.0 ft³

IEEE 488 or RS232



MOD 18

PORTABLES

10, .46 ft³
18, .64 ft³
26, .92 ft³

MOD 170

FLOOR MODELS

100, 3.5 ft³
170, 6.0 ft³
600, 21.0 ft³

M-173 FRONT

M-173 REAR

DUAL ACCESS

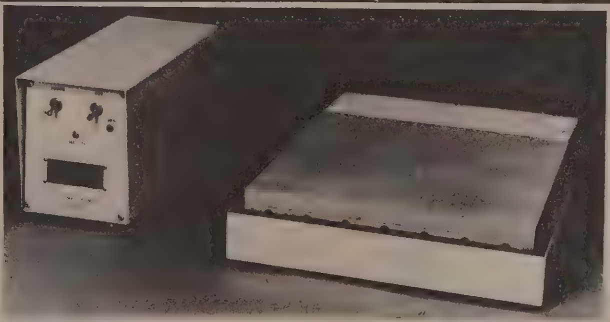
173, 6 ft³
369, 13 ft³

With hinged lift-off doors and interchangeable snap-off rear panels

FLOOR MODELS & DUAL ACCESS

Front and Rear Door Types-Cooled Mechanically, by CO_2, LN_2, Air, or Mechanically with LN_2 boost.

TP781



"COLD PLATE"

A conveniently open temperature control system for small components with a conductive surface.(11"x11")

RANGE: -65°C TO 200°C

SIGMA SYSTEMS CORPORATION

Leaders in the Chamber Industry since 1958
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SIGMA SYSTEMS CORPORATION
(FORMERLY DELTA DESIGN ENGINEERS, INC.)

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USE ONE OF THE NEW

EEMEDIATE ACTION CARDS

INSIDE THE BACK COVER OF
VOLUMES 1A, 1B & 2

SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
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SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

Tenney
ENGINEERING, INC.

ENVIRONMENTAL TEST EQUIPMENT

The Largest and Most Experienced Manufacturer of High Technology Environmental Test Equipment

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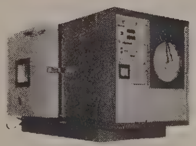
BENCHTOP TEMPERATURE CHAMBERS

Work space:
1¼ and 5 cubic feet.
Temperature range:
−80°C to +200°C

Bulletins 108 and 123

BENCHTOP TEMPERATURE-HUMIDITY CHAMBERS

Workspace:
3 and 5 cubic feet
Temperature range:
−73°C to +200°C
Humidity capabilities:
20% RH to 98% RH



Bulletins 101 and 123

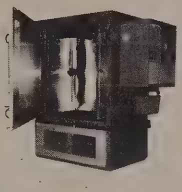
TENNEY SERIES HIGH-LOW TEMPERATURE AND TEMPERATURE HUMIDITY TEST CHAMBERS

Workspace:
6 cubic feet
64 cubic feet
Temperature range:
−80°C to +200°C
Humidity: Optional

Bulletins 104 and 144

TH & T SERIES MODERATE RANGE TEMPERATURE-HUMIDITY CHAMBERS

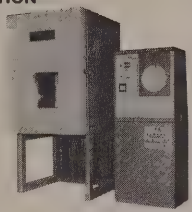
Workspace:
27 cubic feet and
65 cubic feet
Temperature range:
Low to −18°C
High to +93°C
Humidity: Optional



Bulletin 139

MIL-STD 781 AGREE TEMPERATURE- VIBRATION CHAMBERS

Size:
Available in
sizes for mating with
vibrator units having
table tops from
4 square feet to
40 square feet
MicroTenn Standard



Bulletin 105

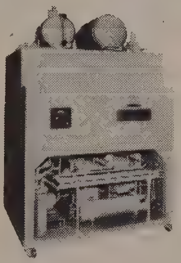
TENNEYSTRAT ALTITUDE- TEMPERATURE CHAMBERS

Workspace:
3.2 cubic feet thru
64 cubic feet
Temperature range:
−73°C to +200°C
Altitude: to 200,000 feet
Humidity: Optional

Bulletin 141

LOW TEMPERATURE PROCESS EQUIPMENT

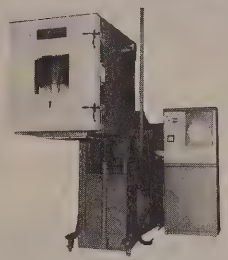
Packaged
Refrigeration Systems
Temperature range:
Low to −73°C
High to +121°C



Bulletin 114

VIBRATION/ TEMPERATURE CHAMBERS

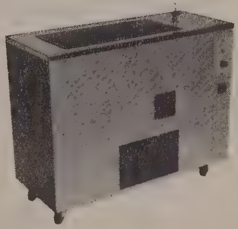
Workspace:
Standard from
5 cubic feet to
64 cubic feet
Temperature range:
−73°C to +200°C
Humidity: Optional



Bulletin 102

MULTI-RANGE PRECISION TEMPERATURE BATHS

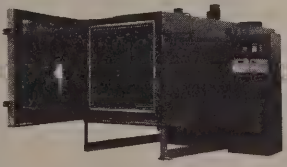
Workspace:
One gallon and
nine gallon
Temperature range:
−73°C to +120°C



Bulletins 107 and 125

CERT SYSTEMS

Combined Environment Reliability Testing Systems provide temperature, humidity, altitude, random vibration and cooling air simulation. Permits simulation of mission profile environments.



Bulletin 134

WALK-IN ROOMS

For burn-in, temperature, humidity, altitude and other controlled environment testing. Custom-engineered in unitized or semi-unitized packages as well as modular panels.

Bulletin 113

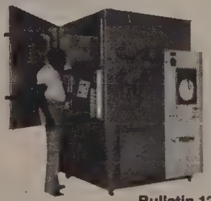
THERMAL VACUUM SPACE SIMULATORS

Workspace:
Standard 1½ feet to
6 feet diameters
Vacuum capability:
to 2×10^{-8} Torr.
Temperature
range: From
−196°C to +177°C

Bulletin 120

MECHANICALLY REFRIGERATED THERMAL SHOCK CHAMBERS

Workspace:
3, 5 and 8 cubic feet
Temperature range:
Top compartment
+200°C
Lower compartment
to −73°C
Center compartment
ambient optional
DigiTennStandard



Bulletin 121

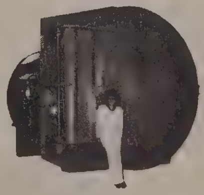
VACUUM CHAMBERS AND VACUUM OVENS

Workspace:
4 cubic feet thru
27 cubic feet
Temperature range:
to +150°C
Vacuum capability:
to 148 microns
(200,000 feet)

Bulletin 110

AUTOCLAVE SYSTEMS

Sizes:
Small laboratory
models to large
production units
Temperature range:
+400°C
Pressure to 800 psig.
Vacuum: Optional



Bulletin 122

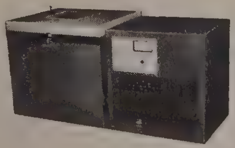
MICROTENN®

Microprocessor Programmer-Controller automatically signals chamber to perform programs entered via the keyboard or by the Microcassette transport. Computer interfaces are available.

Bulletin 137

TENNEY SUB-ARCTIC INDUSTRIAL CABINETS AND COLD STORAGE CHESTS

Workspace:
6 cubic feet thru
12 cubic feet
Temperature range:
Low to −84°C
High to +177°C



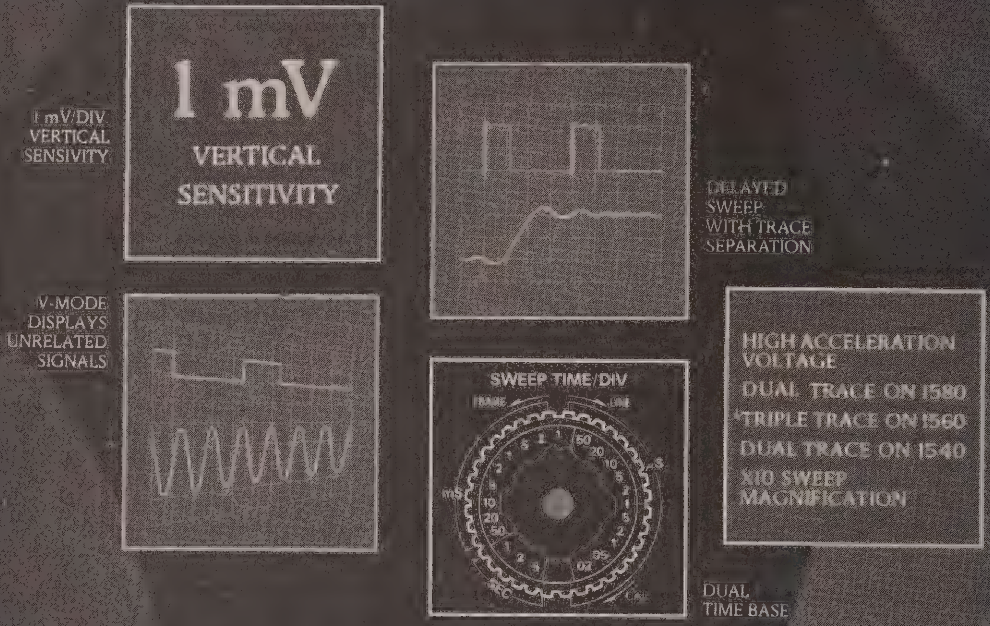
Bulletin 115

BURN-IN CHAMBERS

Size and number of doors may be specified to meet any burn-in requirement
Typical temperature range:
0°C to +60°C

Bulletin 133

Tenney Eng. Inc. 1982


1 mV/DIV
VERTICAL
SENSIVITY
1 mV
VERTICAL
SENSITIVITY
DELAYED
SWEEP
WITH TRACE
SEPARATION
V-MODE
DISPLAYS
UNRELATED
SIGNALS
SWEEP TIME/DIV
FRAME
LINE
mS
SEC
DUAL
TIME BASE

HIGH ACCELERATION VOLTAGE
DUAL TRACE ON 1580
TRIPLE TRACE ON 1560
DUAL TRACE ON 1540
X10 SWEEP MAGNIFICATION

Three new B&K-PRECISION scopes loaded with features at competition-busting prices.

60MHz 1560
$1,150

100MHz 1580 $1,595

40MHz 1540
$950

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South and Central American Sales, Empire Exporters, [illegible]

HANDHELD DIGITAL MULTIMETERS

Manufacturer	EEM Page No.	Model/ Series	No. of Digits	Maximum Readings					DC Accuracy (% Rdng.)	True RMS	Type Display
				Voltage (V)		Current (A)		Resistance MΩ			
				AC	DC	AC	DC				
Ballantine	3•1191	3100A									
BBC-Metrawatt/Goerz	3•1192	M2011	3½	650	650	2	2	20	0.5		LCD
		M2012	3½	650	650	10	10	20	0.25		LCD
F. W. Bell	3•1195	CG100A	—	600	600	100	100	—	2.0		
		CG100D	3½	600	1800	200	200	—	3.0		LCD
		PG200D	3½	600	600	300	300	—	1.0		LCD
North American Soar	3•1267	3025	3½								LCD
		3030/3050	3½								LCD
	3•1268	ME530	3½			10	10				LCD
		ME540	3½	750	1000	10	10	20	0.7		LCD
		ME550	3½	750	1000	20	20	20	0.8		LCD
	3•1269	8050	3½	750	1000	10	10	20	0.5		LCD
		3100	3½								LCD
		3430	4½	1000	1000	10	10	25	0.04	●	
Simpson	3•1302	470	4½	750	1000	10	10	19.99	0.15		LCD
		36013	3½	600	1000	10	10	20	0.25		LED
		467E	3½	750	1000	20	20	20	0.1	●	LCD
Triplett	3•1315	3400	3½	200	0.2	2	2	20	0.15		LCD
		3525	3½	500	200			200K	0.75		LCD

DIGITAL MULTIMETERS, NOT HANDHELD

Manufacturer	EEM Page No.	Model/ Series	No. of Digits	Maximum Readings					DC Accuracy (% Rdng.)	True RMS	Type Display	Battery Operated	Plug-in
				Voltage (V)		Current (A)		Resistance MΩ					
				AC	DC	AC	DC						
Ballantine	3•1191	Var.	3½	—	300	—	—	—	—	●	LED	●	
B&K Precision	3•1198	2817/18	3½	750	1000	10	10	20	0.1	●	LCD	●	
	3•1199	2807	3½	750	1000	10	10	10	0.5		LCD	●	
		2816	3½	750	1000	10	10	10	0.25		LCD	●	
		2806	3½	750	1000	10	10	10	0.7		LCD	●	
		2804	3½	750	1000	10	10	10	0.7		LCD	●	
BBC-Metrawatt/Goerz	3•1192	M2030/ 31/32	3½	600	600	20	20	20	0.1	●	LCD	●	
	3•1193	MA5D	4½	1000	1000	30	30	20	0.05	●	LCD	●	
Clarke-Hess	3•1209	258	3½	1000	1000	7	7		0.1		LED		●
		259	3½	340	650	7	7		0.25	●	LED		●
		255/56	3½	1000	1000	7	7		0.6	●	LED		●
Data Precision	3•1214	7500	5½	1000	1000			20		●	LED		●
		3600	5½	800	1200			20			LED		●
		3500	5½	1000	1000			12			Planar		●
		3501-5	5½		1200						LED		●
		3400R	4½	750	1000			20		●	LED		●
		2590	5½	800	1200	20	20	20			LED		●
		2480	4½	1000	1000	2	2	20			LED	●	●
		248	4½	500	1000	2	2	20		●	LED	●	●
		1351	3½	1000	1200	2	2	20			LED		●
IET Labs	3•1244	IMF-600	3½	750	1000	2	2	1000	0.5	●	LED		●
North American Soar	3•1267	5025	3½									●	●
A. W. Sperry	3•1304	6111/6221	3½	600	1000	10	10	200	0.5		LCD		
		8010	3½	750	1000	10	10	20	0.25				
		6500	3½	600	1000	10	10	200	0.5		LCD	●	
		3010	3½	750	1000	10	10	20	0.5		LCD	●	
		6590	3½	500	500			200	0.5		LCD	●	

HANDHELD ANALOG MULTIMETERS

Manufacturer	EEM Page No.	Model/ Series	Maximum Readings					DC Accuracy (% Rdng.)
			Voltage (V)		Current (A)		Resistance MΩ	
			AC	DC	AC	DC		
BBC-Metrawatt/Goerz	3•1192	MA1H	500	1000	5	5	1	5
			500	1000	15	15	1	2.5
North American Soar	3•1275	TC-202	1000	1000	—	—	2	3
		SX-220	1000	1000		10	1K	3
		SX-200	1000	1000		250 mA	1K	
		SX-100	1000	1000		250 mA	1K	
		SX-120	1000	1000		250 mA	1K	
Simpson	3•1302	165	1000	1000			1K	3
Triplett	3•1314	310-5	1200	1200		0.6	20	0.3
		60-2	1000	1000		1	10	2.0
		60-NA-2	1000	1000		1	100	1.5
	3•1315	310-1	600	600		1.2 mA	5000	3.0
		64		1000			1000	3.0

ANALOG MULTIMETERS, NOT HANDHELD

Manufacturer	EEM Page No.	Model/ Series	Maximum Readings					DC Accuracy (% Rdng.)	Battery Operated	Plug-in
			Voltage (V)		Current (A)		Resistance MΩ			
			AC	DC	AC	DC				
Ballantine	3•1191	3440 A		300					●	
IET Labs	3•1245	MV800		300					●	
Millivac	3•1263	MV-973A	300	1000	1	1	5000		●	●
Simpson	3•1302	260/7	1000	1000		10	2000	0.2	●	

FUNCTION GENERATORS

Manufacturer	EEM Page No.	Model/ Series	Frequency Range (Hz)		Functions	Sweep
			From	To		
B&K Precision	3•1201	3030	0.001	5M	sine, square, triangle, pos. square, neg. square, pos. ramp, neg. ramp	●
		3050	0.005	5M	sine, square, triangle, haversine	●
		3020	0.02	2M	sine, triangle, square, TTL square wave, pulse, tone-burst	●
	3•1202	3015	2	200K	sine, square, triangle	●
		3010	1	1M	sine, triangle, square, TTL square wave	
Krohn-Hite	3•1254	1000A	0.2	3M		
		1200A	0.2	3M		●
		1400	0.2	3M		●
		1600	0.2	3M		●
		2000	0.003	30M		
		2200	0.003	30M		●
		2400	0.003	30M		●
		5100B	0.002	3M		
		5200A	0.002	3M		●
		5300A	0.002	3M		●
		5400B	0.002	5M		
		5600	0.002	2M		
		5700	0.002	2M		
		5500AR	0.0001	5M		
		5900	0.0001	5M		
		5910	0.0001	5M		

SIGNAL GENERATORS

Manufacturer	EEM Page No.	Model/ Series	Frequency Range (Hz)		Modulation (Hz)		Features	
			From	To	From	To	IEEE-488 Compatible	Program-mable
B&K Precision	3•1201	3020	.02	2M				
Boonton	3•1204	1020/21	150K	540M				●
		1030	150K	180M				●
		102E/F	450K	520M	15	15K		
		103C/D	125K	175M				
Comstron	3•1210	1200	2M	1300M			●	●
Marconi	3•1258	2017	10K	1024M			●	●
		2018	80K	520M			●	
		2019	80K	1040M			●	
MCL Inc.	3•1391	15122/15222	10M	2500M	1K			
RE Instruments	3•1291	RE107	100K	150M	20	20K	●	●
		RE104	150K	130M			●	●
		RE101	150K	130M				
Wavetek	3•1318	3000	1K	1000M			●	●
		1062	1M	400M				
		2005	1M	4500M				
Weinschel	3•1319	VM-24	30	18G			●	

DIGITAL DELAY GENERATORS

Manufacturer	EEM Page No.	Model/ Series	Time Increments (ns)	Time Range (ns)	Trigger Rate (MHz)	Input Sensitivity (V)	Features		
							IEEE-488 Compatible	Program-mable	BCD Output
Berkeley Nucleonics	3•1203	7095	100 ps	0-100 μs	0-5	200 mV	•	•	•
		7030A	1	0-.01	0-10	250 mV	•	•	•
		7065	1	0-1.0	0-5	200 mV	•	•	•
		7075	1	0-1.0	0-5	200 mV	•	•	•
		7085	1	0-100	0-5	200 mV	•	•	•
		7050	10	0-10	0-5	200 mV	•	•	•
		7055	10	0-10	0-5	200 mV	•	•	•
		7020	100	0-10	0-1	100 mV	•	•	•
		7010	$100\text{-}10^3$	0-107	0-1	2	•	•	•
California Avionics Labs.	3•1206	201AR	1 μs	1 μs-100s				•	
		101AR	100	100 ns-10s				•	
		111AR	10	100 ns-1s				•	
		101CR	100	100 ns-10s				•	
		111CR	10	100 ns-1s				•	
		131BR	100 ps	50-1599.9				•	
		103BR	100	100 ns-10s			•	•	
		113BR	10	100 ns-1s			•	•	
		103CR	100	100 ns-10s			•	•	
		113CR	10	100 ns-1s			•	•	
		103DR	100	100 ns-10s			•	•	
		113DR	10	100 ns-1s			•	•	

PULSE GENERATORS

Manufacturer	EEM Page No.	Model/ Series	Frequency Range (Hz)		Optical Peak Power μW / Pulse Amplitude (V)	Elec-tronic	Optical
			From	To			
B&K Precision	3•1202	3300	5M	1		•	
Berkeley Nucleonics	3•1203	6010A	20M	500K	50 μW		•
		6010B	20M	500K	200 μW		•
		6010C	5M	100K	3 μW		•
		6020	—	150M	2 mW		•
North American Soar	3•1273	PG-905	1	10M	10	•	

CALIBRATORS, REFERENCES, STANDARDS, SOURCES

Manufacturer	EEM Page No.	Model/ Series	Device Type: Calibrator	References, DC Voltage	Standards	Sources	Parameters: Current, AC	Current, DC	Frequency	Phase Angle	Power	Resistance	Signal, Audio	Signal, Test	Thermal Voltage, AC/DC	Voltage (AC)	Voltage AC (RMS)	Voltage (DC)	Parameter Range: From - To Units	Readout: Analog	Digital	Features: Programmable	IEEE-488 Compatible
Astrosystems	3•1189		●		●	●	●		●	●				●		●			Ratio: 0-180°		●	●	●
Ballantine Labs.	3•1191	4003A	●		●	●	●	●	●	●	●	●		●	●	●						●	●
Bruel & Kjaer	3•1205		●										●										●
Clarke-Hess	3•1209	425/427	●														●		50 Hz-1000 KHz		●	●	
Comstron	3•1210					●													0.1-1300 MHz		●	●	●
Data Precision	3•1215	8200	●												●				All		●	●	●
Deak Technology	3•1216				●					●									2 Hz to 50 KHz		●		●
Dytronics	3•1219	311/RT			●					●									30 Hz to 10,000 Hz	●			
Electronic Development	3•1223	520A			●			●										●	100 mV-1000V		●	●	●
		501J			●		●	●										●	100 mV		●	●	●
		4500	●				●		●							●			100 µV-111 VAC		●	●	●
	3•1224	MV116-J		●	●	●												●	11V-100 mV				
		MV216A			●	●										●			±10V to ±100 mV				
		3210	●				●												100A, 10A, 1A				
		3200B	●				●	●											10A-1 mA				
	3•1225	CR103J			●			●										●	110 mA-11 mA				
		WMC-32	●				●	●								●			Watt/ Hour	●			
		4600			●											●			1000V-100 mV				
		4100			●				●										10 Hz-111 KHz				
Elgenco	3•1229	1600				●													Noise				
	3•1233	1800				●													Noise				
General Resistance	3•1239					●	●	●				●			●				to 100V				
Julie Research	3•1248	Locost	●				●	●								●		●	Ratio		●	●	
	3•1250	AVS/DVS				●												●		●		●	
		SCO-106		●											●								
		ZVR		●																			
		GTX				●																	
		TNB			●												●	●					
	3•1251	DMR/MRS/ PRO		●								●							.001 Ohms-100,000 Ohms				
		NB			●							●											
	3•1252	AC/CS/QC/ PA/RCD				●													10 Hz-100 KHz			●	
		PA	●																10 Hz-1 MHz			●	
North Atlantic Instrument	3•1277	530/20, 532			●				●										50 Hz-11 KHz		●		
Programmed Test Sources	3•1288					●			●										0.1 MHz-500 MHz				
Sensitive Resch. Instrs./Electrical Instr. Svc.	3•1297	C/S/N		●	●			●	●									●		●			
		D/MI		●	●		●	●	●								●	●		●			
Standard Reference Labs	3•1305			●	●													●	Ratio		●		
Weinschel	3•1319	VM-24	●						●										AM, FM		●	●	●
		II	●																10 MHz-18 GHz		●	●	●

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

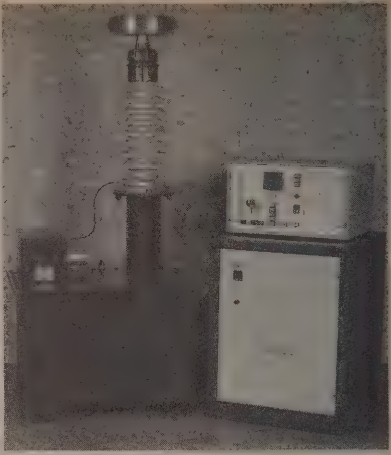
WPS word processing software

Y

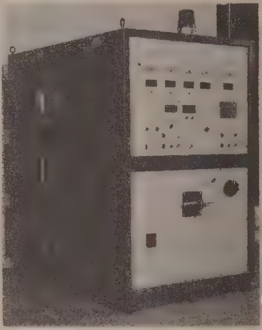
YIG yttrium iron garnet

Put Us to the Test . . .

AMERICAN HV TEST SYSTEMS manufactures a complete line of high voltage test equipment for testing in accordance with CSA, IEEE, NEMA, AEIC, IPCEA, ANSI, UL, ASTM, and other applicable standards. We are also the U.S. distributor for the high voltage test products of ASEA, Haefely, and Micafil, including large AC/DC test sets, impulse test sets, high voltage standard capacitors. Our commitment is to manufacture products of the highest quality which satisfy the needs of our customers. Technical excellence and innovation are our constant goals.


6100-30D

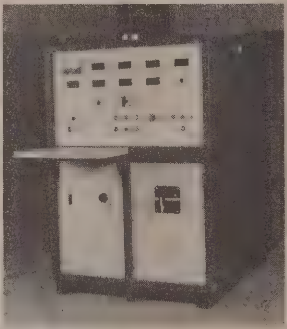
AC DIELECTRIC AND INSULATION TEST SETS. We offer four standard lines for AC dielectric and insulation testing of motors, cables, switchgear, transformers, bushings, capacitors, and so on, according to all applicable standards. Models are available from 3 to 300 kV and from 0.5 to 300 kVA. Each set is designed to provide optimum safety for the operator and the test object.


MTS 300

MTS 80-50D

AC and DC MOTOR TEST SETS. We offer a complete line of conservatively designed test sets for testing large, multi-horsepower AC motors, traction motors, and for other applications requiring a variable AC or DC power source. Standard models are available from 150 to 1000 kVA with output completely variable from zero to full voltage at taps up to 7200 volts. DC options are available to 750 V/400 A. We also offer MTS 80-50D for No Load start-up and testing of single-phase, poly-phase, and DC motors up to 200 hp.

TRANSFORMER TEST SETS. Power transformer test systems have been specifically designed for meeting test requirements and making measurements on single-phase and three-phase power transformers with ratings up to 50 MVA. We also manufacture TTS 155 specifically for testing three-phase distribution transformers with ratings from 75 to 2500 kVA and voltages up to 34.5 kV per ANSI C57. TTS 155 can also test single-phase distribution transformers with ratings from 10 to 500 kVA. Also available is TTS 17M, a roll-around unit designed for testing single-phase, pole- or pad-mount distribution transformers with ratings from 10 to 167 kVA.


TTS 155

1050 kV/3 A

RESONANT TEST SETS. We manufacture a complete line of AC Resonant Test Sets in both dead-tank and cascade designs. Output ratings are available up to 1500 kV and 6000 kVA. These sets offer distinct advantages over the conventional AC test transformer for testing capacitive type loads because of reduced input power requirements, corona-free operation, reduced size and weight, and the non-destructive nature of the test. We also offer a line of transportable resonant test sets with ratings up to 100 kV and 400 kVA for generator testing.

TTS 17M

We also manufacture DC Dielectric Test Sets, High-frequency Cable Aging Equipment, Load-Cycling Test Sets for Power Cables, Liquid Dielectric Test Sets, and Portable Megohmeters and Dielectric Test Sets.

AMERICAN

HV TEST SYSTEMS, INC.

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PRECISION INSTRUMENTATION

SYNCHRO/AC RATIO/POWER SUPPLIES

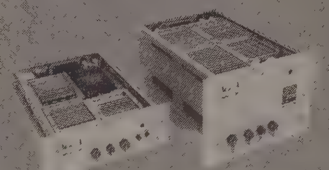
Programmable Ratio Transformer

Astrosystems Programmable Ratio Transformer Model #PRT101 provides from one to three independent ratio transformers in a single unit. Each of the ratio transformers provides 6 decades of voltage resolution with a range of zero to 1.099999. Typical ratio accuracy is better than 1 PPM. Voltage range is 0 to 130 volts AC for both inputs and outputs with a current rating of 500 ma.

Each ratio transformer can be connected with a common return or in the isolated mode. Output can be utilized in phase with the reference or 180° out of phase. A seven decade front panel LED readout is provided for each channel indicating programmed ratio.

The Programmable Ratio Transformer is designed for rack mounting with a 19" front panel and a panel height of 7". The unit features full Built-in Test (BIT) capability.

Programmable Synchro Simulators/Converters



Astrosystems programmable synchro units provide precision test and measurement signals for synchros and synchro based devices. These devices are primarily designed for use in ATE systems. The stimulus and measurement sections are fully programmable over a wide range of angles, voltages, frequencies and impedances.

Typical synchro resolver outputs are programmable over a full 360° range with a .01° resolution. Voltages are programmable from 5V to 140V and a frequency range of 60Hz to 10KHz. Input and output impedances are programmable from 0.1 ohms to 10 kilohms in increments of 0.1 ohms. Measurement and simulation is based on high accuracy tapped toroidal transformers which maintain their performance integrity over long periods without the need for field adjustment or recalibration. Modular construction allows for customizing to specialized ATE requirements.

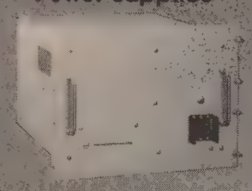
Synchro/Resolver/ Instrumentation

Astrosystems Synchro/Resolver Instrumentation is designed for test and calibration of synchros, resolvers, servos and similar devices. All units utilize high precision toroidal ratio transformers to generate and measure AC signals. Typical accuracies are better than 2 seconds of arc traceable to NBS.

Synchro/Resolver Standards—Synchro/Resolver Standards provide precise output voltage simulating synchro signals to an accuracy of 2 arc seconds. Standard resolutions are .0001°, .001° and 5°. Models are available to cover a full 60Hz to 10KHz frequency range.

Synchro/Resolver Bridges—Synchro/Resolver bridges are designed for high accuracy measurement of synchro/resolver signals. Typical accuracy is 2 seconds of arc. Input and output are fully isolated and the output error signal features a constant null gradient. Input impedance is nominally 500K. Frequency range is 60Hz to 10KHz, depending upon model selected. Standard resolutions are .0001°, .001° and 5°.

Programmable Power Supplies



Astrosystems Programmable Power Supplies provide a variable source of AC and DC voltage and power. These devices are ideal for automatic test equipment and other applications where power inputs must be precisely computer controlled and varied.

AC Sources—Series A2100 and A5500 programmable AC power supplies provide AC power programmable in amplitude and phase. A unique switching autotransformer design eliminates the need for high drive amplifiers resulting in reduced power dissipation and size. 1Ø, 2Ø and 3Ø models are available.

DC Sources—Series A1100 programmable DC power supplies provide a variable source of precisely controlled DC voltage, programmable over a 0-200 volt DC range. Units are fully protected by short current and over-voltage protection circuitry. Supplies and control circuitry are modular in design so that a custom multiple output chassis can be readily implemented.

IEEE-488 Bus Mate Compatible

Programmable instrumentation is implemented with an IEEE-488 GPIB bus using the latest version of the Control Interface Intermediate Language (CIIL). Overall control is exercised by an embedded Test Module Adapter (TMA) incorporating an 8088 processor.

asi astrosystems, Inc.
6 Nevada Drive • Lake Success, N.Y. 11042
516/328-1600 TWX: 510-223-0411

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MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
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Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
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Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
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Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

Ballantine Instrumentation . . . A Generation Jump Ahead

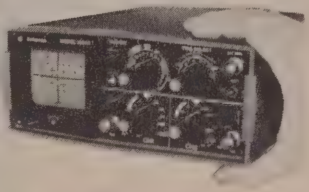
AUTOMATED CALIBRATION SYSTEMS

Fully configured turn key Ballantine COMPUTEST Automated Calibration systems make fast, high quality checks and calibrations of all major functions and modes of oscilloscopes up to state of the art 1 GHz bandwidth units. The systems provide full documented calibration certificate printouts. Calibration throughput can be improved up to 5 times compared with conventional manual methods. Operation is totally user-friendly and requires no programming experience. Three scope cal systems are available offering performance exceeding that of any competitive equipment and at savings up to 70 percent.

The Ballantine COMPUTEST 4003A System employs a Ballantine 6127A Programmable Oscilloscope Calibrator, designed and used in the U.S. Navy's MECCA automated oscilloscope calibration system, and computer control and interface is provided by an IBM PC computer, and high resolution color display to optimize system ergonomics. Ballantine's powerful software package drives the system to provide maximum versatility and simplicity of use. Systems can also be configured for automated calibration of voltmeters, ammeters, ohmmeters and multimeters using the same IBM PC and peripherals supplied with the 4003A Scope Cal System.

TRAVELSCOPES

For the engineer on the move who wants to lighten his workload, Ballantine's Series 1020 Travelscopes offer the smallest, lightest, toughest group of portable miniscopes available. Less than 5 pounds in weight, these instruments provide full professional 15 and 25 MHz oscillosope performance in a unit the size of a bench multimeter. Designed specifically for rugged field applications in computer service, communications, process plants, on shipboards, indoors or outdoors . . . anywhere. The full 4 x 5 cm CRT provides bright, high resolution displays in single or dual trace models. Rechargeable battery options allow complete off-line use. Compact and convenient, they can tuck in a tool kit, or sling on your shoulder, ready to provide reliable service without coddling.



AC & DC CALIBRATION STANDARDS

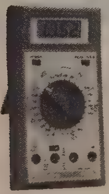
Ballantine provides metrologists a wide selection of AC/DC thermal transfer standards, coaxial thermal converters, micropotentiometers, and RF comparators. Automated AC/DC transfer measurements at high speed rates are achievable with the unique Ballantine 1600A Autobalance Transfer Standards. All units are NBS calibratable and traceable. A new precision AC and DC current source, the Ballantine 1620A Transconductance Amplifier, converts signal input voltages into proportional output current in the same phase and frequency as the input. Ranges are provided from 200 microamperes full-scale, to 100 amperes full scale, at frequencies from DC to 10 kHz. IEEE 488 bus option can be supplied.

DIGITAL MICRO-OHMETER

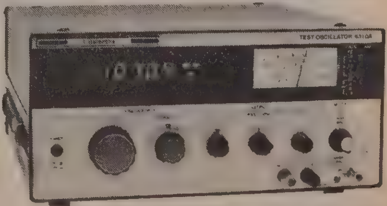
The 3½ digit Ballantine 3205A makes high accuracy, high resolution measurements of low resistance values by a true 4-wire method. Full scale ranges are provided from 2 milli-ohms to 200 Ohms with resolution to 1 micro-ohm. A pulse mode of operation minimizes self-heating errors, and allows non-destructive measurements of devices not rated for steady state currents. Push button operation and highly stable test circuitry makes for easy rapid testing. The 3025A is ideal for checks of switch and relay contacts, low resistance "wirewounds," PCB tracks, critical grounds and current paths, weld and bond quality, motor, generator and transformer coils, and more. BCD output of reading is optionally available. Pricing is substantially less than comparable units.

RF MILLIVOLTMETERS

Ballantine's 3440A 1.25 GHz Programmable RF Millivoltmeter features true rms response and NBS traceability for sine and non-sine waveforms. Ranges from 100 microvolts to 3 volts full scale, extendable to 300 volts by a probe divider. Basic accuracy is 0.1%. DB levels can be measured from −60 dBm to +60 dBm. An adjustable reference control eases gain/loss measurement. Unique circuitry and temperature stabilized probe assures stable, precise measurements, and neglible zero-drift. All ranges are programmable. Off-line operation is offered by an internal rechargeable battery option.



Ballantine also offers a wide selection of frequency counters, and portable digital multimeters, including a hand-held dmm with peak-hold capability — the 3100A. A new test oscillator, the 6310A, is also available to provide low distortion, sine wave signals from 2 Hz o 1.05 MHz at levels up to 14V rms into 600 Ohms. For full details on all products, contact Ballantine or your local representative.



Ballantine Laboratories, Inc.

P.O. Box 97, Boonton, New Jersey 07005, U.S.A., Telephone: 201-335-0900, TWX: 710-987-8380

FIVE DECADES OF INNOVATION IN ELECTRONIC INSTRUMENTATION

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Broomfield, Colorado 80020
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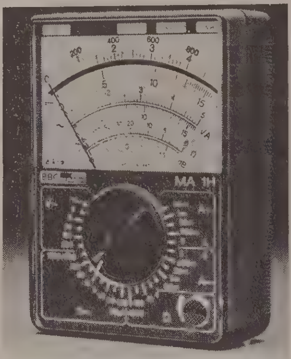
In CO: (303) 469-5231

Analog and Digital Multimeters

Rugged designs: High-impact cases are built for heavy-duty, "hands-free" operation. Extensive RF shielding insures top performance in high EMI environments. Recessed input jacks, safety-designed test leads and extensive input protection guard against accidental shock. All meters comply with tough VDE safety and DIN design standards for high-energy applications. Test leads and rubber boot included. Analog meters warranted for one year, digitals for three years.



◄ MA 1H Analog Multimeter
- Measures ac and dc current to 5A, voltage to 1000V and resistance to 1 MΩ
- -15 dB to +56 dB measurement range
- Large, easy-to-read 3.3 inch mirrored scale
- 2.5% basic accuracy
- **$ 54.00**

MA 2H Analog Multimeter ►
- All the capabilities of the MA 1H plus:
- AC and dc current to 15A
- 2.5% basic accuracy
- **$ 85.00**

◄ M 2011 Digital Multimeter
- 23 measurement ranges for ac and dc volts, ac and dc current and ohms
- Basic dc accuracy: ± (0.5% + 1 digit)
- 15 Hz to 4 kHz frequency response with full RF shielding
- Extra large 1/2 inch LCD display
- 2000 hour battery operation
- **$ 128.00**

M 2012 Digital Multimeter ►
- All the capabilities of the M 2011 plus:
- Current ranges to 10A ac/dc, 20A for 30 seconds
- Basic dc accuracy ± (0.25% of reading + 1 digit)
- **$ 149.00**

Unique Folding Multimeters

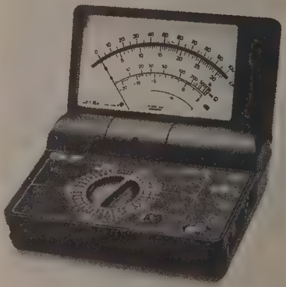
Ideal for both bench and field applications. Hinged analog or digital displays let the user select the optimum viewing angle. Adjustable neck strap frees both hands for probing with the test leads. When closed, meters shut themselves off. All models meet tough VDE safety and DIN design standards. Heavy-duty carrying case and safety-designed test leads included. Three years parts and labor warranty.

◄ M 2030 Folding Digital Multimeter
- 25 measurement ranges for ac and dc voltage, current and resistance
- Basic dc accuracy: ± (0.1% of reading + 1 digit)
- 10A ac and dc current ranges (20A for 30 seconds)
- 2000 hour battery life
- **$ 212.00**

M 2031 Folding Digital Multimeter ►
- All the features of the M 2030 plus:
- Diode, audible continuity and battery self-tests
- 4 low power (0.5V max. open circuit voltage) and 6 high power (2.3V max.) resistance ranges
- **$ 235.00**

◄ M 2032 True RMS Folding Digital Multimeter
- All of the features of the M 2031 plus:
- AC + DC coupled True RMS measurements of voltage and current
- Essential for measuring non-sinusoidal waveforms such as square waves, pulse trains and noise
- Basic ac accuracy: ± (0.75% of reading + 3 digits)
- **$ 259.00**

MA 3E Folding Analog Multimeter ►
- 46 measuring ranges for ac and dc voltage and current, dB and ohms.
- DC voltage accuracy: 1.5%; AC accuracy: 2.5%
- 10 MΩ FET input accepts most DMM accessories including temperature, high voltage and current probes.
- Large, 4-inch mirrored scale with shock resistant movement
- **$ 193.00**



BBC BROWN BOVERI GOERZ METRAWATT

BBC-Metrawatt/Goerz,
6901 W. 117th Avenue
Broomfield, Colorado 80020
Telex: 45-4540

1-800-821-6327
In CO: (303) 469-5231

30,000 Count Bench/Portable Multimeter

MA 5D Digital Multimeter

- 30,000 count display provides 50% more resolution than 4½ digit DMMs
- Resolution is equivalent to 5½ digit DMMs between 20000 counts and 30000 counts.
- Ideal for measuring 20 mA current loops and 24V aircraft power supplies
- 37 measuring ranges for ac and dc voltage and current, resistance, dB and capacitance
- High current (20A) range, 30A for 10 seconds.
- Basic dc accuracy: ± (0.05% of reading + 1 digit)
- True RMS measurements from 15 Hz to 20 kHz (ac coupled)
- Capacitance measurements from 0.01 nF to 3000 μF, 2 second settling time
- dB measurements from -60 dB to + 60 dB, referenced to 600Ω, 1 watt
- All functions and ranges selectable with two rotary switches
- Only two input jacks for all ranges except 20A
- Quick-clamping terminals for wire ends, components or cable lugs
- Rechargeable NiCad batteries with battery charger built in.
- **$ 595.00**

-2.9999
BBC
MA 5D

M 2050 Digital Scope Multimeter

A Digital Scope, Multimeter and Transient Recorder in One

- Lightweight, portable and battery-powered
- Scope and multimeter operate simultaneously
- Extremely easy to set up and use
- Make accurate DMM measurements, view trends and capture waveform data

Digital Storage Scope

- 50 kHz effective bandwidth, 500 kHz sample rate
- High-contrast 128 x 64 LCD dot matrix display
- Low power consumption delivers eight hours of continuous battery operation
- Eight time bases (0.1 ms/DIV to 6 min/DIV) with 4x memory zoom
- Ext/Int/Auto/Manual/Roll trigger selection
- Armed single-shot operation

3½ Digit Multimeter

- 32 measurement ranges for voltage, current and resistance
- 0.2% basic dc voltage accuracy
- AC measurements as low as 15 Hz
- Large, easy-to-read ½ inch LCD display
- Complete display annunciation
- Meets tough DIN design and VDE safety standards

Transient Recorder

- 2 independent 0.5k x 8-bit memories
- Flexible trigger capabilities (-100% to + 100% trigger delay, selectable in five steps)
- Optional dc analog output for making permanent records with a strip-chart recorder
- SAVE function prevents accidental overwriting of stored information
- Long-term memory will store data for 6 months

- **M 2050-01 DSM w/o analog output . . . $ 1,795.00**

- **M 2050-02 DSM with analog output . . . $ 1,995.00**

Hall Effect Gaussmeters

DESCRIPTION

Bell Gaussmeters are designed to accurately measure magnetic flux density. Twenty-eight models and 110 standard field probes meet the demanding requirements of most applications.

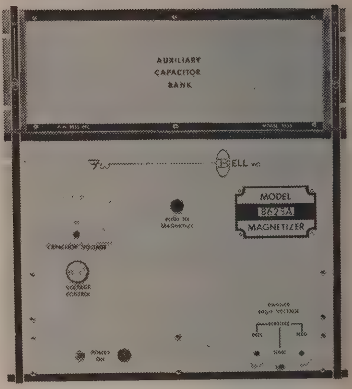
Bell Gaussmeters provide four magnetic field measurement models: direct measurement of absolute magnetic field density, differential measurement of the difference in magnetic field density at two probe locations, incremental field measurements using an expanded scale and summation measurements.

There are 110 standard probe models for each gaussmeter model. Each is a precision, solid-state, magnetic field sensor built into a rugged package for accurate, repeatable, stable, field measurements. Models available for transverse, axial, differential, two-axis, and three-axis measurements with a variety of field ranges, field sensitivities, and configurations for each.

SPECIFICATIONS

Gaussmeter Model	Ranges F.S. Gauss	Accuracy	dc Output Voltage F.S.
811 Digital	10 to 100,000	±0.1% F.S.	1 Volt
810 Field Monitor	10 to 100,000	±0.1% F.S.	1 Volt
660 Digital	1 to 100,000	±0.1% to 10 kG ±0.3% to 30 kG	1 Volt
640 Incremental	0.1 to 30,000	±0.25% F.S.	1 Volt/5 Volts
620 Precalibrated	0.1 to 30,000	±0.25% F.S.	1 Volt
615 Digital	10 to 100,000	±0.5% F.S.	100 mV BCD
610 Self-Calibrated	1 to 100,000	±0.5% F.S.	100 mV
600 General Purpose	100 to 30,000	±4% F.S.	1 Volt

Magnetizers



DESCRIPTION

Bell magnetizers are capacitive discharge power units designed to supply current pulses to a magnetizing fixture coil. The energy level of the pulse is variable and accurately repeatable.

Bell fixtures are designed to apply the proper pulsed magnetic field to the magnet or magnet assembly. The fixtures provide the field shape and direction to accommodate the specific magnet configuration and magnetization direction. Special fixtures that simulate specific magnetic circuits are available. F.W. Bell supplies fixture design assistance.

FEATURES

- FULLY SOLID-STATE
- LOW VOLTAGE FOR SAFETY AND LONG LIFE
- MANUAL OR AUTOMATIC OPERATION

SPECIFICATIONS

MODEL NUMBER	ENERGY MAXIMUM WATT-SEC	STORAGE VOLTAGE, VOLTS
860	600	35 to 350
861		
860 A	1200	
861 A		
870	1800	
871		
870 A	3000	
871 A		

F.W. BELL

An Allegheny International Company

6120 Hanging Moss Rd.
Orlando, FL 32807-3701
Phone: 305/678-6900
TWX: 810-853-3115

Hand-held Non-contact meters to measure Current•Power•Power Factor•Phase Angle

Current Gun® Probe Model CG100A Turns your multimeter or scope into a current meter

Current Gun Plus® Probe Model CG100D Hand-held digital current meter

Power Gun™ Probe Model PG200D Hand-held digital power meter

Power Factor Gun™ Probe Model PFG360D Hand-held digital power factor meter

No need to break the circuit to make fast, accurate readings with either the CG100A or CG100D. CG100A lets you use your DVM, multimeter or scope to read currents from dc to kHz. CG100D has its own large LCD presentation right in the handle and reads from dc to 1 kHz. Output jacks permit use of scope. Both instruments read from 0 to 200 amps.

Bell's hew hand-held power meter lets you easily measure real power to 199.9 kW, dc to 1 kHz with input ranges to 600 V and 150 A.

Reads power factor in all four quadrants, and phase angle in full 360°. Handles up to 200 A in voltage range from 50 to 480. Custom-formatted LCD shows power factor, lead, lag and current direction.

SPECIFICATIONS

	CG100A	CG100D	PG200D	PFG360D
OPERATING RANGE	±10A (dc or Peak ac) ±100 A (dc or Peak ac) 100% over-range capability* **	FS ±200 A dc or ac **	Power 0.01 kW—19.99 kW 0.1 kW—199.9 kW Voltage 20—480 V ac 20—600 V dc Current 2—150 A	Power Factor 0.0 lag. 1.0—0.0 lead (4 quadrants) Phase Angle 0—360° Voltage 50—480 V rms Current 1.5 A—200 A rms
ACCURACY	±2.0% of rated output	dc & ac (15 Hz to 100 Hz) ±0.75% FS to 100 A ±3.0% of reading 100 A to 200 A (dc to 1 kHz) ±1.5% FS to 100 A ±5.0% of reading 100 A to 200 A	<±1% of reading ±2 counts to 100 A <±1.75% of reading ±2 counts to 150 A	Phase angle ±2.5° (0—360°) @ 5 A—100 A rms 70 V—480 V rms 1° additional 1.5 A—5 A 2°additional 100 A—200 A 2° additional 50 V—70 V
FREQUENCY RESPONSE	dc to 1 kHz operable to 5.0 kHz*	dc to 1 kHz	dc to 400 Hz	Power Factor 45—65 Hz sine wave Phase Angle Same as power factor, including square and sinusodial wave forms
AUTOSCALING			20—160 V. 160 V—600 V	
TEMPERATURE RANGE	-10°C to +65°C	-15°C to +35°C	0°C to +50°C	0°C to +50°C
OUTPUT	±1 V/10 A ±1 V/100 A	±2 V / 200 A		
READOUT		3½ digit LCD with 5-second readout hold	3½ digit LCD with 5-second readout hold	3½ digit, custom-formatted LCD
APERTURE SIZE	0.75" (19 mm) closed diameter	0.75" (19 mm) closed diameter	0.75" (19 mm) closed diameter	0.75" (19 mm) closed diameter
POWER REQUIREMENT	4 "AA" cells	4 "AA" cells	4 "AA" cells	4 "AA" cells

*With slightly reduced accuracy
**500 A models available

F.W. BELL
An Allegheny International Company

6120 Hanging Moss Rd.
Orlando, FL 32807-3701
Phone: 305/678-6900
TWX: 810-853-3115

Current Meter

Model 1776

DESCRIPTION

The Bell Model 1776 digital current meter accurately measures ac, dc and ac-on-dc current with non-contact, clamp-on probes. No need to break the circuit to make a measurement. It's possible to obtain current measurements more easily and safely than voltage measurements, with complete isolation from the bus.

The 1776 digital current meter introduces virtually no resistance on dc readings and extremely small impedance on ac readings. Peak read-and-hold capability is standard. This permits you to read and hold the reading of the peak current appearing on the measured conductor. The 1776 is fully portable, operating from internal rechargeable batteries or 115/230 V, 50-60 Hz ac.

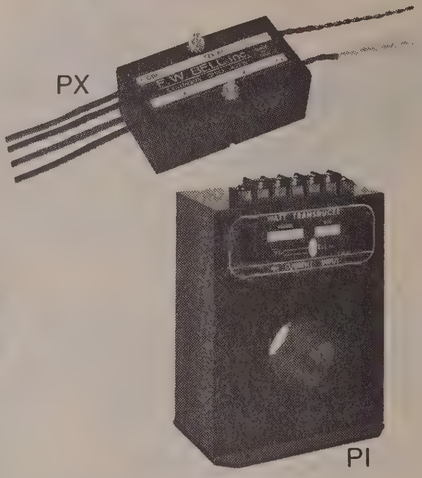
PROBES

Three standard probes are available. Others can be designed and supplied to meet special requirements. Each standard probe has a distinct full-scale range: 1000, 100 and 10 A. Probes are self-calibrating and interchangeable on any 1776 current meter. Special probes available upon request.

SPECIFICATIONS

Current Range (with applicable probe)	3000 A F.S. • 2000 A F.S. 1000 A F.S. • 100 A F.S. 10 A F.S.
Accuracy dc ac (Sinusoidal) Peak Detection (dc accuracy)	 ±1.0% F.S. ±1.0% F.S. ±2.0% F.S.
Frequency Response	dc to 5 kHz

Power Transducers



DESCRIPTION

Power transducers provide an accurate, convenient means of monitoring and controlling a broad variety of operations and processes. The unit senses the ac power being drawn, and provides a proportional dc output voltage which is a precise indicator of load peaks and motor efficiency.

Bell transducers are compact, accurate and dependable solid-state modules, utilizing a Hall generator, a Hall multiplier and appropriate circuitry to reduce the influence of low power factor and fluctuations in ambient temperature.

The output circuit is completely isolated from the input circuit, and it easily interfaces with meters, recorders, amplifiers and power control circuitry.

Bell PX 2000 and PX 4000 series transducers are designed for use with single- or three-phase power in a variety of frequency ranges, while the PI 5110 measures single-phase power in the 55-to-65 Hz range.

The PI 5110 is a through-hole, non-contact power measuring device. It is housed in a Noryl case with four mounting holes passing through the body. It is available with optional base mounting flange.

SPECIFICATIONS

	PX 2000 Series	PX 4000 Series	PI 5110
Rated Power Levels	50-20 kW	1 kW-20 kW	0-20 kW
Rated Current Levels	0.5-20 A	5 A	50 A
Rated Voltage	120-220 V	220 V	220-440 Vac

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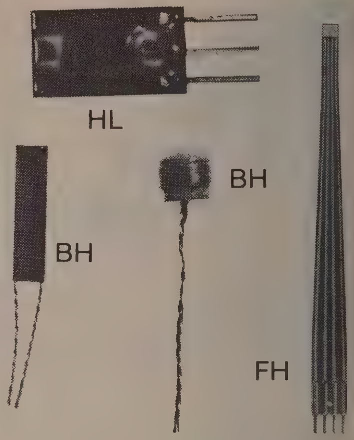
Hall Generators



DESCRIPTION

Bell Hall effect generators are solid-state components that provide a voltage output proportional to ambient magnetic flux density. Their operating characteristics permit virtually any application: frequency, dc to MHz; magnetic flux density, milligauss to kilogauss; linearity to 0.1%; temperature, −269° C to +100° C.

BH-200
General Purpose Transverse
BH-201
Ultra-Thin Transverse
BH-202
Small Axial
BH-203
General Purpose Axial
BH-204
Midget Axial
BH-205
Midget Transverse
BH-206
High Sensitivity Transverse
BH-207
High Resolution Tangential
BH-208
Ultra-Midget Axial
BH-700
Low Cost Transverse
BH-701
High Linearity Transverse
BH-702
Ferrite Imbedded
BH-703
3-Axis
FH-301
Thin Film
FH-302
Thin Film
FH-500
Thin Film
HL-100
Hybrid Linear

APPLICATIONS

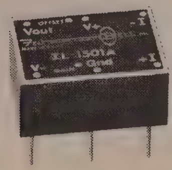
Current sensors, Guidance systems Brushless dc motors, Magnetic fiel measurements, Proximity sensors Power transducers.

SPECIFICATIONS

	Bulk	Thin Film
Control Current Ic	100 to 200 mA	15 to 30 mA
Input Resistance, Rin	1 to 4 ohms	20 to 80 ohms
Output Resistance, Rout	1 to 4 ohms	50 to 200 ohm
Magnetic Sensitivity, λ_B	from 6 to 16 mV/kG, standard 55 mV/kG, high sensitivity	

dc & ac Current Sensors

IF



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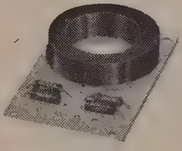

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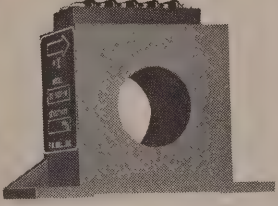

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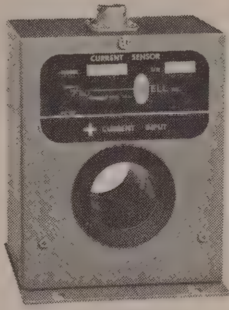
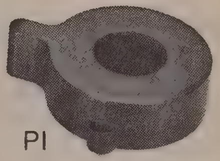


IA



PI

MB

DESCRIPTION

Bell Current Sensors are small, lightweight, inexpensive devices for non-contact current measurements to 3000 A dc or peak ac up to 1 kHz.

The sensors are non-contact, Hall-effect devices, offering no dc insertion loss, power loss, isolation or heating problems.

The Hall-effect sensor is a four-pole, magneto-sensitive device mounted in the core gap, and reads the magnetic field surrounding the conductor passing through the gap. The field is proportional to the unknown current, and the output voltage of the Hall generator is proportional to this magnetic field, thus proportional to the current.

Various units in the broad line of F.W. Bell current sensors find applications in the automotive, aerospace, industrial and power generation fields.

FEATURES

- **Fast-responding**
- **Non-contact operation**
- **Output voltage isolation from input**
- **Very low insertion impedance**
- **Minimal distortion from adjacent conductors**
- **Amplified and non-amplified models available**
- **Models for mounting directly on PCBs**

TYPICAL APPLICATIONS

- **Monitoring and control of dc motor circuits**
- **Overload sensor in dc power supplies**
- **Control of dc motor-driven machine tools**
- **Replacements for shunts, particularly in hostile environments, in airborne circuits and when isolation is required**
- **Monitoring and control of battery load and charge circuits**
- **Current sensing element in feedback circuits, on interlocks and on dc circuit breakers**
- **Process control element in dc-operated processes**
- **Power measurement in dc power circuits**

F.W. BELL
An Allegheny International Company

6120 Hanging Moss Rd.
Orlando, FL 32807-3701
Phone: 305/678-6900
TWX: 810-853-3115

SPECIFICATIONS

MODEL	RATED CURRENT dc & ac	RATED OUTPUT	ACCURACY
ID-5001M	350 A	0.5—1.1 mV/A	±2% RO
ID-5101M	100 A	0.5—1.1 mV/A	±2% RO
ID-5011M	350 A	0.5 mV/A	±2% RO
ID-5111M	100 A	0.5 mV/A	±2% RO
ID-5021M	350 A	0.5 mV/A	±2% RO
ID-5031M	350 A	0.5 mV/A	±2% RO
IB-5001M	350 A	0.5—1.1 mV/A	±2% RO
IB-5101M	100 A	0.5—1.1 mV/A	±2% RO
IB-5011M	350 A	0.5 mV/A	±2% RO
IB-5111M	100 A	0.5 mV/A	±2% RO
IA-5023P	250 A dc	10 V dc	±0.5% RO
IA-5022P	500 A dc	10 V dc	±0.5% RO
IA-5021P	1000 A dc	10 V dc	±0.5% RO
IA-5020P	2000 A dc	10 V dc	±0.5% RO
IA-5024P	3000 A dc	10 V dc	±0.6% RO
IA-5025P	100 A dc	10 V dc	±0.5% RO
IF-5003M	250 A	0.3—0.6 mV/A	±0.5% RO
IF-5002M	500 A	0.15—0.3 mV/A	±0.5% RO
IF-5001M	1000 A	0.15—0.3 mV/A	±0.5% RO
IF-5000M	2000 A	.05—0.1 mV/A	±0.5% RO
IF-5004M	3000 A	.05—0.1 mV/A	±0.6% RO
IF-5023P	250 A	10 V dc	±0.5% RO
IF-5022P	500 A	10 V dc	±0.5% RO
IF-5021P	1000 A	10 V dc	±0.5% RO
IF-5020P	2000 A	10 V dc	±0.5% RO
IF-5024P	3000 A	10 V dc	±0.6% RO
IL-1501A	100 mA	1 V	±1% RO
IL-151A	1 A	10 V	±1% RO
IL-155A	5 A	5 V	±1% RO
PI-100	0-100 A	0.5—1.1 mV/A	±1.5% RO
PI-350	0-350 A	0.5—1.1 mV/A	±1.5% RO
PI-600	0-600 A	0.25—0.55 mV/A	±2% RO
MB-1020	0-20 A	0.5 mV/A	±1% RO
MB-1050	0-50 A	0.5 mV/A	±1% RO
MB-1120	0.20 A	0.5 mV/A	±1% RO
MB-1150	0-50 A	0.5 mV/A	±1% RO
MB-1220	0-20 A	0.5—1.1 mV/A	±1% RO
MB-1250	0-50 A	0.5—1.1 mV/A	±1% RO

B+K PRECISION DYNASCAN CORPORATION / DIGITAL MULTIMETERS

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

NEW 3½ DIGIT TRUE RMS PEAK HOLD DIGITAL MULTIMETER

Model 2818 / $215.00

NEW 3½ DIGIT PEAK HOLD DIGITAL MULTIMETER

Model 2817 / $175.00

FEATURES

• 0.1% DCV accuracy • 1000 hours continuous battery life • True rms-sensing AC volt and amp ranges on 2818 • Peak hold on volt and amp scales • 10 A AC and DC ranges • 3½ digit LCD display with annunciators • Single rotary switch operation • Low-battery indicator • Diode check • Audible continuity check • Transient and overload protected • High energy fuse • Ruggedized case with safety-designed test lead system.

The Models 2817 and 2818 are full function digital multimeters that provide 0.1% VDC accuracy, True rms AC voltage and current readings, peak hold for measuring current and voltage surges, audible continuity check, diode check, overload and transient protection, and convenient single rotary switch to meet a wide variety of applications.

The Models 2817 and 2818 provide manual range selection of all functions.

DC voltage measurement ranges include 200 mV, 2 V, 20 V, 200 V, and 1000 V.

AC voltage ranges include 200 mV, 2 V, 20 V, 200 V, and 750 V.

Input impedance is 10 MΩ.

Ohm ranges include 200Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, and 20 MΩ.

AC and DC current ranges include 200 μA, 2 mA, 20 mA, 200 mA, and 10 A.

A diode test measures the forward voltage drop of a semiconductor junction at approximately 0.6 mA. Reverse drop reads approximately 1400 counts.

Continuity checks are annunciated by an audible tone.

The 2818 is overload and transient protected. A high energy fuse is incorporated in the unit.

Power is provided by a 9 V battery (NEDA 1604) type.

SPECIFICATIONS

(+18°C to +28°C at relative humidity up to 80% unless noted.)

DC VOLTAGE

Range	Maximum Indication	Input Resistance	Overload Protected to (DC+Pk. AC)
200 mV	±199.9 mV	10 MΩ	±1100 V
2 V	±1.999 V	10 MΩ	±1100 V
20 V	±19.99 V	10 MΩ	±1100 V
200 V	±199.9 V	10 MΩ	±1100 V
1000 V	±1000 V	10 MΩ	±1100 V

Accuracy: ± (0.1% of input + 1 count)
Sensitivity: 100 μV on 200 mV Range.
Full Range Step Response: 1 second maximum to rated accuracy). Normal Mode Rejection: 55 dB minimum at DC, 50 Hz, & 60 Hz. Common Mode Rejection: 100 dB minimum at DC, 50 Hz & 60 Hz (with 1 kΩ unbalance).

AC VOLTAGE (True rms — sensing; AC coupled. Average Sensing, rms calibrated sinewave on 2817)

Accuracy:

Range	Maximum Indication	40 Hz-1 kHz	1 kHz-2 kHz	2 kHz-5 kHz	5 kHz-10 kHz
200 mV	199.9 mV	±(0.5% +5)*	±(0.75% +5)*	±(2.5% +5)*	±(5.0% +7)*
2 V	1.999 V				
20 V	19.99 V				
200 V	199.9 V		—	—	—
750 V	750 V		—	—	—

* (% of Input + No. of Counts)

Input Resistance: 10 MΩ and <50 pF.
Overload Protected to: ±1100 V (DC + Peak AC); except 200 mV range ±400 V (DC + Peak AC).

Sensitivity: 100 μV on 200 mV Range.
Crest Factor: 3. Full Range Step Response: 3 seconds maximum (to rated accuracy).

RESISTANCE

Range	Maximum Indication	Test Current	Open Circuit Voltage	Overload Protected to
200 Ω	199.9 Ω	1 mA	1.25 V	250 VRMS
2 KΩ	1.999 KΩ	0.4 mA	0.75 V	250 VRMS
20 KΩ	19.99 KΩ	75 μA	0.75 V	250 VRMS
200 KΩ	199.9 KΩ	7.5 μA	0.75 V	250 VRMS
2 MΩ	1999 KΩ	0.75 μA	0.75 V	250 VRMS
20 MΩ	19.99 MΩ	75 nA	0.75 V	250 VRMS

Accuracy: ±(0.25% of input + 3 counts): 200Ω. ±(0.25% of input + 1 count): 2 kΩ-200 kΩ. ±(0.5% of input + 1 count): 2 MΩ. ± (1.0% of input + 2 counts): 20 MΩ.
Sensitivity: 0.1Ω on 200Ω range. Full Range Step Response: 1 sec., except 3 sec. on 2 MΩ range, and 8 sec. on 20 MΩ range.

DC CURRENT

Range	Maximum Indication	Burden Voltage (Max.)	Overload Protected to
200 μA	±199.9 μ	.25 V	±.5A (Fuse)*
2 mA	±1.999 mA	.25 V	±.5A (Fuse)*
20 mA	±19.99 mA	.25 V	±.5A (Fuse)*
200 mA	±199.9 mA	.7 V	±.5A (Fuse)*
10 A	±10.00 A	.25 V	±10A (None)

* Includes High Energy Fuse

Accuracy: ±(0.5% of input + 1 count) exception 200 mA and 10 A ranges, ±(1% of input + 1 count).
Sensitivity: 100 nA on 200 μA range.

AC CURRENT (True rms-Sensing: AC coupled on 2818)
Accuracy: (Average Sensing, RMS calibrated sinewave on 2817)

Range	Maximum Indication	40 Hz-1 kHz	1 kHz-5 kHz	Overload Protected to
200 μA	199.9 μA	±(1.0% +5)*	±(2.5% +5)*	.5 A (Fuse)**
2 mA	1.999 mA			.5 A (Fuse)**
20 mA	19.99 mA			.5 A (Fuse)**
200 mA	199.9 mA	±(1.5% +3)*		.5 A (Fuse)**
10 A	10.00 A		—	10 A (None)

* (% of input + No. of counts)

** Includes High Energy Fuse

Burden Voltage: 0.25 V max. all ranges, except 200 mA (0.7 V max.).
Sensitivity: 100 nA on 200 μA range.

Full Range Step Response: 3 seconds maximum.

PEAK HOLD (For all functions except resistance)
Accuracy: DC ±(1% + 7). AC ±(2% + 7) 40 Hz-1 kHz.
Acquisition Time: DC: 5 ms minimum duration. AC: 200 ms minimum duration.
Display Decay Rate: 0.2 count per second.

DIODE TEST
Measures forward voltage drop at approx. 0.6 mA. Open V. approx. 2.8 V.

CONTINUITY CHECK
Audible tone and symbol with 20Ω ±10Ω. 50 μs response time.

MAXIMUM COMMON MODE VOLTAGE
1000 V (DC + PEAK AC) between any input terminal and power line (earth) ground.

DISPLAY
Numerical Display: 3½ digit; 7 segment, Liquid Crystal Display (LCD) type with "Low Battery" indication and annunciators.
DC Polarity Selection: Automatic "—" sign indicated, "+" sign implied.
Overrange Indication: Most significant digit on, others off.
Transient Protection: 6 kV for 10 μSec max. (all voltage and resistance ranges).

POWER
Battery Type/Life: One 9-Volt "transistor" battery. Alkaline: NEDA 1604 A/1000 hrs. nominal. Carbon Zinc: NEDA 1604/600 hrs. nominal.

TEMPERATURE RANGE
Operating: 0°C to +50°C.
Storage: −20°C to +60°C.

TEMPERATURE COEFFICIENT
(from +0°C to +18°C and from +28°C to +50°C). Less than 0.1 times the accuracy of the function and range being used per °C.

HUMIDITY RANGE
+0°C to +35°C, 90% max. non-condensing. +35°C to +50°C, 70% max. non-condensing.
Dimensions (HxWxD): 39 x 88 x 168 mm (1.54 x 3.46 x 6.61").
Weight: Approx. 1 lb. (454 gm).

ACCESSORIES SUPPLIED
Test leads, spare fuse, 9V battery, and instruction manual.

OPTIONAL ACCESSORIES
Carrying Case LC-110, Demodulator Probe PR-32, Isolation Direct Probe PR-21, Replacement Test Leads FP-30, Temperature Probe TP-28, Thermocouple Temperature Probe TP-30.

B+K PRECISION **DYNASCAN CORPORATION / DIGITAL MULTIMETERS**

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

NEW HIGH-ACCURACY 3½ DIGIT AUTO/MANUAL RANGING DMM

Model 2807 / $115.00
0.5% DCV accuracy
Model 2816 / $150.00
0.25% DCV accuracy

FEATURES

• 500 hours continuous battery life • Auto-ranging/manual ranging on volt and ohm scales • 10A AC and DC ranges • Convenient single rotary switch • 3½ digit LCD display with annunciators • Low-battery indicator • Diode check • Audible continuity check • Transient and overload protected • High energy fuse • Ruggedized case with safety-designed test lead system.

SPECIFICATIONS

(+18°C to +28°C at up to 80% R.H. unless noted.)

DC VOLTAGE (AUTO/MANUAL RANGING)

Range	Maximum Indication	Input Resistance (MΩ)	Overload Protected to (DC+Pk. AC)
200 mV	±199.9 mV	1000	±1100 V
2000 mV	±1999 mV	11	±1100 V
20 V	±19.99 V	10	±1100 V
200 V	±199.9 V	10	±1100 V
1000 V	±1000 V	10	±1100 V

Model 2816
Accuracy: ±(0.25% of input + 1 count, exc. for 200 mV range, ±(0.25% of input + 2 counts).
Model 2807
Accuracy: ±(0.5% of input + 1 count), exc. for 200 mV range, ±(0.5% of input + 2 counts).
Full Range Step Resp.: 1 sec. max. (to rated accur.). Normal Mode Rej.: 55 dB min. at DC, 50 Hz, & 60 Hz. Comfl. Mode Rej.: 100 dB min. at DC, 50 Hz, & 60 Hz (with 1kΩ unbal.).

AC VOLTAGE (AUTO/MANUAL RANGING)

Range	Maximum Indication	Input Resistance (<50 pF)	Overload Protected to (DC+Peak AC)
200 mV*	199.9 mV	1000 MΩ	±550 V
2000 mV	1999 mV	11 MΩ	±1100 V
20 V	19.99 V	10 MΩ	±1100 V
200 V	199.9 V	10 MΩ	±1100 V
750 V	750 V	10 MΩ	±1100 V

* Manual Ranging Only.

Model 2816
Accuracy: ±(0.8% of input + 5 counts) 40 Hz to 500 Hz.
Model 2807
Accuracy: ±(1.0% of input + 5 counts) 40 Hz to 500 Hz.
Sensitivity: 100 µV on 200 mV range.

RESISTANCE (AUTO/MANUAL RANGING)

Range	Maximum Indication	Test Current	Open Circuit Voltage	Overload Protected to (VRMS)
200 Ω	199.9 Ω	0.7 mA	1.65 V	250
2000 Ω	1999 Ω	0.1 mA	0.65 V	250
20 kΩ	19.99 kΩ	30 µA	0.65 V	250
200 kΩ	199.9 kΩ	4 µA	0.65 V	250
2000 kΩ	1999 kΩ	0.4 µA	0.65 V	250
20 MΩ	19.99 MΩ	0.04 µA	0.65 V	250

Model 2816
Accur.: 200Ω to 200 kΩ ±(0.25% of input + 2 counts). 2000 kΩ ±(0.5% of input + 2 counts). 20 MΩ ±(1% of input + 2 counts).
Model 2807
Accur.: 200Ω to 2000 kΩ ±(0.5% of input + 2 counts). 20 MΩ ±(1% of input + 2 counts).

DC/AC CURRENT (MANUAL RANGING)
Ranging: Same as 2817.
Model 2816
DC Accuracy: ±(0.75% of input + 1 count).
Model 2807
DC Accuracy: ±(1% of input + 1 count).
Model 2816
AC Accur.: ±(1.2% of input + 5 counts) 40 Hz to 500 Hz.
Model 2807
AC Accur.: ±(1.5% of input + 5 counts) 40 Hz to 500 Hz.

DIODE TEST
Measures forward voltage drop at approx. 0.6 mA.
CONTINUITY CHECK
Audible tone 20Ω ± 10Ω.
MAX. COMMON MODE VOLTAGE
1000V (DC + PEAK AC) between any input terminal and power line (earth) ground.
DISPLAY
Display: 3½ digit; 7-segment, LCD with "Low Battery" indication and annunciators.
DC Pol. Selection: Automatic "—" sign indicated, "+" sign implied.
Overrange Indication: Most significant digit on, others off.
TRANSIENT PROTECTION
6 kV for 10 µSec. max. (all volt. & res. ranges).
POWER
Battery: 2 "AA" type Cells; 1.5 V ea.
Battery Life: 500 hrs., nominal (total operation time).
TEMPERATURE COEFFICIENT
(+0°C to +18°C and +28°C to +50°C) 0.1 times the accur. of the function and range being used per °C.
HUMIDITY RANGE
+0°C to +35°C: 90% max. non-condensing. +35°C to +50°C: 70% max. non-condensing.
DIMENSIONS (HxWxD): 39 x 88 x 168 mm (1.54 x 3.46 x 6.61").
WEIGHT: Approx. 454 gm (1 lb.).
ACCESSORIES SUPPLIED
Test leads, spare fuse, 2 "AA" batteries, and instruction manual.
OPTIONAL ACCESSORIES
Carry Case LC-110, Demod. Probe PR-23, Isolation Direct Probe PR-21, Repl. Test Leads FP-30, Temp. Probe TP-28, Termocouple Temp. Probe TP-30.

NEW 3½ DIGIT 0.7% AUTO/MANUAL RANGING DMM

Model 2806 / $75.00
0.7% DCV accuracy

FEATURES

• 0.7% DCV accuracy • 500 hours continuous battery life • Auto-ranging/manual ranging on Volt and Ohm • 3½ digit LCD display with annunciators • Single rotary switch operation • Low-battery indicator • Diode check • Audible continuity check • Transient and overload protected • High energy fuse • Ruggedized case with safety-designed test lead system.

SPECIFICATIONS

(+18°C to +28°C at up to 80% R.H. unless noted).

DC VOLTAGE (AUTO/MANUAL RANGING
Ranging: Same as Model 2807.
Accuracy: ±(0.7% of input + 2 counts).
Other DCV Specs.: Same as 2807.

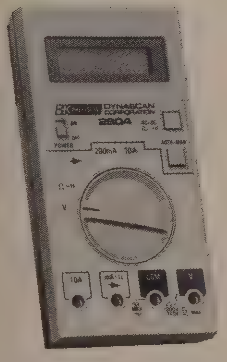
AC VOLTAGE (AUTO/MANUAL RANGING)
Ranging: Same as Model 2807.
Accuracy: ±1.0% of input +5 counts, 40 Hz to 500 Hz. Sensitivity: 1 mV on 2000 mV range.

RESISTANCE (AUTO/MANUAL RANGING)
Ranging: Same as Model 2807.
Accuracy: 200Ω to 200 kΩ ±(0.75% of input + 2 counts). 2000 kΩ ±(1% of input + 2 counts). 20 MΩ ±(2% of input + 2 counts).

DC/AC CURRENT (MANUAL RANGING)
Ranging: Same as Model 2817.
DC Accuracy: ±(1% of input + 2 counts).
AC Accuracy: ±(1.5% of input + 5 counts) from 40 Hz to 500 Hz.

ALL OTHER SPECIFICATIONS
Same as Model 2807.

NEW 3½ DIGIT AUTO/MANUAL RANGING DIGITAL MULTIMETER



Model 2804 / $60.00

FEATURES

• 0.7% DCV accuracy • 500 hours continuous battery life • Auto-ranging/manual ranging on Volt and Ohm scales • 3½ digit LCD display with annunciators • 10A AC and DC ranges • Single rotary switch operation • Low-battery indicator • Diode check • Audible continuity check.

SPECIFICATIONS

(+18°C to +28°C at up to 80% R.H.).

DC VOLTS (AUTO/MANUAL RANGING)

Range	Maximum Reading	Input Resistance (MΩ)	Overload Protected to
200 mV	±199.9 mV	1000	DC 1100 V AC 800 VRMS
2000 mV	±1999 mV	11	
20 V	±19.99 V	10	
200 V	±199.9 V	10	
1000 V	±1000 V	10	

Accuracy: 0.7% of input + 1 count.
Resolution: 0.1 V on 2000 mV range.

AC VOLTS (AUTO/MANUAL RANGING)
Average resp. cal. to read rms value of sine wave.

Range	Maximum Reading	Input Impedance (50 pF)	Overload Protected to
2000 mV	1999 mV	11 MΩ	DC 1100 V AC 800 VRMS
20 V	19.99 V	10 MΩ	
200 V	199.9 V	10 MΩ	
750 V	750 V	10 MΩ	

Accuracy: ±(1.0% of input + 5 counts), 40 Hz to 500 Hz. Resolution: 1 mV on 2000 mV range.

RESISTANCE (AUTO/MANUAL RANGING)
Ranging: Same as Model 2807.
Accuracy: 200Ω range ±(0.8% of input + 3 counts). 2000Ω thru 200 kΩ range ±(0.8% of input + 1 count).

DC/AC CURRENT (MANUAL RANGING)

Range	Maximum Reading	Burden Voltage (Max.)	Overload Protected to
200 mA	±199.9 mA	0.7 V	±0.2 A (Fuse)
10 A	±10.00 A	0.25 V	±10 A (None)

DC Accuracy: ±(1.25% of input + 1 count).

AC Accuracy: ±(1.5% of input + 5 counts) 40 Hz to 500 Hz.

ALL OTHER PERFORMANCE SPEC
Same as Model 2807 except no transient protection.

DIMENSIONS (HxWxD): 32 x 80 x 168 mm (1.34 x 3.15 x 6.61").

WEIGHT: Approx. 225 g (8 oz.)

ACCESSORIES SUPPLIED
Test leads, spare fuse, instruction manual, schematic diagram and parts list.

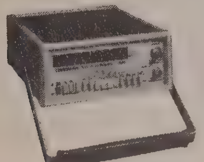
OPTIONAL ACCESSORIES
Demodulator Probe PR-32, Isolation Direct Probe PR-21, Replacement Test Leads FP-30, Temperature Probe TP-28, Thermocouple Temperature Probe TP-30.

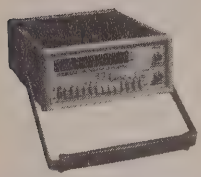
B+K PRECISION DYNASCAN CORPORATION /

FREQUENCY COUNTERS

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

NEW 1.2 GHz AND 520 MHz MULTIFUNCTION COUNTERS





Model 1855 / $750.00
Model 1851 / $575.00

FEATURES

• 5 Hz to 1.2 GHz range (Model 1855) • 5 Hz to 520 MHz range (Model 1851) • Frequency, period, period average and totalize functions • Selectable resolution • 8 digit 0.43″ LED display • Low pass filter • Display hold • Switchable X1/X10 attenuator • Remote start-stop.

SPECIFICATIONS

(Common to each model except as noted)

FREQUENCY
Range: (Sinewave). Ch A: kHz Mode: 5 Hz to 5 MHz. MHz Mode: 5Hz to 80 MHz. Model 1855 Prescale: 75 MHz to 1.2 GHz. Model 1851 Prescale: 10 MHz to 520 MHz. Accuracy: ±t.b. accur., ±1 count. RESOLUTION Ch A: kHz Mode: 0.1 Hz to 100 Hz. Ch A: MHz Mode: 1 Hz to 1000 Hz. Prescale: 10 Hz to 10 kHz.

PERIOD
Range: 0.5 µs to 200,000 µs. Frequency: 5 Hz to 2 MHz sinewave. Resol.: 100 ps to 100 ns. Display: µs with dec. point. Min. Pulse Width: 250 ns.

TOTALIZE
Range: 5 Hz to 15 MHz sinewave. Capacity: 0 to 99,999,999. Control: Man. reset and hold.

INPUT
Ch A: Bandwidth: 5 Hz to 80 MHz. Sensitivity: 30 mVrms, 5 Hz to 30 MHz. 50 mVrms, above 30 MHz. Impedance: 1 MΩ (<40 pF). Coupling: AC. Filter: 100 kHz. Max. Input: 200 V (peak AC + DC) DC to 500 Hz (peak AC + DC at 80 MHz. Model 1855 PRESCALE: Bandwidth: 75 MHz to 1.2 GHz. Sensitivity: 25 mVrms, 75 MHz to 1.0 GHz. 50 mVrms, 1.0 GHz to 1.2 GHz. Model 1851 PRESCALE: Bandwidth: 10 MHz to 520 MHz. Sensitivity: 50 mVrms, 10 MHz to 520 MHz. Impedance: 50 ohms. Max. Input: 5 Vrms.

TOTALIZE START/STOP INPUT
Logic Levels: Low TTL level inhibits totalizing, high level enables it. Loading: One standard TTL gate.

TIME BASE
Standard Type: 10 MHz TCXO. Setability: ±0.1 ppm (±1 Hz). Temp. Stability: <±.0001% (±1 ppm, 0°C to +50°C). Max. Aging Rate: ±1 ppm/year.

DISPLAY
TOTALize Mode: Continuous.

GENERAL
Power: AC, 100 V, 120 V, 220 V, 240 V, 50/60 Hz, 21 W. Dimensions (HxWxD): 9.5 x 24 x 32 cm (3.75 x 9.5 x 12.6″). Weight: Model 1855 2.47 kg (5.44 lbs.); Model 1851 2.41 kg (5.31 lbs.).

ACCESSORIES SUPPLIED
Instruction manual, schematic diagram and parts list.

OPTIONAL ACCESSORIES
Deluxe 10:1/Direct Probe PR-37, Deluxe X10 Probe PR-45.

NEW 175 MHz UNIVERSAL COUNTER

Model 1822 / $450.00

FEATURES

• 5 Hz to 175 MHz range • Frequency, period, period average, totalize, frequency ratio, and time interval functions • Selectable resolution • 8 0.43″ digit LED display • Self-test mode • Trigger level and slope switch signal controls • Switchable low pass 10 kHz filter • Switchable X1/X10 input attenuator • Display hold and reset feature.

SPECIFICATIONS

FREQUENCY
Ch A: Range: 5 Hz to 175 MHz. Resolution: 0.1 Hz to 1 kHz. Accuracy: ±1 count ± t.b. error.

PERIOD
Ch A: Range: 0.5 µs to 200,000 µs. Freq. Range: 5 Hz to 2 MHz sinewave. Resol.: 100 ps to 100 ns. Accuracy: ±1 count ± t.b. error ± trigger error. Min. Pulse Width: 250 ns.

RATIO
Ch A/B: Freq. Range A: 5 Hz to 10 MHz sinewave. Freq. Range B: 5 Hz to 2 MHz sinewave. Display: Ratio with dec. point.

TIME INTERVAL CHARACTERISTICS
Ch A to B: Range: 0.5 µs to 200,000 µs. Freq. Range: 5 Hz to 2 MHz, sinewave. Resolution: 100 ps to 100 ns. Minimum Pulse Interval (A to B): 250 ns.

TOTALIZE
Ch A: Range: 5 Hz to 10 MHz sinewave. Count Capability: 0 to 99,999,999. Control: Man. reset and hold.

SELF TEST
Display: 10 MHz with select. MHz, kHz. Gates Times: 10 ms, 100 ms, 1 s, or 10 s accum. times. Resolution: 0.1 Hz to 100 Hz.

INPUT
Ch A: Bandwidth: 5 Hz to 175 MHz, AC coup. Sensitivity: kHz FREQ. mode: 20 mV rms, 5 Hz to 5 MHz. 100 mV rms, 150 MHz to 175 MHz. Impedance: 1 MΩ, <40 pF. Slope: +, − switchable. LP Filter: 10 kHz, nominal. Max. Input: 250 V rms., Ch B: Bandwidth: 5 Hz to 2 MHz, AC coup. Sensitivity: 30 mV rms. Impedance: 1 MΩ, <40 pF. Slope: +, − switchable. Max. Input: 125 V rms.

TOTALIZE START/STOP INPUT
Logic Levels: Low TTL level inhibits totalizing, high level enables it. Loading: One standard TTL gate.

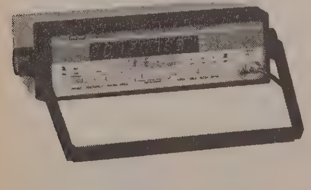
TIME BASE
Type: Crystal. Frequency: 10 MHz. Setability: ±0.1 ppm (±1 Hz). Temperature Stability: <±.001% (±10 ppm) from 0°C to +50°C ambient. Max. Aging Rate: ±10 ppm/yr. TCXO Option: Temp. stability: <±.0001% var. (±1 ppm) from 0°C to +50° ambient.

TOTALize Mode: Continuous.

GENERAL
Power: 108 to 132 VAC, or 100, 120, 220, 240 VAC. 50/60 Hz. Dimensions: 9.5 x 24 x 32 cm (3.75 x 9.5 x 12.6″). Weight: 2.55 kg (5.6 lbs.).

ACCESSORIES AVAILABLE
PR-37-X10/Direct Probe, PR-45-X10 Probe. Optional TCXO can be ordered through B&K-PRECISION Service Dept.

NEW 80 MHz MULTIFUNCTION COUNTER



Model 1805 / $290.00

FEATURES

• 5 Hz to 80 MHz range • Frequency, period, period average and totalize functions • Selectable resolution • 8 digit 0.43″ LED display • Switchable low pass 100 kHz filter • X1/X10 input attenuator • Display hold and reset feature.

SPECIFICATIONS

FREQUENCY
Range: 5 Hz to 80 MHz. 10 MHz max. in kHz mode. Accuracy: ± Time Base Accuracy, ±1 count. Resolution: 0.1 Hz to 1000 Hz selectable.

PERIOD
Frequency Range: 5 Hz to 2 MHz 200,000 ms to 0.5 µs). Pulse Width: 250 ns min.

TOTALIZE
Capacity: 0 to 99,999,999 plus overflow. Control: Man. reset and hold.

INPUT
Impedance: 1 MΩ (<40 pF). Coupling: AC. Sinewave Sensitivity: 30 mVrms, 5 Hz to 30 MHz. 50 mVrms, above 30 MHz. Max. Input: 200 V (peak AC + DC) DC to 500 Hz. Attenuator: X1/X10, switch sel. Filter: Low pass, 100 kHz cutoff.

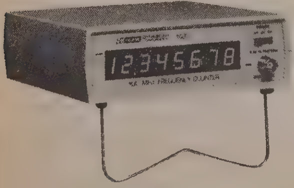
TIME BASE
Type: Crystal. Freq: 10 MHz. Setability: ±0.1 ppm (±1 Hz). Temp. Stability: <±.001% (±10 ppm) from 0°C to +50°C ambient. Max. Aging Rate: ±10 ppm/year.

GENERAL
Power: 108 V to 132 VAC, or 100 V, 120 V, 220 V, 240 VAC. 50/60 Hz. Dimensions (HxWxD): 8.25 x 29.4 x 19 cm (3.25 x 11.57 x 7.5″). Weight: 1.25 kg (2.75 lbs.).

ACCESSORIES SUPPLIED
Includes power cord, instruction manual, schematic diagram and parts list.

OPTIONAL ACCESSORIES
Deluxe 10:1/Direct Probe PR-37, Carrying Case LC-50.

NEW 100 MHz FREQUENCY COUNTER



Model 1803 / $169.00

FEATURES

• 5 Hz to 100 MHz range • 8 digit 0.43″ LED display • Leading zero blanking • Low pass filter • BNC connector input • Overflow indicator • Battery or AC powered • Charger/AC adapter included • Integral tilt stand.

SPECIFICATIONS

FREQUENCY
Range: 5 Hz to 100 MHz. Accuracy: ± Time Base Accuraccy. ±1 count. Resolution: 1 Hz.

INPUT
Impedance: 1 MΩ (<40 pF). Coupling: AC. Sinewave Sensitivity: 30 mV rms, 5 Hz to 30 MHz, 50 mVrms, 30 MHz to 80 MHz. 100 mVrms, 80 MHz to 100 MHz. Maximum Input: 200 V (peak AC + DC) DC to 500 Hz; 100 V (peak AC + DC). 15 V (peak AC + DC) at 100 MHz. Filter: Low pass, 100 kHz (approx.), −3 dB.

TIME BASE
Type: Crystal. Freq.: 2.097152 MHz. Setability: ±0.1 ppm. Temp. Stability: >±.001% (10 ppm) from 0°C to +50°C. Max. Aging Rate: ±10 ppm/year.

GENERAL
Power: Six type AA batteries, or 7.5 to 10 VDC at 400 mA from ext. supply or bat. eliminator. Dimensions (HxWxD): 5 x 16.5 x 17.1 cm (2 x 6.5 x 6.75″). Weight: 680 g (24 oz. approx.), with batteries.

ACCESSORIES SUPPLIED
AC adapter/charger, instruction manual, schematic diagram, and parts list.

OPTIONAL ACCESSORIES
AC Adapter/Charger (120 VAC) — BC-18, AC Adapter/Charger (230 VAC) — BC-19, Deluxe X10/Direct Probe — PR-37, X10/Direct Probe — PR-40, X10 Probe — PR-45.

B+K PRECISION DYNASCAN CORPORATION / SWEEP/FUNCTION GENERATORS

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

5 MHz SWEEP/FUNCTION GENERATOR WITH LIN/LOG SWEEP

Model 3030 / $699.00

FEATURES

• Generates sine, square, triangle, positive square, negative square, positive ramp and negative ramp waveforms • Covers .001 Hz to 5 MHz • 4 decade, 10,000:1 log sweep range • 3 decade, 1000:1 linear sweep range • High-accuracy Kelvin-Varley frequency sweep start/stop controls • Wide range variable symmetry control for virtually any wave shape • Calibrated output attenuation from 10 dB to 60 dB.

The model 3030 is B&K-PRECISION's highest-performance sweep/function generator. It provides frequency coverage from .001 Hz to 5 MHz in eight ranges.

For highest accuracy, Kelvin-Varley dividers are used as start/stop controls to set the low and high end limits of the desired frequency sweep. Sweep times are also selectable, from 10 milliseconds to 100 seconds.

For test applications requiring an unusual wave sweep, the variable symmetry control can be used to alter the shape of any waveform selected. The symmetry control is continuously variable from 5% to 95% duty cycle.

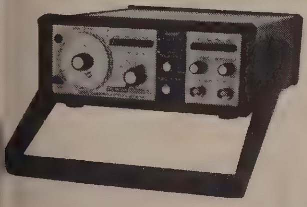
All seven of the most commonly needed waveforms are generated by the 3030. Sine, square and triangle waves are pushbutton selectable. Positive square, negative square and positive and negative going ramps can also be selected by using a combination of the three function pushbuttons and the variable symmetry control.

In addition to conventional function generator applications, the instrument can be used to generate tone-burst signals for audio speaker tests, TIM distortion tests in amplifiers, communications systems tone-burst decoder alignment, audio compressor/expander attack/decay time measurement and many other specialized applications.

SPECIFICATIONS

Waveforms: Sine, square, triangle, sweep ramp, sweep pulse, TTL pulse, DC.
Modes: Continuous, linear sweep, logarithmic sweep, tone-burst, single cycle.
Frequency Range: 0.001 Hz to 5 MHz in 8 ranges, 1000:1 freq. control.
Accuracy: ±(1.5% setting +1% full scale) from 0.001 Hz to 1 MHz, ±(2% setting +2% full scale) from 1 MHz to 5 MHz.
Amplitude Stability: 0.25% of setting after 15 minutes.
Frequency Stability: 0.25% of setting after 15 minutes.
Main Generator Output: Sine, square, triangle.
Output Amplitude: 20 Vp-p into open circuit max., 10 Vp-p into 50Ω, 50Ω output impedance.
Attentuation: Amplitude control provides 20 dB variable atten. Calibrated attenuator provides 60 dB atten. in 10 dB steps.
DC Offset and DC Output: (50Ω output)
Cont. variable ±10 VDC into open circuit, ±5 VDC into 50Ω.
Variable Symmetry: Adjusts main generator output. Cont. variable from 5:95 to 95.5. Freq. divided by approx. 10.
Internal Sweep: Lin. or log., sweep limit set by precision Kelvin-Varley dividers.
Internal Sweep Rate: 10 ms to 10 s in four calibrated steps with variable X10 multiplier for up to 100 s.
Internal Sweep Width: 1000:1 lin., 3 decades; 10,000:1 log, 4 decades.
Internal Sweep Output (f:V): Approx. 0 to +5 V output for 1000:1 linear (10,000:1 log) freq. sweep range.
External Sweep Input (V:f): Approx. 0 to +5 V input for 1000:1 linear 10,000:1 log) sweep.
Triggered Modes: 1.6V trigger input threshold or man. pushbutton. Single cycle — one complete cycle output per pulse trigger input. Tone-burst — sustained output while trigger input applied (last cycle completed when trigger removed).
Square Wave Symmetry: >99% from 1 Hz to 5 MHz.
Square Wave Rise/Fall Time: <50 ns.
Square Wave Overshoot: <5% of peak voltage.
Sinewave Distortion: <0.5% from 1 Hz to 100 kHz. All harmonics >30 dB down from 100 kHz to 5 MHz.
Amplitude Flatness: <±0.1 dB to 100 kHz, <±1 dB to 5 MHz.
Triangle Wave Linearity: >99%, 0.1 Hz to 100 kHz.
Sweep Pulse Output: TTL compatible square wave.
Operating Environment: Specifications valid from 25° ±5°C to 50°C after 30 minutes.
Hz, 30 W.
Power: 100/120/220/240 VAC, 50/60
Dimensions (HxWxD): 12.7 x 31.8 x 27.9 cm (5 x 12.5 x 11″).
Weight: 4.5 kg (10 lbs.).
ACCESSORIES SUPPLIED
Power cord, instruction manual, schematic and parts list.
OPTIONAL ACCESSORIES
BNC to BNC Cable CC-41, BNC to UHF Cable CC-42.

LOW-DISTORTION 5 MHz SWEEP/FUNCTION GENERATOR



Model 3025 / $475.00

FEATURES

Generates sine, square, triangle and aversine waveforms • Covers 0.005 Hz o 5 MHz • Four decade, 10,000:1 log weep range; 1000:1 linear sweep ange • Tone-burst or single cycle op- ration • Sweeps up or down in fre- uency • Independent start and stop requency controls for setting sweep imits • Variagle DC offset • Separate high and low amplitude outputs, plus variable amplitude control.

B&K-PRECISION's Model 3025 sweep/function generator is a versatile signal source with a very wide frequency coverage. The high-frequency limit extends to 5 MHz, allowing the 3025 to be a useful aid in evaluating many rf and i-f circuits.

Like other B&K-PRECISION function generators, the 3025 generates sine, square and triangle waveforms, but also offers haversine for more specialized applications. Linear and logarithmic sweep capabilities are front-panel selectable. Sweep rates are continuously adjustable from 10 milliseconds to 1 minute. Linear sweeps of 1000:1 for 3 decades and, logarithmic sweeps of 10,000:1 for 4 decades may be set.

Because of its exceptionally wide sweep-range capability, the 3025 is ideally suited for sweep testing broadband amplifiers used to carry video, data and multiplexed audio communication signals. It is also an excellent signal source for sweep testing audio components and systems. Another feature of the 3025, useful in evaluating audio systems, is its tone-burst capability.

SPECIFICATIONS

Waveforms: Sine, square, triangle, haversine.
Modes: Continuous, linear sweep, logarithmic sweep, tone-burst, single cycle.
Frequency Range: 0.005 Hz to 5 MHz in 7 ranges, 1000:1 freq. control.
Accuracy: ±5% of full scale.
Amplitude Stability: 0.25% after 15 minutes.
Frequency Stability. 0.25% after 15 minutes.
Main Generator Output: Sine, square, triangle, haversine; selectable.
Output Amplitude: 20 Vp-p into one circuit max., 10 Vp-p into 50Ω, 50Ω output impedance.
Attenuation: Amplitude control provides 20 dB variable atten. Separate low output jack provides 20 dB atten. of main output.
DC Offset and DC Output: (50Ω output) Cont. variable ±10 VDC into open circuit, ±5 VDC into 50Ω.
Internal Sweep: Lin. or log., sweep limit up to 3 decades linear (4 decades log).
Internal Sweep Rate: 10 ms to 1 minute cont. variable.
Internal Sweep Width: 1000:1 lin., 3 decades; 10,000:1 log, 4 decades.
Internal Sweep Output: (f-V) Approx. 0 to +5 V output for 1000:1 lin. (10,000:1 log) freq. sweep range.
External Sweep Input: (V:f) Approx. 0 to +5 V input for 1000:1 lin. (10,000:1 log) freq. sweep.
Triggered Modes: 1.6 V trigger input threshold or man. pushbutton. Single cycle — one complete cycle output per pulse trigger input. Tone-burst — sustained output while trigger input applied (last cycle completed when trigger removed).
Square Wave Symmetry: >99% from 1 Hz to 5 MHz.
Square Wave Rise/Fall Time: <50 ns.
Square Wave Overshoot: <5% of peak voltage (50Ω termination).
Sine Wave Distortion: <0.5% from 1 Hz to 100 kHz. All harmonics >30 dB down from 100 kHz to 5 MHz.
Amplitude Flatness: <0.2 dB to 500 kHz, <±1 dB to 5 MHz.
Triangle Wave Linearity: >99% from 0.1 Hz to 100 kHz.
Sweep Pulse Output: TTL compatible square wave.
Operating Environment: Specifications valid at 25° ±5°C after 30 minutes.
Power: 100/120/220/240 VAC, 50/60 Hz, 25 W.
Dimensions (HxWxD): 8.9 x 21 x 28 cm (3.5 x 8.3 x 11″).
Weight: 2.3 kg (5 lbs.).
ACCESSORIES SUPPLIED
Power cord, instruction manual, schematic and parts list.
OPTIONAL ACCESSORIES
BNC to BNC Cable CC-41. BNC to UHF Cable CC-42.

2 MHz SWEEP/FUNCTION GENERATOR

Model 3020 / $399.00

FEATURES

Four instruments in one package — weep generator, function generator, ulse generator, tone-burst generator Covers 0.02 Hz-2 MHz • 1000:1 tun- ig range • Low-distortion high-accu- icy outputs • Three-step attenuator lus vernier control • Internal linear id low sweeps • Tone-burst output front-panel or externally program- able.

is one instrument can replace a inction generator, sweep generator, pulse generator and tone-burst generator. Frequency coverage spans 0.02 Hz to 2 MHz in seven ranges, with each range providing linear 1000:1 frequency control. Operating frequency can be varied on each range by the front panel frequency control or the VCO external input.

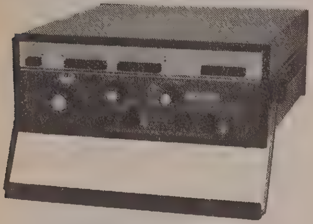
SPECIFICATIONS

FREQUENCY CHARACTERISTICS
Range: .02 Hz to 2 MHz in 7 ranges. (Each range provides 1000:1 frequency control.)
External Control (rear panel input): VCO range >1000:1 (linear).
Accuracy: 5%.
Stability: .05% (after 15 min.)
Functions: Sine, triangle, square, TTL square wave, pulse, tone-burst.
Square Wave: Variable amplitude and fixed TTL output.
Symmetry: 99% to 100 kHz.
Rise/Fall Time: <100 ns at maximum output.
TTL Square Wave Response: <25 ns rise/fall time (logic 0<0.4; logic 1>2.4 V).
Sine Wave: Variable amplitude.
Distortion: <1% 0.2 Hz to 100 kHz, <0.5% typical.
Amplitude Flatness: >±0.3 dB to 2 MHz at max. output amplitude.
Triangle Wave: Variable amplitude.
Linearity: 99% at 100 kHz.
Variable Symmetry: 40:1 range, independent of frequency or output waveform.
AM Modulation: 0-1.5 V p-p external signal provides 100% modulation; continuously variable. Capable of suppressed carrier operation.
SWEEP CHARACTERISTICS
Internal Linear or log.
Sweep Rate: 0.5 Hz (2 SEC period) to 50 Hz (20 ms period).
Sweep Width: Variable from 10:1 to 1000:1.
Sweep Voltage Output: Proportional to sweep; at rear GCV connector.
External Sweep: Rear panel VCO input provided.
TONE-BURST CHARACTERISTICS
Burst Width: Adjustable from 5-90% of period of internal gating freqency. External gating, burst width determined by TTL gating pulse.
Repetition Rate: 0.5 Hz (2 SEC period), to 50 Hz (20 ms period) set by SWEEP RATE control.
OUTPUT
Amplitude: 20 V p-p open circuit; 10 V p-p into 50Ω.
Control: Continuously variable, >20 dB. Fixed attenuation, 0-40 dB in 3 steps. This, together with 30 dB variable, provides 60 dB total attenuation.
Impedance: 50Ω ±5%.
D.C. Offset: Continuously variable, maximum of ±10 V open circuit or ±5 V into 50Ω. (Maximum AC peak + VDC offset without clipping is ±20 V open circuit; ±10 V into Ω).
GENERAL
Rear Panel Jacks: (All phono) VCO (sweep) input, GCV voltage out (proportional to frequency), AM input; TTL output, tone-burst control external input.
Operating Environment: 0-50°C (Accuracy specified at 25°C ±5°C).
Power Requirements: 105-130 VAC, 60 Hz, 22 W. Three-wire cord.
Size (HxWxD): 8.1 x 29 x 20 cm (3.2 x 11.3 x 5″) including handle at rest position.
Weight: 1.35 kg (3.1 lbs.) CSA listed.

B+K PRECISION DYNASCAN CORPORATION / FUNCTION GENERATORS PULSE GENERATORS

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

200 kHz AUDIO SWEEP/FUNCTION GENERATOR



Model 3015 / $289.00

FEATURES

• Sine, square and triangle output • 2 Hz to 200 kHz frequency coverage • Internal lin/log sweeps with selectable sweep rate • 1000:1 frequency ratio in 3 decades • Variable and fixed TTL outputs • 2 Hz to 200 kHz frequency coverage.

APPLICATIONS

Sweep frequency response tests . . . Amplifier square-wave evaluation . . . Graphic equalizer and tone-control evaluations . . . Speaker response tests . . . Signal source for digital and analog circuits . . . Check threshold levels for TTL and CMOS logic . . . Check resonant circuits for ringing inductors . . . Sweep-test any passive or active device up to 200 kHz.

DESCRIPTION

The 3015 sweep/function generator is an exceptionally compact instrument, designed principally for audio and ultrasonic applications.

The 3015 is an excellent signal source for most measurement and troubleshooting applications. Its built-in linear and log sweep capabilities may be operated at three different sweep rates. The sweep/rate may be further increased by adding an external ramp-timing capacitor or controlled by an external 0-1 volt signal. An output is provided for the internal sweep ramp voltage.

SPECIFICATIONS

Waveforms: Sine, triangle, square.
Modes: Continuous, linear sweep, log sweep.
Frequency Range: 2 Hz-200 kHz in 3 ranges.
Accuracy: ±5% full scale to 20 kHz.
Main Generfator Output: Sine, square, triangle 15 V p-p — open circuit; 7.5 V p-p — 600 ohms.
Attenuation 30 dB; continuously variable.
External Frequency Input: (V:f) approximately 0 to +1 V for 1000:1 frequency change.
Square Wave Symmetry: >99% to 100 kHz.
Sine Wave Distortion: <1% 2 Hz to 20 kHz.
Triangle Wave Linearity: >99% to 100 kHz.
Internal Sweep: Linear 1000:1; Log 10,000:1.
Internal Sweep Rate: Selectable: Slow — 25 s; Medium — 250 ms; Fast — 2.5 ms.
Auxiliary Outputs: (f:V) 1. Sweep — voltage proportional to frequency; 2. Ramp Sync — 1 V p-p minimum; 3. TTL — 3 V p-p — minimum.
Auxiliary Inputs: 1. Ramp timing — use ext. cap extended range; 2. V:f — 1 V for 1000: 1 change in frequency.
Operating Environment: 0° to +50°C.
Power Requirements: Supplied with 120 VAC or 220 VAC adapter.
Dimensions (HxWxD): 7.3 x 18.7 x 21.6 cm (2⅞ x 7⅜ x 8½″).
Weight: 0.96 kg (2 lbs.).

ACCESSORIES SUPPLIED

Model 3015 includes power cord, instruction manual, scematic diagram and parts list.

OPTIONAL ACCESSORY

RCA Phone Plug to Alligator Clip Cable CC-51.

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1 MHz LOW DISTORTION FUNCTION GENERATOR

Model 3010 / $239.00

FEATURES

• Generates sine, square and triangle waveforms • Variable amplitude and fixed TTL square-wave outputs • 0.1 Hz to 1 MHz in six ranges • Push button range and function selection • Typical sine wave distortion under 0.5% from 1 Hz to 100 kHz • Variable DC offset for engineering applications • VCO external input sweep-frequency tests.

B & K-PRECISION's Model 3010 function generator offers convenience and excellent waveform accuracy at an affordable price. Frequency coverage is unusually wide, spanning 0.1 Hz to 1 MHz in six ranges, with each range providing linear 100:1 frequency control.

The 3010 features a variable DC offset control which provides up ±5 VDC (into 600Ω) combined with the selected audio output frequency. Engineering applications for this feature are many and varied. For square-wave operation, the 3010 offers a fixed TTL output level and a variable amplitude output. Variable output square wave rise or fall time is 100 nanoseconds or less; TTL square wave rise/fall time is 25 nanoseconds or less. Square-wave symmetry at 100 kHz is a near-perfect 99%. The 3010 generates a near-perfect triangle-wave output by providing 99% linearity at 100 kHz. As a sine-wave generator, the 3010 is conservatively rated at less than 1% distortion from 0.1 Hz to 100 kHz; less than 0.5% is typical.

SPECIFICATIONS

FREQUENCY CHARACTERISTICS

Range: 0.1 Hz to 1 MHz in six ranges. (Each range provides >100:1 frequency control.)
External Control (rear panel input): VCO ≥100:1 (linear) on any frequency range. (With dial setting at .1, a 0 to 5.5 V input ramp produces a frequency change of 100:1).
Accuracy: 5% of F.S. to 500 kHz, 8% F.S. 500 kHz to 1MHz.
Stability: 05% (after 15 min.).
Functions: Sine, Triangle, Square, TTL Square Wave.
Square Wave: Variable amplitude or fixed TTL output.
Symmetry: 99% to 100 kHz.
Rise/Fall Time: <100 ns at maximum output.
TTL Square-Wave Response: <25 ns rise/fall time (0 <.4 V: 1> 2.4 V).
Sine-Wave: Variable amplitude.
Distortion: <1% 1 Hz to 1000 kHz; <0.5% typical.
Amplitude Flatness: <.3 dB to 1 MHz at maximum output amplitude.
Triangle Wave: Variable amplitude.
Linearity: 99% at 100 kHz.

OUTPUT

Amplitude: 20 V p-p open circuit 10 V p-p into 600Ω.
Control: Continuously variable, >30 dB range.
Impedance: 600Ω ±5%.
D.C. Offset: Continuously variable, maximum of ±10 V open circuit or ±5 V into 600Ω. (Maximum VAC + VDC offset without clipping is ±10 V open circuit; ±5 V into 600Ω).

GENERAL

Operating Environment: 0-50°C (accuracy specified at 25°C ±5°C).
Power Requirements: 117/234 VAC, 50/60 Hz, 8 W. Three-wire cord.
Size (HxWxD): 8.1 x 29 x 20 cm (3.2 x 11.3 x 7.8″) including handle at rest position.
Weight: 1.3 kg. (2.9 lbs.). CSA listed.

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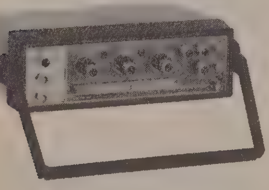
5 MHz PULSE GENERATOR



Model 3300 / $399.00

FEATURES

• Pulse period range of 200 nanoseconds to 1 second; frequency range of 5 MHz to 1 Hz • Identical pulse width and delay ranges of 100 nanoseconds to 1 second • Can be used with an oscilloscope for adjustable sweep delay • Rise time is less than 15 nanoseconds for 50-ohm high-speed output • General purpose 600-ohm output offers adjustable DC offset • TTL output • LED overlap indicator reveals incorrect control settings • Adjustable input-trigger level for use with arbitrary waveforms and for pulse reconstruction • Pulse-burst capability allows convenient testing of counters and shift registers.

APPLICATIONS

Add sweep delay to any triggered-sweep oscilloscope . . . Test counter circuits and shift registers . . . IC logic testing of TTL, MOS, CMOS, HiNIL, HTL, RTL and ECL logic families . . . Determine transient and step response of amplifiers . . . "Single step" digital circuits for easy analysis . . . Use with the 3010 or 3020 for frequency-shift keying tests . . . High drive for testing opto-electronic devices . . . Substitute clock-pulse signals for microprocessor applications . . . Use one shot mode for activating circuits with a single pulse . . . Drive several instruments independently.

The new B&K PRECISION Model 3300 pulse generator is an essential instrument for anyone involved with digital circuitry. This versatile instrument generates a range of digital signals at three separate outputs.

SPECIFICATIONS

PULSE CHARACTERISTICS

Pulse Width Range: From 100 ns to 1 sec., linear adjust in 7 decade steps.
Trigger Delay or Pulse Delay: Same as pulse width.
Repetition Period Range: 200 ns to 1 sec. linear adjust in 7 decades.
Frequency Range: 1 Hz to 5 MHz.
Duty Cycle: Capable of 100% DC.
Trigger Input: Selectable threshold from −18 to +18 V.
Trigger Output: TTL Level.
Outputs: TTL, 50Ω, 600Ω.

OUTPUT CHARACTERISTICS

TTL. Standard.
50Ω: 0 to 10 V open circuit. 0 to 5 V with 50Ω load.
600Ω: −15 V to +15 V linear adjust with DC offset. Pulse amplitude peak to peak 30 V into open circuit 15 V into 600Ω.
Rise and Fall Times: TTL <25 nS; 50Ω outputs: less than 15 ns; 600Ω: less than 75 ns.

OPERATING MODES

Free Running: Continuous operation as selected.
Triggered: Operates only once per trigger input.
Pulse Amplifier: Operates once when input crosses selected threshold.
External Gate: Synchronous gating. Unit runs at selected frequency during time when TTL level is present at gate input. Last pulse is completed if gate signal is removed.
Trigger Delay (Post Trigger): Trigger output is a pulse variable in width independently of pulse output.
Pulse Delay: Output pulse is delayed by amount selected with delay setting.
Manual: One output pulse is produced when manual button is pushed (one shot mode).
Fixed Delay: Trigger pulse will be set at a fixed width of approx. 1 µs for easy set up.
Invert: All pulse outputs are inverted.
Square Wave: 50% duty cycle output. Frequency is automatically selected for a frequency of ½ the selected rep. rate.

GENERAL

Overlap Indicator: LED indicates when controls have been incorrectly set so that pulse width exceeds period.
Operating Environment: 0-50°C.
Power Requirements: 117/234 VAC, 50/60 Hz 28 W. Three-wire cord.
Size (HxWxD): 8.1 x 29 x 20 cm (3.2 x 11.3 x 7.8″) including handle at rest position.
Weight: 1.35 kg. (3.1 lbs.). CSA listed.

BNC

Digital Delay Generators Light Pulse Generators

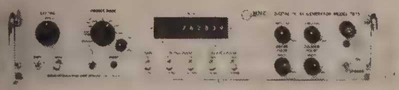
Digital Delay Generators provide accurate, repeatable control of time. DDGs are a source of stable intervals, pulses and gates produced as low-jitter outputs for precise triggering, gating, syncing, delaying, blanking, calibrating, etc. Remote IEEE-488 or BCD programmability is available.

Triggering a DDG results in a pair of fast risetime pulses, T_0 (Initial Pulse) and T_1 (Delayed Pulse), from separate outputs. The delay can be the selected interval between T_0 and T_1 or timed from the trigger. A Gate is a third output equal to the delay. With the Model 7085, both T_1's delay and width are digitally selectable and can be auto-swept internally.

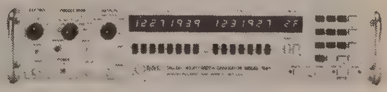
Accuracies and jitter of 100 ps or less are attainable. Pulse amplitudes of ±5 V and −1.5 V are standard; the 7085 also has complement and ECL outputs. Amplifiers can boost pulse higher. Model AP-3 portable or TB-4 rack/bin power supply houses the modular units. Key specs are below. Phone (415) 527-1121 to discuss your needs or get detailed literature.

MODEL	Time Increments	Basic Time Range	Optional Time Range	Insertion Delay	Indeterminacy	Basic Jitter (RMS)	Trigger Rate	Input Sensitivity	Operating Modes	Power Required	Base Price (USA)
7095	100 ps	0-100 µs	0-100 ms^1	85 ns	None	30 ps	0-5 MHz	200 mV	D,G	115/230 VAC	$6750
7030A	1 ns	0-100 µs	—	80 ns	None	50 ps	0-10 MHz	250 mV	D,G	±6, ±12, −24V	$3495
7065	1 ns	0-1 ms	0-1 s^1	85 ns	None	50 ps	0-5 MHz	200 mV	D,G	115/230 VAC	$4730
7075	1 ns	0-1 ms	0-1 s^1	85 ns	None	50 ps	0-5 MHz	200 mV	D,G	115/230 VAC	$5410
7085	1 ns	0-100 ms^2	—	150 ns	None	50 ps	0-5 MHz	200 mV	D/W	115/230 VAC	$7140
7050	10 ns	0-10 ms	0-1 s^1	55 ns	±5 ns	100 ps	0-5 MHz	200 mV	D,G,P	±6V	$2440
7055	10 ns	0-10 ms	0-1 s^1	55 ns	±5 ns	100 ps	0-5 MHz	200 mV	D,G,P	115/230 VAC	$3095
7020	100 ns	0-10 ms	0-10 s^1	110 ns	±50 ns	100 ps	0-1 MHz	100 mV	D,G	±6, ±12V	$1650
7010	100 ns to 1 ms	0-10 ms to 0-100 s^3	—	120 ns	±50 ns	500 ps	0-1 MHz	2V	D,G,P, E,B^4	115/230 VAC	$1175

Operating Modes: D — Delay; G — Gate; D/W — Delay/Width; P — Period; E — Events; B — Counted Burst.
Notes: ^{1}Option A. ^{2}Width of Delayed Pulse also digitally variable in 1 ns steps to 10 ms. ^{3}Selectable in 5 decade steps. ^{4}Option B.


MODEL 7075

MODEL 7010

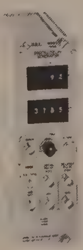

MODEL 7085

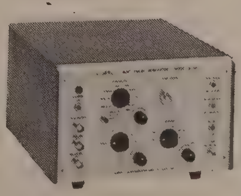
Light Pulse Generators are an optical waveform equivalent of electronic pulse generators. LPGs serve as a basic tool for electro-optics work. Variable are the light output's rep rate, pulse width, delay and power. Features include fast transition times, adjustable baseline, peak control, CW output, external drive or modulation and more. See key specs below. Phone (415) 527-1121 to talk about applications or for literature.

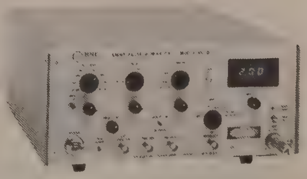
MODEL	Wavelength	Bandwidth	Peak Power	Pwr Adj. Range	Maximum Rate Hi-Spd	Maximum Rate Stab.	Risetime Hi-Spd	Risetime Stab.	Operating Modes	Price (USA)
6010A	660 nm	±30 nm	50 µW	20 dB	20 MHz	500 kHz	10 ns	900 ns	S,D,C,R	$2420
6010B	820 nm	±20 nm	200 µW	20 dB	20 MHz	500 kHz	10 ns	500 ns	S,D,C,R	$2420
6010C	560 nm	±30 nm	3 µW	20 dB	5 MHz	100 kHz	50 ns	900 ns	S,D,C,R	$2420
6020	850 nm	±1 nm	2 mW	20 dB	—	150 MHz	—	500 ps	S,D,C,R,M,Q,I	$5950
6030	1300 nm	Similar to Model 6020 — scheduled for 1985								

Operating Modes: S — Single Pulse; D — Double Pulse; C—CW; R — Ext. Drive; M — Ext. Modulation; Q — Square Wave; I — Impulse.

MODEL 7030A


MODEL 7050


MODEL 6010


MODEL 6020

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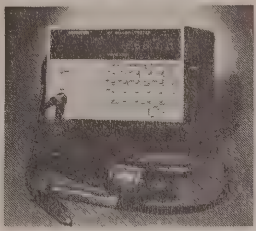
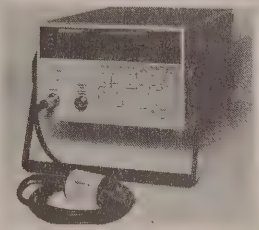


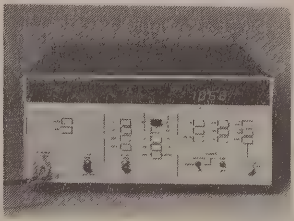
R.F. Millivoltmeters

The Model 9200A combines advanced microprocessor-controlled measuring circuits with a new series of r.f. probes and accessories to provide sensitive terminated and thru-line voltage measurements, in both 50-ohm and 75-ohm systems, to 1.2 GHz. A 50-ohm sensor is also available for voltage and power measurements to 2.5 GHz. An optional second input channel allows dual input gain and loss measurements. Full GPIB with SRQ is an option. A low cost, single channel, analog Model 92E is also available.



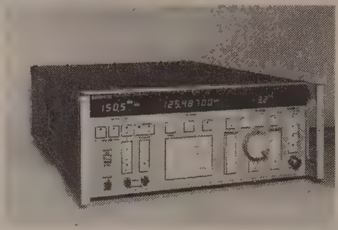
Microwattmeters

The Model 4200 features display in power or dB with automatic zeroing, ranging, and calibration. A series of diode sensors with 70 dB dynamic range is available for measurements from 1 nW (−60 dBm) to 1 W (+30 dBm), 200 kHz to 18 GHz. Two thermocouple sensors cover from −30 dBm to +20 dBm with 40 dB range, 10 MHz to 18 GHz. Interpolated cal factors are automatically applied with entry of frequency. Optional second input channel allows dual power measurements and direct display of gain, insertion loss, or return loss. Full GPIB with SRQ is an option. Low cost, single input Model 4210 also available.



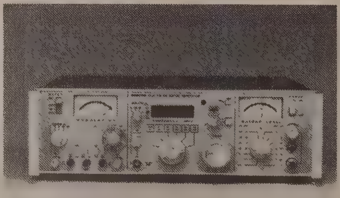
Modulation Meters

The Model 82AD combines the easy-to-operate features of automatic tuning and leveling with high accuracy, digital display, and GPIB programmability. F.M. deviation accuracy is ±2% of reading, ±1 digit with f.s. ranges of 10, 100, and 300 kHz at all modulation rates from 30 Hz to 100 kHz and carrier frequencies from 10 MHz to 1.2 GHz. A.M. accuracy is also ±2 of reading ±1 digit from 10 to 90% a.m. over identical bandwidths and carrier ranges. Low cost Model 8210, featuring automatic calibration, also available for non-programmable applications.



Programmable Signal Generators

Three models of low distortion, wideband f.m./a.m./ϕ.m. signal generators can function as manual instruments with pushbutton and spin knob control or as fast responding controller-operated generators with full talk and listen capability. They feature analog and digital sweeps, low distortion frequency and level programmable modulation oscillators, and are capable of storing and recalling from non-volatile memory up to 250 complete panel setups. The Model 1020 covers a frequency range from 150 kHz to 540 MHz. The Model 1021 adds an additional range to 1.08 GHz. The Model 1030 goes from 150 kHz to 180 MHz and features output power to +23 dBm (200 mW.)



Manual Signal Generators

Two models of manual f.m./a.m. signal generators provide outstanding performance at reasonable cost. The Model 102 E/F covers a range from 450 kHz to 520 MHz, with an optional range to 1 GHz. They are available with or without phase lock for 0.05 ppm/hour carrier frequency stability. Optional pulse modulation has superior specifications. The Model 103 C/D offers 125 kHz to 175 MHz coverage, output range to +23 dBm, five sweep ranges. Both models have external frequency counting capability.

Programmable Audio Oscillator

The new Model 1100 audio oscillator provides programmable sinewave frequencies from 20 Hz to 50 kHz with low distortion (typically less than 0.02%), levels programmable to 8 V e.m.f. with 2 mV resolution (1 mV below 4 V), and a separate fixed 1 V output. Full GPIB is standard and up to 190 complete panel setups can be stored in non-volatile RAM for instant recall.

Boonton Electronics Corporation
791 Route 10, Randolph, NJ 07869,
Telephone (201) 584-1077

BOONTON

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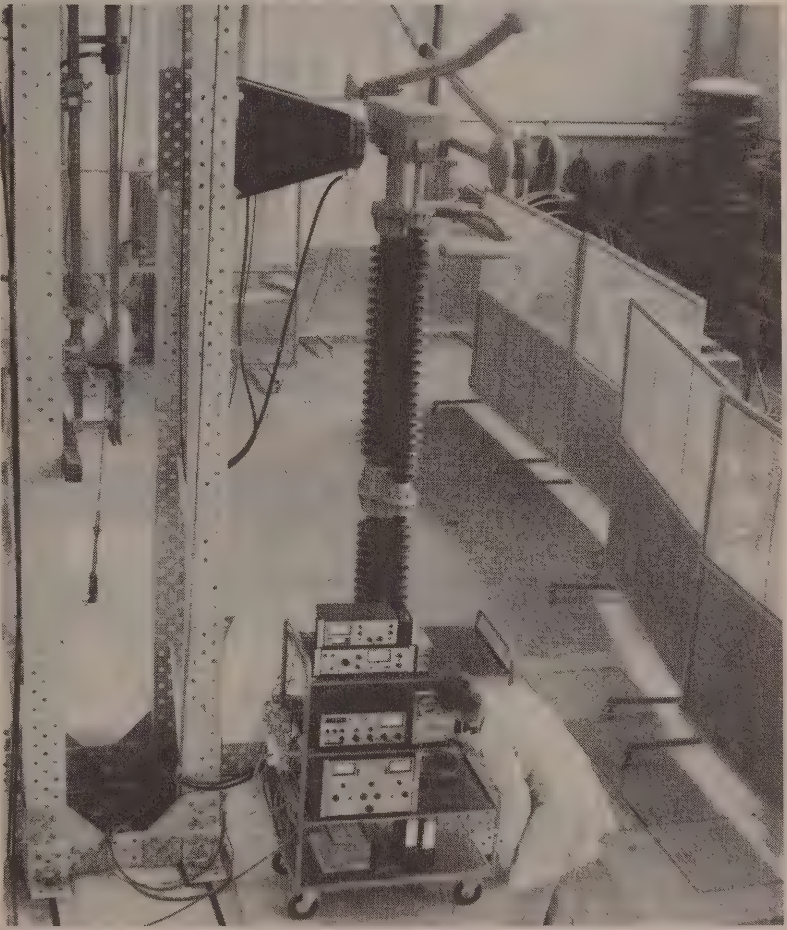
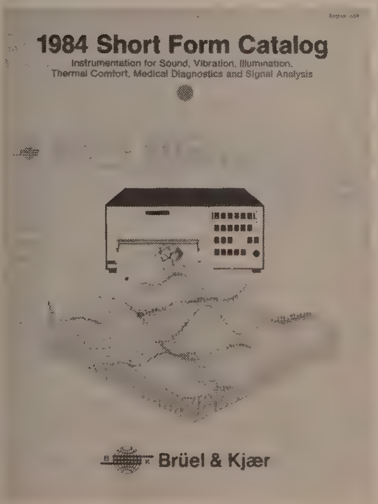
World Leaders in Sound and Vibration Instrumentation Through Four Decades

Bruel & Kjaer continues in the forefront by providing our customers with the benefits of the latest technological advances in the fields of:

- Sound Measurement and Analysis
- Vibration Measurement and Analysis
- Audio Investigations
- Acoustic Emission Analysis
- Underwater Acoustics
- Strain Measurement
- Dynamic Balancing
- Environmental Vibration Testing
- Audiological Testing
- Telephone System Analysis
- Illumination & Contrast Measurement



Photo, by courtesy of Versuchs- und Trainingszentrum der Starkstrom-Anlagen-Gesellschaft mbH, Frankfurt am Main



1984 Short Form Catalog

Instrumentation for Sound, Vibration, Illumination, Thermal Comfort, Medical Diagnostics and Signal Analysis

Brüel & Kjær

With our massive investment in R&D, our devotion to high precision, quality and reliability, and our world embracing documentation and customer service facilities, we intend to stay in the lead!

Our 1984 instrumentation guide is fresh off the presses. Its 64 pages are packed with details of over 200 transducers and measuring instruments.
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185 Forest Street, Marlborough, Massachusetts 01752 · (617) 481-7000 · TWX: 710-347-1187

Regional Offices: NJ (201-526-2284), MD (301-948-0494), GA (404-951-0115), MI (313-522-8600), IL (312-358-7582), TX (713-645-0167), CA (714-978-8066, 415-574-8100).

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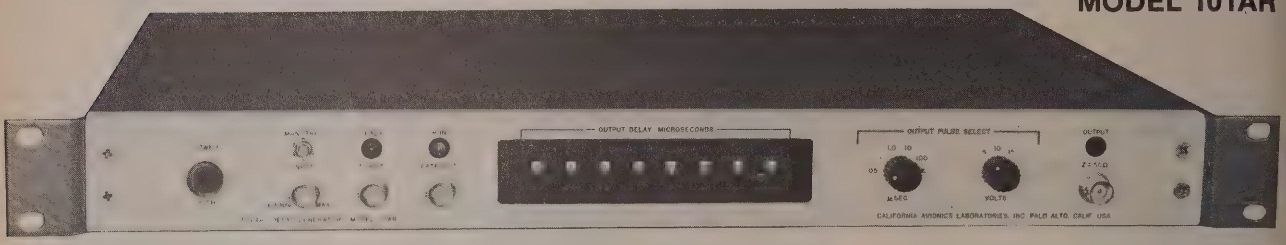
84-109

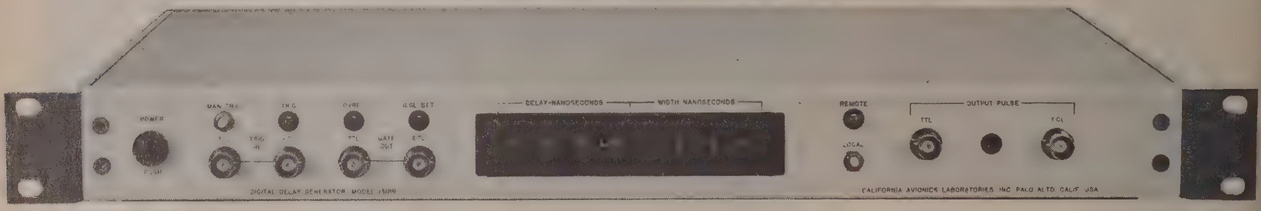
DIGITAL DELAY GENERATORS

FOR PRECISE EXPERIMENT TIMING AND SYNCHRONIZATION

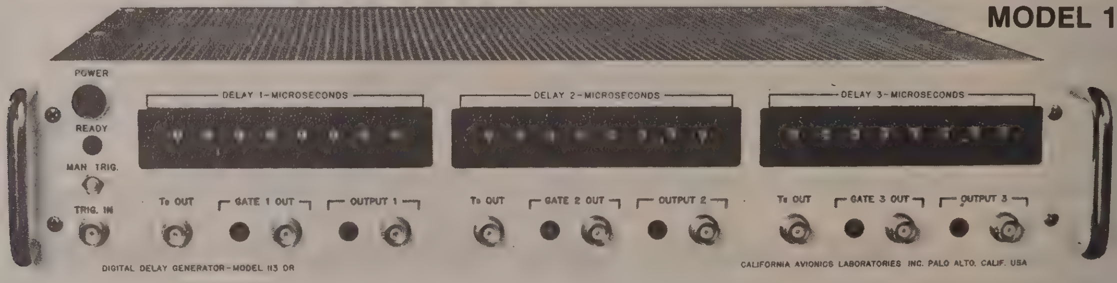
MODEL 101AR


OUTPUT DELAY MICROSECONDS
OUTPUT PULSE SELECT
μSEC
VOLTS
OUTPUT
CALIFORNIA AVIONICS LABORATORIES, INC PALO ALTO, CALIF. USA

MODEL 131BR


POWER
MAN TRIG
TRIG
GATE
DELAY-NANOSECONDS
WIDTH NANOSECONDS
REMOTE
LOCAL
OUTPUT PULSE
TTL
ECL
DIGITAL DELAY GENERATOR MODEL 131BR
CALIFORNIA AVIONICS LABORATORIES INC PALO ALTO CALIF USA

MODEL 113DR


POWER
READY
MAN TRIG.
TRIG. IN
DELAY 1-MICROSECONDS
DELAY 2-MICROSECONDS
DELAY 3-MICROSECONDS
T0 OUT
GATE 1 OUT
OUTPUT 1
T0 OUT
GATE 2 OUT
OUTPUT 2
T0 OUT
GATE 3 OUT
OUTPUT 3
DIGITAL DELAY GENERATOR-MODEL 113 DR
CALIFORNIA AVIONICS LABORATORIES INC. PALO ALTO, CALIF. USA

MODEL	No. of Channels	Resolution	Delay Range	Delayed Output Pulse(s) (into 50Ω)*		Height (19″ Rack)	Power	Base Price (USA)
				Amplitude	Width-Nominal			
201AR	1	1μsec	1μsec-100sec	+5, +10, or +15V Minimum	0.5, 1, 10, 100, 1K or 10Kμsec	1-3/4″	115 VAC 50 Hz **	$995
101AR	1	100nsec	100nsec-10sec		0.05, 0.1, 1, 10 100 or 1Kμsec			$995
111AR	1	10nsec	100nsec-1sec					$1095
101CR	1	100nsec	100nsec-10sec	+70V Nominal ***	Capacitor Discharge T.C = 2.5μsec			$995
111CR	1	10nsec	100nsec-1sec					$1095
131BR NEW!	1	100psec	50-1599.9nsec Programmable	TTL & ECL ****	10-1000nsec Programmable	1-3/4″	115 VAC	$1695
103BR	3	100nsec	100nsec-10sec	+2.2V Minimum (TTL Line Driver)	500nsec Standard 50nsec Minimum	3-1/2″	115 VAC 50/60 Hz (Standard) or 230 VAC 50/60 Hz (Specify 230V Wiring)	$2395
113BR	3	10nsec	100nsec-1sec					$2595
103CR	3	100nsec	100nsec-10sec	+70V Nominal ***	Capacitor Discharge T.C. = 2.5μsec			$2595
113CR	3	10nsec	100nsec-1sec					$2795
103DR	3	100nsec	100nsec-10sec	+15V Minimum	100μsec Standard 100nsec Minimum			$2595
113DR	3	10nsec	100nsec-1sec					$2795

Indeterminacy ±50nsec all models except zero on 131BR; basic jitter <1nsec; trigger - coherent clock (no indeterminacy) available on 3-channel models. Internal pulser and remote programming available - all models; IEEE-488 programming available for 3-channel models. Consult factory.

*Initial pulse (T_0) and gate pulse, +2.2V (Min.) into 50Ω (TTL Line Drivers), all models; higher voltage and/or pulse widths longer than standard 500nsec are available for T_0(s).

**230 VAC 50/60 Hz optional.

***Optional output voltages of +150, +225 or +300V (into 50Ω) readily available; consult factory for negative, variable, and/or 20 to 500 volt outputs.

****Model 131BR delay and pulse width programmable by internal IEEE-488 interface - standard feature.

For Full Details, Contact:

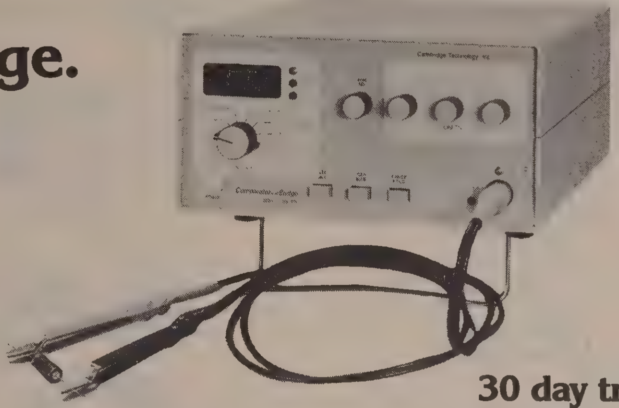
CALIFORNIA AVIONICS LABORATORIES, INC.

Since 1959

Box 701
Palo Alto, Calif. 94302
(415) 328-7999

Best value in an inductance and capacitance bridge.

Model 520 L/C bridge



- .25% accuracy
- Dual frequency, 120 Hz. 1 kHz.
- Built-in limits comparator
- Internal DC bias, 0 to 10 V
- Autoranging/Range-hold
- 4 terminal test clips included

30 day trial, no risk

Combines the accuracy of instruments costing three times as much with features that no other instrument in its price range comes close to duplicating.

Two Excitation Frequencies Give Wide Measurement Range

The Model 520 has two standard sinusoidal excitation frequencies: 120 Hz and 1 kHz. Having both frequencies available is important because it extends the operating range and allows you to use the appropriate frequency for measurement. The Model 520 has full scale ranges from 199.9 pF/μH to 1999 μF/H. That's a decade more measuring capability than most single frequency instruments.

Built-in Tri-mode Comparator

This is the only instrument in its price range that includes a comparator, allowing you to sort components for high and low tolerance and dissipation limits, simultaneously.

Internal DC Bias Voltage

The 520 is one of the few instruments at any price that has an internal, continuously adjustable, capacitor bias voltage. The front panel display and a ten-turn control let you set the bias to any voltage between 0 and 10 VDC.

Protected Inputs

Input protection is a feature that you can't appreciate fully until you find out you don't have it. The Model 520 has two separate schemes to provide protection for both fast transients and static overloads.

Autoranging With Range Hold

There's no need to guess the value of an unknown component. Let the quick autoranging circuitry find the value for you. The Range Hold feature lets you make repetitive or sorting measurements at 2 readings per second.

Four Terminal Measurements

True 4 terminal measurements (plus guard) are standard. This is important when measuring very small or very large component values because it eliminates test lead circuit parameters which can give erroneous results. We even include 4 terminal kelvin-type test clips at no additional cost.

Lead Capacitance Null

A front panel screw driver adjustment has been provided to offset test fixture and lead capacitance. The Model 520 can resolve 0.1 pF and this feature is important when measuring small capacitance values.

Rugged Industrial-Duty Construction

The instrument is housed in a heavy metal clam-shell enclosure and it has a sturdy metal tilt stand. There are no wires or cables to jar loose.

MODEL 520 SPECIFICATIONS

Capacitance Measurement Accuracy
.25% + 1 count + (3 counts × D reading) + .5 pF over the range of 5 counts to 2000 counts.

Inductance Measurement Accuracy
.25% + 1 count + (3 counts × D reading) + 1.0 uH over the range of 5 counts to 2000 counts.

D Range and Accuracy
The dynamic range for D is 00.01 to 19.99. Accuracy is 3% + 1 count for components with values greater than 200 counts.

Drive Frequency Accuracy
1 kHz ±3%, 120 Hz ±3%

Internal Bias Range and Accuracy
0.00 VDC to 10.00 VDC ±5%

Tri-mode Comparator Accuracy
±1 count of display reading

Impedance Models
Parallel model for capacitors and series model for inductors.

Accuracy vs. Temperature
Accuracy applies over an ambient temperature range of 23 C ± 5 C (at 0 C to 50 C, error doubles)

Warm up Time
1 minute to rated accuracy

Power Requirements
120 VAC ±10%, 60 Hz, 10 watts max.

Dimensions
9″ wide × 4½″ high × 11½″ deep.

Weight
7.5 lbs.

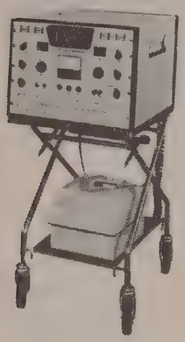
Cambridge Technology, Inc.

2464 MASSACHUSETTS AVENUE, CAMBRIDGE MA 02140
TEL (617) 876-0891

CABLEMASTER DIVISION
(213) 341-9200

AUTOMATIC CABLE HARNESS AND CONNECTOR TESTERS

CABLEMASTER 400-C



The Cablemaster Model 400-C is a 400 point sequential tester which measures continuity, insulation resistance and dielectric strength (hipot) quickly — accurately — economically. It is ideal for use in receiving inspection, production, quality control, laboratories, field maintenance, operational sites and in a wide range of applications where complete and reliable cable or connector testing is desired with one compact unit. It is equipped with a removable mobile carrier. The 400-C sequences thru the 400 points at a rate of up to 120 steps per minute checking each point for the parameter under test.

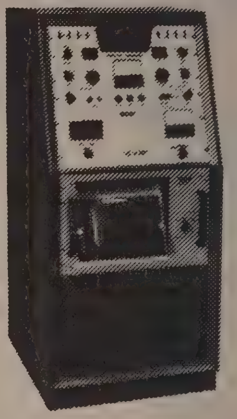
CHECK THESE OUTSTANDING FEATURES

- Continuity to 59 ohms, and to 3 amps
- Insulation resistance to 5K meg variable voltage
- Dielectric strength (hipot) AC and DC to 3000 volt
- Simplified multiple circuit testing. (More than 2 ends to each wire)

CABLEMASTER 400S

The Model 400-S Cablemaster is a modified Model 400-C, designed to test long, installed cables in ships, aircraft, launch facilities and nuclear plants where test points may be hundreds of feet apart. It contains a scanning feature for finding crossed wires which is used in making retrofits and troubleshooting new systems.

CABLEMASTER 1200-C

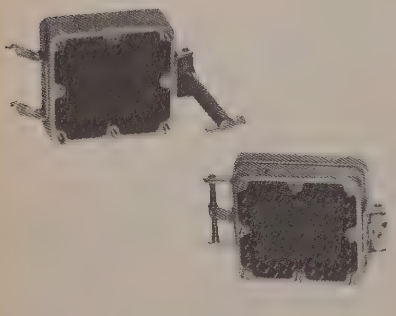


The Model 1200-C Cablemaster incorporates all of the features of the Model 400-C and functions identically except that it has the capability to test up to 1200 points. To accommodate the additional number of output modules it is mounted in a mobile console. When accessories such as a printer, low ohm analyzer, etc. are incorporated they are mounted within the same console. The 1200-C is modular in design and construction.

OPTIONS

- Printed record
- AC current monitor for actual current readings
- AC capacitance compensation
- Megohmmeter panel for exact resistance measurements
- Low ohms analyzer for discrete low resistance values
- Digital readout of discrete values for each of the above accessories
- Digital printout of measurement values
- Rise time control for application of high voltage
- 220 Volt units available

HIGH VOLTAGE CONNECTORS WITH QUICK DISCONNECT



High voltage, high current connector with hinge action mating; comes in 50 pin and 100 pin configurations. Will accommodate 50 or 100 No. 16 wires, and is nominally rated at 2000 volts at RMS 60 Hz at sea level. Available with various types of contacts.

IMPACT-O-GRAPH DIVISION
(213) 341-3000

IMPACT & VIBRATION INDICATORS, ACCELEROMETERS AND RECORDERS

IMPACT-O-GRAPH RECORDER

Impact-O-Graph recorders are available in sensitivities of 2g to 300g full scale deflection. Recording period of various models is from (1) one minute to (6) six months. Independent styli record time, direction and magnitude of impacts in (3) three separate axes. Lightweight and compact. Self-contained — no outside power necessary. Used to monitor shipping and handling abuse and to design packaging.

IMPACT INDICATOR

Resettable and non-resettable impact indicators (accelerometers) are used to monitor impacts accurately from all directions to give a visual indication that a specific "g" level has been exceeded. Used to monitor shipping and handling abuse. Available up to 300g.

CHATSWORTH DATA CORPORATION

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CABLEMASTER DIVISION (213) 341-9200 / IMPACT-O-GRAPH DIVISION (213) 341-3000
TWX 910-494-1244 CHATS DATA CHCA

VOLT-AMPERE WATTMETERS

IEEE-488

A variety of Models to choose from . . .

ALL are TRUE RMS reading.
ALL are waveshape independent
ALL are DC coupled.
ALL are useable to zero power factor.
ALL measure CURRENTS from 250 μAmperes to 7 Amperes directly.
ALL have 12 POWER ranges including all VOLTAGE and CURRENT combinations as well as 12 POWER x 10 scales.
ALL have options including isolated BCD, analog, and energy outputs and isolated REMOTE control inputs.
ALL are capable of easy integration with range extending transformers, shunts, and/or capacitive voltage dividers.
ALL have an isolated IEEE-488 bus as an option.

Model 258

1% accuracy from 10 Hz to over 1000 kHz. Variety of current transformer inputs. Full scale currents from 50.00 mA to 50.00 A. Full scale voltage inputs from 1.000 V to 200.0 V. Option offers complete control via IEEE-488 bus.

Price: $2330.00

Model 259

0.25% accuracy from DC thru 30 kHz. Calibrated to 50 kHz. Usable as AC/DC transfer instrument. 34 V, 340 V and 170 V or 650 V ranges. Remote control of both functions and ranges as an option.

Price: $2145.00

Model 255/256

0.6% accuracy from 30 Hz through 100 kHz. Calibrated to 300 kHz. 10 mW to 5000 W. 34 V, 340 V, and 1000 V ranges. (Model 256 has 170 V range instead of 1000 V range.)

Price: $1365.00

TYPICAL AREAS FOR MEASUREMENT INCLUDE:

Switching Power Supply Efficiency, Transformer and Motor Losses, Fluorescent Lamp Ballast Efficiency, Ultrasonic Power Losses, MOV (Varistor) Testing, Gyroscope and Servo System Testing, Television Set Testing and Ferrite Loss Measurements.

MODEL 273A

DIGITAL ESR METER

The Model 273A is the industry standard for the measurement of 100 kHz ESR (Capacitor Loss). Measures Equivalent Series Resistance values from 0.1 milliohm to 20 ohms. Deals with ANY capacitance larger than 5000 pF.

MODEL 425/427

BROADBAND CALIBRATOR/AMPLIFIERS

The Model 425 combines a broadband power amplifier with precision leveling circuitry and a set of non-inductive precision power resistors to provide constant currents and voltages from 50 Hz to over 1000 kHz. RMS voltage levels from 2 to 20 V together with resistors from 10 ohms to 400 ohms provide currents from 5 mA up to 2 A and powers from 10 mW up to 40 W. Open circuit position allows use with reactive, or customer specified loads.

The Model 427 combines the components of the Model 425 with an internal sine wave oscillator settable, or remotely programmable, to any one of 40 frequencies from 50 Hz to 100 kHz.

POWER FACTOR/V-A-W METER

Portable, Auto-ranging, True RMS

The Model 263 measures the true POWER FACTOR in low power factor and/or highly distorted waveshapes (50-400 Hz).

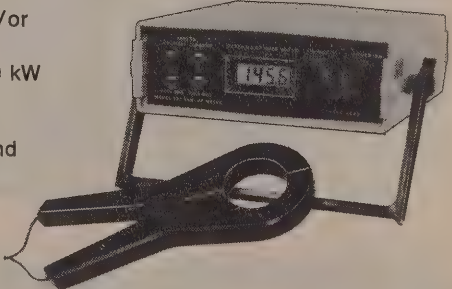
The Model 263 has FOUR autoranging POWER scales (199.9W, 1.999 kW, 19.99 kW and 120 kW), TWO auto-ranging CURRENT (19.99 and 199.9A), and VOLTAGE (199.9 and 600 V) scales.

The Model 263 handles HIGH CREST FACTOR waveshapes such as those found in capacitive input filters or SCR circuits.

The instrument may be operated either via a line cord (90 V-250 V) or from the VOLTAGE input leads (90 V-500 V). In either case, operation is possible from 50 Hz-400 Hz. (NO BATTERIES.)

The Model 263 is supplied complete with a clamp-on current transformer, voltage leads and a heavy duty carrying case.

Price: $895.00



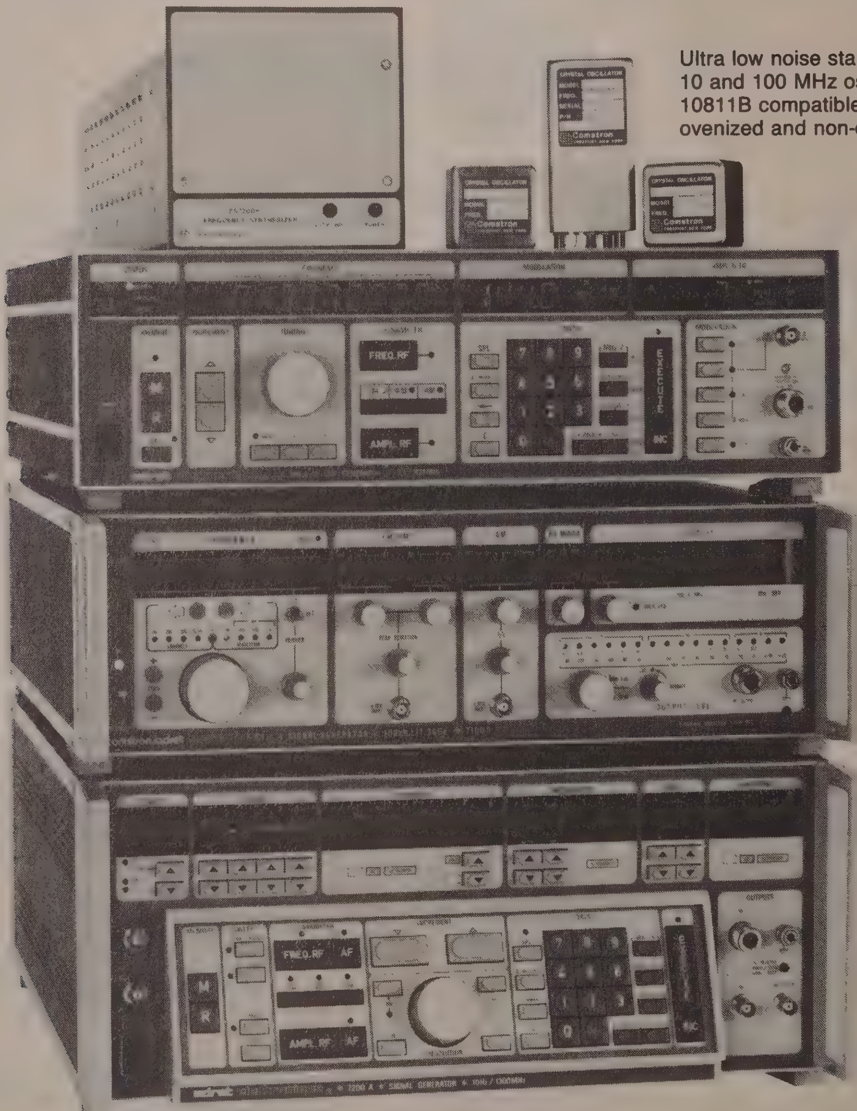
Model 263

clarke·hess COMMUNICATION RESEARCH CORP.
17 WEST 17th STREET, N.Y., N.Y. 10011 • (212) 255-2940

WE'VE GOT THE SOURCES YOU NEED AND WE'VE GOT THE PROOF!

OSCILLATORS, OEM SYNTHESIZERS, PHASE LOCK SOURCES AND SYNTHESIZED SIGNAL GENERATORS

Model 1200: the **only** modular OEM Frequency Synthesizer; 2-1300 MHz; convenient ⅓ rack, 5¼″ high; low phase noise; IEEE, RS-232C and BCD programming.



Ultra low noise standard 10 and 100 MHz oscillators; 10811B compatible; ovenized and non-ovenized.

Model 740A:
0.1 to 1120 MHz;
AM, FM, phase and pulse modulation;
IEEE-488 programming;
– **under $10,000.**

Model 7100:
0.1 to 1300 MHz;
phase noise: – 136 dBc @6.5 kHz offset;
+20 dBm output level;
AM, FM, phase and pulse modulation;
IEEE-488 programming;
– **under $15,000.**

Model 7200:
0.1 to 1300 MHz;
phase noise: – 136 dBc @6.5 kHz offset;
keyboard and spinwheel entry;
full sweep of all parameters;
memory for 40 configurations;
best level accuracy available;
IEEE-488 programming;
– **under $20,000.**

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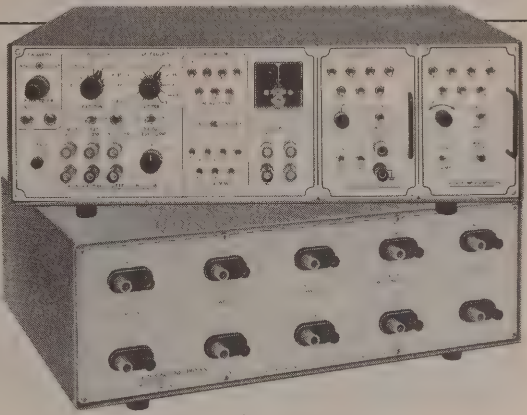
TELEPHONE/MODEM TEST EQUIPMENT



TELEPHONE CHANNEL PHASE JITTER SIMULATOR

- Phase Jitter
- Phase Hits
- Harmonic Distortion
- Impulse Hits
- Broad Band Noise
- Attenuation Characteristic
- Envelope Delay Characteristic
- Frequency Translation

TELEPHONE CO. SPECIFICATIONS

Models	FA-1445	FA-1446	FA-1447	FA-1448	FA-1984	FA-3508
Bell Schedule	3002	C1	C2	C4	Average Long Haul	Worst Case Long Haul
INSERTION LOSS	16 ± 1db @ 1000 Hz	16 ± 1db @ 1000 Hz	16 ± 1db @ 1000 Hz	16 ± 1db @ 1000 Hz	10 ± 1db @ 1000 Hz	10 ± 1db @ 1000 Hz
ATTENUATION **CHARACTERISTIC (Ref. 1000 Hz)** VARIATION IN dB	300 to 3000 Hz −3 to +12db 500 to 2500 Hz −2 to +8dB	300 to 2700 Hz −2 to +6db 1000 to 2400 Hz −1 to +3dB 2700 to 3000 Hz +3 to 12dB	300 to 3000 Hz −2 to +6db 500 to 2800 Hz −1 to +3dB	300 to 3200 Hz −2 to +6db 500 to 3000 Hz −2 to +3dB	300 Hz: +4dB 600 Hz: +1.2dB 2300 Hz: +1.7dB 2750 Hz: +4.7dB	300 Hz: +6.1dB 600 Hz: +2.0dB 2300 Hz: +3.1dB 2750 Hz: +7.0dB
ENVELOPE DELAY **DISTORTION** (max.)	800 to 2600 Hz 1750 μsec.	1000 to 2400 Hz 1000 μsec.	1000 to 2600 Hz 500 μsec.	1000 to 2600 Hz 300 μsec.	600 Hz: 1335 μsec.	600 Hz: 1927 μsec.
		800 to 2600 Hz 1750 μsec.	600 to 2600 Hz 1500 μsec.	800 to 2800 Hz 500 μsec.	1000 Hz: 335 μsec.	1000 Hz: 544 μsec.
			500 to 2800 Hz 3000 μsec.	600 to 3000 Hz 1500 μsec.	2450 Hz: 442 μsec.	2450 Hz: 672 μsec.
				500 to 3000 Hz 3000 μsec.	2850 Hz: 1166 μsec.	2850 Hz: 1739 μsec.

Out-of-band Characteristics

Above Band: 80dB/octave roll-off to 50dB holding to 10kHz
Below Band: 24dB/octave roll-off to 150Hz holding to DC
Delay: 3000 μ sec. minimum at band edges
All Models: Selectable 135 ohm, 600 ohm, balanced input and output, transformer-coupled

Individual Unit Simulator

Our line of proven simulators continue to be available individually. These in fact are the units incorporated in the cased unit above. Any combination of 4 or 5 simulator models are currently available packaged in rack mount or carrying case assembly.

Special orders requiring more than 5 will be quoted separately.

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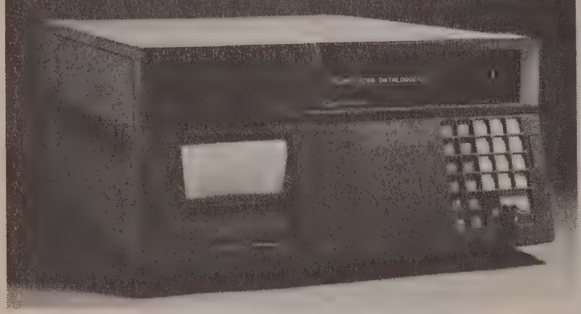
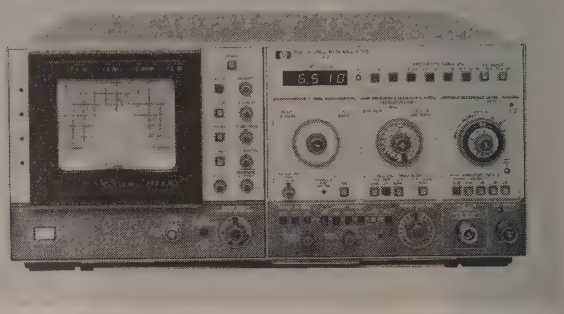
EVERY TEST EQUIPMENT PROBLEM HAS ONE SOLUTION — CONTINENTAL RESOURCES.





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But that's not all. Our regional service centers also assure precise troubleshooting, repair, and calibration of customer-owned equipment — all at costs typically less than those charged by the original manufacturer.

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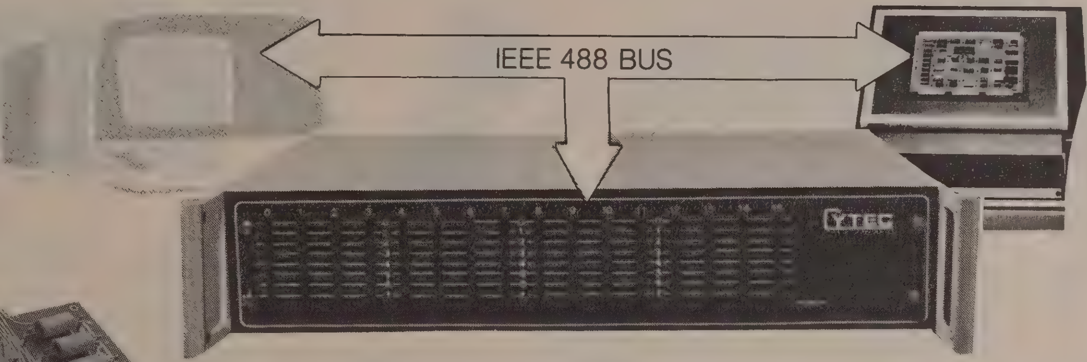
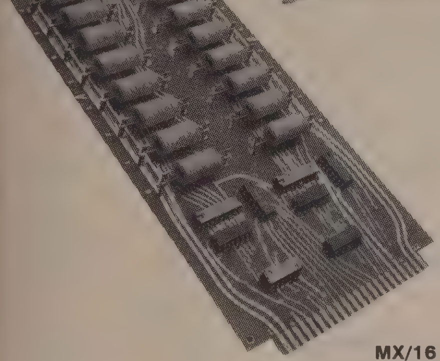
SWITCHING SYSTEMS

for

AUTOMATIC TEST, INSTRUMENTATION, COMMUNICATIONS AND CONTROLS





MX/16
SWITCH MODULE

PORTABLE, BENCHTOP CABINETS OR RACK MOUNTED CHASSIS WITH LED DISPLAY

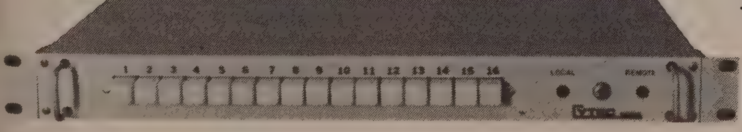
CONTROLS

- COMPUTER OR MANUAL
- MATRIX OR MULTIPLEX MODE
- CLEAR COMPLETE MATRIX
- REMOTE STATUS FEEDBACK

CX8 COAX SWITCH MODULE

SIGNAL SWITCHING

- ANALOG OR DIGITAL
- LOW THERMAL TO POWER
- SINGLE OR MULTIPOLE
- DC TO 100 MHz. RF.
- COAXIAL 50 OR 75 OHM



PUSH BUTTON COAX SWITCH

COMPUTER INTERFACES

- IEEE 488 BUS
- 8 OR 16 BIT I/O
- STD BUS
- RS232

CYTEC CORP.

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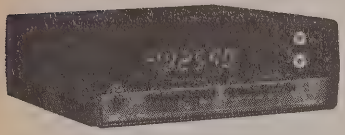
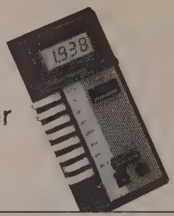
Maintaining The Integrity



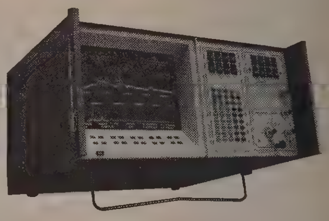
5½ Digit DMM
Model 2590



Capacitance Meter
Model 938

Universal
Waveform
Analyzer
Data 6000

IEEE-488



LABORATORY & SYSTEMS INSTRUMENTATION

DIGIT	MODEL	DESCRIPTION	POWER	FUNCTIONS & RANGES (MIN.—MAX. READINGS)			DISPLAY
5½	7500	System/Lab DMM	Line	**DCV/ACV** 1µV to 1000V	**Ratio** DCV, ACV, Ω	**Ohms** 1mΩ to 20MΩ	LED
5½	3600	System/Lab DMM Microcomputer-based	Line	**Volts** 1µV to 1200VDC 1µV to 800VAC	**Ratio** DCV, ACV	**Ohms** 1mΩ to 20MΩ	LED
5½	3500	System/Lab DMM	Line	**DCV/ACV** 1µV to 1000V	**DC Ratio** .01:1 to 120:1	**Ohms** 1mΩ to 12MΩ	Planar
5½	3501-5	System Build-in DVMs	Line	**Five Single-Range Models:** ±.12, ±1.2, ±12, ±120, ±1200VDC			LED
4½	3400R	System/Lab DMM	Line	**DCV** 10µV to 1000V	**ACV** 10µV to 750V	**Ohms** 10mΩ to 20MΩ	LED
4½	3410	3400R/IEEE STD 488 Interface Unit	Line	in full conformance with IEEE STD 488 (1978)			

DIGIT	MODEL	DESCRIPTION	POWER	FUNCTIONS & RANGES					DISPLAY
				DCV	**ACV**	**DCI**	**ACI**	**Ohms**	
5½	2590	Lab/Bench DMM	105-125V 210-250V (E,RE) 91-109V (J,RJ)	200mV-1200V	200mV-800V	200µA-2000mA	2mA-2000mA	200Ω-20MΩ	LED
5½	2590R	Lab/Bench DMM	105-125V 210-250V (E,RE) 91-109V (J,RJ)	2000mV-1200V	2000mV-800V	200µA-2000mA	2mA-200mA	200Ω-20MΩ	LED

DIGITAL MULTIMETERS

DIGIT	MODEL	DESCRIPTION	POWER	FUNCTIONS & RANGES (MIN.—MAX. READINGS) DCV	ACV	DCI	ACI	Ohms	DISPLAY
4½	2480R	Bench/Portable	Line (Opt. Batt.)	10µV—1000V	10µV—1000V	10nA—2A	10nA—2A	100mΩ—20MΩ	LED
4½	248	Mini-Portable	Battery & Line*	10µV—1000V	10µV—500V	10nA—2A	10nA—2A	100mΩ—20MΩ	LED
3½	1351	Bench	Line	100µV—1200V	100µV—1000V	0.1µA—2A	0.1A—2A	100mΩ—20MΩ	LED

DIGITAL CAPACITANCE METER

DIGIT	MODEL	DESCRIPTION	POWER	MEASUREMENT RANGES (MIN.—MAX.)	BASIC ACCURACY	DISPLAY
3½	938	Hand-Held	Battery (Opt. Line)**	0.1pF to 2000µF	±0.1% rdg./±1 digit	LCD

DC VOLTAGE STANDARD

DIGITS	MODEL	DESCRIPTION	POWER	FUNCTIONS & RANGES (MIN.—MAX. OUTPUTS)		DISPLAY
5	8100	Secondary DC Voltage Standard	Line	**Dual Output** 0 to ±11.1110VDC 0 to ±111.110mVDC	**Accuracy** 50ppm ±50µV 150ppm ±0.5µV	Rear-illuminated Annunciator
6	8200	DC Voltage Current Standard	Line	**Ranges** 0.1µV—100mV; 10µV—10V; 100µV—100V 1µA—100mA	**Basic Accuracy** 10ppm rdg. + 1ppm range 0.01% rdg. + 1µA	0.8″ LED

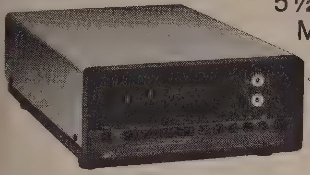
WAVEFORM ANALYZER/DIGITAL STORAGE OSCILLOSCOPE

MODEL	DESCRIPTION	POWER	FUNCTIONS & RANGES			DISPLAY
D6000	Universal Waveform Analyzer	105-125V 210-250V (50-60Hz)	**Digitizing Plug-ins** 610/611 (2 or 4 ch.) 620 (2 ch.)	**Ranges** DC-30KHZ; 500mV, 5V, 50V DC-20MHZ; 1.2V, 3.6V	**Basic Accuracy** 610/611 System: .05% 620 System: .5%	9″ Diagonal Screen

*Rechargeable battery module and charger included.

**Battery supplied, battery eliminator optional.

Of Measurement



5½ Digit DMM
Model 3600

IEEE-488

DC Calibrator
Model 8200

IEEE-488

MODEL	SPECIAL FEATURES & OPTIONS
7500	Up to 1000 readings/sec. Remotely programmable, BCD output. IEEE STD 488 and True RMS AC Sensing options.
3600	Modular, field installable plug-ins provide dozens of cost effective functions. Remote programmable/BCD output, RMS Sensing option, high impedance DCV input to 20V.
3500	2 and 4-wire Resistance. Remotely programmable, BCD output.
3501-5	BCD output. Ratio options. Autopolarity.
3400R	True RMS AC Sensing. 2 and 4-wire Resistance. Remotely programmable, BCD output.
3410	Dedicated MC6800 μC with 2K of ROM and 128 words of RAM, extendable by 1K words of PROM.
2590	Model 2590: average responding.
2590R	Model 2590R:True RMS. Basic accuracy .007%, 1μV, 1mΩ, 1ηA resolution. Automatic 2/4 Wire Ohms.

MODEL	SPECIAL FEATURES & OPTIONS
2480R	True RMS AC Sensing (Model 2480R) Average Sensing AC (Model 2480).
248	True RMS AC Sensing.
1351	Hi/LoΩ, 20 amp. AC/DC (Model 1351). Average Sensing AC.

MODEL	SPECIAL FEATURES
938	One-hand operation. 200-hour battery life.

MODEL	SPECIAL FEATURES & OPTIONS
8100	NBS traceability. Wide load tolerance. Low noise.
8200	NBS traceability. Manual or ATE operation via IEEE-488 interface. "Incrematic" adjustment facilitates access to all functions and ranges. Return-to-zero feature automatically prevents inadvertent overvoltage.

MODEL	SPECIAL FEATURES & OPTIONS
D6000	IEEE-488 compatible, RS-232-C compatible. Plotter option, Memory option, Floppy Disk option. Standard Features include: Spectral Analysis (FFT-based), Auto/Cross Correlation, Transient capture and analysis, complete waveform analysis capability.

Data Precision Instruments provide more Value and Versatility than any other you can buy.

Over the years, Data Precision products have reflected truly creative design innovations. Data Precision has led the industry with pioneering advances that have reduced the size, circuit complexity, and cost of digital instruments, while improving performance and reliability. TriPhasic™ Conversion, including Ratiohmic™ Resistance Mode and Isopolar™ Reference Voltage, Opti-Ranging™ automatic range control, and Incrematic™ scale calibration are all technical advances to the state of the art. These, combined with far-sighted product planning and painstaking quality control (every instrument is put through definitive burn-in and ambient temperature cycle before final approval) have established Data Precision as the industry's leading source for reliable, high-performance, economically priced instruments, and the third largest in DMM volume. Over 200,000 are now in use all over the world, representing more than a million instrument-years of service.

As a convenience to you, our customer, Data Precision offers a wider range of DMMs through a nationwide network than any other manufacturer. All of these instruments, accessories, and options are available through your local distributor or authorized sales representative.

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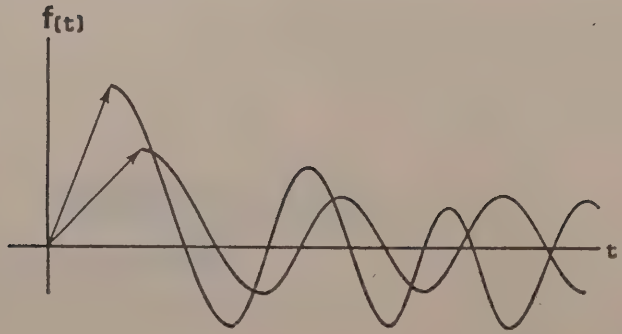
- MICROPROCESSOR BASED
- TWO LINE 16 DIGIT ALPHA-NUMERIC DISPLAY
- DUAL BNC CONNECTOR OUTPUT CHANNELS
  - VARIABLE CHANNEL 0
  - REFERENCE CHANNEL 1
- IEEE-488 INTERFACE
- RS-232 SERIAL INTERFACE (SPECIAL OPTION)
- TOTAL HARMONIC DISTORTION
  - .001% OF OUTPUT WAVEFORM VALUE
  - THROUGHOUT FREQUENCY RANGE
- AMPLITUDE RANGE 0 TO 100 V RMS
  - RESOLUTION FOUR SIGNIFICANT DIGITS
  - ACCURACY .001%
- FREQUENCY RANGE 2 HZ TO 50 KHZ
  - RESOLUTION 1 HZ
  - ACCURACY ±10 PPM
- PHASE/OFFSET RANGE ±999.999°
  - RESOLUTION 1 MILLIDEGREE
  - ACCURACY ±1 MILLIDEGREE TO 5 KHZ
  - ±10 MILLIDEGREES FROM 5 TO 50 KHZ



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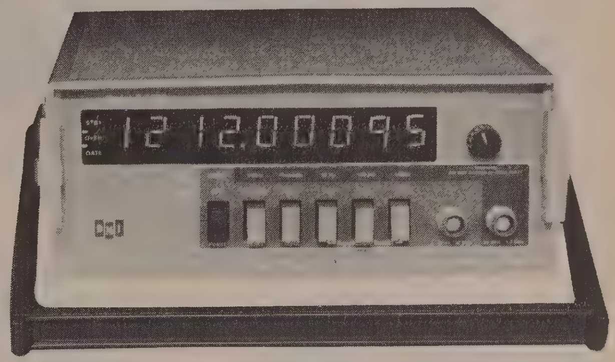
DIGIMAX MODELS D500/D510/D612/D1200

MODEL D612/D1200

Temperature controlled ovens have long been the accepted industry standard for maintaining crystal controlled precision measuring instruments within frequency tolerance over a wider temperature range than is economically achievable using a TCXO (temperature compensated crystal oscillator) time base. Two objectionable characteristics of these ovens are: **1. Bulk. 2. High current consumption.** DMI technology and research has overcome these objections. Gone are versions of bulky current ovens. DMI presents its latest innovation: A .1 PPM proportional oven that not only operates from external power but from batteries as well. DMI's streamlined high accuracy low current proportional type 10 mHz oven outmodes all others.



SPECIFICATIONS

INPUT IMPEDANCE

Non-prescaled: 1 Meg in parallel with 20 pf

Prescaled: 50 ohms

Aging: 1 ppm per year typ.

FREQUENCY RANGE (typical)

Non-prescaled: 10 Hz to 50 MHz

Prescaled: 10 MHz to 1.2 GHz

RESOLUTION (selectable)

Non-prescaled: 0.1 Hz; 1 Hz; 10 Hz

Prescaled: 10 Hz; 100 Hz; 1 KHz

8 VDC to 14.5 VDC; 115 VAC with AC-12 ac adapter; Internal battery pack: 6 "C" cells. Optional rechargeable NiCad battery pack. Current requirements: 260-500 ma typ.

SENSITIVITY (typical)

10 mV to 50 mV: 10 Hz to 25 MHz

10 mV to 50 mV: 25 MHz to 450 MHz

20 mV to 100 mV: 450 MHz to 1 GHz

2 BNC on front panel/50 Ohm & 1 Meg

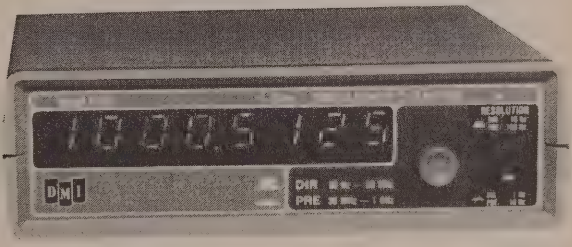
DISPLAY

9 LED readouts with the following features:

Easy to read .5″ seven segment characters. Leading zero suppression assures error-free readings. Display blanking to minimize power consumption. When no signal is present first eight digits are blanked, ninth digit displays 1 or 0.

MODEL D500/D510

The time base used in the DMI Models D500 and D510 frequency counters is selected to give the highest accuracy over the temperature range (1 part per million 20°C to 35°C) using a TCXO.



SPECIFICATIONS

INPUT IMPEDANCE

Non-prescaled: 1 Meg in parallel with 20 pf

Prescaled: 50 ohms

FREQUENCY RANGE (typical)

Non-prescaled: 50 Hz to 50 MHz

Prescaled D500: 30 MHz to 512 MHz

Prescaled D510: 30 MHz to 1.2 GHz

RESOLUTION (selectable)

Non-prescaled: 1 Hz; 10 Hz

Prescaled: 10 Hz; 100 Hz

POWER REQUIREMENTS

8 VDC to 14.5 VDC; 100 to 250 mA typical; 115 VAC with AC-12 ac adapter.

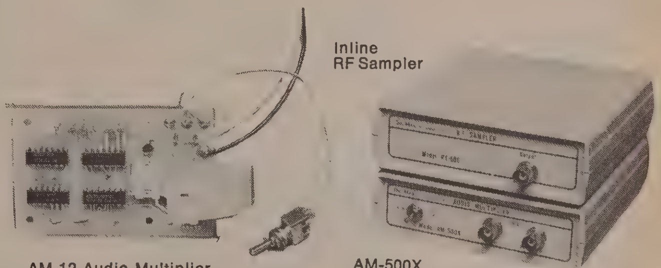
SENSITIVITY (typical)

Non-prescaled: 10-50mV, 50 Hz-25 MHz

Prescaled: 20-50 mV, 25 MHz-450 MHz; 50-100 mV, 450 MHz-1.0 GHz

DISPLAY

8 digit LED seven segment characters. Leading zero suppression assures error-free readings.



Inline RF Sampler

AM-12 Audio Multiplier
Std. on D1200

AM-500X
Audio Multiplier

The AM-500X allows you to resolve 1/100 of 1 Hz in only 1 sec. It multiplies the incoming frequency by either 10 or 100. No longer must you wait 10 sec.

MODEL	FREQUENCY RANGE	ACCURACY OVER TEMPERATURE	READ OUTS	SENSITIVITY TYP. Direct	SENSITIVITY TYP. Prescaled	PRICE
D500	50 Hz-512 MHz	1 PPM 17°C-35°C TXCO TIME BASE	8	10 to 50 mV	10 to 50 mV to 450 MHz 50 to 100 mV to 1 GHz	$149.95
D510	50 Hz-1.2 GHz					$179.95
D612	10 Hz-1.2 GHz	0.1 PPM 20°C-40°C PROPORTIONAL 10 MHz OVEN	9	10 to 50 mV	15 to 50 mV to 450 MHz 20 to 100 mV to 1 GHz	$259.95
D1200	10 Hz-1.2 GHz			15 to 50 mV		$299.95

AC-12 AC ADAPTER $8.95 T-1200 BNC-BASE 21″ ANT. $8.95 BAC12 $34.95 BAC5 $29.95

DIGIMAX INSTRUMENTS CORP.

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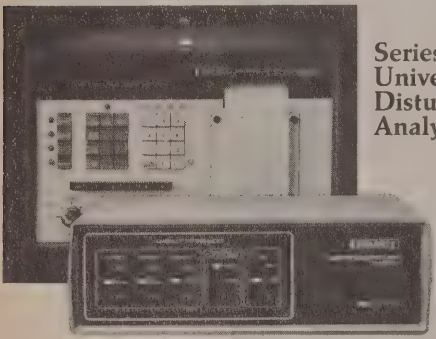
DRANETZ SERIES 626 UNIVERSAL DISTURBANCE ANALYZER

An extremely valuable tool for analyzing power transients and other environmental conditions that affect:

- Computers
- Word Processors
- Telephone/Telecommunications Equipment
- Automated Production Systems
- Medical Instrumentation
- Military and Avionics Systems



Series 626 Universal Disturbance Analyzer

Remote Monitor Unit (RMU)

The Series 626 Universal Disturbance Analyzer is a modularly expandable system for measuring environmental disturbances that affect the proper operation of computers and other sensitive electronic equipment. The Series 626 detects, measures, and records an extensive range of variations in AC power, DC voltage, temperature, humidity, and other environmental factors. For example, the AC power module records transient impulses, both in amplitude and duration, sags, surges, undervoltages, overvoltages and frequency variations with accurate time and date correlation. Up to five individual monitoring modules can be added to the mainframe, which provides the operating controls, alphanumeric printer, time base, and power supply. Each monitoring module can be user-programmed with the precise limits beyond which disturbance detection occurs. A system check facility activates an automatic calibration and diagnostic routine to verify proper operation. An RS232 port is provided for data output and remote programmability.

The Series 626 is packaged in a rugged portable case. AC powered, the 626 is protected from power outages by internal, rechargeable batteries that provide 10 to 40 minutes of full operation. A separate battery supply protects the time clock, data, and program memories for 1 to 3 months.

New Remote Monitor Units (RMU's)

RMU's are low cost additions for the Series 626 that extend its monitoring capabilities to multiple remote locations. RMU's rely on the 626 mainframe, equipped with 626-PA-6036 Interface Adapter, for programming and data readout. Once programmed, each RMU monitors power line disturbances independently, without connection to the 626. Data may be collected by connecting the RMU directly to the 626 mainframe, or remotely to the 626 through an optional plug-in RMU modem.

For full specifications, call or write for Bulletin 626.

MONITORING MODULES (Plug-In)

Plug-in/PN	Inputs
1φ AC 626-PA-6001	Line Voltage: 50-600 VAC, 45-65 Hz Impulse Peak Voltage: 25-4000 V, 1-2000 μs, optional Impulse direction
Low Range DC 626-PA-6002A	Voltage Level: 0.5-80 VDC Impulse Peak Voltage: 0.5-80 V, 1-2000 μs
High Range DC 626-PA-6002C	Voltage Level: 25-600 VDC Impulse Peak Voltage: 25-4000 V, 1-2000 μs
3φ AC 626-PA-6003	Line Voltage: 50-600 VAC, 45-65 Hz Impulse Peak Voltage: 25-4000 V, 1-2000 μs
AC Neutral-Ground 626-PA-6006	Line Voltage: 2-50 VAC, 45-65 Hz Impulse Peak Voltage, 25-4000 V, 1-2000 μs
Sequential Events 626-PA-6007	8 inputs, change-of-state times 2 VDC (nominal) trip point
Temperature/Humidity 626-PA-6008	Temperature: 0-100°C Relative Humidity: 0-100%
3φ 400 Hz AC 626-PA-6009	Line Voltage: 50-600 VAC, 370-450 Hz Impulse Peak Voltage: 50-4000 V, 1-100 μs
Event Time Accumulator 626-PA-6011	8 inputs, elapsed and on/off times 2 VDC (nominal) trip point
Communications 626-PA-6012	Accepts data from 626 RS-232 port. Stored data (450 disturbances) available via integral auto-answer/auto-dial modem

Plug-in/PN	Inputs
8-Point Temperature 626-PA-6014	8 separate probes, −50° to +150°C
3-Channel Transducer 626-PA-6015	0-10 VDC, 0.2% accuracy, programmable full scale value and Engineering units
Remote Interface Adapter 626-PA-6036	Connects directly to any RMU, optional auto-dial modem available
1φ AC Remote Monitor 626-RMU-1	Line Voltage: 90-140 VAC or 180-250 VAC, 47-63 Hz Impulse Peak Voltage: 50-2000 V, 1-1000 μs
3φ AC, DC Remote Monitor 626-RMU-3	Line Voltage: 50-320 VAC, 47-63 Hz Impulse Peak Voltage: 50-2000 V, 1-1000 μs DC Voltage Level: 1-25 V
3φ AC Remote Monitor 626-RMU-3A	Line Voltage: 50-320 VAC, 47-63 Hz (isolated neutral-to-ground monitoring) Impulse Peak Voltage: 50-2000 V, 1-1000 μs

ACCESSORIES AVAILABLE

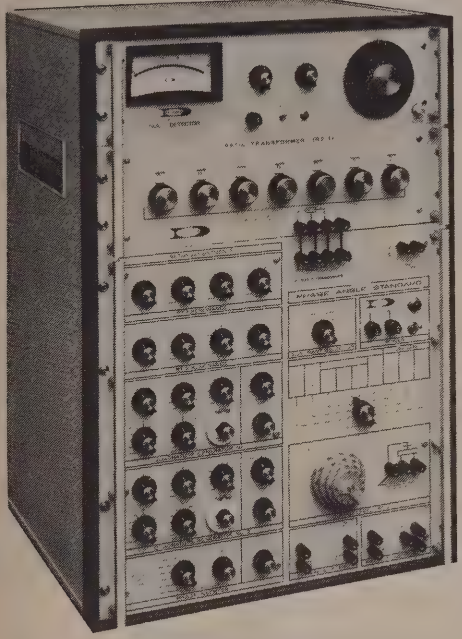
626 Shipping Container 106725	Rugged, reusable shipping container for safely transporting 626 and accessories
RMU Shipping Container 111223	Rugged, reusuable shipping container for safely transporting RMU and accessories
Modem Cartridge DM-C15	Auto-answer, 300 baud, direct connect modem fits into rear of RMU

DRANETZ TECHNOLOGIES, INC.

COMPUTER PRODUCTS DIVISION

1000 New Durham Road, Edison, NJ 08818
TEL: (201) 287-3680
TWX: 710-997-9553/CABLE: DRANETZ

DYTRONICS

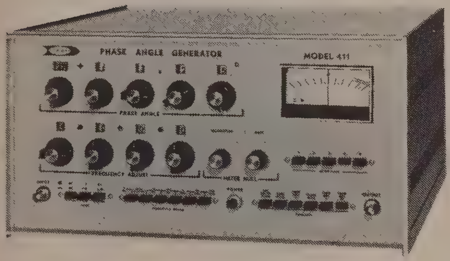


The first authentic Primary Phase Angle Standard for industry

MODEL 311/RT-1/717S PRIMARY PHASE ANGLE STANDARD

- 0.015° Accuracy
- Self-Calibrating
- Maximum 125 Volt Output
- Shift or Measure Phase Angle
- Frequency Range 30Hz to 10,000Hz
- 12 Microdegrees Resolution

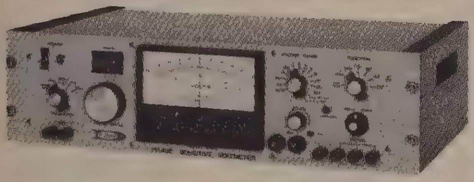
Dytronics offers an array of instrumentation for the measurement and generation of phase angle. This successful and advanced measurement technique pioneered by Dytronics is recognized as the finest throughout the world. See our catalog for complete information contact or Dytronics Company 4800 Evanswood Drive, Columbus, Ohio 43229, Telephone (614) 885-3303.



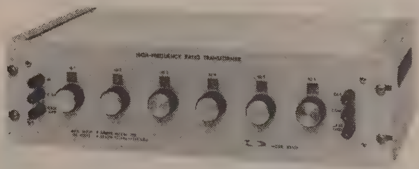
MODEL 411
PHASE SHIFTER/GENERATOR

Model Number	Frequency Range	Accuracy	Measure Phase?	Shift Phase?	0° to 360° Coverage without Ambiguity?
311/Rt-1/717S	30 Hz-10 kHz	±0.015°	Yes	Yes	Yes
312	4 kHz-500 kHz	±0.02°	Yes	Yes	Yes
402	400 Hz	±0.01°	No	Yes	No
411	1 Hz-100 kHz	±0.1°	No	Yes	Yes
412	.01 Hz-1 kHz	±0.1°	No	Yes	Yes

SEE OUR CATALOG FOR A COMPLETE LIST OF MODELS AND SPECIFICATIONS.

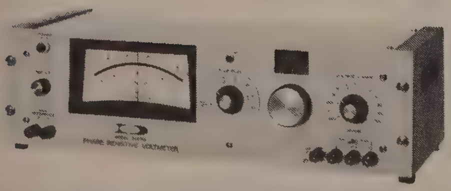


MODEL 250B
PHASE SENSITIVE VOLTMETER



MODEL RT-501
HIGH FREQUENCY
RATIO TRANSFORMER

MODEL RT-501	Operation up to 500 kHz.	±0.0005% Accuracy at 5 kHz; ±0.09 Accuracy at 500 kHz.	Less than 1 ohm Output Impedance.	1 ppm Resolution



MODEL 244/RS
PHASE SENSITIVE VOLTMETER

Model Number	Frequency Range	Accuracy	Internal Filters	Outputs	0° to 360° Coverage without Ambiguity?
244/RS	400 Hz	±1.0°	Yes	DC	Yes
250B	4 Frequency	±1.0°	Yes	DC	Yes

SEE OUR CATALOG FOR A COMPLETE LIST OF MODELS AND SPECIFICATIONS

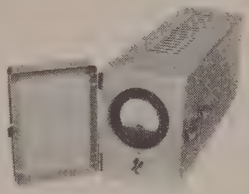
DYTRONICS COMPANY
DIVISION OF RYAN INTERNATIONAL CORPORATION
4800 EVANSWOOD DRIVE, COLUMBUS, OHIO 43229
Telephone (614) 885-3303

Electro IMPULSE, INC.

PRODUCTS FOR BROADCAST COMMUNICATIONS

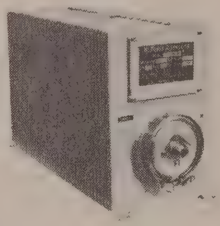
DUMMY LOADS • POWER METERS • ATTENUATORS • BALUNS • CALORIMETERS

PM SERIES
POWER METERS



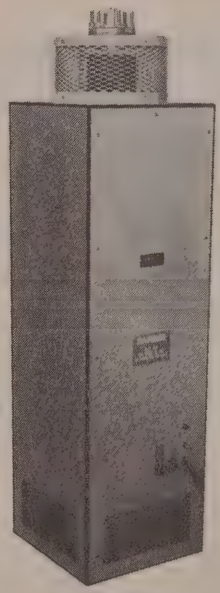
- 1.5 — 150 Watts
- Termination-Type
- AC Calibration

AX SERIES
ATTENUATORS



DC — 500 MHz
100-10,000 Watts
Many Standard Values

DPTC-FM SERIES



FM DRY FORCED AIR COOLED LOADS

10,000-75,000 Watts
VSWR 1.15:1

CLW SERIES
COAXIAL WATER LOADS

5000-80,000 Watts
Field Replaceable Resistor

CPTC SERIES
SELF-COOLED LOAD PACKAGE

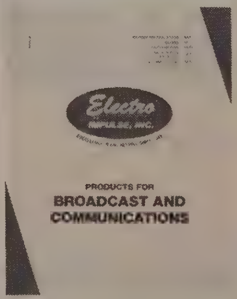
VSWR: 1.05:1
For FM/TV

Up to 75,000 Watts
DC — GHz

RF POWER CALORIMETERS

ADR-1000
WITH DIGITAL
READOUT

- Coaxial/Waveguide Loads to 40GHz
- Average Power 100-100,000 Watts
- Accuracy ½% f.s.



Electro IMPULSE, INC.

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NEW GENERAL CATALOG

AVAILABLE FREE
UPON REQUEST

EXCELLENCE IN
ENGINEERING SINCE 1949

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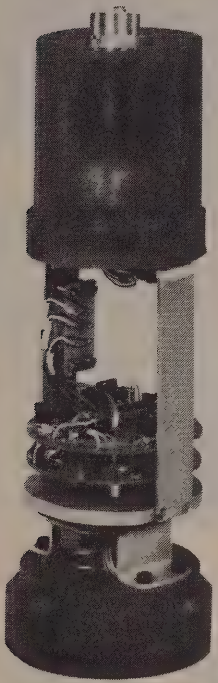
SEE OUR OTHER PRODUCTS ON PAGE 2•1817

MAGNETOMETERS from EMDS

ELECTRO MECHANICAL DESIGN SERVICES, INC.
16698 OAKMONT AVENUE
GAITHERSBURG, MARYLAND 20877
(301) 840-5710



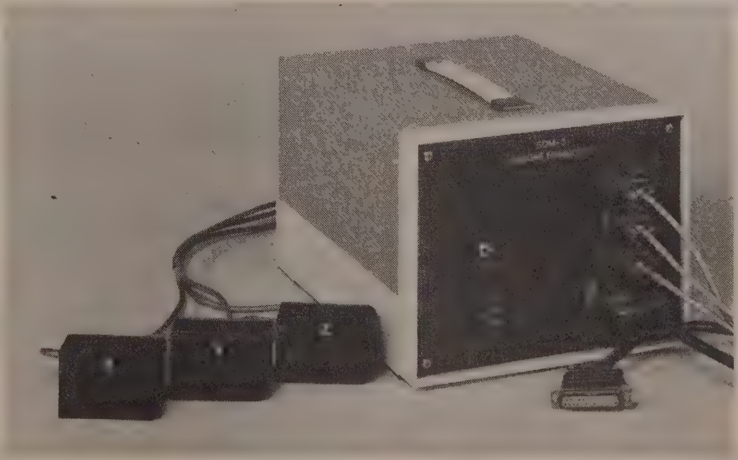
E.M.D.S. OFFERS A RANGE OF HIGH STABILITY, LOW NOISE FLUXGATE MAGNETOMETERS. THESE INSTRUMENTS CAN BE READILY CONFIGURED TO MEET YOUR SPECIALIZED REQUIREMENTS OF INSTRUMENT PACKAGING, DRIVER FREQUENCY OR SCALE FACTOR. E.M.D.S. IS CAPABLE OF DELIVERING MAGNETOMETERS WITH NOISE LEVELS OF ∠.1 NANOTESLA✻ P. TO P./100Hz BANDWIDTH AND ZERO OFFSET DRIFTS OF ∠.5 NANOTESLA OVER A 100 DEG. C TEMPERATURE RANGE. WE HAVE EXTENSIVE EXPERIENCE IN BOTH SPACECRAFT INSTRUMENTATION AND COST SENSITIVE APPLICATIONS.

MODEL	RANGE	LINEARITY	NOISE .1 Hz TO 10 Hz	ZERO OFFSET	POWER	FEATURES
1) SDM-3	.75 GAUSS	.005%	.1 nt	10 nt	115VAC/3W	(HI-STABILITY 3 AXIS)
2) DM75K2	.075 GAUSS	.01%	.1 nt	50 nt	+/-15vdc/.5W	(LINEAR FREQUENCY RESP.)
3) DM75KG	.075 GAUSS	.05%	.1 nt	75 nt	43vdc+/-5/1.8W	(GIMBALLED SENSOR)
4) DM7.5K	.0075 GAUSS	.04%	.05 nt	10 nt	+/-12vdc/.13W	(LOW POWER)
5) RFM1G-1	1 GAUSS	.05%	.2 nt	75 nt	+/-15VDC/.5W	(LONG TERM STABILITY)
6) M2G-2	2 GAUSS	.05%	.4 nt	150 nt	35 to 15vdc	(WIDE VOLTAGE RANGE)

✻1 NANOTESLA (nt) = 10^{-5} GAUSS = 1 Gamma

ADDITIONAL SERVICES

- DESIGN DRAFTING
- COMPUTER AIDED DESIGN
- PRECISION PHOTOGRAPHY
- PROTOTYPE & PRODUCTION P.C. BOARD MANUFACTURING
- ELECTRO MECHANICAL ASSEMBLY & FABRICATION



24 PAGE PRODUCT INDEX BOOK LISTS 3,800 ITEMS
61 CROSS REFERENCE CARDS
308 FILE FOLDER LABELS
eem
electronic engineers master
FILE SYSTEM
HARDWARE (ELECTRICAL/ELECTRONIC)
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PAGE NO.
2800
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GET ORGANIZED!

Are your catalog files organized? Can you find any given catalog in a matter of seconds? If your answer is "Yes," you probably already have the EEM File System. But, if you said "No," you really ought to look into this simple system. It will save hours of time and tons of aggravation.

The EEM File System was invented over twenty-five years ago to help people who specify, buy, or work with electronic products and equipment. It is upgraded on a constant basis to reflect the current state of the art. It's easy to use and easy to customize to your particular needs.

You say you want to file catalogs by type of product? That's easy to do with The System. But, what are you going to do when there are multiple products in one catalog? Take Mallory for example. There are all kinds of products in the Mallory Short Form Catalog. With the EEM File System all you do is file the catalog under "M" for Mallory and refer to it on all of the cross reference cards that apply.

There are thousands of EEM File Systems in everyday use in engineering and procurement offices all over the world. Shouldn't you be using this proven system?

The EEM File System is shipped in one neat package. The package contains everything you need to set up your very own filing system. Best of all, it's easy to get and very affordable. Send a check or money order for $25.00 and EEM will pay the postage and sales tax. If you must use a purchase order, please add $5.00 for postage and handling. An invoice will accompany your System.

Don't waste any more time. Get organized now!

EEM FILE SYSTEM,

645 stewart ave., garden city, ny 11530

ELECTRONIC
DEVELOPMENT
CORPORATION

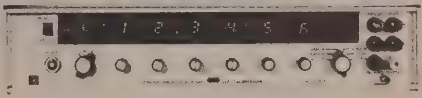
Digitally Programmable Standards AC and DC Voltage and Current

NOTICE: All instruments are traceable to the U.S. Bureau of Standards. Certification is supplied with all applicable instruments at time of delivery.
Line (mains) Power: 117 Vac and 230 Vac; from 50 Hz to 400 Hz.
All instruments are available under G.S.A. CONTRACT to authorized organizations. (Request Bulletin 4).

D.C. VOLTAGE & CURRENT STANDARD — MODEL 520 A (See Page A-3)

PROGRAMMABLE IEEE-488 GP-IB

- IEEE-488 interface is included. No extra charge.
- Floating output. Optically isolated from the logic.
- True bipolar, balanced zero.
- "Crowbar" zero reference.
- 100 Volts COMPLIANCE in the current mode.
- ±1000V range is optional.
- Complete output terminal sets on both front and rear panels. No extra charge.
- Bench or rack mountable. No extra charge.
- Weight 14 lbs., 6.35 kg.



D.C. VOLTAGE MODE					D.C. CURRENT MODE	
Model 520 A	**100 mV range**	**10 V range**	**100 V range**	**1000V range OPTION RA-5**	**10 mA range**	**100 mA range**
Output, d.c.	±100.0000 mV	±10.000 00 V	±100.000 0 V	±1000.000 V	±10.000 00 mA	±100.000 0 mA
Resolution (1 ppm)	±0.1μV	±10μV	±1μV	±1 mV	±10 nA	±100 nA
Accuracy	±0.002%	±0.002%	±0.002%	±0.002%	±0.005%	±0.005%
Accuracies stated are of setting plus range residual, "worst case" method, valid for 12 months.						
Noise	±0.0005% of range +2μV in a band pass of 0.1 Hz to 100 kHz.					
Compliance	emf into 400Ω	100 mA	100 mA	1 mA	100 V	100 V
Price	$2,250.00 Complete			$480.00	$2,250.00 Complete	

DIGITALLY PROGRAMMABLE D.C. STANDARDS, MODEL 501 J (See Page A-7)

"Building Block" Concept: Purchase only what you need.
Switching and setting time: 50μS

Program Formats: BCD or BINARY; **Entry:** Serial or Parallel or IEEE 488 (GP/IB).
Certification: NBS traceability.

	MAIN FRAME Model (501 J)	**100 mV RANGE Option: D**	**AMPLIFIER RA-3**	**AMPLIFIER RA-4**	**DC CURRENT PCS-1**	**AC & DC CURRENT PCS-2**
See Page	**A-7**	**A-9**	**A-12**	**A-14**	**A-11**	**B-2**
Output d.c.	10.0000Vdc	100.000mVdc	100 & 200Vdc	100V & 1000Vdc	10 & 100mAdc	1Ma, 10mA, 100mA, 1A, 10A ac/dc
Resolution	100μV (10 ppm)	1μV (10 ppm)	1 & 2mV (10 ppm)	1mV & 10mV	0.1 & 100mA	10nA, 100nA, 1mA, 10mA, 100mA
w/opt. B	10μV (1 ppm)	0.1μV (1 ppm)	100 & 200μV	100μV & 1mV	0.01 & 0.1μA	1nA, 10nA, 100nA, 1mA, 10mA
Accuracy	±0.002%	±0.002%	±0.01%	±0.01%	0.01%	DC: ±0.01%; AC: ±0.05%
Noise	0.0005%	0.0005%	0.0005%	0.0005%	0.0005%	0.15% to 0.00375%
Compliance	50mA	in to 400Ωload	15mA	15mA-50mA	100V	1.5V-5Vdc
Prices	$1995	$240	$1295	$1595	$1625	$1995

ACCESSORIES (May be field installed)

MR-1	Memory register or buffer storage
AK-1	Negative programming logic.
AM-1	Front panel display and control (for BCD).
AM-2	Front panel display and control (for BINARY).
IS-40	Opto-Isolation.
KT-488	IEEE 488 interface (Kit)

PROGRAMMABLE AC CALIBRATOR, MODEL 4500 (See Page A-14)

Completely Solid State. 60 Second warm up. Light Weight — 20 lbs. (9.1 kg)

Programming Format: BCD; **Entry:** Parallel or Serial or IEEE-488. GP/IB

6 Output Ranges	100μV to 111 Vac	**Resolution**	1 ppm
Accuracy (Amplitude)	0.04%	**Distortion**	0.1%
4 Frequency Ranges	10 Hz to 111 kHz	**Resolution**	100 ppm
Accuracy (Frequency)	0.001%	**AC Current**	See Model PCS-2 (Page B-2)
Price	$4995		

SEE FOLLOWING PAGES

ELECTRONIC
DEVELOPMENT
CORPORATION

11 Hamlin Street, Boston, Mass. 02127, U.S.A.
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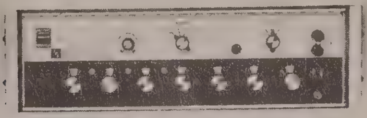
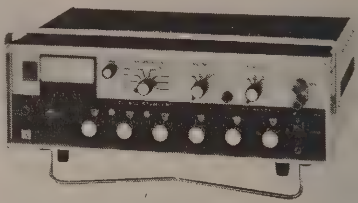
ELECTRONIC DEVELOPMENT CORPORATION

Manually Operated AC & DC Voltage and Current Standards, Sources, References, Calibrators.

NOTICE: All instruments are traceable to the U.S. Bureau of Standards. Certification is supplied with all applicable instruments at time of delivery.
Line (mains) Power: 117 Vac and 230 Vac; from 50 Hz to 400 Hz.
All instruments are available under G.S.A. CONTRACT to authorized organizations. (Request Bulletin 4).



1030 A



MV 116 J
with option G-1

DC VOLTAGE STANDARDS

Applications for Production Line QC, Field Service Calibration Laboratories. Ideal as a Reference/Source/Supply for design and development labs. Simulator for thermocouples and transducers.

MODELS	E 100E	MV 106/J	MV 116/J	330J	1030A
See Page	C-2	C-5	C-5	D-2	D-3
DC Volts (ranges)	± 11V ±100mV	± 11V ±100mV ± 10mv	± 11V ± 1V ±100mV	±311V ± 31V ± 3V ±300mV	±1111V ± 111V ± 11V ± 100mV
Resolution (1 ppm)	100μV 1μV	10μV 100nV 10nV	10μV 1μV 100nV	100μV 10μV 1μV 0.1μV	100μV 10μV 1μV 0.1μV
I out	75mA	50mA	50mA	100mA	50mA
Accuracy	±0.005% of setting	±0.002% of setting	±0.002% of setting	±0.002% of setting	±0.003% of setting
Price	$950	$1475	$1475	$1895	$2450

DIFFERENTIAL VOLTMETER (ΔVM) Option G-1 (See Page H-2) — Price $395
with RECORDER OUTPUT Option G-2 (See Page H-2) — Price $495

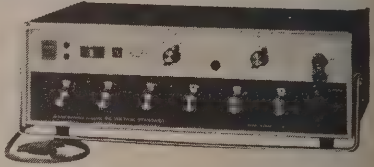
Available in Models MV 106, MV 116 and 1030. For potentiometric and differential measurements from 0.5μV to 1000 Vdc. Factory installed.
Accuracies: from ±0.005% to ±0.002%.

BATTERY/EXTERNAL POWERED DC VOLTAGE STANDARD/SOURCE — MODEL MV 216 A

Internal, re-chargeable battery operation and 117 Vac, 12 Vdc and 24 Vdc external power. Absolute isolation from line. **(See Page C-3)**
High voltage accuracy and stability. Compliance current. Very low source impedance.

Ranges (dc)	±10V	±1V	±100mV
Resolution (1 ppm)	10μV	1μV	100NV
I out	10mA		
Accuracy	±0.003% of setting		

Z_{out}	0.01Ω	0.001Ω	20Ω
Power	Internal re-chargeable Batteries also 117 Vac, 12V and 24 Vdc		
Price	$1795		

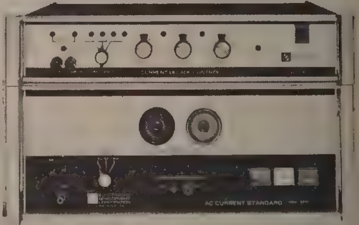


100 AMP AC CURRENT CALIBRATOR MODEL 3210

This is a calibrator for meters, shunts, coils and transducers when used in this stand-alone configuration. **(See Page E-6)**

Ranges (ac)	100A, 10A, 1A
Compliance	0.1V, 2.0V, 20V
Accuracy	± (0.05% of setting + 0.02% of range)
Price	(3210A=$2250+CDC-32=$795) CDC 32/10=$2995

Stand-alone Configuration

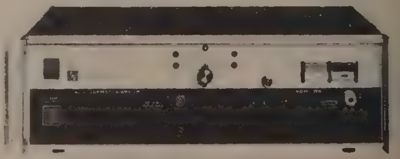


(For watt-hour meter configuration, see WMC-32)

10 AMP AC & DC CURRENT CALIBRATOR (Source), MODEL 3200B (See Page E-4)

This auxiliary instrument operates from the output of a stable, accurate AC or DC Voltage Calibrator, such as: EDC Model MV 116 J (for d.c.), and EDC Model 4600 or Model CDC-32 (for a.c.).

Ranges (ac & dc)	10A, 1A, 100mA, 10mA, and 1mA
Accuracy: (dc)	±(0.01% of setting+0.01% of range+10μA)
(ac)	±(0.05% of setting+0.001% of range+20μA)
Voltage Compliance	1.5V (min) to 5V (max)
Price	$1595



DC CURRENT AND VOLTAGE STANDARD — MODEL CR 103 J (See Page E-2)

Short-circuit and open-circuit protected. 30 second warm-up. Automatic zero.

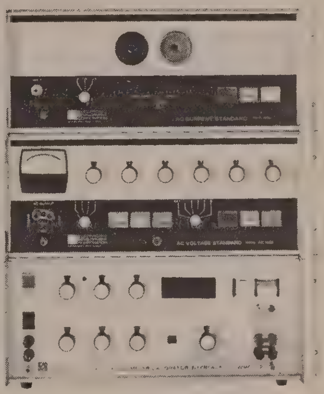
	Current Mode	**Voltage Mode**
DC Ranges	±110mA ± 11mA	±11V ±1V ±110mV
Resolution (1 ppm)	100nA 10nA	10µV 1µV 0.1µV
Compliance	100V	50mA
Accuracy	±0.005% of setting	±0.003% of setting
Price	$1895	

AC WATT-HOUR METER CALIBRATION SYSTEM (See Page E-6)

System WMC-32/10 and WMC-32/00

This is a completely flexible system comprised of three independently useable instruments:

Model 4600	AC Voltages up to 1000 Vac
Model WMC-32	Interface, Power-factor (Phase angle control), and time measurements.
Model 3210	100 Ampere a.c. Calibrator
Price	System WMC-32/10 $9945
	— or —
Model 3200	10 Ampere a.c. and d.c. Calibrator
Total System Accuracy	0.1%
Frequency	50 Hz to 400 Hz.
Price	System WMC-32/00 $9290



AC VOLTAGE STANDARD — MODEL 4600 (See Page F-2)

Completely solid state. Highly stable. 60 second warm-up. Low output impedance.

Vac rms Ranges	1000V, 100V, 10V, 1V, 100mV
Accuracy	±0.05%
Burden	50 VA (2A max.)
Frequency Range	50 Hz to 5 kHz

5 internal frequencies 50 Hz, 60 Hz, 400 Hz, 1 kHz plus optional frequency and unlimited number of frequencies attained by use of external oscillator via front panel terminals.

Distortion	0.5%
Weight	48 lbs.
Price	$4395

Auxiliary Instruments: **Model IC-20** Meter Increment Calibrator
Model PAS-300 Phase Shifter
Model WMC-32 Watt Hour Meter Calibrator

SINE WAVE FREQUENCY & AMPLITUDE STANDARD Model 4100 (See Page F-4)

Completely Solid State. Light weight — 20 lbs. (9.1 kg).

6 Output Ranges	100µV to 111 Vac	**Resolution**	1 ppm
Accuracy (Amplitude)	0.04%	**Distortion**	<0.1%
4 Frequency Ranges	10 Hz to 111 kHz	**Resolution**	100 ppm
Accuracy (Frequency)	0.001%		
Price	$3995		

ELECTRONIC
DEVELOPMENT
CORPORATION

11 Hamlin Street, Boston, Mass. 02127-4198, U.S.A.
TEL: (617) 268-9696; TLX: 951596 (ELECDEVCO BSN); CABLE: ELECDEVCO BOS

INTRODUCTION

On January 10, 1983, we at Electronic Precision Components celebrated our twentieth year as a manufacturer of resistive devices. During this period we have tried to treat every individual customer as if they were our one and only. This philosophy has taught us to produce quality devices that have proven their reliability over the past two decades.

Most of the shunts that EPC has manufactured were specials, to customer specifications or custom designed by us, to meet a specific price/performance requirement.

With the introduction of this brochure, we have made many of these designs standard.

Of course, EPC will still custom design to meet your requirements, be it one or many; and look forward to being of service to you in the near future.

SPECIFICATIONS

The resistive element of the shunt is Manganin, which has a temperature coefficient of resistance of ±15 PPM/°C between 40° and 60°C. At rated current the self heating effect should not exceed 80°C.

The Manganin is terminated to brass blocks of sufficient size to insure even heat distribution due to self heating at rated current.

Various tolerances are available; from .01% to 20%, depending on resistance value and the current rating.

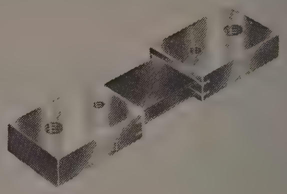
Please consult the factory for your particular requirements.

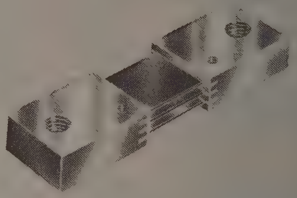
epc CORPORATION

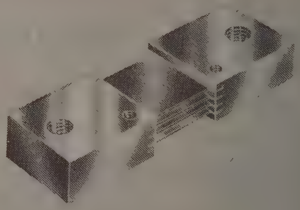
11 W. Sandford Blvd. • Mt. Vernon, N.Y. 10550
Telephone: (914) 664-2333

ELECTRONIC PRECISION COMPONENTS

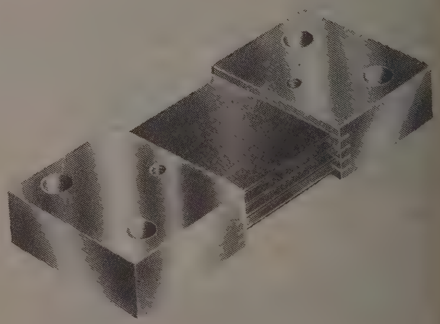
SERIES A







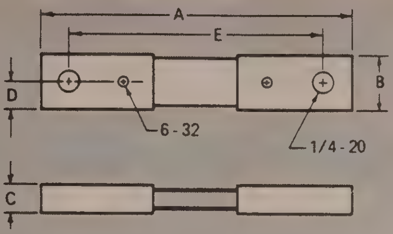
SERIES B



* Bases available upon request.

A1

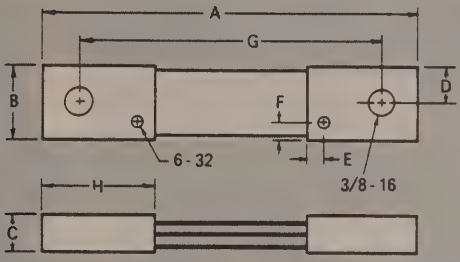
50 mV	100 mV
AMPS	AMPS
50	50
75	75
100	100
150	150
200	200



Dimension ▶	A	B	C	D	E
50 mV	4.12	.750	.375	.375	3.37
100 mV	5.25	.750	.375	.375	4.50

A2

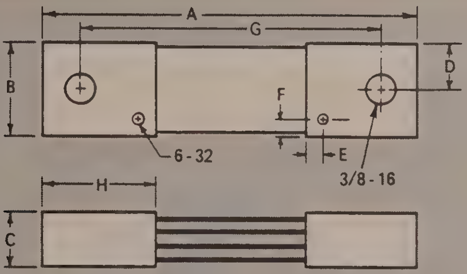
50 mV	100 mV
AMPS	AMPS
200	200
300	300
400	400



Dimension ▶	A	B	C	D	E	F	G	H
50 mV	4.00	1.00	.50	.50	.25	.25	3.00	1.50
100 mV	5.00	1.00	.50	.50	.25	.25	4.00	1.50

A3

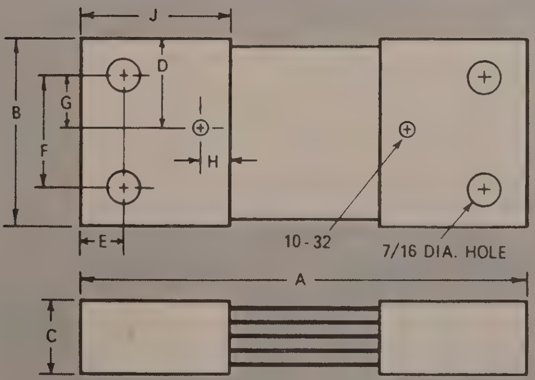
50 mV	100 mV
AMPS	AMPS
400	400
500	500
600	600
750	750



Dimension ▶	A	B	C	D	E	F	G	H
50 mV	4.00	1.25	.75	.62	.25	.25	3.00	1.50
100 mV	5.00	1.25	.75	.62	.25	.25	4.00	1.50

B

50 mV	100 mV
AMPS	available
600	upon
900	request
1200	
1500	



Dimension ▶	A	B	C	D	E	F	G	H	J
50 mV	6.00	2.50	1.00	1.25	.562	1.50	.75	.375	2.00

Dimensions in inches. Tolerances: ±.015 for hole dia's. Others ±.030 unless otherwise noted.

ELECTRONIC PRECISION COMPONENTS 11 W. Sandford Blvd. • Mt. Vernon, N.Y. 10550 • Telephone: (914) 664-2333

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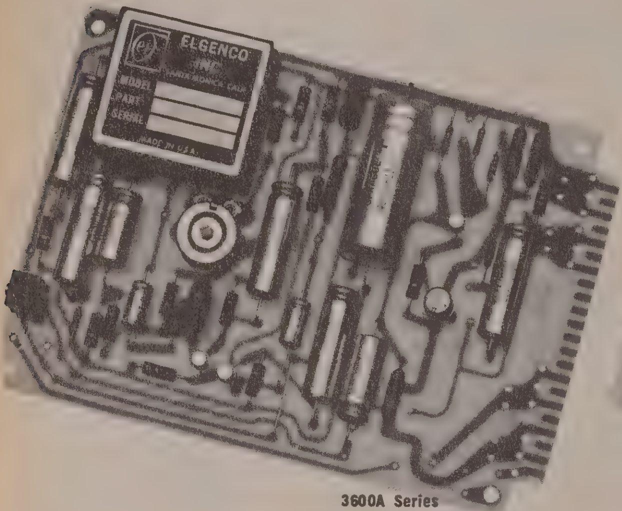
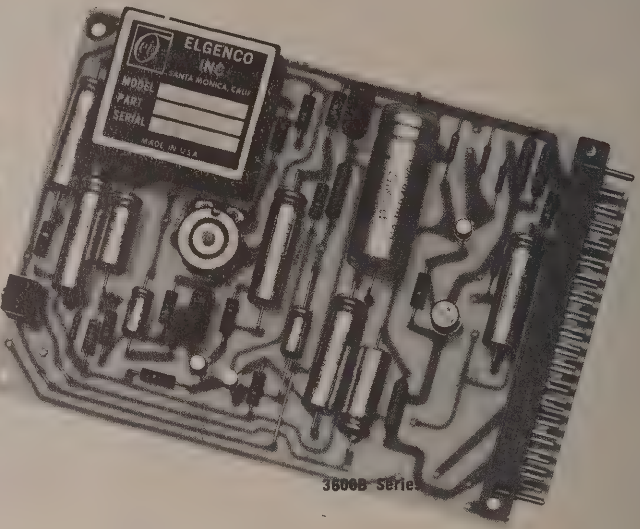
SERIES 3600 FIXED RANGE • NOISE GENERATOR CARDS



3600A Series



3600B Series

SPECIFICATIONS

FREQUENCY RANGE: The frequency band may be any combination of the listed low and high frequencies.

Lower Frequency: 10, 20, 50, or 200 Hz, 5 kHz.

Upper Frequency: 20, 50, 100, 200, or 500 kHz; 1, 2, 3, or 5 mHz.

SPECTRAL UNIFORMITY: Spectral uniformities are available as:

Upper Frequency	Spectral Uniformity
20 kHz to 500 kHz	±0.5, ±1.0, ±2.0 or ±3.0db
1 mHz to 3 mHz	±1.0, ±2.0, or ±3.0db
5 mHz	±2.0 or ±3.0db

As a rule of thumb, the roll off above the specified upper frequency gives a 3db point about twice the specified upper frequency. Roll off above 3db point approaches 12db per octave.

OUTPUT IMPEDANCE:

20 kHz to 500 kHz units	600 ohms
1 to 5 mHz units	200 ohms

POWER REQUIREMENTS:

	3600A Series or 3600B Series	Low Current Option 3600A or 3600B	3600C Series
Power supply voltage required	−30 VDC ±1%	−30 VDC ±1%	−24 VDC ±1%
Approximate current..	50 ma	30 ma	37 ma
Open ckt. output level	0 to 3.0 VRMS	0 to 1.5 VRMS	0 to 2.2 VRMS

Note: The 3600B series units are the same as the 3600A series except the 3600B series have a test point and Elco 00-7023-035-000-001 connector mounted on the PCB.

The 3600A and 3600C units mate with a Cinch 250-22-30-170, Elco 00-6007-022-940-022 connector or equivalent.

SPECIFICATIONS COMMON TO ALL UNITS:

Specifications are for 25°C unless specified otherwise.

Amplitude Probability Distribution: Gaussian.

Peak to RMS Capability: Minimum dynamic ranges 3.5 to 1 at specified maximum level. Increases with lower output levels.

Maximum Load: 900 ohms minus output impedance.

Operating Temperature Range: 0 to 50°C.

Size: 4½ x 6½ x ⅞ inches.

Weight: 7 oz.

PRICING: (See price list on facing page)

Base Price: 3600A, 3600C and 3600A or C with reduced current option (specify on order).

Base price plus $50.00: 3600B or 3600B with reduced current option (specify on order).

OPTIONS:

Other than specified frequency; add $25.00 each per frequency per board.

Steel shield plate, ¼-inch off conductor side of PCB; add $20.00 each.

Other than specified output impedance, add $20.00 each.

To operate on other power supply voltages, voltage difference must be 30-volts for 3600A or 3600B and 24-volts for 3600C. Specify on order; "Decoupled option for operation on __________ power supply," and add to price as:

Quantity Per Order	Add Each	Quantity Per Order	Add Each
1	$25.00	25-49	$8.00
2	20.00	50-99	6.00
3	18.00	100-249	5.00
4	15.00	250-499	4.50
5-9	12.00	500 up	4.00

DISCOUNT: Quantity discounts apply as:

Quantity	Discount	Quantity	Discount
1-4	List	20-49	13%
5-9	5%	50-99	17%
10-19	10%	100	20%

MODEL 3609A POWER SUPPLY CARD

Size: 4½″ x 6½″ x 2¹⁄₁₆″.

Input: 115/230 volts ± 10/20 volts, 50 to 1000 Hz.

Supplies power for up to 2 noise generator cards or up to 4 noise generator cards with reduced current option. Price: **$241.00.**

MATING CONNECTOR: Mating Elco Connector; Elgenco, Inc. part numbers 7521-1122, for 3600A, 3600C and 3609A is available at **$22.33** each.

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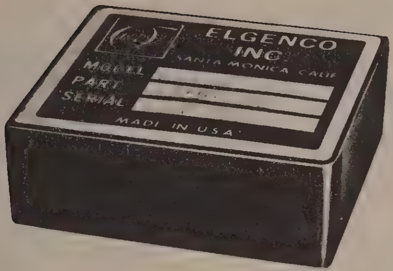
ERIES 1600 • ENCAPSULATED NOISE SOURCE MODULES • 10Hz TO 5MHz



PECIFICATIONS IN RECOMMENDED CIRCUIT:

e 1600 series provide a low level wide band output. A portion of is wide band is specified to a certain flatness; uniformity. The 3 or millivolt output is for the whole band extending to 5 mHz. Specifications e for 25°C unless specified otherwise.

PECTRAL DENSITY UNIFORMITY: Available with uniformity to ±½db, ±1db, ±2db, or ±3db and many frequency ranges within 10 Hz to 5 mHz. See price list for complete list of standards.

SPECTRAL DENSITY: Approximately 2 μv/√ Hz .

RMS OUTPUT LEVEL: 1602A series 3 mv; 1603A, 1606A, and 1607A series 5 mv.

OUTPUT IMPEDANCE: Approx 20 ohms.

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

OPERATING TEMPERATURE RANGE: 0 to 50°C.

POWER REQUIREMENTS: −30 volts dc ±1% at approximately 3.5 ma. **Note:** external passive components are required to properly install unit.

MOUNTING: .032″ Printed Circuit Leads.

Size: 11/16″ H x 1 51/64″ W x 1 37/64″ D.

WEIGHT: Approx 1.5 oz.

ERIES 3600/1600 PRICES

Frequency Band	Flatness	SERIES 3600 CARDS		SERIES 1600 MODULES	
		Model No.	Price	Model No.	Price
200 Hz to 20 kHz	±½db	3606A-52224	$624.00	1606A-52224	$555.00
50 Hz to 20 kHz	±½db	-55124	$634.00	-55124	$565.00
20 Hz to 20 kHz	±½db	-52124	$664.00	-52124	$595.00
10 Hz to 20 kHz	±½db	-51124	$714.00	-51124	$645.00
200 Hz to 50 kHz	±½db	3606A-52254	$644.00	1606A-52254	$575.00
50 Hz to 50 kHz	±½db	55154	$654.00	-55154	$585.00
20 Hz to 50 kHz	±½db	-52154	$684.00	-52154	$615.00
10 Hz to 50 kHz	±½db	-51154	$734.00	-51154	$665.00
200 Hz to 100 kHz	±½db	3606A-52215	$664.00	1606A-52215	$595.00
50 Hz to 100 kHz	±½db	-55115	$674.00	-55115	$605.00
20 Hz to 100 kHz	±½db	-52115	$704.00	-52115	$635.00
10 Hz to 100 kHz	±½db	-51115	$754.00	-51115	$685.00
200 Hz to 200 kHz	±½db	3606A-52225	$679.00	1606A-52225	$610.00
50 Hz to 200 kHz	±½db	-55125	$689.00	-55125	$620.00
20 Hz to 200 kHz	±½db	-52125	$719.00	-52125	$650.00
10 Hz to 200 kHz	±½db	-51125	$769.00	-51125	$700.00
200 Hz to 500 kHz	±½db	3606A-52255	$699.00	1606A-52255	$630.00
50 Hz to 500 kHz	±½db	-55155	$709.00	-55155	$640.00
20 Hz to 500 kHz	±½db	-52155	$739.00	-52155	$670.00
10 Hz to 500 kHz	±½db	-51155	$789.00	-51155	$720.00
200 Hz to 20 kHz	±1db	3602A-12224	$499.00	1602A-12224	$430.00
50 Hz to 20 kHz	±1db	-15124	$509.00	-15124	$440.00
20 Hz to 20 kHz	±1db	-12124	$539.00	-12124	$470.00
10 Hz to 20 kHz	±1db	-11124	$589.00	-11124	$520.00
200 Hz to 50 kHz	±1db	3602A-12254	$519.00	1602A-12254	$450.00
50 Hz to 50 kHz	±1db	-15154	$529.00	-15154	$460.00
20 Hz to 50 kHz	±1db	-12154	$559.00	-12154	$490.00
10 Hz to 50 kHz	±1db	-11154	$609.00	-11154	$540.00
200 Hz to 100 kHz	±1db	3603A-12215	$539.00	1603A-12215	$470.00
50 Hz to 100 kHz	±1db	-15115	$549.00	-15115	$480.00
20 Hz to 100 kHz	±1db	-12115	$589.00	-12115	$510.00
10 Hz to 100 kHz	±1db	-11115	$649.00	-11115	$560.00
200 Hz to 200 kHz	±1db	3603A-12225	$544.00	1603A-12225	$475.00
50 Hz to 200 kHz	±1db	-15125	$554.00	-15125	$485.00
20 Hz to 200 kHz	±1db	-12125	$584.00	-12125	$515.00
10 Hz to 200 kHz	±1db	-11125	$634.00	-11125	$565.00
200 Hz to 500 kHz	±1db	3603A-12255	$564.00	1603A-12255	$495.00
50 Hz to 500 kHz	±1db	-15155	$574.00	-15155	$505.00
20 Hz to 500 kHz	±1db	-12155	$604.00	-12155	$535.00
10 Hz to 500 kHz	±1db	-11155	$654.00	-11155	$585.00
200 Hz to 50 kHz	±2db	3602A-22254	$489.00	1602A-22254	$420.00
50 Hz to 50 kHz	±2db	-25154	$499.00	-25154	$430.00
20 Hz to 50 kHz	±2db	-22154	$529.00	-22154	$460.00
10 Hz to 50 kHz	±2db	-21154	$579.00	-21154	$510.00
200 Hz to 100 kHz	±2db	3602A-22215	$499.00	1602A-22215	$430.00
50 Hz to 100 kHz	±2db	-25115	$509.00	-25115	$440.00
20 Hz to 100 kHz	±2db	-22115	$539.00	-22115	$470.00
10 Hz to 100 kHz	±2db	-21115	$589.00	21115	$520.00
200 Hz to 200 kHz	±2db	3602A-22225	$514.00	1602A-22225	$445.00
50 Hz to 200 kHz	±2db	-25125	$524.00	-25125	$455.00
20 Hz to 200 kHz	±2db	-22125	$554.00	-22125	$485.00
10 Hz to 200 kHz	±2db	-21125	$604.00	-21125	$535.00
200 Hz to 500 kHz	±2db	3602A-22255	$529.00	1602A-22255	$460.00
50 Hz to 500 kHz	±2db	-25155	$539.00	-25155	$470.00
20 Hz to 500 kHz	±2db	-22155	$569.00	-22155	$500.00
10 Hz to 500 kHz	±2db	-21155	$619.00	-21155	$550.00
200 Hz to 500 kHz	±3db	3602A-32255	$489.00	1602A-32255	$420.00
50 Hz to 500 kHz	±3db	-35155	$499.00	-35155	$430.00
20 Hz to 500 kHz	±3db	-32155	$529.00	-32155	$460.00
10 Hz to 500 kHz	±3db	-31155	$579.00	-31155	$510.00
5 kHz to 1 mHz	±1db	3607A-15316	$700.00	1607A-15316	$621.00
5 kHz to 2 mHz	±1db	-15326	$790.00	-15326	$711.00
5 kHz to 3 mHz	±1db	-15336	$890.00	-15336	$821.00
5 kHz to 1 mHz	±2db	3607A-25316	$600.00	1607A-25316	$521.00
5 kHz to 2 mHz	±2db	-25326	$675.00	-25326	$596.00
5 kHz to 3 mHz	±2db	-25336	$755.00	-25336	$676.00
5 kHz to 5 mHz	±2db	-25356	$905.00	-25356	$836.00
5 kHz to 1 mHz	±3db	3607A-35316	$530.00	1607A-35316	$451.00
5 kHz to 2 mHz	±3db	-35326	$590.00	-35326	$511.00
5 kHz to 3 mHz	±3db	-35336	$660.00	-35336	$581.00
5 kHz to 5 mHz	±3db	-35356	$805.00	-35356	$716.00

OTE: A SERIES TO OPERATE ON −30VDC
C SERIES TO OPERATE ON −24VDC, PRICE SAME AS (A) SERIES

TO EXTEND 3607A LOW FREQUENCY ADD AS FOLLOWS:

200 Hz add $30.00	20 Hz add $ 70.00
50 Hz add $40.00	10 Hz add $120.00

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MODELS 602A-200/602A-1390/603A • ALL SOLID STATE NOISE GENERATORS 5 Hz TO 5 MHz

AMPLITUDE
ATTENUATOR
X.001
X.01
X0 1
X.0001
X1 0
RANGE
500 KC
20 KC
5 MC
OUTPUT
ON
OFF
LINE
ELGENCO INC.
SANTA MONICA, CALIFORNIA
MODEL 603A
GAUSSIAN NOISE GENERATOR

SPECIFICATIONS:

These specs are unique to the Series 602A-200, 602A-1390, 603A introduced on this page.

FREQUENCY RANGES: 5 Hz to 20 kHz, 5 Hz to 500 kHz, 5 Hz to 5 mHz.

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

OUTPUT SPECTRUM:

Accuracy	602A-1390	602A-200	603A
20 Hz to 20 kHz	±1 db	±1 db	—
20 Hz to 500 kHz	±3 db	±2.5 db	—
500 kHz to 5 mHz	±8 db	±5 db	—
10 Hz to 500 kHz	—	—	±1 db
500 kHz to 5 mHz	—	—	±3 db

RMS OUTPUT LEVEL: (Minimum value of maximum open circuit output).

20 kHz range	3 volts	3 volts	3 volts
500 kHz range	2 volts	2.5 volts	3 volts
5 mHz range	1 volt	2.0 volts	3 volts

OUTPUT IMPEDANCE:

	900 ohms ±10%	200 ohms ±10%	200 ohms ±10%

MAXIMUM LOAD: (on direct output)

	no limit	700 ohms	700 ohms

OUTPUT STEP ATTENUATOR: Five positions: X1.0, X0.1, X.01, X.001, and X.0001; calibrated to work into open circuit. Accuracy:

to 100 kHz	±3%	±3%	—
to 500 kHz	—	—	±3%
to 5 mHz	±10%	±10%	±5%
Output Impedance	200 ohms —	200 ohms ±1%	200 ohms ±1%

SPECTRAL DENSITY: Approximate spectral density (mv $\sqrt{\text{Hz}}$) for 1 volt RMS output.

20 kHz band	5.0	5.0	5.0
500 kHz band	1.2	1.2	1.2
5 mHz band	0.6	0.4	0.4

PRICE

	$1,705.00	$1,925.00	$2,265.00

SPECIFICATIONS • ALSO COMMON TO SERIES 624A

These specs are common to the Series 602A-200, 602A-1390, 603A introduced on this page and the Series 624A on facing page. Specifications are for 25°C unless specified otherwise.

DYNAMIC RANGE: 3.5 to 1 peak to RMS at 3 volts RMS open circuit; 5 to 1 at 2.1 volts RMS. Dynamic range is inversly proportional to output level as set by front panel amplitude control.

OUTPUT METER: Rectifier type meter circuit reads proportional to average value, calibrated to read RMS value of Gaussian Noise; 0-5 volts RMS scale.

OPERATING TEMPERATURE RANGE: 0 to 50°C.

POWER SUPPLY: Built-in highly regulated dc supply.

POWER REQUIREMENTS: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac; approximately 5 watts. A rechargeable battery option is available. Battery is recharged by operating unit on ac line.

DIMENSIONS: 5¼″ high x 8⅝″ wide x 11″ deep.

RACK MOUNT: A rack mounting adapter kit is available for rack mounting two units side by side. Also available is a rack mounting adapter kit for rack mounting one unit. One or two units use 5¼″ x 19″ of rack panel space with adapter kit. Full rack width cabinet option for one unit is available. Size of unit with this option is 5¼″ high x 17″ wide x 11″ deep and comes with rack mounting hardware.

SHIPPING WEIGHT: Approximately 12 lbs.

OPTIONS AVAILABLE: Full rack width cabinet with mounting hardware option; rechargeable battery option; BNC output terminal on rear panel option.

ACCESSORIES AVAILABLE: Dual adapter kit and rack mounting hardware; single unit adapter kit with rack mounting hardware and front and rear dummy panels; rechargeable battery adapter kit.

OPTIONS & ACCESSORIES FOR MODELS 602A/603A/610A & SERIES 624A

Adapter kit, single unit rack mounting (mounts one unit in rack, includes blank panel to make dual unit) Part No. 8804-0002	$282.00
Adapter kit, dual unit and rack mounting hardware (mounts two units side by side) Part No. 8804-0001	$65.00
Full rack width cabinet and rack mounting hardware option....add	$245.00
Pink filters, Part No. 8890-0015	$245.00
Rechargeable battery option	add $670.00
Rechargeable battery kit	$695.00

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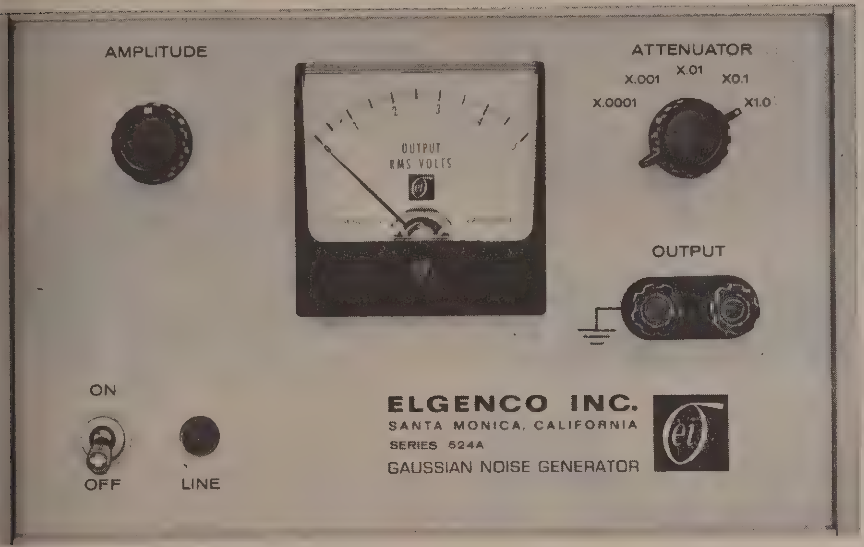
SERIES 624A FIXED RANGE • ALL SOLID STATE NOISE GENERATORS



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SPECIFICATIONS • ALSO SEE FACING PAGE

FREQUENCY RANGES: See price list for a partial list of frequency ranges available.

RMS OUTPUT LEVEL: (Minimum value of maximum open circuit output) 3 volts.

OUTPUT IMPEDANCE: 200 ohms ±10%.

MAXIMUM LOAD: (on direct output) 700 ohms.

OUTPUT STEP ATTENUATOR: Five positions: X1.0, X0.1, X.01, X.001, and X.0001; calibrated to work into open circuit.

Accuracy: ±3%
Output Impedance: 200 ohms

SPECTRAL DENSITY: Approximate spectral density (mv$\sqrt{\text{Hz}}$) for 1 volt RMS output.

Accuracy	mv	Accuracy	mv
20 kHz band	5.0	200 kHz band	1.6
50 kHz band	3.1	500 kHz band	1.0
100 kHz band	2.2		

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

SPECIFICATIONS FOR SERIES 624A

±1 db 200 Hz to 20 kHz	624A-12224	$1625.00
±1 db 50 Hz to 20 kHz	-15124	$1635.00
±1 db 20 Hz to 20 kHz	-12124	$1665.00
±1 db 10 Hz to 20 kHz	-11124	$1715.00
±1 db 200 Hz to 50 kHz	624A-12254	$1645.00
±1 db 50 Hz to 50 kHz	-15154	$1655.00
±1 db 20 Hz to 50 kHz	-12154	$1685.00
±1 db 10 Hz to 50 kHz	-11154	$1735.00
±1 db 200 Hz to 100 kHz	624A-12215	$1665.00
±1 db 50 Hz to 100 kHz	-15115	$1675.00
±1 db 20 Hz to 100 kHz	-12115	$1705.00
±1 db 10 Hz to 100 kHz	-11115	$1755.00
±1 db 200 Hz to 200 kHz	624A-12225	$1715.00
±1 db 50 Hz to 200 kHz	-15125	$1725.00
±1 db 20 Hz to 200 kHz	-12125	$1755.00
±1 db 10 Hz to 200 kHz	-11125	$1805.00

SPECIFICATIONS FOR SERIES 624A (Cont'd)

±1 db 200 Hz to 500 kHz	624A-12255	$1765.00
±1 db 50 Hz to 500 kHz	-15155	$1775.00
±1 db 20 Hz to 500 kHz	-12155	$1805.00
±1 db 10 Hz to 500 kHz	-11155	$1855.00
±2 db 200 Hz to 50 kHz	624A-22254	$1625.00
±2 db 50 Hz to 50 kHz	-25154	$1635.00
±2 db 20 Hz to 50 kHz	-22154	$1665.00
±2 db 10 Hz to 50 kHz	-21154	$1715.00
±2 db 200 Hz to 100 kHz	624A-22215	$1635.00
±2 db 50 Hz to 100 kHz	-25115	$1645.00
±2 db 20 Hz to 100 kHz	-22115	$1675.00
±2 db 10 Hz to 100 kHz	-21115	$1725.00
±2 db 200 Hz to 200 kHz	624A-22225	$1650.00
±2 db 50 Hz to 200 kHz	-25125	$1660.00
±2 db 20 Hz to 200 kHz	-22125	$1690.00
±2 db 10 Hz to 200 kHz	-21125	$1740.00
±2 db 200 Hz to 500 kHz	624A-22255	$1665.00
±2 db 50 Hz to 500 kHz	-25155	$1675.00
±2 db 20 Hz to 500 kHz	-22155	$1705.00
±2 db 10 Hz to 500 kHz	-21155	$1755.00
±3 db 200 Hz to 500 kHz	624A-32255	$1625.00
±3 db 50 Hz to 500 kHz	-35155	$1635.00
±3 db 20 Hz to 500 kHz	-32155	$1665.00
±3 db 10 Hz to 500 kHz	-31155	$1715.00
±½ db 200 Hz to 20 kHz	624A-52224	$1780.00
±½ db 50 Hz to 20 kHz	-55124	$1790.00
±½ db 20 Hz to 20 kHz	-52124	$1820.00
±½ db 10 Hz to 20 kHz	-51124	$1870.00
±½ db 200 Hz to 50 kHz	624A-52254	$1800.00
±½ db 50 Hz to 50 kHz	-55154	$1810.00
±½ db 20 Hz to 50 kHz	-52154	$1840.00
±½ db 10 Hz to 50 kHz	-51154	$1890.00
±½ db 200 Hz to 100 kHz	624A-52215	$1820.00
±½ db 50 Hz to 100 kHz	-55115	$1830.00
±½ db 20 Hz to 100 kHz	-52115	$1860.00
±½ db 10 Hz to 100 kHz	-51115	$1910.00
±½ db 200 Hz to 200 kHz	624A-52225	$1870.00
±½ db 50 Hz to 200 kHz	-55125	$1880.00
±½ db 20 Hz to 200 kHz	-52125	$1910.00
±½ db 10 Hz to 200 kHz	-51125	$1960.00
±½ db 200 Hz to 500 kHz	624A-52255	$1890.00
±½ db 50 Hz to 500 kHz	-55155	$1900.00
±½ db 20 Hz to 500 kHz	-52155	$1930.00
±½ db 10 Hz to 500 kHz	-51155	$1980.00

Model 602A with full rack width mounting option

Models 602A and **610A** combined by dual unit adapter kit.

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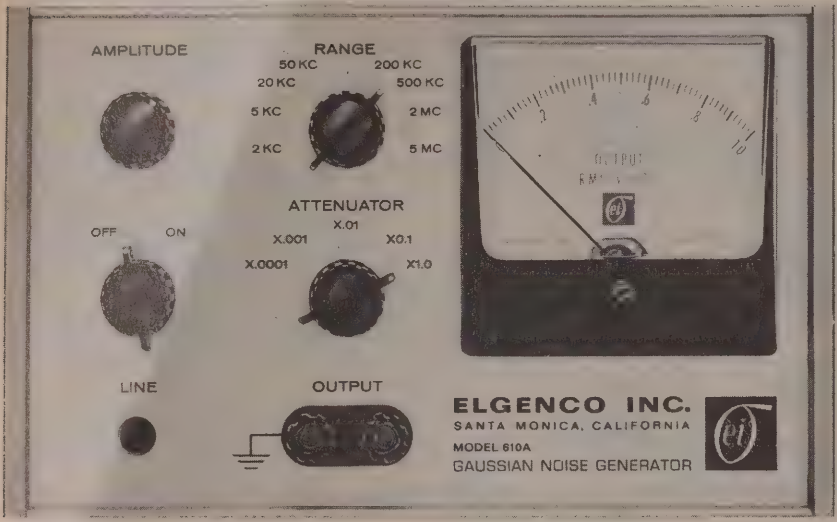
MODEL 610A • ALL SOLID STATE NOISE GENERATOR • 5Hz TO 5MHz



SPECIFICATIONS

Specifications are for 25°C unless specified otherwise.

FREQUENCY RANGES: Eight ranges selectably by front panel switch; 5 Hz to 2 kHz, 5 Hz to 5 kHz, 5 Hz to 20 kHz, 5 Hz to 50 kHz, 5 Hz to 200 kHz, 5 Hz to 500 kHz, 5 Hz to 2 mHz, and 5 Hz to 5 mHz.

OUTPUT SPECTRUM: Uniform to ±0.5 db from 10 Hz to 500 kHz and ±2.0 db from 500 kHz to 5 mHz.

OUTPUT LEVEL: 0 to 1 volt RMS, adjustable by front panel amplitude control. A dynamic range of 5 to 1 peak to RMS value is provided.

OUTPUT STEP ATTENUATOR: Five positions; X1.0, X0.1, X.01, X.001, X.0001. Accuracy ±0.1 db to 500 kHz; ±0.25 db to 5 mHz.

SPECTRAL DENSITY: Approximate spectral density for 1 volt RMS output.

Band	volts/$\sqrt{}$ Hz	Band	volts/$\sqrt{}$ Hz
2 kHz	1.75×10^{-2}	200 kHz	1.75×10^{-3}
5 kHz	1.1×10^{-2}	500 kHz	1.1×10^{-3}
20 kHz	5.5×10^{-3}	2 mHz	5.5×10^{-4}
50 kHz	3.5×10^{-3}	5 mHz	3×10^{-4}

AMPLITUDE PROBABILITY DISTRIBUTION: Symmetrical Gaussian Distribution all ranges.

OUTPUT METER: Meter reads 0 to 1 volt RMS. Accuracy ±2% of full scale to 2 mHz; ±5% to 5 mHz.

MAXIMUM LOAD: 500 ohms on direct output.

OUTPUT IMPEDANCE: Approximately 50 ohms direct output. Step attenuated output 50 ohms ±1%.

OPERATING TEMPERATURE RANGE: 0 to 50°C

POWER SUPPLY: Built-in highly regulated dc supply.

POWER REQUIREMENTS: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac; approximately 7 watts. A rechargeable power option is available. Battery is recharged by operating unit on ac line.

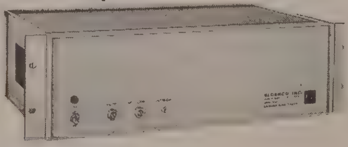
DIMENSIONS: 5¼″ high x 8⅝″ wide x 11″ deep.

RACK MOUNT: A rack mounting adapter kit is available for rack mounting two units side by side. Also available is a rack mounting adapter kit for rack mounting one unit. One or two units use 5¼″ x 19″ of rack panel space with adapter kit. Full rack width cabinet option for one unit is available. Size of unit with this option is 5¼″ high x 17″ wide x 11″ deep and comes with rack mounting hardware.

SHIPPING WEIGHT: Approximately 14 lbs.

PRICE: $4585.00

MODELS 632A/631A • ALL SOLID STATE NOISE GENERATOR



Model 632A Dual Output DC to 400 Hz and 5 Hz to 40 kHz **$9,055.00**

LOW FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±1.0%.

OUTPUT SPECTRUM: Uniform ±0.1 db from DC to 350 Hz.

MAXIMUM OUTPUT: 1.0 volts rms. A dynamic range of 5 to 1 peak to rms value is provided.

MAXIMUM SPECTRAL DENSITY: Approx. 1.5×10^{-3} volts²/Hz.

OUTPUT MEAN: Less than 5 mv.

OUTPUT IMPEDANCE: Approximately 1,000 ohms.

HIGH FREQUENCY OUTPUT

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian ±2%.

OUTPUT SPECTRUM: Uniform ±0.5 db from 10 to 35,000 Hz.

MAXIMUM OUTPUT: 1.0 volts rms. A dynamic range of 5 to 1 peak to rms values is provided.

MAXIMUM SPECTRAL DENSITY: Approx. 2×10^{-5} volts²/Hz.

OUTPUT MEAN: Less than 1 mv.

OUTPUT IMPEDANCE: Approximately 100 ohms.

NOISE REGULATOR: rms output level continuously stabilized against a reference voltage.

OVERLOAD INDICATOR: Panel overload indicator lights when input noise level to regulator is out of regulation range.

POWER: 115/230 volts ±10/20 volts, 50 to 1,000 Hertz ac.

DIMENSIONS: 5¼″ high x 17″ wide x 11″ deep. 19″ wide with rack mounting flanges mounted (supplied).

Model 631A 5 Hz to 40 kHz **$5,840.00**

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SERIES 1800 • NOISE SOURCE MODULES • 10KHz TO 100MHz

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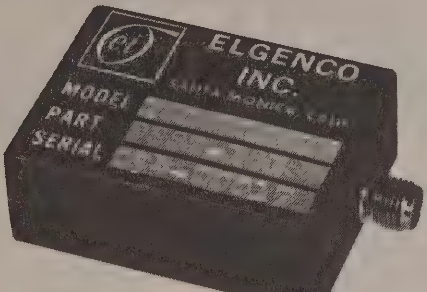
MODEL
PART
SERIAL

1800A SERIES



1800B SERIES

SPECIFICATIONS

The 1800 Series provides a low level wide band output. A portion of this band is specified to a certain flatness; uniformity. The approximate 6 mv open circuit output is for the whole band. The 1800B Series modules are the same as the 1800A series except the output is via a SMA connector. Specifications are for 25°C unless specified otherwise.

SPECTRAL DENSITY UNIFORMITY: Available with uniformity of ±0.5 db, ±1 db, ±2 db, ±3 db and ±4 db for many frequency ranges between lower frequencies of 10 kHz and 2 mHz and upper frequencies of 20 mHz, 30 mHz, 45 mHz, 50 mHz, 70 mHz, 80 mHz and 100 mHz.

SPECTRAL DENSITY: Approximately 0.3 μV per root Hz into 50 ohms.

RMS OUTPUT LEVEL: Approximately 3 mv rms into 50 ohms; 6 mv rms open circuit.

OUTPUT IMPEDANCE: Approximately 50 ohms.

AMPLITUDE PROBABILITY DISTRIBUTION: Gaussian.

OPERATING TEMPERATURE RANGE: 0 to 50°C.

POWER REQUIREMENTS: Model 1815, −15 VDC; Model 1818, −18 VDC; Model 1820, −20 VDC; Model 1822, −22 VDC; Model 1824, −24 VDC (well regulated power is required); current approximately 25 ma. Note: No external components are needed to properly install unit.

MOUNTING: .032″ printed circuit leads.

SIZE: 1.60 x 1.30 x 0.65 inches.

WEIGHT: Approximately 1 oz.

PRICING:

Base Price: 1818A.

Base Price plus $80.00: 1818B.

Base Price plus $20.00: 1815A, 1820A, 1822A and 1824A.

Base Price plus $100.00: 1815B, 1820B, 1822B and 1824B.

SERIES 1800 PRICES

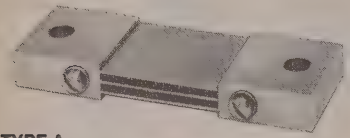
Model No.	Frequency Band	Price
1818A-31427	10 kHz to 20 mHz, ±3 db	$ 539.00
-21427	10 kHz to 20 mHz, ±2 db	$ 559.00
-11427	10 kHz to 20 mHz, ±1 db	$ 679.00
-51427	10 kHz to 20 mHz, ±0.5 db	$ 839.00
1818A-31437	10 kHz to 30 mHz, ±3 db	$ 549.00
-21437	10 kHz to 30 mHz, ±2 db	$ 579.00
-11437	10 kHz to 30 mHz, ±1 db	$ 699.00
-51437	10 kHz to 30 mHz, ±0.5 db	$ 889.00
1818A-31447	10 kHz to 45 mHz, ±3 db	$ 579.00
-21447	10 kHz to 45 mHz, ±2 db	$ 629.00
-11447	10 kHz to 45 mHz, ±1 db	$ 799.00
-51447	10 kHz to 45 mHz, ±0.5 db	$1019.00
1818A-31457	10 kHz to 50 mHz, ±3 db	$ 629.00
-21457	10 kHz to 50 mHz, ±2 db	$ 699.00
-11457	10 kHz to 50 mHz, ±1 db	$ 849.00
-51457	10 kHz to 50 mHz, ±0.5 db	$1139.00
1818A-41477	10 kHz to 70 mHz, ±4 db	$ 629.00
-31477	10 kHz to 70 mHz, ±3 db	$ 649.00
-21477	10 kHz to 70 mHz, ±2 db	$ 719.00
-11477	10 kHz to 70 mHz, ±1 db	$ 899.00
1818A-41487	10 kHz to 80 mHz, ±4 db	$ 649.00
-31487	10 kHz to 80 mHz, ±3 db	$ 669.00
-21487	10 kHz to 80 mHz, ±2 db	$ 749.00
-11487	10 kHz to 80 mHz, ±1 db	$ 949.00
1818A-41418	10 kHz to 100 mHz, ±4 db	$ 749.00
-31418	10 kHz to 100 mHz, ±3 db	$ 839.00
-21418	10 kHz to 100 mHz, ±2 db	$ 999.00
-11418	10 kHz to 100 mHz, ±1 db*	$1349.00

ote: 1815 Series not available in 80 mHz and 100 mHz units.

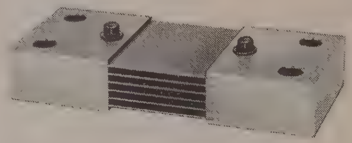
Model No.	Frequency Band	Price
1818A-32627	2 mHz to 20 mHz, ±3 db	$ 429.00
-22627	2 mHz to 20 mHz, ±2 db	$ 449.00
-12627	2 mHz to 20 mHz, ±1 db	$ 569.00
-52627	2 mHz to 20 mHz, ±0.5 db	$ 639.00
1818A-32637	2 mHz to 30 mHz, ±3 db	$ 439.00
-22637	2 mHz to 30 mHz, ±2 db	$ 469.00
-12637	2 mHz to 30 mHz, ±1 db	$ 589.00
-52637	2 mHz to 30 mHz, ±0.5 db	$ 689.00
1818A-32647	2 mHz to 45 mHz, ±3 db	$ 469.00
-22647	2 mHz to 45 mHz, ±2 db	$ 519.00
-12647	2 mHz to 45 mHz, ±1 db	$ 689.00
-52647	2 mHz to 45 mHz, ±0.5 db	$ 819.00
1818A-32657	2 mHz to 50 mHz, ±3 db	$ 519.00
-22657	2 mHz to 50 mHz, ±2 db	$ 589.00
-12657	2 mHz to 50 mHz, ±1 db	$ 739.00
-52657	2 mHz to 50 mHz, ±0.5 db	$ 939.00
1818A-42677	2 mHz to 70 mHz, ±4 db	$ 519.00
-32677	2 mHz to 70 mHz, ±3 db	$ 539.00
-22677	2 mHz to 70 mHz, ±2 db	$ 609.00
-12677	2 mHz to 70 mHz, ±1 db	$ 789.00
1818A-42687	2 mHz to 80 mHz, ±4 db	$ 539.00
-32687	2 mHz to 80 mHz, ±3 db	$ 559.00
-22687	2 mHz to 80 mHz, ±2 db	$ 639.00
-12687	2 mHz to 80 mHz, ±1 db	$ 839.00
1818A-42618	2 mHz to 100 mHz, ±4 db	$ 639.00
-32618	2 mHz to 100 mHz, ±3 db	$ 729.00
-22618	2 mHz to 100 mHz, ±2 db	$ 889.00
-12618	2 mHz to 100 mHz, ±1 db*	$1239.00

*Available 1800B Series only.

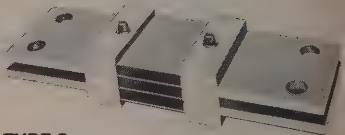
Empro gives you the world's widest selection of DC ammeter shunts



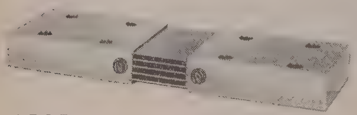
TYPE A
50 MV 15 through 600 amperes
100 MV 50 through 600 amperes



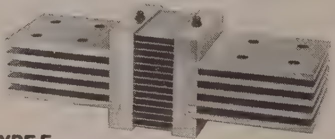
TYPE B
50 MV 300 through 1200 amperes
100 MV 300 through 1200 amperes



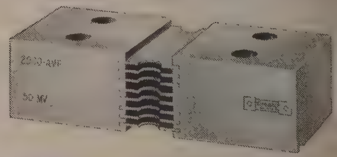
TYPE C
50 MV 1000 through 2000 amperes
100 MV 1000 through 2000 amperes



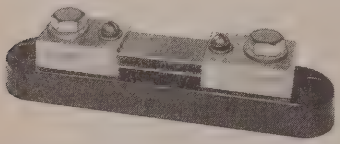
TYPE E
50 MV 1500 through 2000 amperes
100 MV 1500 through 2000 amperes



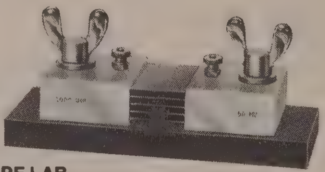
TYPE F
50 MV 2500 through 30000 amperes
100 MV 2500 through 10000 amperes



TYPE FL
50 MV 1000 through 3000 amperes

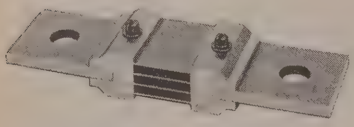


TYPE HA
50 MV 1 through 500 amperes
100 MV 1 through 500 amperes

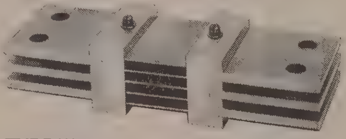


TYPE LAB
50 MV 15 through 1000 amperes
100 MV 15 through 1000 amperes

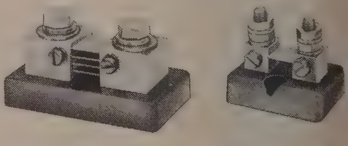
TYPE TRW-50
50 MV 100 through 600 amperes



TYPE W
50 MV 300 through 1000 amperes
100 MV 120 through 500 amperes



TYPE WT
50 MV 1000 through 10000 amperes
100 MV 600 through 6000 amperes



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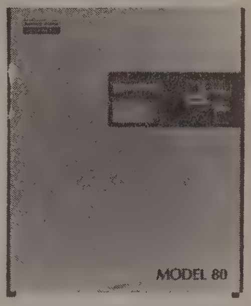
MODEL 9

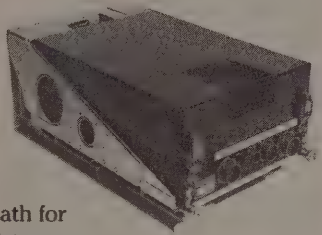
- 14, 28, 32 or 42 channel capacity
- Useable reel sizes 10½, 14 or 15 inch
- Tape speed range 120 to 15/16 ips
- All program controls via touch membrane on the face of a 7" CRT
- Fast self test for Direct, FM and HDR

MODEL 80



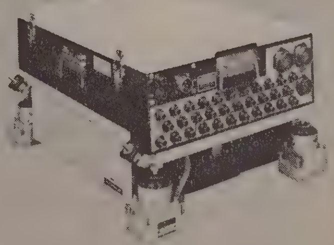
- 7 or 14 channel capacity
- Useable reel sizes 10-½ and 14 inch
- Tape speed range 120 to 15/16 ips
- Operates from 12 or 26 VDC, 117 or 234 VAC plug-in power modules
- 3000 hours/3 year head warranty

MODEL 12



- 7, 14 or 28 channel capacity
- Useable reel size of 10-½ inch
- Tape Speed Range 120 to 15/16 ips
- Raised zero loop tape path for maximum vibration resistance
- Operates from 18 to 30 VDC

MODEL 15



- 7, 14, 28 or 32 channel capacity
- Useable reel sizes 10-½, 14 and 15 inch
- Tape speed range 120 to 15/16 ips
- Standard tape width ½ or 1 inch
- Built-in autotest and calibration

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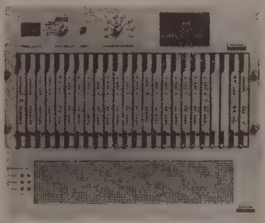

- Total system capability, incorporating deskew and spectral correction allows wrap around to any quality instrumentation data recorder without the need for special signal electronics.
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- Built in error monitor.
- Error rate performance in 10^{10} or better.

MODEL 80-T

- Tempest qualified
- 7, 14, or 28 channel capacity
- Useable reel sizes 10-¼ and 14 inch
- Tape speed range 120 to 15/16 ips
- Two channel reproduce monitor
- Programmable stitcher mode of operation, standard

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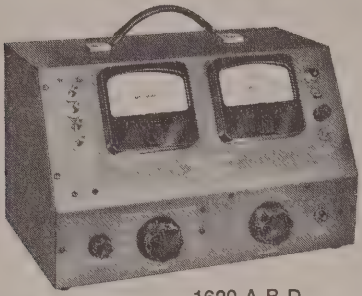
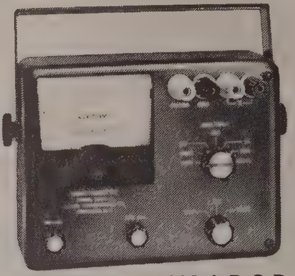
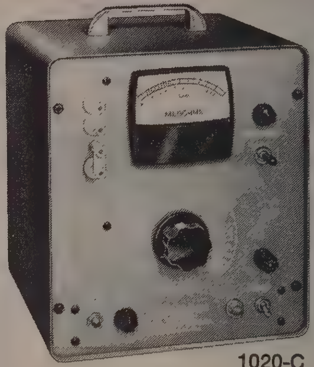

1620-A-B-D


2030-A-B-C-D


1020-C

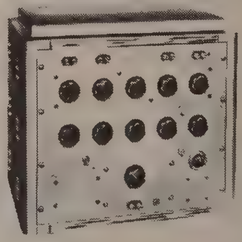
MEGOHMMETERS

Freed can supply a complete range of insulation resistance measuring equipment with fixed and variable d.c. test voltages from 5 to 2500 volts. Insulation and leakage measurements can be made on transformers, motors, cables, electronic assemblies and components, dielectric materials, electrical applicances and tools, capacitors and resistors.

Type	Resistance Range	Test Voltage	Accuracy	Power Requirements	Size and Weight
1620-A	0.01 to 4,000,000 megohms 0.1 to 200,000 megohms @ 50 volts 1 to 2,000,000 megohms @ 500 volts	Variable 5-100 volts d.c. 100-1000 volts d.c.	±5% at full scale	105-125 volts 50-60 cycles	15″ x 9″ x 7½″ 24 lbs. *
1620-B	1 to 2,000,000 megohms 10 to 2,000,000 megohms @ 2500 volts	Variable 250-2500 volts d.c.	±5% at full scale	105-125 volts 50-60 cycles	15″ x 9″ x 7½″ 24 lbs. *
1620-D	0.01 to 40,000,000 megohms 0.1 to 2,000,000 megohms @ 50 volts 1 to 20,000,000 megohms @ 500 volts	Variable 5-100 volts d.c. 100-1000 volts d.c.	±5% at full scale except highest range ±10%	105-125 volts 50-60 cycles	15″ x 9″ x 7½″ 25 lbs. *
1020-C	0.1 to 2,000,000 megohms 0.1 to 200,000 megohms @ 50 or 100 volts d.c. 1 to 2,000,000 megohms @ 500 volts d.c.	Fixed 50, 100, 500 volts Regulated	±3% all ranges except highest range ±5%	105-125 volts 50-60 cycles	9½″ x 10½″ x 8″ 18 lbs. *
2030-A	10 to 2,000,000 megohms	Fixed 500 volts d.c.	±5% full scale	battery operated transistor supply	6″ x 8″ x 4″ 8 lbs.
2030-B	1 to 20,000,000 megohms	Fixed 500 volts d.c.	±5% full scale	battery operated transistor supply	6″ x 8″ x 4″ 8 lbs.
2030-C	1 to 2,000,000 megohms	Fixed 50 volts d.c.	±5% full scale	battery operated transistor supply	6″ x 8″ x 4″ 8 lbs.
2030-D	1 to 2,000,000 megohms	Fixed 100 volts d.c.	±5% full scale	battery operated transistor supply	6″ x 8″ x 4″ 8 lbs.

INCREMENTAL INDUCTANCE BRIDGES

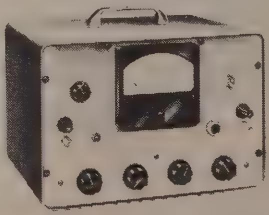
Direct in-line readings of inductance and conductance of iron core component at audio frequencies with or without super-imposed direct current. The bridge uses the Owens circuit with provisions for measuring the series or parallel inductance and conductance of the unknown inductor; five precision resistance and capacitance decades are provided to indicate these values. "Q" or storage factor can be measured as the product of the inductive reactance and the conductance.



Type	Inductance Range	Conductance Range	Frequency Range	D.C. Current	Accuracy	Dimensions and Weight
1115	111.1 h to 100 µh 5 decades 0.11 h to 0.1 µh 2 decades	0.15 µmho—1000 mho "Q" = 600 max @ 100 cycles	20 cycles to 10 KC	up to 15 amperes	±1% to 5 KC ±3% to 10 KC	21¾″ x 28″ x 15¼″ 80 lbs.
1185	111.1 h to 100 µh 5 decades 0.11 h to 0.1 µh 2 decades	0.15 µmho—1000 mho "Q" = 600 max @ 100 cycles	20 cycles to 10 KC	up to 30 amperes	±1% to 5 KC ±3% to 10 KC	21¾″ x 33¼″ x 15¼″ 100 lbs.

NULL DETECTOR

Sensitive null detector for bridge measurements, with self contained selective filters to limit the amplifier characteristics at various bridge measuring frequencies.


1140-B

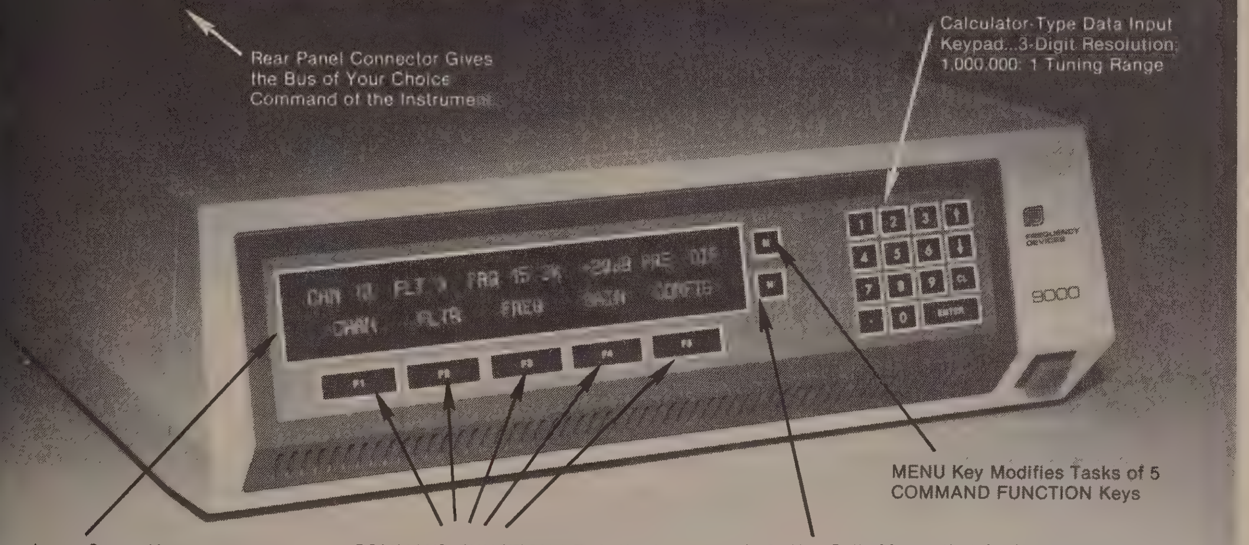
Type	Sensitivity	Frequency Range	Filter	Power Requirements	Dimensions and Weight
1140-B	10µ volts @ 1 KC for 15% meter deflection filter in	20 to 20,000 cycles	Fixed 60, 400, 1000 cycles Adjustable ±5% of center Other frequencies available	105-125 volts 50-60 cycles	Cabinet 12″ x 8½″ x 10″—18 lbs. Rack—19″ x 6″ x 10″

Prices quoted are subject to change without notice

FREED TRANSFORMER COMPANY. INC. 1795 WEIRFIELD ST., RIDGEWOOD, N.Y. 11385

KEYPAD- AND BUS- PROGRAMMABLE 16-CHANNEL FILTER

TUNABLE OVER A 1,000,000:1 FREQUENCY RANGE WITH 3-DIGIT RESOLUTION



Rear Panel Connector Gives the Bus of Your Choice Command of the Instrument

Calculator-Type Data Input Keypad...3-Digit Resolution; 1,000,000: 1 Tuning Range

MENU Key Modifies Tasks of 5 COMMAND FUNCTION Keys

Large Green, Vacuum Flourescent Displays Provide Easy-to-Read Alphanumeric Readouts

COMMAND FUNCTION KEYS (F1-F5) Let You Tune, Configure and Monitor Individual Filter Channels

Help Key Calls Menus that Assist the User in Configuring/Tuning All Filter Channels

Makes complex filtering tasks easier

COMMAND and HELP menus in firmware make it easy for you to configure/tune any or all of up to 16 filter channels. You can mix and match **9000 Series** card-mounted lowpass, highpass and bandpass filters that span 0.1Hz to 100kHz and fit any card cage slot within the instrument.

Configure by Keypad or the bus of your choice

The choice is yours: the front-panel keypad or the rear-panel connector over the bus you specify: **HPIB..IEEE-488..Centronics Parallel..RS-232..RS-499.**

Internal non-volatile memory stores up to 8 user-definable configurations independently for any of one through 16 channels.

A full spectrum of analog performance

Responses: Include Butterworth, Bessel, and near ideal Elliptic characteristics, with up to 8 poles and 6 zeros per filter. Special needs? No problem.

Configurations: Each channel is logic-or keypad-configurable with single-ended or differential inputs; programmable pre-and post-filter amplification, plus filter bypass...and much, much more.

ALL THIS, PLUS...THE RELIABILITY OF SOLID STATE SWITCHING

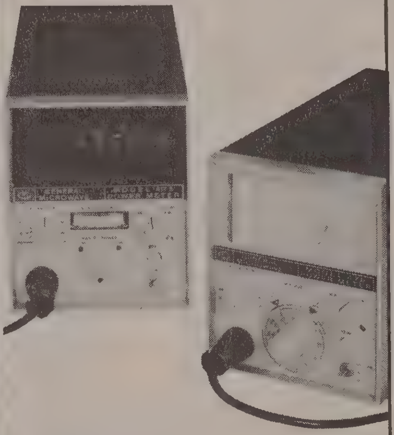
Connect a **9000 Series** instrument to your digitally controlled system to perform "intelligent" multi-channel filtering with ease. Call us today and get the best of the analog and digital worlds.

FREQUENCY DEVICES™

25 Locust Street, Haverhill, Massachusetts 01830
(617) 374-0761 TWX 710-347-0314

INSTRUMENTATION FROM GENERAL MICROWAVE

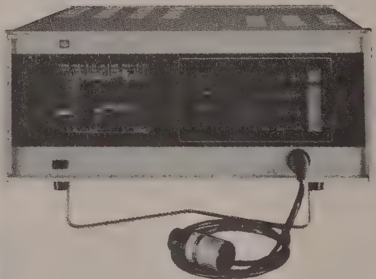
Average Power Meter 0.01-40 GHz



Model 475: Digital Readout
- Direct reading from: – 39.99 to + 35.0 dBm in one range
- Accuracy as high as 0.05 dB
- Resolution: 0.01 dB
- Noise and Drift: less than 0.01 W p-p
- Automatic zero set
- Built-in self calibrator

Model 476: Analog Readout
- 30 nanowatts to 3 W power range
- ± 1% of full scale accuracy
- less than 1.5% noise and drift on lowest range
- Automatic zero set
- Built-in self calibrator

Automatic Peak Power Meter 0.75* – 26GHz Model 478A



The new General Microwave microprocessor based Automatic Peak Power Meter characterizes pulses down to 25 Nanoseconds or less. With the GMC unit, the pulse to be measured is digitized and presented on the built in CRT Monitor on a calibrated graph in either dB or linear power units. The peak power is always displayed as well as any instantaneous power point that the operator selects by sliding a cursor on the graph. Any time parameter of the pulse such as rise time or pulse width is read out automatically by setting a set of cursors to any points on the pulse. Operation on the IEEE-488 standard bus is a standard feature of the instrument.

* Optionally to 5 MHz

Radiation Hazard Meter -RAHAM™

General Microwave RAHAM Hazard Meters detect and measure potentially hazardous electromagnetic energy radiating or leaking from rf and microwave sources, e.g. microwave ovens, medical equipment, radar installations, microwave heaters and dryers, mobile communication systems, electronic warfare systems.

Model	Polarization	Frequency Range, GHz
1	Bi-directional	0.3-18
2	Bi-directional	0.01-3
3	Isotropic	0.3-18
12	Bi-directional	0.01-18
4A	Isotropic, (High Stability)	200-kHz-26GHz

For complete information call or write.

GENERAL MICROWAVE

GENERAL MICROWAVE

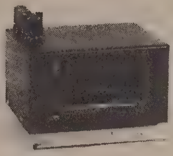
155 Marine Street, Farmingdale, L.I., New York 11735, Tel: 516-694-3600

TEMPERATURE SIMULATORS

RTD-100 SERIES

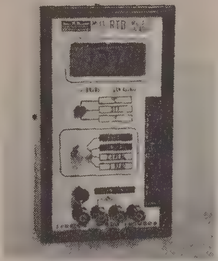
- 100Ω Pt any curve
- 1000Ω Platinum
- ±0.01% Accuracy

RTD-200 SERIES



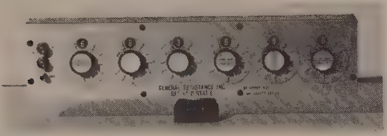
- ±0.02% Accuracy
- 0.01Ω Resolution
- In Line Readout

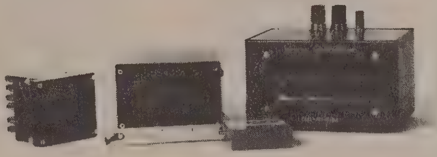
RTD-400 SERIES



- 100ΩPt or 10Ω Copper
- Measures and Simulates
- Reads out in °C or °F

RESISTANCE DECADE BOXES



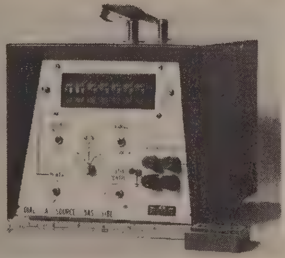


- Resistance Values to 111.111 Meg
- Resolution to 0.01 Ohms
- Up to 7 Decades
- Low Cost Units Available
- OEM Mechanical Styles Available
- Accuracies of ±1.0% to ±0.01%

AND KELVIN-VARLEY VOLT/RATIO DIVIDERS ACCURATE TO ±0.5PPM

VOLTAGE/CURRENT SOURCES PROGRAMMABLE or MANUAL

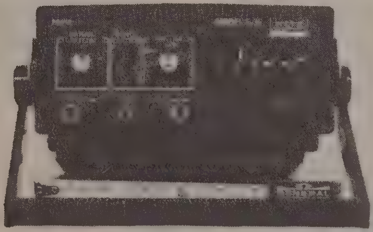
DIAL-A-SOURCE SERIES



- Battery or Line Operated
- Accuracies to ±15 ppm
- "Zero" Voltage Output Z
- Outputs to ±100V
- Resolution to 0.1μV

"THE INSTANT LAB"

1 Instrument, 5 Functions and Hundreds of Uses!



- Voltage
- Current
- Ohms
- Simulates TC's and RTD's
- Battery or Line Operated

OTHER INSTRUMENTATION

- Wheatstone Bridges
- Strain Gage Simulators
- Thermocouple Simulators

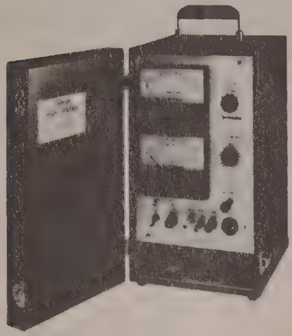
GENERAL RESISTANCE, INC.
Twin Lakes Road • P.O. Box 185
North Branford, CT 06471
(203) 481-5721 • TWX 710-452-3092

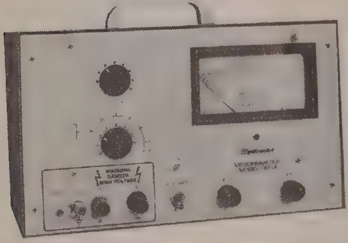
GENERAL RESISTANCE INSTRUMENTS

A PRIME TECHNOLOGY COMPANY

Hipotronics

H.V. MEGOHMMETERS


Model HV5


Model HM3A

Complete range H.V. Megohmmeters for testing insulation resistance on all electrical equipment. HIPOTRONICS, INC. offers two lines of Megohmmeters, the H.V. Series for Industrial Use and the H.M. Series for Precision Scientific Measurement.

Both units operate on a 115 Volt, 60 Hz input, (220 available). Units are lightweight, well packaged and provide portability in addition to accuracy. No tedious hand cranking required.

Megohmmeters are loaded with features which make them the most functional instruments available in industry today.

HV Series Heavy Duty Industrial Megohmmeters.

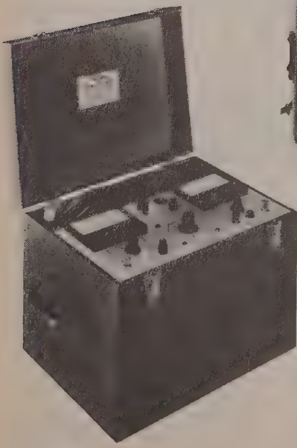
Model No.	Output Voltage	Megohm Range	Range Switch
HV2.5	0- 2,500	.1 to 50,000	X .01, .1, 1, 10
HV5	0- 5,000	.1 to 100,000	X .1, 1, 10, 100
HV10	0-10,000	.1 to 200,000	X .1, 1, 10, 100
HV15	0-15,000	.1 to 300,000	X .1, 1, 10, 100

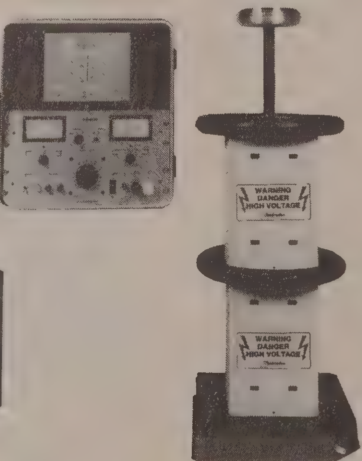
HM Series Precision Measuring Scientific Megohmmeters.

Model No.	Output Voltage	Megohm Range	Megohm Ranges
HM3A	50	0.1 to 1,000,000	6
	100	0.2 to 2,000,000	6
	500	1 to 10,000,000	6
	1000	2 to 20,000,000	6
HM6B	50	0.1 to 1,000,000	6
	250	0.5 to 5,000,000	6

For more information request **BROCHURE HP7101.**

PORTABLE HIGH VOLTAGE DC HIPOTS


Model 860 PL


Model 8120 PL-2

Both the control unit and the HV section are contained within fully-instrumented case. The safe, hermetically-sealed, oil filled HV section is mounted below the control panel. Cables are stored behind the control panel.

Input	115V, 60 Hz or 220V, 50/60 Hz, 3 amp	
Output	Model 880 PL	0-80 kV
	Model 860 PL	0-60 kV
	Model 815 PL	0-15 kV
	Model 8120-5 PL	0-120 KV
	Model 8170-5 PL	0-170 kV

For more information request **BROCHURE HP7103.**

8175 PL Series — Gas Insulated Modular Unit

The high voltage circuitry in this unit is a cascade system, overcoming disadvantages of conventional voltage-multiplier circuits. Each high voltage multiplier is a complete voltage doubler with its own transformer, rectifiers, capacitors, series resistors, meter multiplier, and an insulated tertiary to feed the next stage. The conservatively designed transformers can be overloaded repeatedly. Anticorona toroids are provided as needed.

8060 PL Series — Air Insulated DC Insulation Tester

The cascade circuitry (patent #3,643,105) of the 8060 PL series eliminates the major disadvantages of the widely used Cockroft Walton multiplier circuit: there is no decrease in power capability as more HV sections are added. Each HV module is a complete voltage doubler with its own epoxy-encapsulated transformer; each transformer has a tertiary winding to feed the succeeding stage. The standard controller has a continuous rating of 1 KW, which can be raised to 2 KW during cable charging.

Input	115V, 50/60 Hz or 220V, 50/60 Hz 3 KW at full load, 5 KW intermittent operation	
Output	Model 8175 PL-1	0-175 kV @ 17.0 mA
	Model 8175 PL-2	0-350 kV @ 8.5 mA
	Model 8175 PL-3	0-525 kV @ 5.7 mA
	Model 8175 PL-4	0-700 kV @ 4.3 mA
	Model 8175 PL-5	0-875 kV @ 3.4 mA
	Model 8175 PL-6	0-1050 kV @ 3.0 mA

Input	115V, 60 Hz or 220V, 50/60 Hz 1. KVA full load		
Output	Model No.	Number of 60 KV Modules	Output
	8060 PL	1	0-60 kV @ 16.0 mA 0-50 kV @ 20.0 mA
	8120 PL	2	0-120 kV @ 8.0 mA 0-100 kV @ 10.0 mA
	8180 PL	3	0-180 kV @ 5.5 mA 0-150 kV @ 7.5 mA
	8240 PL	4	0-240 kV @ 4.1 mA 0-200 kV @ 5.0 mA
	8300 PL	5	0-300 kV @ 3.3 mA 0-250 kV @ 4.0 mA

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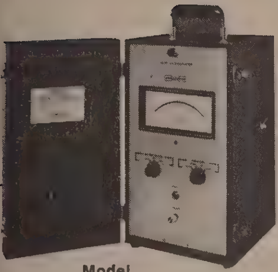
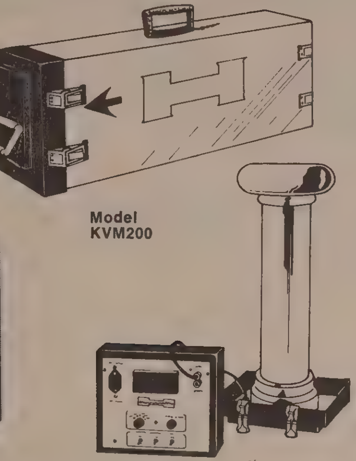
Hipotronics

KILOVOLTMETERS



Model KV100A



Model KVM200

KV Series — AC/DC Kilovoltmeter

Two Piece Laboratory Instruments with Analog Meter and Separate Divider for AC and DC Testing, packaged in one oil-filled phenolic cylinder.

Model No.	KV25A	KV50A	KV100A	KV200A
Meter	0-5/10/25	0-10/25/50	0-20/50/100	0-40/100/200
Volts KV	5/10/25	5/10/25/50	20/50/100	40/100/200

KVM Series — Digital Kilovolt Meter System

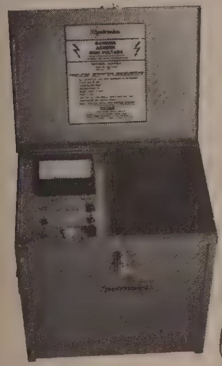
A precise battery operated unit with self-contained readout device, charger and a true passive high voltage divider. Entire unit is packaged in a single durable carrying case.

Model No.	KVM200	KVM100	KVM20
High Range Low Range	0-199.9 kV 0-19.99 kV	0-100 kV 0-10.0 kV	0-19.99 kV 0-1.999 kV
Voltage Rating	200 kVac (285 kVp) 200 kVdc	100 kVac (142 kVp) 100 kVdc	20 kVac (285 kVp) 20 kVdc
Ratio	2000:1*	1000:1*	200:1*

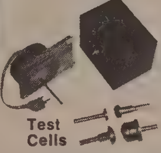
* (With Load Impedance of One Megohm and <500 pF.)

For more information request **BROCHURE HP7104.**

LIQUID DIELECTRIC TESTER



Model OC-60A



Test Cells

OC Series — Oil Testers

Designed to test breakdown Voltages of Insulating Oil to ASTM Specifications. Provided with extended voltage ranges to accommodate dielectrics currently being used in Transformers, Bushings, Capacitors, etc. Features Input Line Regulation ±10%.

OC Series

Input	115V, 50/60 Hz, 2 Amps, Single Phase (220V also available)	
Output	Model OC-60A	0-60 kV rms @ 2 KVA
	Model OC-90A	0-90 kV rms @ 2 KVA
	Model OC-51M*	0-50 kV rms @ 2 KVA

*Manual Rate of Rise Adjustment.

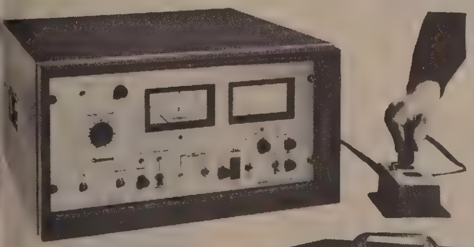
TC Series — ASTM Test Cells

Test Cell Model	TC/DE	TC/VDE	TC/CE90*
Specification tested to	D-877	D-1816	D-877 D-1816

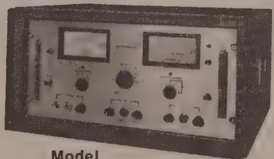
*Includes Oil Circulator VDE.

For more information request **BROCHURE HP7106.**

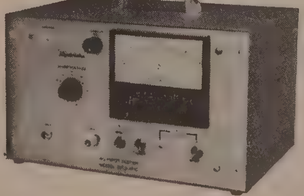
AC/DC HIPOT (INSULATION) TESTERS (completely automatic units available)



Model TT-3



Model HD115



Model HA3-AT

Non-Destructive Units for measurements of Leakage Current, Resistance, Dielectric Strength and Corona Discharge. Applications include hipot testing transformers, motors, cables, insulation material, electrical appliances, electronic assemblies, capacitors, etc.

300 Series — A Units — Two Megohm Range
B Units — Four Megohm Range

Model No.	H301A	H301B	H303A	H303B	H306A	H306B
Output AC	1.0 kV	1.0 kV	2.5 kV	2.5 kV	5.0 kV	5.0 kV
Output DC	1.5 kV	1.5 kV	3.0 kV	3.0 kV	6.0 kV	6.0 kV

100 Series — Voltage & Current Readout

Model No.	HD103	HD106	HD115	HD125	HD140
Output AC	2.5 kV	5.0 kV	12.0 kV	10.0 kV	15.0 kV
Output DC	3.0 kV	6.0 kV	15.0 kV	25.0 kV	40.0 kV

A-B Series — Simple Low Cost AC or DC Models

		AC			DC	
Model No.	HDA3	HDA5	HDA10	HDB4	HDB6	HDB12
Output	3 kV AC	5 kV AC	10 kV AC	4 kV DC	6 kV DC	12 kV DC

A-T Series — Electrical Appliance Testing to UL Standards

Model No.	A1-AT-C	HA3-AT, HA3-AT-C, HA3-AT-CT	HA5-AT	HDB4-AT
Output	1200 VAC	0-3000 VAC	0-5000 VAC	0-4000 VDC

TT-3 Model — Tool & Appliance Tester

Designed for unskilled or semi skilled personnel on a go/no-go basis in testing of electrical tools and appliances. Unit performs three major functions:

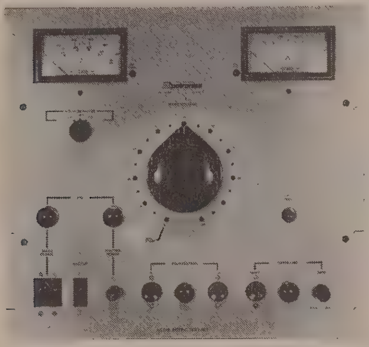
1. Test for Wire Continuity
2. AC Hipot Testing
3. Run Test Sample at 115V/220V — 3 Amps

For more information request **BROCHURE HP7107**

IPOTRONICS, INC., P.O. DRAWER A • BREWSTER, NY 10509 • (914) 279-8091 • TWX 710-574-2420

Hipotronics

AC Dielectric
Test Set
(controls)



HIGH VOLTAGE DIELECTRIC INSULATION TEST EQUIPMENT

AC dielectric test sets.
Standard Models with output ranges from 0.5 to 500 KVA for testing to UL, CSA, MIL, ASTM, AEIC, ICEA and other international specifications:

NOTE:
Hipotronics Series Resonant Test Sets are available for Capacitive Loads above 500 KVA (Brochure HP 7109).

No. of Models	Power Rating (KVA)*	AC Volt Range (KV)
8	0.5	1-30
8	1	1-30
9	2	1-50
11	5	1-100
13	10	1-150
15	20	1-200
16	40	1-300
17	60	1-350
20	100	1-400
21	150	1-500
22	200	1-600
23	250	1-750
23	300	1-750
23	400	1-750
23	500	1-750

* Higher KVA Ratings Available

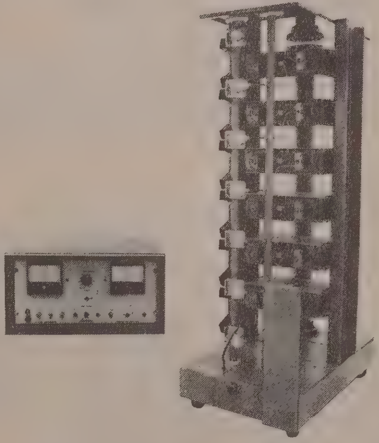
For more information request
BROCHURE HP7108

IMPULSE GENERATORS

Impulse Systems simulate Lightning or Transient Voltage Phenomena associated with power Distribution.

Standard Systems available in 50 KV, 100 kV and 200 kV sizes, and can be purchased and designed to be expandable to cover future Test Requirements.

Hipotronics Impulse Systems Provide flexibility. Generators are expandable in terms of energy and voltage to cover future test requirements. Due to the modular design and highly efficient Marx circuit each generator may be used for a variety of test applications including high current or high voltage requirements. Stage capacitors on 200 kV per stage units are manufactured in insulating cases which provides minimum inductance.



Impulse Generator System — IG 300-1.125

Generators can be built for both Indoor Operation or Outdoor/Indoor Operation.

Accessories Include:
Oscilloscope with camera, Peak Reading Voltmeter, Voltage Dividers, Phase Firing Controls, Electric Chop Gaps, Air Lift Pads, Automatic Polarity Reversal and Auxiliary Wave-Shaping Resistors.

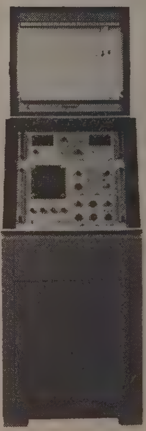
For more information request
BROCHURE HP7201

CORONA DETECTORS

Model CDO-77A:
System includes Horizontal Amplifier, Vertical Amplifier, Pre-Amp Amplifier and Calibrator, and Discharge Meter.

For more information request
BROCHURE HP7110

Modular Corona Detection System designed to user's specifications. Components for basic systems include: Calibrators, Horizontal Controls, Vertical Controls, Pre-Amp Controls, Accessory Racks, Fully Independent Power Supplies, KV Meters, Discharge Meters, X-Y Plotter and Electronic Window. System never becomes obsolete. As new technology becomes available we'll incorporate it into new modules, so you buy another module and not a complete new system.



Model CDO-77A3:
Similar to CDO-77A unit, the CDO-77A3 includes X-Y Plottor, KV Meter, Discharge Meter and Electronic Window Circuit.

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EEM PRODUCT SELECTION GUIDES

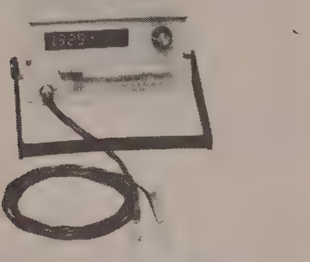
There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

IET LABS, INC.

DEPT. EM, 534 MAIN STREET, WESTBURY, NY 11590, (516) 334-5959

MODEL IMF-600 DIGITAL IMPEDANCE AND MULTIFUNCTION METER

COMBINES MOST OF THE COMMONLY NEEDED LABORATORY MEASUREMENTS



FUNCTIONS

- VOLTAGE (DC & TRUE RMS)
- CURRENT (DC & TRUE RMS)
- RESISTANCE
- CAPACITANCE
- INDUCTANCE
- CONDUCTANCE
- DISSIPATION
- FREQUENCY
- EVENT COUNTER

FEATURES

- AUTOMATIC MEASUREMENT
- HIGH ACCURACY
- WIDE RANGE
- CRYSTAL CONTROLLED
- PROTECTED CIRCUITRY
- ANALOG & DIGITAL OUTPUTS
- 4-TERMINAL KELVIN CONNECTORS
- COMPANION COMPARATOR

CAPACITANCE (C)
Number of ranges: 7
Full scale ranges: 200.0 pF to 200.0 μF; up to 20,000 μF may be measured using the inductance function
Accuracy: ±(0.25% +1 LSD +1% of G reading in absolute digit counts on same range)
Bias: Up to 100 VDC may be applied in series with unknown impedance
Test voltage: 1.4 VRMS on Ranges 1-6; 0.14 VRMS on Range 7
Input protection: 220 VRMS
Impedance model: C G

INDUCTANCE (L)
Number of ranges: 7
Full scale ranges: 200.0 μH to 200.0 H
Accuracy: ±(0.25% +1 LSD +1% of R reading in absolute digit counts on same range)
Test current: 110 mA on Range 1; 11 mA on Ranges 2-3; 1.1 mA on Range 4; 110 μA on Range 5; 11 μA on Range 6; 1.1 μA on Range 7
Input protection: 220 VRMS
Impedance model: L R

RESISTANCE (R)
Type of measurement: 1 kHz AC resistance
Number of ranges: 7
Full scale ranges: 2.000Ω to 2000 kΩ; up to 1000 MΩ may be measured using the conductance function
Accuracy: ±(0.25% +1 LSD +1% of L reading in absolute digit counts on same range)
Test current: Same as inductance
Input protection: 220 VRMS
Impedance model: See INDUCTANCE

CONDUCTANCE (G)
Type of measurement: 1 kHz AC conductance
Number of ranges: 7
Full scale ranges: 2.000 μS to 2000. mS (S = 1/Ω)
Accuracy: ±(0.25% +1 LSD +1% of C reading in absolute digit counts on the same range)
Test voltage: Same as capacitance
Input protection: 220 VRMS
Impedance model: See CAPACITANCE

DISSIPATION (D or 1/Q)
Type of measurement: D = G/2πfC (see impedance model); D = 1/Q = R/2πfL (see impedance model)
Full scale range: 2.000; higher values may be computed from readings
Accuracy: ±(1% +2 LSD) for C or L >500 counts; 1% +4 LSD for C or L 200-500 counts

DC VOLTAGE (V DC)
Number of ranges: 5
Full scale ranges: 200.0 mV to 1000. V
Accuracy: ±(0.1% +1 LSD)
Input impedance: 10 MΩ
Maximum input: 1000 V peak; common mode voltage (low terminal to ground): 500 V peak

DC CURRENT (I DC)
Number of ranges: 5
Full scale ranges: 200.0 μA to 2000. mA
Accuracy: ±(0.2% + 1 LSD)
Burden voltage: 0.3 V maximum on Ranges 1-5; 1.4 V maximum on Range 5
Maximum input: 2 A fuse and diode network protected

TRUE RMS VOLTAGE (V TRMS), AC COUPLED
Number of ranges: 5
Full scale ranges: 2.000 mV to 750. V
Accuracy: ±(percentage of reading + number of least significant digits)

FREQ.	50-100 Hz	100-500 Hz	500 Hz-1 kHz	1-10 kHz	10-20 kHz
200.0 mV	0.5% +2	0.5% +2	0.5% +2	0.5% +2	1% +2
2.000 V	1% +2	0.5% +2	0.5% +2	0.5% +2	1% +2
20.00 V	1% +2	0.5% +2	0.5% +2	1% +2	1% +2
200.0 V	1% +2	1% +2	2% +2	not specified	
750 V	1% +2	2% +2	not specified		

Input impedance: 10 MΩ
Maximum input: Same as DC VOLTAGE

TRUE RMS CURRENT (I TRMS), AC COUPLED
Number of ranges: 5
Full scale ranges: 200.0 μA to 2000. mA
Accuracy: ±(percentage of reading + number of least significant digits)

FREQ	50-100 Hz	100-500 Hz	500 Hz-1 kHz	1-10 kHz	10-20 kHz
200.0 μA	0.5% +2	0.5% +2	0.5% +2	1% +2	2% +2
2.000 mA	0.5% +2	0.5% +2	0.5% +2	1% +2	2% +2
20.00 mA	1% +2	1% +2	1% +2	2% +2	2% +2
200.0 mA	1% +2	1% +2	1% +2	2% +2	2% +2
2000 mA	2% +2	2% +2	2% +2	3% +2	3% +2

Burden voltage: Same as DC CURRENT
Maximum input: Same as DC CURRENT

FREQUENCY (F)-Model IMF-600F
Display: Overrange will be indicated when the frequency option is not present
Number of ranges: 6
Range: 100.0 Hz to 15.00 MHz; 30.0 Hz to 17.00 MHz typical
Resolution: 3½ digits, may be extended to one additional least significant digit by downranging. This does not apply to Range 1 (200.0 Hz)
Gate time: 10 seconds for 200.0 Hz range; 1 second for 2.000 kHz range; 0.1 second for 20.00 kHz range; 10 ms for 200.0 kHz range; 1 ms for 2.000 MHz range; 0.1 ms for 20.00 MHz range
Sampling period: 20 seconds for 200.0 Hz range; 2 seconds for 2.000 kHz range; 0.25 seconds for all other ranges
Impedance: >1 Megohm, diode protected
Coupling: AC
Sine wave sensitivity: 3 VRMS at 30 Hz; 1 VRMS at 100 Hz; 0.3 VRMS for 1 kHz-15 MHz
Maximum input: 100 V peak 30 Hz-1 kHz; 75 V peak 1 kHz-10 MHz: 50 V peak to 10 MHz-15 MHz
Time base: 1 MHz crystal oscillator

TEST CONDITIONS
Performance specifications apply
1) after correction for test lead zero reading
2) after 10 minute warmup
3) between 15-35°C

GENERAL SPECIFICATIONS
Test frequency: 1 kHz for impedance functions
Reading rate: 4 measurements per second
Display: 3½ digit 0.5″ (1.2 cm) LED, with corresponding annunciator showing units; all decimal points on indicate overrange or illegal condition
Analog outputs: L, R, C, or G scaled at 0.1 V/1000 counts; output impedance: 900 ohms
Digital output: BCD parallel output representing 3½ digit reading for any quantity
Test terminals: 4-terminal shielded Kelvin test leads, 50 inches (127 cm) long
Operating controls: Push button ON-OFF and function select switches; rotary range select switch
Power requirements: 105-125 V or 210-250 V; 50-60 Hz; 5 W
Dimensions: 8.5″ W x 9.25″ D x 4.44″ H (22 cm x 24 cm x 12 cm)
Weight: 6 lbs. (2.7 kg) nominal

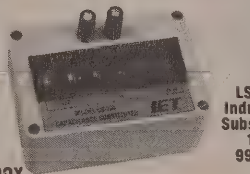
ORDERING INFORMATION:

Model IMF-600 Impedance & Multifunction Meter	$989.00
—F Option (Frequency Measurement)	199.00
—FEC Option (Frequency & Event Counter)	269.00
—DO Option (Digital Output)	169.00
Model LC-603 Single Channel Digital Limits Comparator (Requires DO option. May be cascaded.)	429.00
10 kHz Option	Consult IET
High Sensitivity Option — 20.00 pF or 20.00 μH	Consult IET

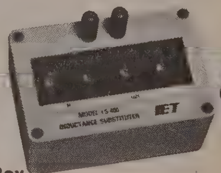
DIGITAL DECADE SUBTITUTERS FOR: • RESISTANCE • CAPACITANCE • INDUCTANCE

RS Series Resistance Substituter
0.1Ω 99.9999999 MΩ
R-Box

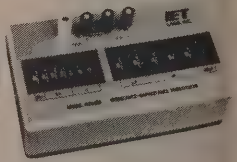
CS Series Capacitance Substituter
10 pF- 99.99999 μF
C-box



LS Series Inductance Substituter
100 μH- 99.9999H
L-Box



RCS Series Resistance-Capacitance Substituter Combines R-box & C-box
RC-box



Greatest Substituter Value Available — More Accuracy — Wider Range

■ DIRECT READING — NO FUMBLING WITH SWITCHES OR KNOBS ■ ERROR PROOF ■ HUMAN ENGINEERED ■ COLOR-CODED ■ COMPACT, CONVENIENT & DURABLE

Model	RS-200	RS-201	RS-200W	RS-201W	CS-300	CS-301	RCS-500	RCS-502	LS-400	LS-400A
Type of Substituter	Resistance	Precision Resistance	Wide Range Resistance	Wide Range Precision Resistance	Capacitance	Precision Capacitance	Resistance-Capacitance	Precision Resistance-Capacitance	Wide Range Inductance	Inductance
Accuracy	1%	0.1%	1%	0.1%	4%	1%	Combines the RS-200 and CS-300	Combines the RS-201 and CS-301	1.5% max, 1% typical	
Decades	7		9		6				4	3
Range	1-9,999,999Ω		0.1-99,999,999.9Ω		100 pF-99.9999 μF				1 mH-9.999 H	1 mH-999 mH
Type of Components	Metal Film Resistors (0.1-0.9Ω Wirewound Resistors)				100-900 pF: Mica .001-.009 μF: Polystyrene .01-0.9 μF: Polycarbonate 1-9 μF: Polyester 10-90 μF: Polarized Tantalum				Toroidal Inductors	
Rating	0.5 watt				100 volts (20V 10-100 μF)				20-500 mA	
Residual Impedance	0.3Ω (.04Ω/decade)		0.4Ω (.04Ω/decade)		30 pF (5 pF/decade)				0.2Ω (.04Ω/decade)	
Physical	3.2x3.1x2.2 in, 6.5 oz (8.1x7.9x5.6 cm, 184 g)		4.7x3.1x2.2 in, 8.3 oz (12x7.9x5.6 cm, 235 g)		4.7x3.1x2.2 in, 8.3 oz (12x7.9x5.6 cm, 235 g)		7.4x4.3x2.4 in, 14 oz (18.8x11x6 cm, 410 g)		4.7x3.1x2.2 in, 8 oz (12x7.9x5.6 cm, 230 g)	
Price	$114.00	$229.00	$199.00	$399.00	$124.00	$249.00	$229.00	$459.00	$459.00	$344.00

PROGRAMMABLE UNITS AVAILABLE — CONSULT IET

CUSTOM MODELS

IET can supply your choice of substituter in any number of decades with or without case in various tolerances. Generate a part number to meet your requirements from the table below. Consult IET for price.

RS — F — 4 — 0.1 — WC (0.1-999.9μ, 1%, Resistance Substituter in a case)

TYPE
RS Resistance
CS Capacitance
LS Inductance

TOLERANCE
A .05%
B 0.1%
F 1%
G 2%
H 4%

NO. OF DECADES
1 to 9

IMPEDANCE PER STEP FOR LOWEST DECADE
0.1Ω to 10 MΩ; 1 pF to 10 μF; 100 μH to 10 H

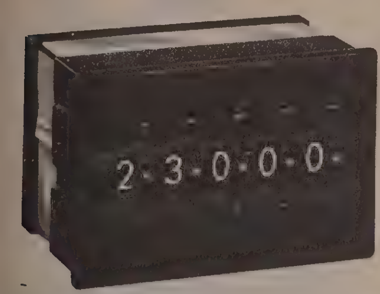
PACKAGING
WC Packaged in a standard case with binding posts.
PM Supplied without case for panel mounting or other use.

IET LABS, INC.

DEPT. EM, 534 MAIN STREET, WESTBURY, NY 11590, (516) 334-5959

DP 500 SERIES DIGITAL POTENTIOMETER

PRECISION DIGITAL REPLACEMENT FOR ORDINARY POTENTIOMETERS



- Eliminates the need for dials & multiturn potentiometers
- TRUE potentiometer circuit
- Unlimited choice of resistance values
- In-line digital readout
- Convenient (snap in) panel mounting with bezel
- 1, 2, 3, 4, 5, and 6 decade units are available
- Suitable for use in voltage and current dividers

GENERAL SPECIFICATIONS:

Minimum potentiometer resistance: .04 Ω/decade
Power across input terminals: 5 watts
Temperature coefficient: 50 ppm/°C
Operating temperature: −25°C to +90°C

ORDERING INFORMATION:

IET can supply any resistance value in a number of tolerances and decades. A part number is determined as follows:

DP500 — B — 50k — 5 — PM

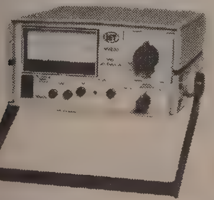
TOLERANCE
A 0.05%
B 0.1%
F 1%

PACKAGE STYLE
PM Panel mounting
WC Case with binding posts

Total Resistance (ohms)	No. of Decades					
	1	2	3	4	5	6
1, 2, 5	•					
10, 20, 50	•	•				
100, 200, 500	•	•	•			
1k, 2k, 5k	•	•	•	•		
10k, 20k, 50k	•	•	•	•	•	
100k, 200k, 500k	•	•	•	•	•	•
1M, 2M, 5M	•	•	•	•	•	•
10M, 20M, 50M	•	•	•	•	•	•

Other resistance values available on request.

MODEL MV-800 HIGH SENSITIVITY ANALOG RMS VOLTMETER



- TRUE RMS READING
- HIGH ACCURACY
- WIDE BANDWIDTH
- READS FROM −105 TO +53 dBm (30 μV-300V)
- SWITCHABLE AUDIO FILTER
- ACCEPTS VARIETY OF PLUG-IN FILTERS
- SEPARATE AC AND DC OUTPUTS
- RECHARGEABLE BATTERY OPERATION
- COMPACT, RUGGED CONSTRUCTION

ORDERING INFORMATION:

Model MV-800 Analog RMS Voltmeter	$625.00
Model A-810 Insulated Banana Plugs to Alligator Clips Coaxial Cable Test Leads	29.00
Model A-820 220 Volt Adapter	39.00
Model F-801 Hum Filter Module (Bandpass 800 Hz to 3 MHz)	76.00
Model F-802 "A" Weighted Noise Filter	99.00
Model F-803 Low Pass Filter (100 kHz cutoff)	76.00
Model F-804 Empty Filter Module Used to House Custom Filter	24.00

Consult factory for prices and availability of custom filter modules.

RMS Voltmeter Ranges:	30 μV, 100 μV, 300 μV, 1 mV, 3 mV, 10 mV, 30 mV, 100 mV, 300 mV, 1V, 3V, 10V, 30V, 100V, 300V; full scale; linear scales.
dB Ranges:	−90 dB to +50 dB in 10 dB steps. 0 dB relative to 1 mW into 600Ω; log scale.
Meter:	3.7 inches taut band, ruggedized.
Scale Length:	3.2 inches mirrored, 2 color.
Frequency Range:	5 Hz to 2 MHz.

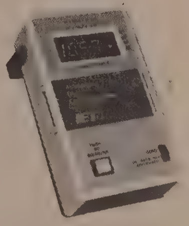
Accuracy and Frequency Response:

dB Range	±3% Full Scale	±3 dB	dB Range	±3% Full Scale	±3 dB
−90	10-100kHz	5-200kHz	−10	10-200kHz	5-1.7MHz
−80	10-100kHz	5-600kHz	0	10-900kHz	5-2MHz
−70	10-100kHz	5-800kHz	+10	10-400kHz	5-1MHz
−60	10-100kHz	5-1MHz	+20	10-500kHz	5-2MHz
−50	10-800kHz	5-1.5MHz	+30	10-500kHz	5-2MHz
−40	10-800kHz	5-2.2MHz	+40	10-500kHz	5-2MHz
−30	10-800kHz	5-1.7MHz	+50	10-500kHz	5-2MHz
−20	10-1.1MHz	5-1.9MHz			

Above accuracy is over a temperature range of 18°-28°C, and a crest factor of 1-2; error increases by 1% at crest factor of 6.

Filter Switch:	1. Flat: Flat response; no filter. 2. Audio: Provides a bandpass of 20 Hz and 20 kHz. Down 3 dB at 20 Hz and 20 kHz. Filter slope is 6 dB per octave; (see curve). 3. Ext.: Accesses an external plug-in filter per customer's requirements. (See listing of stock filter modules available).
Input Impedance:	9 MΩ on all ranges.
Maximum Continuous Input:	630V (AC peak + DC).
Response Time:	Less than 3 seconds, worst case.
Outsputs:	1. Analog preamplifier output is provided on rear panel. 2. DC output is provided on rear panel; 0-1V DC proportional to meter deflection.
Connectors:	Banana jacks (for maximum safety with a battery operated instrument).
Power Supply:	Internal rechargeable batteries operate the unit for more than 20 hours continuously. Charger/adapter may be used to operate the unit while recharging.
Size:	8.5 in. wide x 4.4 in. high x 9.2 in. deep (216 mm x 110 mm x 235 mm).
Weight:	6 lbs. (2.7 kg).
Accessories Supplied:	110 Volt AC Charger/Adapter, and Instruction Manual. Unit comes with carrying handle which serves as a tilt stand.

MODEL CM-500 PROFESSIONAL QUALITY AUTORANGING DIGITAL CAPACITANCE METER



- AUTORANGING MISTAKE PROOF CAPACITANCE MEASUREMENT
- HIGH ACCURACY
- WIDE MEASUREMENT RANGE
- EASY TO READ
- CUTS TIME AND COSTS
- TROUBLE-FREE POWER SUPPLY
- CONVENIENT PORTABLE PACKAGING
- DIGITAL OUTPUT
- COMPANION COMPARATOR

Range:	9 ranges for measuring from 1 pF to 200,000 μF. The full scale value is automatically selected from one of the following to give maximum resolution: 2000. pF, 20.00 nF, 200.0 nF, 2.000 μF, 20.00 μF, 200.0 μF, 2000. μF, 20.00 mF, 200.0 mF.
Accuracy:	2000. pF to 20.00 μF scales: 0.1% ±1 LSD; 200.0 μF to 2000. μF scales: 0.8% ±1 LSD; 20.00 mF to 200.0 mF scales: 1.0% ±1 LSD; Temperature Range: 10°C to 40°C.
Reading Rate:	2000. pF to 200.0 μF scales: 0.25 sec./2000. μF to 20.00 mF scales: 0.8 sec./200.0 mF scale: 6.4 sec.
Test Parameters:	Determination of the time constant of the unknown capacitor and a known resistor. The maximum voltage is less than 3.2 volts.
Power Supply:	Battery Operation: 5 standard D cells. AC Adapter: IET Labs AC Adapter Model CM5001 (110 volts) or Model CM5002 (220 volts) may be used with or without the batteries in place.
Digital Output:	The range, the BCD capacitance value, the overrange signal, the sampling strobe signal, the power supply, and the system ground are available through a 26 pin header connector.
Input Protection:	The capacitance test terminals are shorted as long as the Measure button is not depressed. During this time a charged capacitor will be automatically discharged. No fuse is required.
Physical:	Dimensions: 7.4″L x 4.33″W x 2.36″H. Weight: 31 oz. (batteries included). Test Terminals: Connector Strips, Component Clip, and Banana Plug-Alligator Clip Test Leads. Display: 0.5″ high, 3½ digit LED display with 4 LED scale indicators.

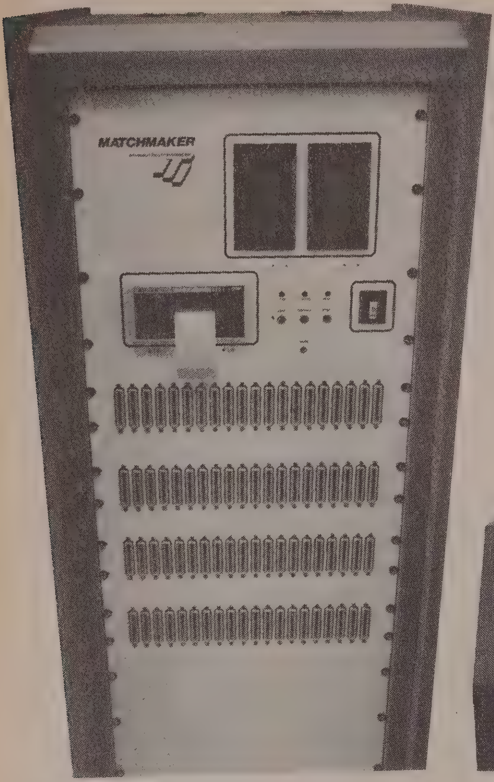
ORDERING INFORMATION:

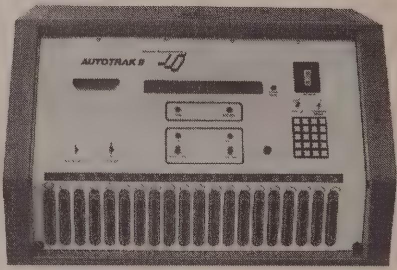
Model CM-500 Autoranging Digital Capacitance Meter	$299.00
Model CC-25 Component Clip	8.00
Model TL-26 Alligator Clip Test Leads	5.00
Model CM-5001 110 Volt AC Adapter	15.00
Model CM-5002 220 Volt AC Adapter	25.00
Model CLC-502 Capacitance Limits Comparator	429.00
Model CB-27 Connector Cable (for CM-500 BCD output)	16.00

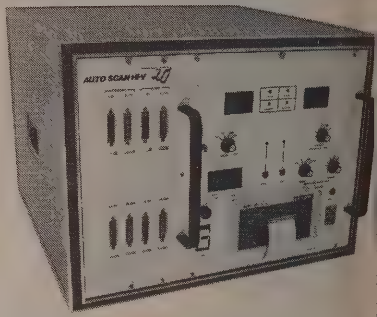
All products are warranted for one year. Specifications and prices subject to change without notices.

IET DESIGNS & MANUFACTURES TO MIL-SPEC & COMMERCIAL CUSTOM REQUIREMENTS

Information Transfer Industrial, Inc.







MATCHMAKER

TESTS:
- Backplane Wiring
- Cables & Harnesses
- Bare PC Boards
- Loaded PC Boards
- Switch & Relay Assemblies

LOCATES, DISPLAYS & RECORDS:
- Continuity
- Shorts
- Opens
- Miswires

FEATURES:
- 1000 Points Per Second Test Time
- 3 Expandable Models Up To 16,000 Points
- Self Programmed From Known Good Model
- Flexible Disk Data Storage
- Menu Prompting Programming Instruction
- CRT Terminal
- Self Diagnostics

AUTOTRAK II

TESTS:
- Backplane Wiring
- Cables & Harnesses
- Bare PC Boards
- Switch & Relay Assemblies

LOCATES, DISPLAYS & RECORDS:
- Continuity
- Shorts
- Opens
- Miswires

FEATURES:
- 500 Points Per Second Test Time
- Expandable To 2,000 Points
- Self Programmed From Known Good Model
- Permanent Storage With Optional Cassette
- Simplified Program Edit Capability
- Self Diagnostics

AUTOSCAN HI·V

TESTS:
- Cables & Harnesses

LOCATES, DISPLAYS & RECORDS:
- Continuity
- Shorts
- Opens
- Miswires
- Insulation Breakdown

FEATURES:
- Complete Test of 100 Wires In 1 Second
- Expandable To 100 Wires
- Selectable Hi-Pot Voltage
- Selectable Hi-Pot Dwell Time
- Selectable Insulation Breakdown Threshold
- Selectable Continuity Resistance Threshold

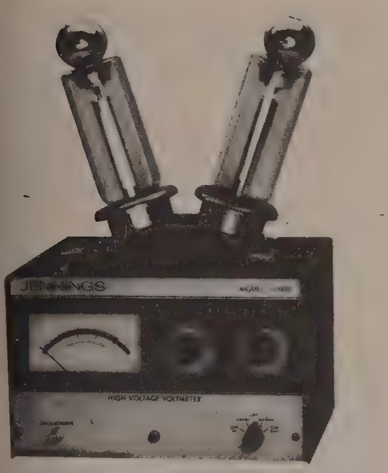
Products formerly manufactured by
Addison Division of Muirhead, Inc.

Information Transfer Industrial, Inc.
The Switching Company

P.O. Box 357
HOLCOMB, NY 14469
PHONE (716) 657-7074

high voltage test and measuring equipment

SOLID STATE AC VOLTMETER



MODEL J-1005

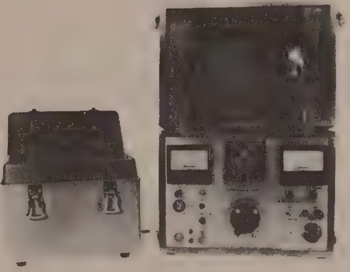
A compact, portable instrument for the accurate, direct reading of very high voltages at rf, audio and power frequencies . . . determination of the amplitude of pulses with oscilloscope connections for viewing wave shapes . . . removable high voltage input circuit for remote panel mounting of the meter . . . internal battery and ac line operation.

Specifications	Model J-1005
Voltage Ranges	Peak Kilovolts (single-ended) 0-2.5, 0-5, 0-10, 0-25, 0-50 Peak Kilovolts (double-ended) 0-2.5, 0-5, 0-10, 0-25, 0-50, 0-100
Frequency Response	Flat from 10 Hz to 20 MHz at full rated voltage.
Accuracy	±3% of full scale on all voltage ranges.
Oscilloscope Connection	600 to 1 division ratio (approx.).
Meter Calibration	The meter is calibrated in peak kilovolts with linear voltage scales of 0-2.5, 0-5, 0-10, 0-25, 0-50.
Input Impedance	Greater than 2 x 10^{12} ohms and approx. 4 pf single-ended to ground, 2 pf double-ended.
Power Supply	117/230 volts ±10%, 50/60 Hz, 5 watts, or rechargeable battery.
Dimensions	Height, 16″; width, 10¾″; depth, 8″.
Net Weight	12 pounds (approx.).

PORTABLE AC HIGH VOLTAGE TESTER

MODEL JHP-70A

The smallest and lightest instrument available at its power level the JHP70A will generate and measure 70,000 volts peak for on-site testing of high voltage components such as capacitors, switches, transformers, bushings, vacuum tubes, etc.

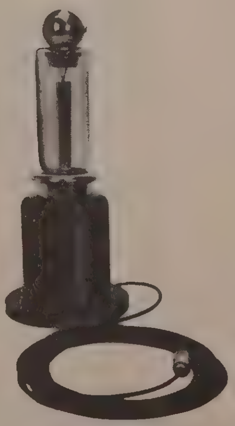


Maximum Output Voltage	**70 KV Peak**
Maximum Continuous Current	**21 MA RMS**
Short Circuit Current (Est.)	**100 MA RMS**
Power Requirements	**105-125 Volts RMS**
Frequency	**50-60 Hz**
Current	**15 Amps**
Surge Current	**10 Amps**
Weight:	
Control Cabinet	**28 lbs.**
Transformer	**43 lbs.**

HIGH VOLTAGE AC DIVIDER

MODEL 13200

hese dividers can be used with an oscilloscope o measure and observe voltages up to 50 kv at requencies up to 20 MHz. Their low circuit loading design and shielded construction make them articularly suitable for rf measurement applications including tank circuit and transmission ine voltages, pulse parameters, modulation oltages, and transient wave characteristics.



Specifications	Model 13200
Voltage	50 kv peak
Current	12.5 amperes RMS maximum through the voltage divider.
Input Impedance	Above 10^{12} ohms, 4 pfd.
High Frequency Response	Flat to 20 MHz at 50 kv peak; maximum frequency 50 MHz at 20 kv peak.
Division Ratio	As requested, 325:1, 1000:1 or 2000:1
Low Frequency Response When operated into shunt resistance of 1 megohm 10 megohms	 1000 Hz 100 Hz
Weight	2 lbs. 4 oz.

ITT JENNINGS Dept. EM, 970 McLaughlin Ave. • San Jose, CA 95122 • (408) 292-4025

DIVISION OF ITT CORPORATION

JRL JULIE RESEARCH LABORATORIES INCORPORATED LOCOST 106

- **LEASING A LOCOST SAVES THE AVERAGE CALIBRATION LAB A MIN. OF $4000/MONTH.**

FEATURES

- High-reliability multi-station capability without limitations of central-processor time sharing.
- Requires zero software design by the user.
- Multi-function/Multi-instrument/Multi-parameter automation of short run test routines.
- Completely modular, endlessly field-expandable and totally non-dedicated.
- Based on NBS-traceable, state-of-the-art, ratiometric measurement technology.
- Dated, unconditionally guaranteed fully functional turnkey on-site performance . . . on-line, in your facility, from 84-114 days ARO.
- Provides economical solutions to all requirements from 2½-digit production ATE to 7½-digit standards-laboratory automation.

APPLICATIONS

- Completely automated production batch-testing of electrical and electronic components at accuracy levels from ±1% to ±0.00001%.
- Versatile short-run multi-point/multi-parameter testing of active and passive networks, circuits, subsystems, and systems.
- Automatically programmed data-logging of physical parameters into electrical qualities.
- Comprehensive life-test measurement and categorization of components, circuits and equipment by quality.
- Automated stimulus/response testing of circuit modules, subsystems and complete equipment.

SUPPORT COMPONENTS

- Master Program Cassettes.
- Disc memories for mass program storage.
- Fundamental standards of EMF, resistance, ratio and AC/DC transfer.
- Data-link Modems.
- Programmable Resistance (Standard Model PRS-106).
- Power amplifiers providing up to 1200 V and 200 W AC output.
- Programmable resistive dividers providing up to 1 million precise ratios.
- Graphic Displays.
- Computer-compatible D/A & A/D converters.
- Function, Signal, Pulse, Word and Sweep Generators.

System can include pulse/function generators, frequency synthesizers, distortion analyzers, vector voltmeters, phasemeters. Peripherals available for complete oscilloscope testing.

DESCRIPTION

From the leading manufacturer of precision standards and measuring instrumentation, Julie Research, a new computer controlled test system is available at a low cost to fit into the budgets of even small calibration and testing laboratories.

LOCOST* features a combination of computer, data terminal, high speed thermal printer, programming cassette memory and a programming calculator which can be operated by lab technicians with little or no computer and programming experience. It uses BASIC language, has an alphanumeric keyboard and an interactive 32-character display, as well as a built-in 15Kbyte main-line memory. Cassette memory is 32,000 words. Capability of the calculator is equivalent to a 10K or 12K minicomputer. A unique, labor saving feature of LOCOST* is its unique programmed software which makes it possible to generate, store, and carry-out test programs for new instruments efficiently. Simple questions concerning the specifications of the instrument under test are asked by the calculator and the operator answers these questions by typing specifications such as full-scale accuracy, etc. When completed, these specifications are then stored on cassette memory for future reference and use by the system's preprogrammed meter test routine. Programming costs are 80 to 90% lower than for conventional computer controlled systems.

A complete array of programmable DC and AC test instrumentation is available to satisfy even the most demanding testing and calibration applications. LOCOST* is a highly flexible user oriented system and is expandable in both hardware and software. Extended range instruments for both stimulus and measurement may be integrated into these systems at the time of purchase or at a later date as new requirements arise. Typical systems that are available include:

POPULAR LOCOST 106 MODELS

LOCOST 106 MINI (ON SITE) SYSTEM ......

Gives the user all the capabilities necessary for full-range precision measurement and limited range precision DC stimulus: calibrates and prints out complete data for potentiometers, decade boxes, meter functions, dividers, bridges, dc power supplies, DC voltage and current calibrators, standard cells, standard resistors, meter shunts, load cells, strain gauges, temperature, resistors, networks, and others. Does double duty as an automated on-site test system. (1)

LOCOST 106 DC/LF SYSTEM ....

Adds full-range precision AC and DC stimulus to the MINI system: in addition to the capabilities listed above gives full range precision calibration of all meters (AC and DC, digital and panel), volt boxes, high current shunts, AC voltage and current calibrators, etc. (2)

LOCOST 106 OSCILLOSCOPE/PLUG-IN SYSTEM ....

A complete stand alone automated system to provide fully automated calibration of oscilloscopes and plug-ins. (2)

LOCOST 106 STANDARD SYSTEM ....

Combines the LOCOST 106 DC/LF AND OSCILLOSCOPE/PLUG-IN systems in a single system. (3)

LOCOST 106/2 DUAL STATION UNIVERSAL SYSTEM ....

A complete two station automated system, as in the STANDARD system, with the addition of a second, fully independent work station and added capability for calibration of pulse and function generators, oscillators and counters. (4)

(1) This system produces savings of over $20,000/yr in a plant with $75,000 total present Standard/Calibration/Repair payroll

(2) This system produces savings of $30,000 to $55,000/yr in a plant with $150,000 to $250,000 total present S/C/R payroll

(3) This system produces savings of $55,000/yr (one shift) to $110,000/yr (two shift) in a plant with $150,000 to $300,000 total present S/C/R payroll

(4) This system produces $120,000/yr savings (one shift) in a plant with $400,000 total present S/C/R payroll

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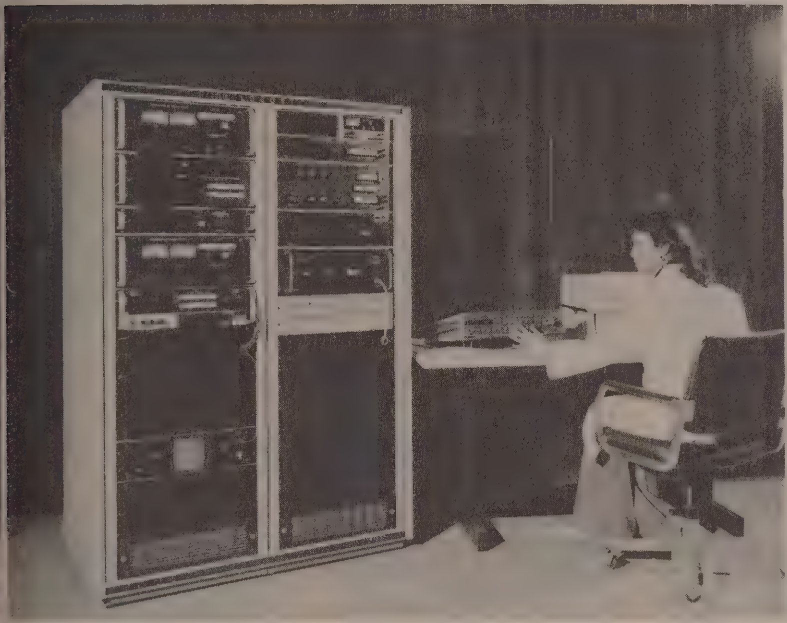
JULIE RESEARCH LABORATORIES INCORPORATED

AUTOMATED TEST EQUIPMENT

FOR $60 YOU CAN TURN CALIBRATION PROBLEMS INTO PROFITS AT JULIE HIGH SPEED CALIBRATION CENTERS

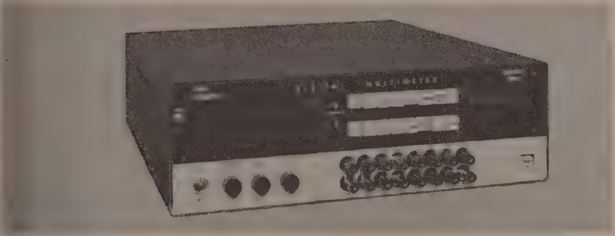


Why buy, rent, or invest in expensive hardware and software when $60 will allow you to time-share a state-of-the-art LOCOST computerized calibration system — including all of the high performance hardware and software you need for full-quality, fully documented and fully traceable calibrations. A single $60 time-shared hour on LOCOST is enough to finish four calibration jobs, (or three with calibration adjustments) — all of the highest quality, with complete computerized printout of all test variable data and repair diagnostics — easily worth $250 or more by present-day standards.

At our centers, the LOCOST system is there to serve you whenever you want it, and for as much work (or as little) as you really need.

Call us for more information about high-speed time-share calibration at the new LOCOST centers. If you should want to set up your own center, we also have data on leasing or franchising LOCOST systems.

PROGRAMMABLE AC/DC MULTIMETERS AND PRODUCTION CALIBRATORS DM-1000 SERIES DIGITAL MULTIMETERS TO 1 PPM ACCURACY/RESOLUTION/ STABILITY



JULIE RESEARCH, for 15 years the pioneer in the manufacture of Precision Standards, now leads the way in providing Multimodel automatic precision calibrators. The new approach to production measurements with three sigma certainty reduces test equipment costs and testing time. The DM-1000 Multimeter doubles as a Ratiometer and Voltage Source in addition to measuring Voltage, Resistance and Current to 1 ppm. Just a few of this amazing instrument's uses are:

- **CALIBRATING DVM's AND DMM's** — 2½ digits to 5½ digits, with full confidence.
- **CALIBRATING A/D AND D/A CONVERTERS** — 8-bit to 20-bit binary resolution.
- **CALIBRATING ANALOG TRANSDUCERS** — to unprecedented orders of precision.
- **MEASURING ZENER DIODES AND STANDARD CELLS** — 1% to 0.0001%, automatically.
- **MEASURING RESISTORS AND NETWORKS** — both absolute resistance and ratios.
- **CALIBRATING POTENTIOMETERS AND ATTENUATORS** — both linear and nonlinear.
- **MEASURING POWER-SUPPLY CHARACTERISTICS** — absolute output, regulation, tracking, stability.
- **CALIBRATING AC SIGNALS AND GAINS** — over 30 Hz-5 kHz, with excellent linearity.
- **STANDARDIZING CURRENT SOURCES** — over wide ranges, to unprecedented accuracy.
- **MONITORING PROCESS VARIABLES** — electrical parameters, temperature, strain, pressure, etc.

These new calibrators are the ultimate in accurate DC measurements, offering numerous benefits which yield the most reliable and flexible operation ever. Some of the more obvious benefits are low parts count for reliability, ease of programmable application for quality measurements with isolated data output with BCD input, and output options.

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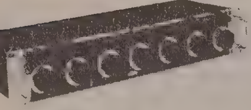
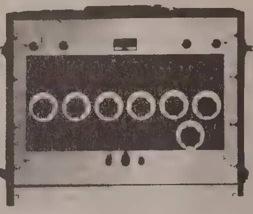
JRL JULIE RESEARCH LABORATORIES INCORPORATED PRECISION MEASURING & REFERENCE EQUIPMENT

VOLTAGE DIVIDERS

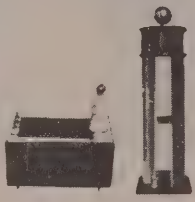




Model	Accu. (ppm)	Lin. Resol. (ppm)	Stability (ppm/yr.)	Resistance (Kohms)	Max. Volts	Mode of Operation
VDR-106/7H	1 (5 yr.)	1	1	100	700	Manual
VDR-106/7	1 (5 yr.)	.1	.2	100	300	Manual
VDR-307	1 (5 yr.)	.1	1	100	700	Manual
VDR-307J	1	.1	1	100/110/120	700	Manual
*RVD-106	1	1	.5	100	200	Prog./Manual
*RVD-126	1	1	.5	100/110/120	200	Prog./Manual

* All RVD Programmable Dividers are standard with BCD input/output.

HIGH VOLTAGE DIVIDERS/VOLT BOXES

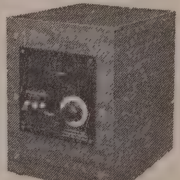


The Julie High Voltage Dividers and Volt Boxes on the table below are used to "drop" high voltages to a level that traditional precision potentiometers and high impedance electronic voltmeters can safely measure (such as the Julie models PVP-1000S and PVP-1000C).

Model	No.	Input Ranges Lowest	Input Ranges Highest	Input Imped.	Output Taps	Acc. (%)	1 Year Stab. (%)
DV-1500	11	1 v	1500 v	1 Kohm/v	1/1.5 v	.001	.001
DV-1000	7	1 v	1000 v	1 Kohm/v	1/1.5 v	.001	.001
DV-1000B	7	1 v	1000 v	1 Kohm/v	1 v	.001	.001
HV-100/w	1	100 Kv	100 Kv	1 Kohm/v	1 v	.05	.005
HV-100	1	100 Kv	100 Kv	4 Kohm/v	1 v	.05	.1
KV-50/.01	1	50 Kv	50 Kv	1 Kohm/v	1/10 v	.01	.0015
KV-25/.01	1	25 Kv	25 Kv	1 Kohm/v	1/10 v	.01	.0015
KV-10/.01	1	10 Kv	10 Kv	1 Kohm/v	1/10 v	.01	.0015
KV-10R	1	10 Kv	10 Kv	1 Kohm/v	1/10 v	.01	.0015
KV-VB/10	1	10 Kv	10 Kv	2 Kohm/v	10 v	.05	.005

VOLTAGE REFERENCES

SATURATED STANDARD CELL OVENS



The best voltage reference possible must meet two basic critical requirements —

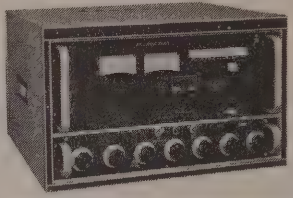
1. Time performance; the three saturated cells used must have minimum output voltage change with time.
2. The enclosure must maintain its nominal temperature with time.

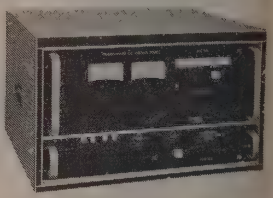
Stability Specs	Temperature	Time
SCO-106 cells	.64 ppm/.01°C	1 ppm/yr. max.
oven	.01°C/day max.	.05°C/yr. max.

DIALABLE PRECISION DCV SOURCES

The GTX-300 Series is a high quality, compact, portable voltage source. Output settings on this 1 ppm resolution instrument range from 1 microvolt to 10 volts DC and can be made simply by dialing the desired value. Accuracies of from 0.001% to 0.005% can be ordered. Loads requiring up to 25 mA can be tolerated without accuracy deterioration. An output stability of ±3 ppm/24 hours is standard on all units.

DC VOLTAGE AND CURRENT SOURCES, MANUAL AND PROGRAMMABLE





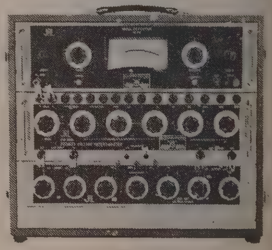
Model	Outputs	
*AVS-106	0 to ±12, 120, 1200V, 6 digits	
DVS-106	0 to ±12, 120, 1200V at 35 ma, 7 digits	
DVS-106D	0 to ±12, 120, 1200V at 35 ma, 6 digits	
*ACS-106	0 to ±1.2, 12, 120 ma; 1.2, 12 Amps	
DCS-105	0 to ±1.2, 12, 120 ma; 1.2, 12 Amps	
DCS-106	0 to ±1.2, 12, 120 ma; 1.2, 120 Amps	
*ACV-106	0 to ±1.2, 12 ma; 0-12V, 120 Volts	
Accuracy	**Stability**	**Linearity**
To 2 ppm	To 5 ppm/30 days	To 1 ppm

* Compliance Programmable

POTENTIOMETERS

Through the use of POTENTIOMETER Plug-ins, the Multivider system is made into various precision voltage measuring systems. (Systems listed in the table below include null detector and voltage divider.)

Range Volts	PVP-1000S Accuracy (w/self cal.)
1000	8 ppm +1 ppm f.s.
300	8 ppm +1 ppm f.s.
100	8 ppm +1 ppm f.s.
30	8 ppm +1 ppm f.s.
12	—
10	5 ppm +1 ppm f.s.
3	5 ppm +1 ppm f.s.
1.2	—
1.1	+1 μv (cell compar.)
1.0	2 ppm +1 ppm f.s.
.12	—
.012	—
.0012	—



PVP-1000C Potentiometer/Voltbox Plug-in with ranges to 1000 volts and with accuracy as shown below for PVP-1000S:
PVP-1001J Universal Potentiometer Plug-in is used.

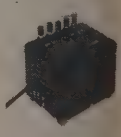
SOLID STATE REFERENCES — ZENERS

Line Regulation: 1 ppm for 10% line change for all models.

Output: +1.018, +1.0 and −5.0 volts all models except ZVR-500 Series.

Room Temp. Efficiency: 0.3 ppm/°C (20°C to 30°C) for ZVR-106 Series and 0.2 ppm/°C (20°C to 30°C) for ZVR-500 Series.

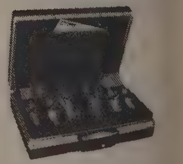
Model	MM	Size
ZVR-106B ZVR-106MV (10v, 1v, .1v, .01v)	152.4 x 152.4 x 101.6 152.4 x 152.4 x 101.6	6″ x 6″ x 4″ 6″ x 6″ x 4″
ZVR-506 (6.3v) ZVR-512 (12.6v) ZVR-518 (18.9v)	21.3 x 21.3 x 19.1 21.3 x 21.3 x 19.1 21.3 x 21.3 x 19.1	.84″ x .84″ x .75″ — —
ZTS-106	1.000, 1.018 + Delta; + Delta VDC 0 to 1000 μV (Delta); ±2 ppm Accur.; 1 μV Resol.; ±3 ppm/Mo. Stable	



AC-DC THERMAL VOLTAGE TRANSFER STANDARDS

TNB-102 Series

This set of two Thermoelement Modules (2.5 ma and 5 ma) and six Resistor Modules provide highest available transfer accuracy from 0.5 v to 1000 v up to 50 kHz.



Model TNB-102 Series Coaxial AC/DC Transfer Standards

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JRL JULIE RESEARCH LABORATORIES INCORPORATED PRECISION MEASURING & REFERENCE EQUIPMENT

BUFFER AMPLIFIERS

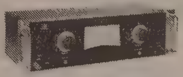
BA106

BA107, BA108

Line Operated High Performance Floating Amplifier

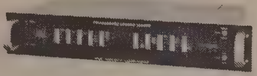
Specification	BA106	BA107	BA108
Gain	1.0 ±1.5 PPM 10.0 ±1 PPM	100 ±1 PPM	1000 ±1 PPM
Max. Output	±12 Volts	±12 Volts	±12 Volts

NULL DETECTORS



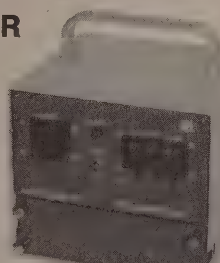
Model	Ranges	Sensitivity	Dimensions
ND-106	(9) 3 µv to 30 mv	.1 µv	19 x 5¼ x 8

AUTOMATIC RANDOM ACCESS SCANNER



Features: Random bussing capabilities, will not degrade 1 ppm measurements, up to 10 individually Addressable Decades, 2-Pole 100-Position and most combinations in-between. Programmable, sequential, or manual modes. Thermal EMF of 0.2 µV max. Please call us for custom applications.

MINI SCANNER


MS-106

(1) Only .1 to .2 µV thermals, (can be used in 1 PPM accuracy systems)
(2) Manual and complete on line (computer) capabilities
(3) 10 test positions plus 2 mutually exclusive dual form A closures
(4) Random or sequential access
(5) Manually settable or programmable lower limit and manually settable upper limit in the sequential mode
(6) I/O, standard positive BCD code, TTL levels
(7) Illuminated test position display
(8) Automatic stop and hold position or repeat previous scan pattern capabilities.

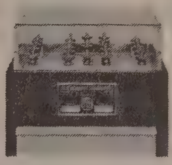
MINIDIVIDER

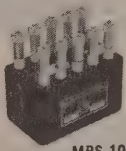
MVD306

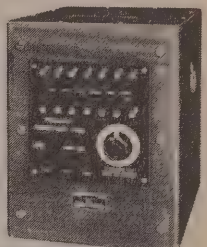
6 Reading Switches — Ratios from .000001 to .999999 — Over Range Switch to 1:100000 Ratio

Enclosure	3½″ x 4″ x 6″
MVD306	2.5 PPM Accuracy
MVD306	5 PPM Accuracy
MVD306	10 PPM Accuracy

RESISTANCE REFERENCES

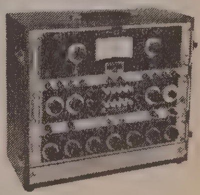

DMR


MRS-106


PRO-106

Model	Absolute Resistance Values	Accuracy (ppm)	Room Temp. Eff. (ppm/°C)	Approximate Size (inches)
PRO-106	10 ohms to 1 Meg.	8	.1(0-28°C)	10 x 14 x 15
PRO-106L	.001 ohms to 10 ohms	50-100	.1(0-28°C)	10 x 14 x 15
MRS-106	100 ohms to 1 Meg.	15	2.5/°C	4 x 2 x 4
MRS-105	.1 ohms to 100 ohms	30-100	2.5/°C	4 x 2 x 4
DMR Series	10 ohms to 1 Meg.	15	2.5/°C	5 x 4 x 3
BMR Series	29,996,131,071 ohms	15-50	5/°C	5 x 4 x 3
BDR Series	100,000 ohms Max.	15	5/°C	5 x 4 x 3

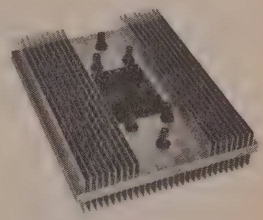
PRECISION RESISTANCE MEASURING SYSTEMS



PRB-205C PLUG IN	
0-1000Ω	±1 ppm Setting ±1 ppm f.s.
0-10K	±1 ppm Setting ±1 ppm f.s.
0-100K	±1 ppm Setting ±1 ppm f.s.
0-1 Meg.	±2 ppm Setting ±1 ppm f.s.
0-10 Meg.	±3 ppm Setting ±1 ppm f.s.

PRB205L & PRB205H available extending resistance range from .01 ohms to 100 K Meg.

CURRENT SHUNTS



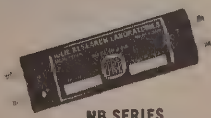
High quality shunts are high quality 4-terminal resistors especially designed to operate at relatively higher current levels without suffering appreciable resistance change. Most high ranges (50 A for example) are the finned heat-sink type. Most lower ranges are available in single and multiple-range (oil-filled) units. Accuracies up to .0025% are available although .05% or .01% are most typical. Yearly stabilities of .01% are typical and temperature coefficients are 5 ppm/°C or better. Ask for a data sheet.

MINI DECADE BOX

New DR100 Series Available:
Ranges: 1 Kohm to 11 MGohm; same high performance as our MDR116

Max. Res.	1,111,110Ω
Ohms Per Step	1Ω
Decade Ranges	6
Enclosure	3½″ x 4″ x 9″ Metal Case

PRIMARY RESISTANCE AND RATIO STANDARDS


NB SERIES

These ultra-stable oil-immersed resistors, provide absolute accuracy and stability heretofore unattainable in conventional precision components
(See JRL Bulletins B-5 and B-6)

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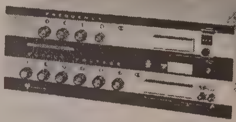
JRL JULIE RESEARCH LABORATORIES INCORPORATED

Φ OPTIMATION Division



PRECISION OSCILLATORS

Model	Frequency Range	Frequency Accuracy	Output Voltage	Output Current	Frequency Response	Features
RCD-10	.1 Hz-100 kHz	1%	0-5		±.5%	General Purpose Oscillator
RCD-902	10 Hz-1 MHz	1.0%	0-5			Wide Band
RCD-904	10 Hz-1 MHz	0.1%	0-11.11 absolute	100 MA	±.05%	Remote Sensing

POWER OSCILLATORS

Model	Power VA	Frequency Range	Voltage*	Features
AC-50	50	0.1 Hz to 100 kHz	15	Precision High Power

* Options are available to extend V+1 ranges of all power oscillators and amplifiers.

PRECISION POLYPHASE OSCILLATORS/POWER OSCILLATORS

Model	Phases Power/φ	Output V/φ	1/φ	Regulation	Frequency Range	Amplitude Stability	Distortion	Features
AC-153	2/3 45	150	2a	adj. to Zero	10 Hz to 10 kHz	100 ppm	.05%	Switchable 2 or 3φ
RCD-11	2/3	5			.01 Hz to 10 kHz	100 ppm	.02%	General Purpose Oscillator

PRECISION POLYPHASE OSCILLATORS/POWER OSCILLATORS

- High Power — to 50 VA per phase
- Low Distortion — to less than 0.02%
- Fixed or Variable Stable Frequency
- Adjustable Load Regulation
- Perfectly Suited for Gyro Testing

POWER OSCILLATORS

- Accurate Digital Frequency Selection
- Stable Amplitude — less than 0.01% variation
- Stable Frequency — 10 ppm available
- Low Distortion — less than 0.05%
- Wide Frequency Range — up to 110 kHz
- Absolute Stability Regardless of Load
- Up to 50 VA Output

POWER AMPLIFIERS

- Low Distortion — under 0.05%
- Stable Voltage Gain — to 1 ppm
- Wide Frequency Ranges — DC to 2 Mhz
- Adjustable Output Impedance
- Absolute Stability Regardless of Load
- Voltage or Current Regulation

PRECISION SOURCES

- Stable Amplitude — less than 20 ppm variation
- Low Distortion — under 0.05%
- High Power Output — up to 200 VA
- Stable Frequency — less than 0.01% variation
- Wide Frequency Range — to 100 kHz at 1000 V
- Constant Voltage/Current—to 1500 V: to 40 Amps

PRECISION OSCILLATORS

- Absolute Amplitude Accuracy — ±0.05%
- Amplitude Stability — ±0.01% month
- Output — from 11 Volts to 100 Milliamperes
- Remote Sensing Available
- Quadrature Phase Accuracy — 0.05°
- Frequency Range — 10 Hz to 1 MHz
- Frequency Accuracy — to 0.1%

ABSOLUTE CALIBRATORS FOR:

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- Programmable Models
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- 10 Hz to 1 MHz
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ABSOLUTE CALIBRATORS

Model	Output Range	Accuracy DC	Accuracy AC*	Frequency Range	Features
AC125/PA225	10 NV to 1211.11V		0.02%	10 Hz to 1.1 MHz	Fixed Amplitude Quadrature Output
AC129/PA225	10 NV to 1211.11V		0.02%	10 Hz to 1.1 MHz	Fully Programmable
AC160	0-600V		0.05%	25 Hz to 10 kHz	Calibrates Volt, Amp and Watt Meters — Variable Phase
CS112	0-10 Amps 1 μa to 2.2 Amp	.005%	0.05% 0.02%	10 Hz to 100 kHz	Absolute Power Factor Bi-polar DC
CS129	1 μa to 2 Amp		0.02%	10 Hz to 100 kHz	Programmable
QCS110	1 μa to 1.1 Amp		0.02%	10 Hz to 100 kHz	Phase Calibrated From 0-360° ±0.05°
PA270	1 Amp to 110 Amp		0.02%	10 Hz to 100 kHz	High Current—Self Calibrating
RCD709	0 to 5V RMS			10 Hz to 100 kHz	Absolute Phase Standard ±.05°

* Typical Midband

PRECISION SOURCES

Model	Voltage	Current	Resolution	Frequency Range	Distortion	Stability	Features
AC50CAL	500V	10A	10 ppm	10 Hz to 100 kHz	<.05%	±20 ppm	High Performance at Low Cost
AC104	1500V	20A	10 ppm	10 Hz to 100 kHz	<.05%	±20 ppm	Full Power Output From 45 Hz to 100 kHz

POWER AMPS

Model	Power (VA)	Voltage	Current	Band Width Full Power	Band Width Extended	Distortion	Features
PA25	25	150		DC - 1 MHz	DC - 2 MHz	<.02%	Sine/Pulse—1500V μS
PA50	50	15		DC - 20 kHz	DC - 100 kHz	<.05%	Wide band
PA50T	45	150		45 Hz - 20 kHz	10 Hz - 100 kHz	<.05%	Voltage Regulated
PA50T/10A	45		10 Amps	45 Hz - 2 kHz	10 Hz - 100 kHz	<.05%	Current Regulated
PA50T/500	45	500	10 Amps	55 Hz - 10 kHz	10 Hz - 100 kHz	<.05%	High Voltage
PA250AC	250	150	10 Amps	25 Hz - 20 kHz	15 Hz - 40 kHz	<.05%	Adjust. Output Imped.
PA250H	250	300	5 Amps	45 Hz - 60 kHz	20 Hz - 100 kHz	<.05%	Absolute Load Stability

Φ OPTIMATION

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Function & Sweep Generators

	Frequency Range	Model	Output Waveforms ∿	⊓	∧	◁	⎍	↑	Maximum Output	Output Impedance (Ohms)	Auxiliary Outputs	DC Offset	Ext. V.C.	Additional Features	Rack Mounting Kit—$50	Base Price
	2Hz-3MHz	1000A	●	●	●				20V p-p	50	TTL	—	1500 1	1500 1 Tuning	RK-39	$ 395
	2Hz-3MHz	1200A	●	●	●				20V p-p	50	TTL. ⟋	±10V	1500:1	Linear Sweep	RK-39	$ 525
	2Hz-3MHz	1400	●	●	●		●		20V p-p	50	TTL. ⟋. CV	±10V	1500:1	Lin Swp. Trig. Gate. Burst	RK-314	$ 795
	2Hz-3MHz	1600	●	●	●		●		20V p-p	50	TTL. ⟋. CV. MKR, PEN LIFT	±10V	1500:1	Lin/Log Swp. Pause-Mkr, Trig, Gate, Burst	RK-314	$ 895
	.003Hz-30MHz	2000	●	●	●		●	●	30V p-p	50	TTL. CV	±15V	1000:1	dB Attenuator Symmetry Control	RK-58	$1050
	003Hz-30MHz	2200	●	●	●		●	●	30V p-p	50	TTL⟋. ⟋CV. MKR. PEN LIFT	±15V	1000:1	Lin/Log Swp. Pause-Mkr. Trig. Gate. Burst	RK-519	$1495
	.003Hz-30MHz	2400	●	●	●		●	●	30V p-p	50	20V ⊓ ⊓ ∧	±15V	1000:1	AM, FM, φ Lock, Swp. Trig. Gate	RK-519	$1650
	.002Hz-3MHz	5100B	●	●	●	●	●	●	20V p-p	50	5 V ⊓	± 5V	1000:1	Symmetry Control Output Protection	RK-58	$ 850
	002Hz-3MHz	5200A	●	●	●	●	●		20V p-p	50	⊓ ⟋	± 5V	1000:1	Lin Swp. Trig. Gate. Burst Output Protection	RK-58	$1050
	002Hz-3MHz	5300A	●	●	●	●	●		20V p-p	50	⊓ ⟋ ⟋ ⊓	± 5V	1000:1	Lin Log Swp. Trig. Gate Burst. Output Protection	RK-58	$1095
	.002Hz-5MHz	5400B	●	●	●	●	●	●	30V p-p	50	5 V ⊓	±10V	1000:1	Symmetry Control Output Protection	RK-58	$ 950
	002Hz-2MHz	5600	●	●	●				15V p-p	50 600 Bal	1V ∿ ⊓ ∿	± 5V	—	* Battery Operated	N A	$ 695
	002Hz-2MHz	5700	●	●	●				15V p-p	50 600 Bal	1V ⊓	± 5V	—	1000.1 Tuning	N A	$ 595
	.0001Hz-5MHz	5500AR	●	●	●		●	●	30V p-p	50	5V ⊓	±7.5V	1000:1	Programmable	N/A	$2500
IEEE-488	.0001Hz-5MHz	5900	●	●	●		●	●	30V p-p	50	TTL ⊓	±15V	200:1	GPIB, Autoprogrammer	RK-519	$3000
IEEE-488	.0001Hz-5MHz	5910	All Features of 5900 Plus Arbitrary Waveforms						Data Point Grid Ampl: 4000 X Time: 1024	Data Point Timing 200ns to 10,000 Sec		Data Point Slew Rate 20V/μSec		Features: Load Arbitrary Via IEEE Bus, Front Panel, or Auto-Programmer		$3500

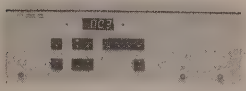
WAVEGUARD™ (output protection): Standard on Models 1000A, 1200A, 5100B, 5200A, 5300A and 5400B. All other generator models, specify option 001: $45.00. ($90; Models 5500AR, 5900 and 5910) * Battery Kit, Model 5600, Part No. BK-560; $150.

RC Oscillators

	Frequency Range	Model	Freq. Acc. %	Freq. Tuning	Output Each Phase: Power (mw)	Output Each Phase: Impedance (Ohms)	Quad. Output	Output Waveforms	Freq. Resp (dB)	Dist. %	Rack Mounting Kit—$50	Base Price
	001Hz-100kHz	4024A	0 5	Decade	125	200/600	Yes	∿ ⊓ ⎍	0.01	0.01	See Note*	$2050
	001Hz-100kHz	4025A*	0 1	Decade	125	200/600	Yes	∿ ⊓ ⎍	0.01	0.01	See Note*	$2395
	01Hz-1MHz	4100A*	0 5	P. Button	500	50		∿ ⊓	0.05	0.02	See Note*	$1095**
	1Hz-100kHz	4000A	0 5	Decade	125	200/600	Yes	∿	0.01	0.01	See Note*	$1550
	1Hz-100kHz	4001A	0 1	Decade	125	200/600	Yes	∿	0.01	0.01	See Note*	$1850
	10Hz-10MHz	4200A	2.0	Dial	500	50		∿ ∿	0.025	0.1	RK-58	$ 795**
	10Hz-10MHz	4300A	2.0	Dial	500	50		∿ ⊓ ∿	0.025	0.1	RK-58	$ 850**
	1Hz-110kHz	4400A	1.0	Decade	5/20	50/600	Yes	∿ ∿ ⊓	0 05	.001	RK-39	$ 695
	1Hz-110kHz	4500	10.0	Dial	5/20	50/600	Yes	∿ ⊓	0 05	0.001	RK-39	$ 695
	1Hz-100kHz	4030R	0.5	Decade	125	200/600	Yes	∿ ⊓ ⎍	±0.01	0.01	N/A	$2550
	1Hz-100kHz	4031R	0.1	Program	125	200/600	Yes	∿ ⊓ ⎍	0.01	0.01	N/A	$2995
	1Hz-1MHz	4141R	0.1	Program	500	50		∿ ⊓	0.05	0.02	N/A	$2400
IEEE-488	1Hz-1MHz	4180	0.1	Program	500	50		∿ ⊓	0.05	0.02	RK-519	$3000*

* Rack Model (19″ Panel) add $50. Add Suffix 'R' to Model No. **WAVEGUARD™, option 001: $45.

Automatic Distortion Analyzers



IEEE-488

Model 6880

Frequency Range	Model	Input Sensitivity VRMS	Display	Distortion Range %	Voltmeter Range VRMS	Internal Osc.	Additional Features	Rack Mounting Kit—$50	Base Price
1Hz-110kHz	6800	1-130	3 Digit	.000-12.0	0.1-130	1kHz 5V RMS	Distortion Output Analog Output	RK-319	$1600*
10Hz-110kHz	6801	0.1-13	3 Digit	.000-12.0	.01-13	1kHz 5V RMS	Distortion Output Analog Output	RK-319	$1600*
10Hz-110kHz	6880	0.1-130	3 Digit	.000-50.0	.01-130	1kHz 5V RMS	Freq. Counter GPIB Prog	RK-519	$3500**
5Hz-1MHz	6900	0.1-130	3 Digit	.000-19.9	.01-130	1kHz 5V RMS	Complete Auto-Ranging	RK-319	$1995‡

* Models 6800, 6801: Option 001; BCD output: $225. Option 002, %/dB Readout: $200. Option 003,30kHz, 80kHz LP Filters: $200.
** Model 6880: Option-001, 1Hz-110kHz: $250. ‡ Option 001, BCD Output: $225.

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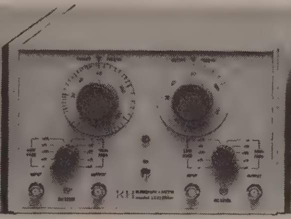
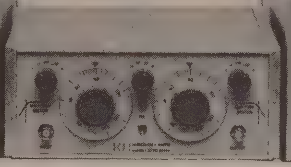
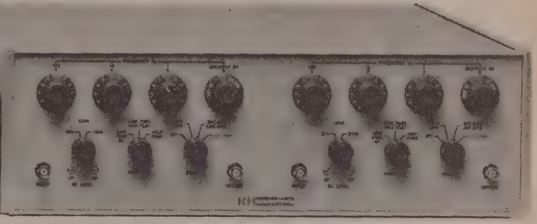
Tunable Active Filters

Model 3200


Model 3202


Model 3550


Model 3342

Frequency Range	Filter Model	BAND PASS	BAND REJECT	HIGH PASS	LOW PASS	Freq. Acc. %	Attenuation Slope dB/Octave	Hum and Noise (RMS)	Max. Attenuation (dB)	Output Volt/Amps (RMS)	3dB Points	Battery Kits No./Price	Rack Mounting Kit—$50	Base Price
.001Hz-99.9kHz	3320			X	X	2	24	500uV	80	5v/50ma	DC-1MHz	BK332/$100	RK-58	$1075
.001Hz-99.9kHz	3322	X	X	X	X	2	24/48	500uV	80	5v/50ma	DC-1MHz	BK334/$200	RK-519	$2050
.001Hz-99.9kHz	3340			X	X	2	48	500uV	80	5v/50ma	DC-1MHz	BK332/$100	RK-58	$1495
.001Hz-99.9kHz	3342	X	X	X	X	2	48/96	500uV	80	5v/50ma	DC-1MHz	BK334/$200	RK-519	$2895
.01Hz-99.9kHz	3321			X	X	2	24	500uV	80	5v/50ma	DC-1MHz	BK332/$100	RK-58	$ 995
.01Hz-99.9kHz	3323	X	X	X	X	2	24/48	500uv	80	5v/50ma	DC-1MHz	BK334/$200	RK-519	$1895
.01Hz-99.9kHz	3341			X	X	2	48	500uV	80	5v/50ma	DC-1MHz	BK332/$100	RK-58	$1395
.01Hz-99.9kHz	3343	X	X	X	X	2	48/96	500uV	80	5v/50ma	DC-1MHz	BK334/$200	RK-519	$2650
.02Hz-20kHz	3750	X	X	X	X	5	6,12,18,24	500uV	80	10v/2ma	DC-1MHz	BK375/$220	RK-519	$1350
.2Hz-20kHz	3700	X				5	24	200uV	80	5v/1ma	N/A	BK370/$110	RK-38	$ 895
2Hz-200kHz	3550	X	X	X	X	5	24	200uV	60	5v/10ma	.2Hz-3MHz	N/A	RK-38	$ 950
10Hz-1MHz	3100A	X				5	24	100uV	80	3v/10ma	N/A	N/A	RK-314	$ 850
10Hz-3MHz	3103A	X				5	24	100uV	80	3v/10ma	N/A	N/A	RK-314	$ 950
10Hz-3MHz	3103A-4	X				5	18	100uV	80	3v/10ma	N/A	N/A	RK-314	$ 950
20Hz-200kHz	3500	X				10	24	200uV	60	5v/3.5ma	N/A	N/A	RK-38	$ 795
20Hz-2MHz	3200			X	X	5	24	100uV	80	3v/10ma	DC-10MHz	N/A	See Note	$ 695
20Hz-2MHz	3202	X	X	X	X	5	24/48	100uV	80	3v/10ma	DC-10MHz	N/A	See Note*	$1295

* Rack Model (19" Panel) add $50. Add Suffix 'R' to Model No.

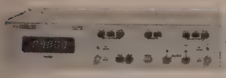
Narrow Band Tracking Filter

Model 3800

Frequency Range	Model	Bandwidths	Peak Output Volts/mA	Max. Attenuation	Output* Noise (r.t.i.)	Tuning Modes	Rack Mfg. Kit—$50	Base Price
1Hz-100kHz	3800	.001Hz, .01Hz, .1Hz, 1Hz, 10Hz, 100Hz, 1kHz, EXT	10V/5mA	40dB	100μV	REF, REF TRAK DIAL, SIG TRAK	RK-319	$2200

* Referred to input

Digital Phasemeters

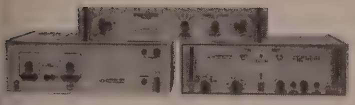

Model 6500

Model 6200A

Model	Phase Accuracy	Frequency Range	Resolution	Input Waveforms	Input Voltage Range	Display Range	Rack Mounting Kit—$50	Base Price*
6500	.05°	3Hz-5MHz	.01°	∿ ⊓ ∿ ⎍	.01V-120V RMS	0° to 360°	RK-319	$2595
6400	0.1°	3Hz-5MHz	0.1°	∿ ⊓ ∿ ⎍	.01V-120V RMS	0° to 360°	RK-319	$1995
6200A	0.5°	10Hz-1MHz	0.1°	∿ ⊓	0.1V-120V RMS	−180° to +180°	RK-38	$ 895

* Optional 001, BCD Output: $225.

Wideband Amplifiers


Model 7500 Model MT-56R Model DCA-10

Frequency Range	Model	Output Power (watts)	Dist. %	Freq. Resp. dB	Input Volts (RMS)	Max. Voltage Gain	Matched Load (Ohms)	Max. Output Volts (RMS)	Max. Output Current	Rack Mfg. Kit—$50	Base Price
DC-1MHz	DCA-10	10	0.1	+1.0	10	10	600-1000	105	130ma	See Note*	$1595
DC-1MHz	7500	75	0.1	+0.1	1.25	100	200	125	625ma	RK519	$1795
30Hz-1MHz	MT-56R	75	—	—	125	—	2-1000	100	6.5A	N/A	$ 550

* Rack Model (19" Panel) add $50. Add Suffix 'R' to Model No.

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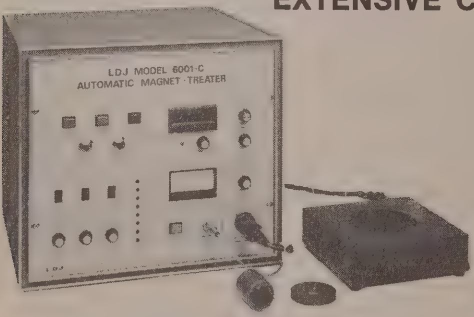

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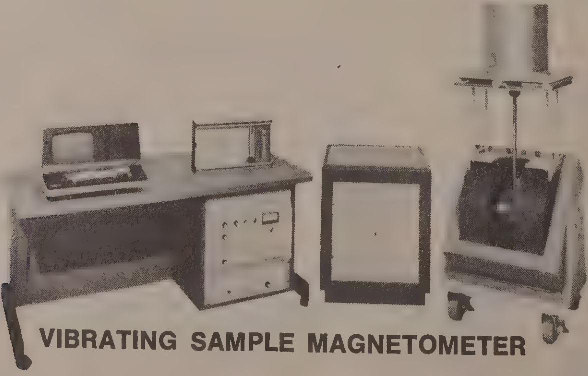

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WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

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PRODUCT DIRECTORY

Model 2017
Programmable Cavity-tuned Signal Generator

SIGNAL GENERATORS

FM/AM SIGNAL GENERATOR Model 2017	10kHz to 1024MHz GPIB	Spurious free, low noise, cavity-tuned signal generator with keyboard/GPIB entry of all functions. Typical SSB noise −144 dBc/Hz, 20kHz from carrier. Output level to +19dBm, with ±1dB level accuracy down to 1μV, and integral reverse power protection. Facilities include slow analog sweep, FM/AM/Pulse, internal modulation oscillator, and GPIB counter function.
FM/AM SIGNAL GENERATOR Model 2018 Model 2019	80kHz to 520MHz 80kHz to 1040MHz GPIB	Synthesized generators with very low close-in phase noise. Microprocessor control provides simple and rapid operation by direct keyboard or GPIB entry of all functions. Includes comprehensive frequency and amplitude modulation, ±1dB level accuracy down to 1μV and integral reverse power protection. Calibration and fault finding performed from keyboard or GPIB to dramatically cut downtime.

MARCONI INSTRUMENTS
80kHz 1040MHz signal generator 2019
CARRIER FREQUENCY
MODULATION
RF LEVEL
1040.0000
125
13.0

Model 2019 Synthesized Signal Generator – Available on GSA
Now with 4 Special Purpose Variants

SPECIAL PURPOSE VARIANTS *NEW*

EXPANDED FM BANDWIDTH Option −01	80kHz to 1040MHz GPIB	The FM bandwidth is extended down to 1Hz to improve ability to handle digital signaling information on pagers and transceivers. Stereo separation is also improved to better than 56dB at 10MHz in this version.
AVIONICS Option −02	1.5MHz to 1040MHz	Variant designed to handle VOR/ILS signals used in aircraft navigation and landing equipment. Difference in depth of modulation better than 0.045% for ILS tones.
10kHz CARRIER FREQUENCY Option −04	10kHz to 1040MHz GPIB	This generator has extended carrier frequency to cover VLF communication bands between 10kHz and 80kHz used in maritime applications.
PULSE MODULATION Option −08	80kHz to 1040MHz	A pulse modulation facility allows testing of radar R.F. and I.F. stages. Rise and fall time less than 100ns, with on/off ratio better than 65dB at 70MHz.

MARCONI INSTRUMENTS
modulation meter 2305
FREQUENCY
MODULATION
20000000
0.000

Model 2305 2GHz Modulation Meter – Available on GSA

MODULATION METERS

AM/FM MODULATION METER Model 2305 (6625-01-154-4844)	500kHz to 2GHz GPIB	Measures FM to 500kHz, AM to 99%, ϕ M to 500 radians with modulating frequencies up to 300kHz. Selectable automatic or manual tuning including display of carrier or modulation frequency. Choice of band limiting filters to optimize measurement of residual noise, S/N ratio, and frequency response. Power measured from 10mW to 1W. Design includes non-volatile memory and full GPIB programming facilities. Optional direct measurement of distortion.
AM/FM MODULATION METER Model 2304 (6625-01-033-5835)	25MHz to 1000MHz	Completely automatic tuning and level setting. Measures FM on ranges 1.5kHz to 150kHz, AM 30% and 100% for modulating frequency 50Hz to 9kHz. Accuracy 3%. Optional internal rechargeable battery.

MARCONI INSTRUMENTS automatic amplitude analyzer 6500

Model 6500 Automatic Amplitude Analyzer

MICROWAVE PRODUCTS

AUTOMATIC AMPLITUDE ANALYZER Model 6500 ***NEW***	10MHz to 126GHz GPIB	Provides versatile and accurate scalar measurements with on screen graphics. Includes direct display of transmission loss/gain, return loss, VSWR and absolute power. Dynamic range of at least 66dB, 71dB with noise reduction. Designed to be used with any sweeper. All functions keyboard/GPIB controlled with comprehensive memory system.
MICROWAVE COUNTER Model 2440 ***NEW***	10Hz to 20GHz GPIB	Three channel automatic frequency measurement with resolution down to 0.1Hz. Acquisition rate is a fast 200ms. High FM and AM tolerance. Compact design.
MICROWAVE POWER METER Model 6900 Series ***NEW***	10MHz to 20GHz GPIB	Fast response power meters with choice of analog or digital read-out models. Include built-in calibrator and nonlinearity corrections for sensors. See power meter section for further details.

marconi instruments

Partial Listing Only- Call Marconi for complete catalog of products

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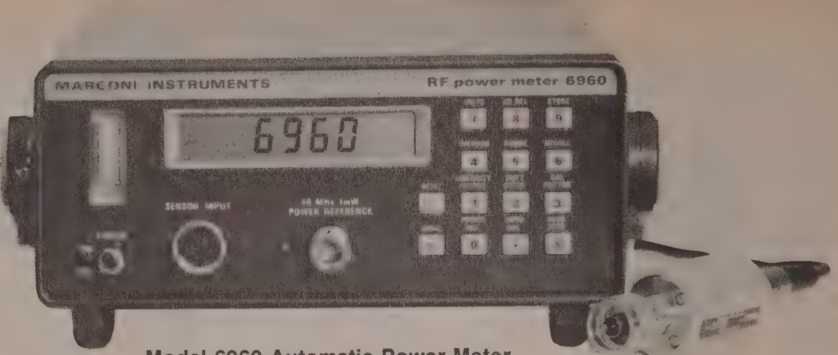
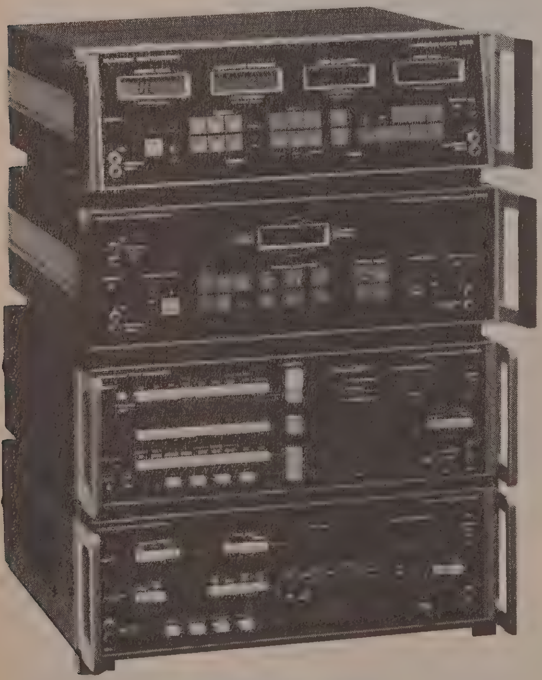
5455 Garden Grove Blvd., Suite 420, Westminister, CA 92683 • [714] 895-7182



Model 6960 Automatic Power Meter

POWER METERS

AUTOMATIC RF POWER METER Model 6960 ***NEW***	10MHz to 20GHz GPIB	Microprocessor controlled, fast response Power Meter with auto-range, auto-calibration, and auto-zero facilities. Under GPIB control, measurements can be made in less than 25ms. Includes non-volatile memory, self-test capability, and corrections for duty.cycle and power meter nonlinearity. Choice of sensors to meet desired sensitivity and frequency range.
PORTABLE RF POWER METER Model 6950 ***NEW***	10MHz to 20GHz	Lightweight analog power meter designed for applications where portability is essential. Indications in dB and mW with meter accuracy of ±2%. Response time continuously adjustable from 50ms to 15s. This fast response time makes the unit ideal for power meter leveling applications using the recorder output. An optional rechargeable battery pack can be fitted internally. Sensors available to meet desired sensitivity and frequency range.
AF POWER METER Model 893B	20Hz to 35kHz	Covers power range from 300μW to 10W full scale. Impedance 2.5Ω to 20kΩ in 48 steps. Balanced or unbalanced input, calibrated in volts and dBm. Version available with SINAD filter.



PCM Multiplex Test System

OTHER MARCONI PRODUCTS INCLUDE:

WHITE NOISE TEST SETS

Noise Loading Test Sets Models 2090B and 2090C are designed to meet both manual and automatic requirements of testing FDM multichannel systems. Units meet latest CCIR and CCITT accuracy requirements (399-3 & 482-1). Both units are suitable for use with either A or B series filters. Model 2090C is programmable via GPIB with suitable interface.

SPECTRUM ANALYZERS

Choice of Spectrum Analyzers Systems 2370, 2371 and 2373 covering 30Hz to 1.25GHz. All feature narrow dispersion of 20Hz per division, resolution 0.1dB, filter bandwidth from 5Hz to 50kHz, frequency measurement to counter accuracy and built-in tracking generator for network analysis.

BROADCAST TEST SYSTEMS

Systems to analyze and display all essential television transmission parameters associated with the vertical interval test signal and timing of horizontal and vertical blanking intervals. Audio test system automatically performs 17 parameter measurements on mono and stereo sound broadcast systems in seconds.

PCM & DIGITAL TEST SETS

Instruments to measure and analyze performance parameters of digital communications links and their associated channel banks.

EDDYSTONE RECEIVERS

Communications receivers covering 10kHz through 1GHz, suitable for primary or back-up receiver requirements.

COMING SOON...

Complete the Marconi Action Card to receive details of all new products being announced in 1984, including Signal Generators, Microwave Counters, Data Test Sets, and a Mobile Radio Test Set.

marconi instruments

Partial Listing Only- Call Marconi for complete catalog of products

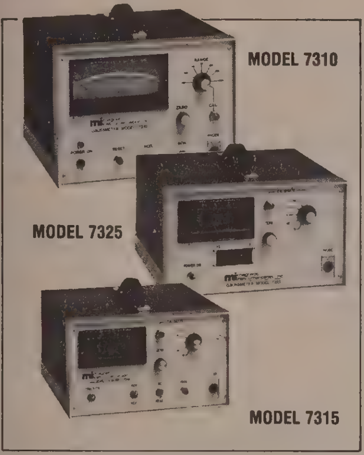
100 STONEHURST COURT, NORTHVALE, New Jersey 07647 • (201) 767-7250
5455 Garden Grove Blvd., Suite 420, Westminister, CA 92683 • (714) 895-7182

THE PERMANENT MAGNET USER'S EQUIPMENT STORE!

HALL EFFECT GAUSSMETERS

The wide line of Magnetic Instrumentation, Inc. Gaussmeters shares the following features:

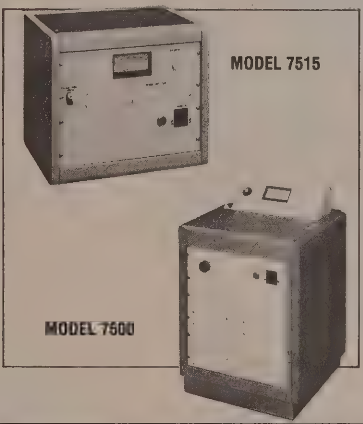
- Magnetic field measurements from 1 Gauss to 100,000 Gauss.
- Output voltage accurate to 10X over range.
- Simple setup and operation with front panel controls.
- Accurate internal calibration.
- Wide range of high linearity Hall probes.



MAGNETIZERS

The Magnetic Instrumentation Capacitive Discharge type Magnetizer line features the following:

- High speed production operation.
- Energy levels from 300 to 5400 Joules.
- Low voltage — 425 volts maximum.
- Saturation of all Alnico, Barium Ferrite, Rare Earth Cobalt magnetic materials.
- Continuous meter readout of capacitor voltage.
- Wide variety of fixtures including multi-pole fixtures.
- Control prevents firing below preset level.



INTEGRATING FLUXMETERS

Fluxmeters by Magnetic Instrumentation, Inc. provide:

- Very low drift rate.
- Push button or remote electronic zeroing.
- Up scale and down scale push button drive.
- Simple setup and operation with front panel controls.
- Solid state circuit design.

MODEL 7386
MODEL 7383

MAGLAB

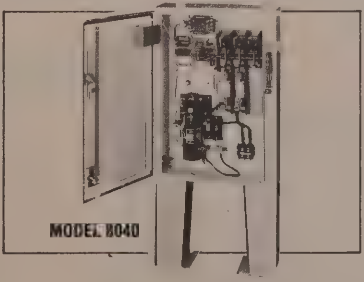
Magnetic Instrumentation's perfect answer for a dual-purpose test instrument for use where an Integrating Fluxmeter and a Hall Effect Gaussmeter are needed . . . but not simultaneously.

MODEL ML400

MAGNECHARGERS™

The 8000 Series Magnechargers are half cycle type magnetizers designed for use in high volume production situations.

- High speed operation to 3000 charging cycles per hour.
- Controllable output currents to 6000 amps.
- Safe, heavy-duty NEMA 12 type construction.
- Manual or automatic operation.
- Polarity reversible models available.



CUSTOM INDUSTRIAL MAGNET PROCESSING EQUIPMENT

Magnetic Instrumentation, Inc., can meet your every need from a flexible range of existing designs, modified designs, and custom designs. Our innovative and experienced engineers can provide magnetizing, measuring, stabilizing and demagnetizing systems built to NEMA 12/JIC specifications. These systems, including automatic parts feeding, are designed to your specifications.

SPECIALISTS IN MAGNETIZING AND CALIBRATING RARE EARTH COBALT MAGNETS!

mi magnetic instrumentation inc.

8350 East 48th Street, Indianapolis, Indiana 46226
(317) 545-2102, Telex 27-2111

M D F PRODUCTS INC.

WHITE NOISE Generator

DIODES AND MODULES

PLEASE NOTE - most of our customers do not purchase our standard units, as they require different parameters. Therefore, do not hesitate to submit your particular requirements.

MDF NOISE DIODES

DO-7 GLASS PACKAGE

- Flatness over Frequency Range: ±2db
- Operating Temperature Range: −55°C to +125°C

MDF PART NO.	FREQUENCY RANGE	MINIMUM RMS NOISE OUTPUT		OPERATING CURRENT -ma		TEST LOAD
		µv / √Hz	µv / B.W.	RANGE	TYPICAL	OHMS
Vz= 8.2v ± 20% - other zener voltages are available						
MDF402	10Hz - 20KHz	.8	113	.020 - .060	.045	600
MDF501	10Hz - 100KHz	.8	252	.020 - .060	.045	600
MDF505	10Hz - 500KHz	.8	565	.020 - .060	.045	600
MDF601	10Hz - 1MHz	.05	50	0.5 - 2.0	1.5	600
MDF603	20Hz - 3MHz	.05	86	0.5 - 2.0	1.5	600
MDF701	20Hz - 10MHz	.05	158	0.5 - 2.0	1.5	600
MDF703	20Hz - 30MHz	.05	273	0.5 - 2.0	1.5	600
MDF801	20Hz - 100MHz	.05	500	0.5 - 2.0	1.5	50
MDF803	1KHz - 300MHz	.02	346	1 - 10	5.0	50
MDF805	1KHz - 500MHz	.02	447	1 - 10	5.0	50
MDF901	1KHz - 1000MHz	.015	474	1 - 10	5.0	50
Vz= 14v ± 20% - other zener voltages are available						
MDF402H	10Hz - 20KHz	7.0	989	.020 - .060	.045	10K
MDF501H	10Hz - 100KHz	7.0	2213	.020 - .060	.045	10K
MDF505H	10Hz - 500KHz	7.0	4949	.020 - .060	.045	10K
MDF601H	10Hz - 1MHz	7.0	7000	.020 - .060	.045	10K

MDF NOISE MODULES

- Flatness over Frequency Range: ± 2db.
- Operating Temperature Range: −35°C to + 85°C.

MDF △ PART NO. * ↓ ↓	Frequency Range	△Available Minimum RMS Noise Output Levels per B.W.	Test Load Resistance	*Available Supply Voltage	Maximum Supply Current	Available Module Packages
		MV	OHMS	+Vdc	MA	
☐ MDF 402- ☐	10Hz - 20KHz	5,10,20,50,100,1000	600	12 to 50	10 ma max. for low output units - 120 ma max. for higher output units ↓	L W H 2.5 1.25 .75 4.0 2.0 1.0 5.0 3.0 1.5 2.5 2.0 .75 ↓
☐ MDF 501- ☐	10Hz - 100KHz	5,10,20,50,100,1000	600	12 to 50		
☐ MDF 505- ☐	10Hz - 500KHz	5,10,20,50,100,1000	600	12 to 50		
☐ MDF 601- ☐	10Hz - 1MHz	5,10,20,50,100,1000	600 (optional 50)	12 to 50		
☐ MDF 603- ☐	10Hz - 3MHz	5,10,20,50,100,1000	600 (optional 50)	12 to 50		
☐ MDF 701- ☐	10Hz - 10MHz	5,10,20,50,100,1000	50	15 to 50		
☐ MDF 703- ☐	10Hz - 30MHz	5,10,20,50,100,1000	50	15 to 50		
☐ MDF 801- ☐	20Hz - 100MHz	5,10, 20, 50,100	50	15 to 50		

Call or write for complete catalog. TELEX 4998051

MDF PRODUCTS INC., 7E JOHNSON DRIVE, DANBURY, CONNECTICUT, U.S.A. 06811 • PHONE (203) 743-3579

HIGHLY SENSITIVE
DC AC RF
TEST EQUIPMENT

MILLIVAC INSTRUMENTS

QUALITY, PRECISION
AND PERFORMANCE AT
COMPETITIVE PRICES

DC MILLIVOLTMETERS

- 100μV full scale to 1000V full scale
- Digital or analog readout
- Portable or panel mount
- Ease of calibration
- Compact, lightweight
- Left or center zero analog
- High input impedance

AC MILLIVOLTMETERS

- 10Hz to 2MHz
- 1mV full scale to 300V full scale
- True RMS indication
- Ease of calibration
- Digital or analog readout
- Portable or panel mount
- Compact, lightweight

RF MILLIVOLTMETERS

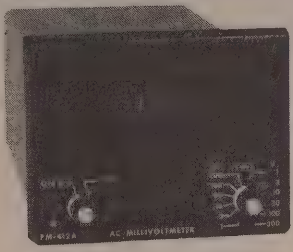
- 10KHz to 1.5GHz
- 1mV full scale to 300V full scale
- True linear response
- True RMS indication
- Programmable
- Digital or analog readout
- Line or battery power
- Portable, panel or rackmount
- Replaceable probe cartridge

MULTIMETERS

- 10μVDC full scale to 1000VDC full scale
- 10pA full scale to 1000mA full scale
- 3mVAC,RF full scale to 300VAC, RF full scale
- .1 Ohm to 5000 Meg Ohm range
- Individual calibration controls
- Line or battery power
- Portable or rackmount
- Left or center zero analog
- High input impedance
- DC recorder output

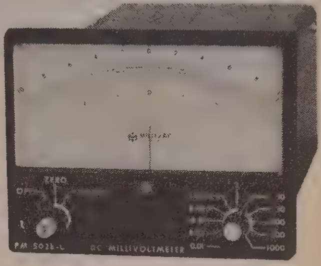
AC AMPLIFIERS

- Ultra low noise
- Variable gain, adjustable from 10dB to 60dB
- Variable bandpass limits from 5Hz to to 500KHz
- Selectable 10K ohm or 10Meg ohm input impedances
- Portable or rackmount
- Battery operated
- Rechargeable Ni-Cad batteries
- BNC input and output connectors
- Detachable input dividers


PM-412A
AC MILLIVOLTMETER

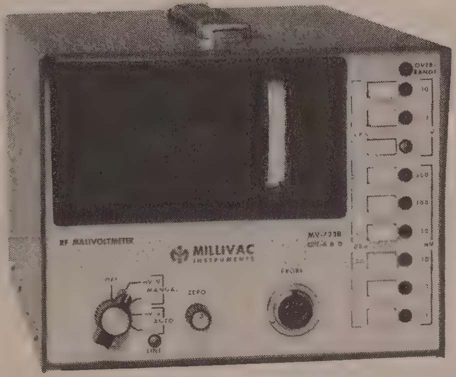
Model PM-412A
AC Millivoltmeter

1mV to 300V
full scale


ZERO
PM 502B-L
DC MILLIVOLTMETER

Model PM-502B-C
DC Millivoltmeter

10mV to 1000V
full scale


RF MILLIVOLTMETER
MILLIVAC INSTRUMENTS
MV-723B
ZERO
PROBE

Model MV-723B
RF Millivoltmeter
with options:
autoranging,
BCD output
and dBm
readout

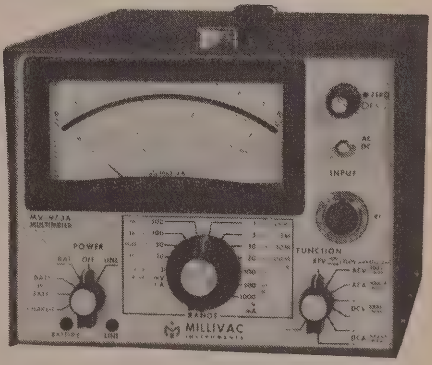
1mV to 10V
full scale

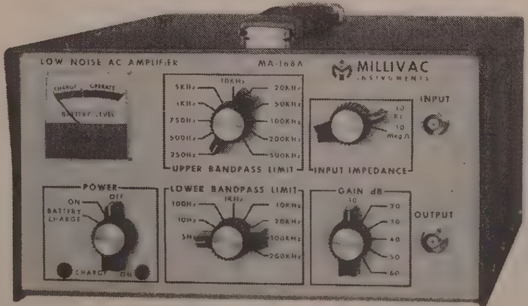
NEW

Model MV-973A
Multifunction Multimeter

DCV, DCA, ACV,
ACA, RFV and
Ohms

Battery or line
operated


INPUT
MV-973A MULTIMETER
POWER
BAT
OFF
LINE
FUNCTION
RANGE
MILLIVAC
BATTERY
LINE


LOW NOISE AC AMPLIFIER
MA-168A
MILLIVAC INSTRUMENTS
CHARGE
OPERATE
BATTERY LEVEL
10KHz
5KHz
20KHz
50KHz
750Hz
100KHz
500Hz
200KHz
250Hz
500KHz
UPPER BANDPASS LIMIT
INPUT IMPEDANCE
INPUT
10 K Ω
10 Meg Ω
POWER
OFF
ON
BATTERY CHARGE
LOWER BANDPASS LIMIT
1KHz
100Hz
10KHz
10Hz
20KHz
5Hz
100KHz
200KHz
GAIN dB
10
20
30
40
50
60
OUTPUT
CHARGE
ON

NEW

Model MA-168A
Ultra Low Noise
AC Amplifier

The illustrations and highlights shown here are only representative of our complete line. Many additional models, options and accessories are available. Information and detailed specifications are available upon request.

MILLIVAC
INSTRUMENTS, INC.

P.O. Box 997
Schenectady, NY 12301
Phone (518) 355-8300

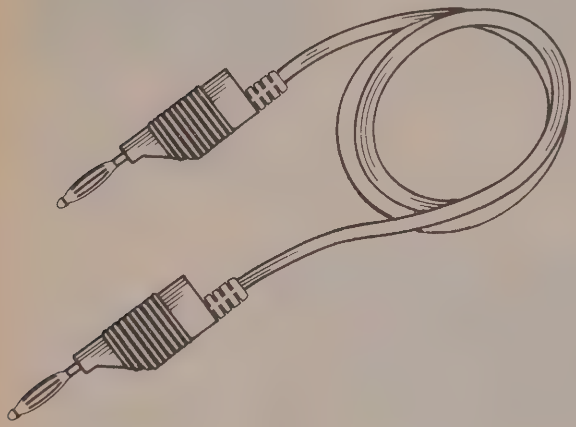
Sales and rentals - most items from stock

A COMPLETE LINE OF ELECTRICAL and ELECTRONIC TEST ACCESSORIES

Mueller

MUELLER ELECTRIC COMPANY
1583 East 31st Street, Cleveland, Ohio 44114
CALL TOLL FREE 800/222-2600, ext. 174
(In Ohio 800/556-1600 ext. 174)

ULTRA-FLEX Test Leads



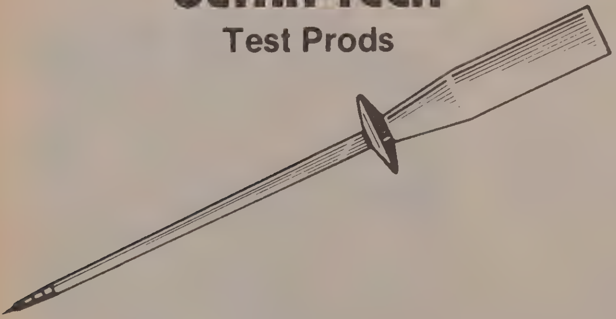
Laboratory-grade test leads provide superior performance and longer test lead life. Main conductor consists of 384 strands of soft drawn copper wire for tangle-free operation. Pure silicone rubber insulation withstands temperatures from -100°C to 300°C (-148°F to 572°F). Thermoplastic banana plug body resists chemical influences and helps prevent conductor separation with a strain relief. All test leads feature a stackable 3.5mm (0.128″) banana plug and jack at both ends to provide multiple outputs from one input source.

Plug Handle:	Thermoplastic PVC insulated
Plug Body:	Brass, nickel plated
Plug Spring:	3.5mm (0.138″), 9-leaf phosphor bronze, nickel plated
Plug Jack:	3.5mm (0.138″) brass, nickel plated stackable jack
Insulation:	1mm (0.040″) thick, scratch resistant pure silicone rubber, 3.3mm (0.130″) overall diameter
Wire Lead:	Ultra flexible, 0.75mm (0.029″) cross-section consisting of 384 twisted copper strands each 0.05mm (0.002″) in diameter.
Rating:	30 amp maximum load

No.	Overall Length
3025	250 mm (9.843″)
3050	500 mm (19.685″)
3100	1000 mm (39.370″)
3150	1500 mm (59.055″)
3200	2000 mm (78.740″)

Available in red, black, yellow, blue, green and violet. Specify color when ordering.

ULTRA-TECH
Test Prods



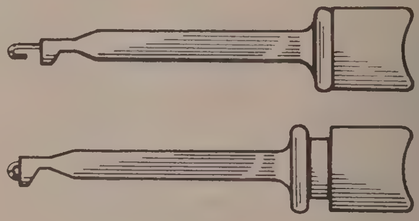
Designed to accept ULTRA-FLEX Test Leads and other 3.5 mm banana plug terminated leads. Laboratory-grade test prods feature lightweight, thermoplastic insulation that can withstand temperatures to 300°C (572°F). Polished stainless steel tip provides positive contact up to 1000V during test procedures by piercing through layers of pc board lacquer and oxide build-up. Square design and safety shock guard collar provides positive contact accuracy.

Prod Handle:	Fully insulated thermoplastic PVC
Probe:	Brass, nickel plated
Probe Tip:	Polished stainless steel
Mechanical Connection:	3.5mm (0.138″) brass, nickel plated banana jack.
Shock Guard Collar:	16mm x 16mm (0.630″ x 0.630″), thickness 5mm-8mm (0.197″-0.315″)
Temperature:	Withstand temperatures up to 300°C (572°F)
Rating:	1000V nominal
Length:	130mm (5.118″) overall, 85mm (3.346″) probe to shock guard collar, 45mm (1.772″) handle with collar

No.	Overall Length
3930	130 mm (5.118″)

Available in red, black, yellow, blue, green and violet. Specify color when ordering.

"CLIPPER"
Plunger-Type Test Clips



"Clipper" test clips make difficult IC test connections fast and easy. A spring-loaded hook attaches firmly yet gently to delicate component leads and terminals to free hands while troubleshooting and circuit testing. Insulated to a single contact point to assure true readings, the hook retracts into the plastic tip when removed from the contact point to prevent shorting. Six standard colors with interchangeable plunger heads allows hundreds of color combinations for multi-circuit testing. Four sizes are offered to meet a broad range of testing requirements.

Plunger Head & Body:	Heat and chemical resistant (70% nylon, 30% glass fiber)
One-Piece Blade Conductor/Hook:	Beryllium copper for maximum heat dissipation. Designed for connection over component leads up to .060 inches in diameter (1.52mm).
Spring:	Stainless steel compression coil.

No.	Overall Length
201	44.45 mm (1.75″)
202	63.50 mm (2.5″)
203	88.90 mm (3.5″)
205	127.00 mm (5″)
206	Plunger-Head

Available in red, black, yellow, blue, green and violet. Specify color when ordering.

A COMPLETE LINE OF ELECTRICAL and ELECTRONIC TEST ACCESSORIES

Mueller

MUELLER ELECTRIC COMPANY
1583 East 31st Street, Cleveland, Ohio 44114
CALL TOLL FREE 800/222-2600, ext. 174
(In Ohio 800/556-1600 ext. 174)

PRODUCTION CAPABILITIES

Mueller Electric Company, a privately-owned corporation, enters its 76th year with 72,000 square feet of manufacturing, assembly and warehouse capacity. We invite you to call us for prompt attention to your design or manufacturing requirements for which our experience and production capabilities might be suitable. As the largest manufacturer of electrical test clips and insulators, we have developed many unique capabilities in the following areas:

METAL FABRICATION: Our modern press department features presses ranging in size from one to fifty tons. Materials which we fabricate include alloy steels, copper, copper alloy, and stainless steel

SPRING PRODUCTION: Mueller manufactures helical and torsion springs in a variety of sizes. Materials available include hard (cold) drawn steel and music wire, stainless steel, inconel and phosphor bronze. Both strength and size can be modified to meet many special requirements.

PLATING: While we normally plate with cadmium, we also offer a wide variety of other plating techniques, including lead, chrome, chromate, nickel, zinc, tin and copper.

INJECTION MOLDING: All Mueller insulators are produced on our own molding equipment using both flexible polyvinyl chloride (PVC) and acetate. Ranging in size up to 30 ounce capacity, these machines can be used with most thermoplastic materials.

ASSEMBLY DEPARTMENT: Our assembly department features personnel who are skilled in small parts assembly. Our system can be readily adapted to include secondary or special operations.

Mueller Electric Co.

NATIONAL INSTRUMENTS

12109 Technology Blvd.
Austin, Texas 78727
Phone (512) 250-9119 Toll-Free (800) 531-5066

IEEE-488

INTERFACE FAMILY

IBM™- PC GPIB-PC

- DMA
- 300K bytes/sec
- ½ size card for IBM PC, XT, Portables
- IBM-PC, IBM-XT, Compatibles

$385.
Software Handler - PC DOS $75.

DEC Q-BUS™

GPIB11V-1

SOFTWARE INCLUDED

- Programmed I/O
- 50K bytes/sec
- Single Dual-Height Card
- MICRO PDP compatible

$795.

GPIB11V-2

- DMA
- 250K bytes/sec
- Single Dual-Height Card
- MICRO PDP compatible

$1,495.

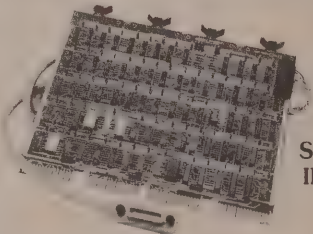
DEC RAINBOW GPIB-PC

- Optional real time clock
- Optional I/O port
- Uses extended comm. slot

$385
Software Driver - CPM 86/80 $75.

DEC UNIBUS™

GPIB11-1

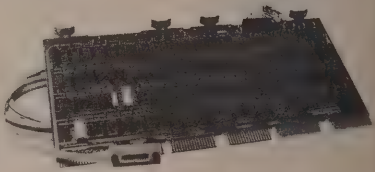


SOFTWARE INCLUDED

- Programmed I/O
- 60K bytes/sec
- Single Quad-Height Card

$1,395.

GPIB11-2



- DMA
- 500K bytes/sec
- Single Hex-Height Card
- VAX/VMS Compatible

$2,195.
VAX/VMS and UNIX option $500.

iSBX BUS™ GPIB-SBX

- 250K bytes/sec with host DMA
- Single wide card
- Turns GPIB-796P or GPIB-696P into multiport IEEE-488 interfaces

$350.

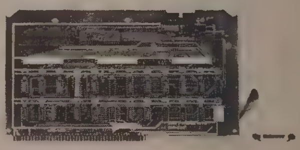
MULTIBUS™

GPIB-796

- DMA
- 500K bytes/sec
- Full 24 bit Multibus addressing

$1,295.

GPIB-796P



- Programmed I/O
- 3 optional iSBX connectors for multifunction capability
- 8 or 16 bit I/O addressing

$595.

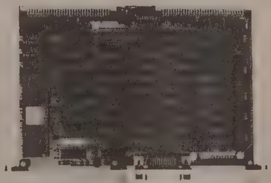
STD BUS GPIB-961P

- 250K bytes/sec with external DMA
- Optional on board interrupt controller
- STD-Z80, -8085, -8088 compatible
- 8, 16, 20, 24 bit I/O addressing

$350.

VME BUS

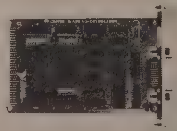
GPIB-1014



- 500K bytes/sec
- Hitachi HD 68450 LSI DMA Controller

$1295.
MOSTEK UNIX Software Handler $500.

GPIB-1014P



- Programmed I/O
- Polled or interrupt driver transfers

$595
MOSTEK UNIX Software Handler $500.

All National Instruments interfaces have complete Talker, Listener, and Controller capability. Each interface comes with complete documentation and direct factory support is available.

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SOAR corporation

NORTH AMERICAN SOAR CORPORATION

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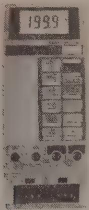
PROFESSIONAL ELECTRONIC INSTRUMENTS

3½ DIGIT MULTIMETER WITH COMPARATOR

MODEL 3025



$179.

FEATURES

- The use of SOAR CORP. custom-designed 80-pin LSI chip allows a low overall parts count that assures long-term stability and accuracy.
- The 3025 contains a built-in comparator circuit (High-Low Limit Set) that operates on all functions and is ideal for production line testing or incoming parts QC.
- Tactile switching for full auto or manual range (except current).
- Overload protection is built-in on all functions and ranges, surge protection up to 6000V.
- A fast response continuity check feature with "No Look" audible beeper sound is included.
- The LCD readout includes annunciators for function, unit, polarity, decimal, low battery and continuity plus auto polarity.
- Housed in a fully RFI/EMI shielded ABS plastic case with tilt stand for rugged everyday use. Safety designed probes, battery, fuse and spare fuse are included.

SPECIFICATIONS
FOR MODELS 3025, 3030, 3050, 5025, 5030

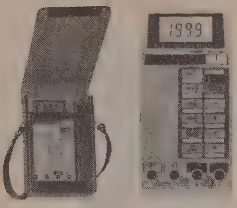
Display . . . 3½ digit LCD, max. reading 1999. Annunciators include mV, V, μA, mA, A, Ω, kΩ, MΩ, .))) (buzzer), B (low battery), AC, "−" (minus sign) and + (diode check)
Switching . . . . . 6 touch-button function and 6 touch-button range tactile switch
Operation . . . . . . Manual or automatic (except current)
Polarity . . . Automatic, "+" inferred, "−" in display window
Operating Temperature . . . 0°C to 40°C at 80% RH or less
Storage Temperature . −20°C to 60°C at 70% RH or less
Calibration . . . Accuracy guaranteed for 1 year
Measurement Rate . . . . . 4 measurements per second nominal
Battery Type & Life . . 2 "AA" size 1.5V, >600 hours continuous with alkaline batteries, >400 hours typical with zinc carbon
Probes . . . . One red, one black, safety type
Fuse . . . . GMA type, 250V, 0.3A
Overrange Indication . . . . . . Leading digit "1" displayed

MODELS 3030, 3050

Size . . . . . 6¼" x 3" x 1⅜" 160(H) x 76(W) x 35(D) mm
Weight . . . . . . 8 oz. (225 grams) less batteries
Optional Accessory . . . . . Model CC-531 Deluxe Carrying Case is constructed of ⅛" simulated leather, saddle-stitched with velcro close cover and separate probe compartment

3½ DIGIT LCD AUTO/ MANUAL RANGE DMM

MODEL 3030/MODEL 3050



3030/$139.
3050/$109.

FEATURES

- The use of SOAR CORP. custom-designed 80-pin LSI chip allows a low overall parts count that assures long-term stability and accuracy.
- The 3030 and 3050 contain a diode check function.
- Touch switch selection for full auto-ranging or manual range (except current).
- Overload protection is built-in on all functions and ranges, surge protection up to 6000V.
- A fast response continuity check feature with "No Look" audible beeper sound is included.
- The LCD readout includes annunciators for function, unit, polarity, decimal, low battery, continuity and diode check.
- Housed in a fully RFI/EMI shielded ABS plastic case with tilt stand for rugged everyday use. Safety designed probes, battery, fuse and spare fuse are included.

MODEL 3025

Size . . . . . 7⅜" x 3" x 1⅜" 188(H) x 76(W) x 35(D) mm
Weight . . . . . 11 oz. (310 grams) less batteries

MODELS 5025, 5030

Battery Type & Life . . . 4 "C" size 1.5V, >300 hours continuous use with alkaline batteries, >200 hours typical with zinc carbon
AC Operation . . . . . . Optional AC adaptor Model MQ-62
Probes . . . . One red, one black, safety type
Fuse . . . . 3 AG type, 250V, 0.2A
Overrange Indication . . . . Leading digit "1" displayed
Size . . . 2¼" x 7¼" x 7⅛" 57(H) x 186(W) x 180(D) mm
Weight . 1 lb., 14 oz. (845 grams) less batteries

NOTE: Models 3030 and 3050 are identical in all respects except for their accuracy specifications.

WARRANTY: One Year Parts and Labor

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SEE OUR PAGES IN SECTION 2975

3½ DIGIT LCD AUTO/ MANUAL BENCH DMM

MODEL 5025

$239.

FEATURES

- Uses SOAR custom 80-pin LSI chip for low parts count assuring long-term stability and accuracy.
- The 5025 contains a high-low limit set comparator circuit for all functions, ideal for production line or QC, etc. Has pass-fail beeper and LED indicators. Two 3½ digit thumbwheel switches with "+" "−" for high-low setting.
- Model 5025 has 8 channels of parallel BCD data out at the TTL level via rear panel connector giving all pertinent front panel readings and settings (10-pin connector supplied).
- Positive action tactile switching, full manual or auto-ranging (except current), built-in overload protection with surge up to 6000V, continuity beeper, LCD with annunciators, rugged ABS plastic case with U-bracket handle/tilt stand, supplied with safety probes, batteries and spare fuse. MQ-62 AC adaptor optional.

Range	Resolution	3050 Accuracy	All Other	Input Impedance	Overload Protection
DC Volts					
200mV	0.1mV	±0.5% reading ±2 digit	±0.25% reading ±2 digit	1000MΩ	DC/AC 1100 800 Vrms
2000mV	1mV	±0.5% ±1 digit	±0.25% ±1 digit	11MΩ	
20V	10mV			10MΩ	
200V	100mV				
1000V	1V				
AC Volts					
2000mV	1mV	±0.75% ±5 digit 40Hz∼ 500Hz	±0.5% ±5 digit 40Hz∼ 500Hz	11MΩ	DC/AC 1100 800 Vrms
20V	10mV			10MΩ	
200V	100mV				
750V	1V				
Ohms					
200Ω	0.1Ω	±0.5% ±3 digit	±0.25% ±3 digit	Test current 0.7mA	250V (0.2A Fuse)
2000Ω	1Ω	±0.5% ±1 digit	±0.25% ±1 digit	0.1mA	
20kΩ	10Ω			30μA	
200kΩ	100Ω			4μA	
2000kΩ	1kΩ	±1.0% ±2 digit	±1.0% ±2 digit	0.4μA	
20MΩ	10kΩ	±2.0% ±2 digit	±20% ±2 digit	0.04μA	
DC Amps					
200μA	0.1μA	±0.75% ±1 digit	±0.75% ±1 digit	Max. voltage drop Less Than 0.25V	250V (0.2A Fuse)
2000μA	1μA				
20mA	10μA				
200mA	100μA	±1.0% ±1 digit		Less Than 0.7V	
10A	10mA		±1.0% ±1 digit	Less Than 0.25V	——
AC Amps					
200μA	0.1μA	±1.0% ±5 digit 40Hz∼ 500Hz	±1.0% ±5 digit 40Hz∼ 500Hz	Max. voltage drop Less Than 0.25V	250V (0.2A Fuse)
2000μA	1μA				
20mA	10μA				
200mA	100μA	±1.2% ±5 digit	±1.2% ±5 digit	Less Than 0.7V	
10A	10mA	40Hz∼ 500Hz	40Hz∼ 500Hz	Less Than 0.25V	——
*Diode Test					
0∼ 1000mV	1mV	±5% ±1 digit	±5% ±1 digit	Test current 0.6mA	Open voltage 1.5V
Continuity Check					
All Ω	Buzzer	20Ω ±10Ω	20Ω ±10Ω	Test current 0.7mA	Open voltage 1.5V

* No diode test on Model 3025

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3½ DIGIT MULTIMETER WITH AUTO/MANUAL RANGE

MODEL ME-530

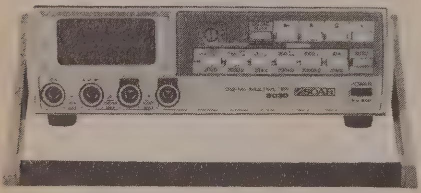
$69.

FEATURES

- Uses SOAR CORP. custom high density LSI chip to achieve low parts count for long term stability and accuracy.
- Auto- or manual-range for AC/DC volts and resistance.
- AC/DC current measurements from 0.1 μA to 10A on 5 ranges
- All AC/DC volts and resistance ranges are the same as ME-540 but DCV accuracy is ≤±0.5%.
- Has diode test and built-in continuity beeper.
- Comes complete with test leads, batteries, fuse and spare fuse.
- Overload protection is built-in on all functions and ranges. Surge protection up to 6000V.

3½ DIGIT LCD AUTO/MANUAL BENCH DMM

MODEL 5030



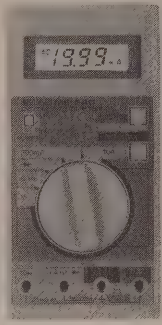
$169.

FEATURES

SOAR CORP. Model 5030 contains all the operating specifications/features and is housed in the same case as the Model 5025, but does not have the High/Low Limit Set Comparator Circuit and BCD output. The 5030 is ideal for bench or field service use. The use of tactile switches permits positive function/range selection without the pressure associated with spring loaded pushbuttons. Supplied with safety test leads, batteries and spare fuse. AC adaptor MQ-62 available separately.

7 FUNCTION AUTO/MANUAL RANGE DMM

MODEL ME-540



$59.

FEATURES

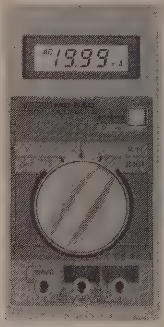
- Uses SOAR CORP. 80 pin LSI for low parts count that assures long term stability and accuracy, runs for over 500 hours on 2 "A" batteries.
- Manual or Auto-ranging for AC/DC volts and ohms.
- Has diode test, continuity beeper and 10 Ampere AC/DC range, 1000 MΩ input resistance on 200 mV DC range, standard 10 MΩ all other.
- Auto polarity and decimal, large distinct numeral readout also has annunciators plus low battery indicator.
- Rugged ABS plastic case, LCD protective lens, RFI/EMI shielding, full overload protection for all functions, can withstand up to 6000V surge.
- Comes complete with two 1.5V "AA" batteries, test leads and spare fuse.

SPECIFICATIONS

DC Volts .... Resolution 0.1 mV to 1000V on 5 ranges accuracy <±0.7% reading ±1 digit
AC Volts ..... Resolution 1.0 mV to 750V on 4 ranges accuracy <±1% reading ±5 digits 40 Hz to 500 Hz
DC Current ... Resolution 100 μA to 10A on 2 ranges; accuracy <±1.2% reading ±1 digit; Max V drop <0.7V
AC Current ... Resolution 100 μA to 10A on 2 ranges; accuracy <±1.5% reading ±1 digit; Max V drop <0.7V
Resistance ... Resolution 0.1Ω to 20 MΩ on 6 ranges; accuracy <±0.8% reading (2000 kΩ <±1%, 20 MΩ <±2%); Max test current 0.7 mA diminishing to 0.04 μA
Diode Test .... Range 0 to 1000 mV, accuracy ±5% reading ±1 digit, Test current~0.6 mA, open voltage 1.5V
Continuity Test .. Range 200Ω, resolution 0.1Ω, buzzer goes on if circuit is less than 20Ω ±10Ω; Test current <0.7 mA, Open Voltage~1.5V
Size .. 6¼" x 3⅛" x 1⅛" (160 mm x 80 mm x 30 mm) HWD
Weight .... ½ lb. (~225g.)

6 FUNCTION AUTO RANGE DMM

MODEL ME-550



$49.

FEATURES

- Uses SOAR CORP. 80 pin LSI for low parts count that assures long term stability and accuracy, runs for over 500 hours on 2 "AA" batteries.
- Full auto-ranging for easy quick readings.
- Has continuity beeper, 1000 MΩ input resistance on 200 mV DC range for virtually no circuit loading of low output devices, standard 10 MΩ all other ranges.
- Auto polarity and decimal with full function annunciators plus low battery indicator.
- Rugged ABS plastic case, LCD protective lens, RFI/EMI shielding, full overload protection for all functions, can withstand up to 6000V surge.
- Comes complete with two 1.5V "AA" batteries, test leads and spare fuse.

SPECIFICATIONS

DC Volts ... Resolution 0.1 mV to 1000V on 5 auto ranges; accuracy <±0.8% reading ±1 digit
AC Volts ... Resolution 1 mV to 750V on 4 auto ranges; accuracy <±1.2% reading ±5 digits; 40 Hz to 500 Hz
DC Current ... Resolution 100 μA to 200 mA on 1 range; accuracy <±1.2% reading ±1 digit; Max V drop <0.7V
AC Current ... Resolution 100 μA to 200 mA on 1 range; accuracy <±1.5% reading ±1 digit; Max V drop <0.7V
Resistance ..... Resolution 0.1 to 20 MΩ on 6 auto ranges; accuracy <±0.8% reading ±1 digit (2000 kΩ <±1.0 reading 20 MΩ <±2% reading + 2 digits); Test current 0.7 mA diminishing to 0.04 μA
Continuity Test .. Range 200Ω, resolution 0.1Ω, buzzer goes on if circuit is less than 20Ω ±10Ω; Test current <0.7 mA, Open Voltage~1.5V
Size .. 6¼" x 3⅛" x 1⅛" (160 mm x 80 mm x 30 mm) HWD
Weight .... <½ lb. (<225g.)

WARRANTY: One Year Parts and Labor

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SOAR corporation

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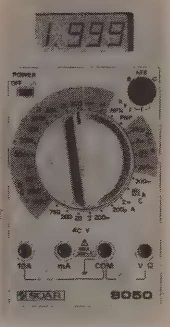
SUPER PERFORMANCE DMM

MODEL 8050



$76.50

FEATURES

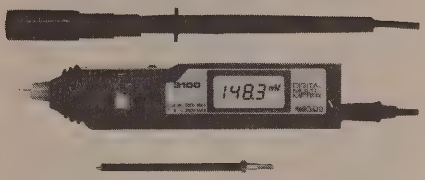
- 30 ranges, 8 functions, full overload protection.
- 10 Amperes AC and DC ranges.
- Super fast continuity beeper (<0.4 sec. response).
- Diode test plus transistor hFE.
- Large bold ½″ LCD readout with low battery indicator.
- Complete with test leads, battery and spare fuse.
- Optional carrying case CC531, $9.90; transistor test extension leads UP-11, $4.50.

SPECIFICATIONS

DC Volts . . . . . . Measure 0.1 mV to 1000V on 5 ranges; 1 yr. accuracy ±0.5%∼0.8%, Input Res. 10 MΩ; Overload 1000 VDC or AC Peak all ranges
AC Volts . . . . . . Measure 0.1 mV to 750V on 5 ranges 1 yr. accuracy ±1% Input Imp. 10 MΩ; Freq. response 45 to 500 Hz; Overload 750 Vrms/DC
DC Current . . . . . . Measure 0.1 μA to 10A on 5 ranges; 1 yr. accuracy ±1%; Overload 0.5A/250V fast fuse; Max. burden 250 mV (700 mV on 10A)
AC Current . . . . . . Measure 0.1 μA to 10A on 5 ranges; 1 yr. accuracy ±1.2%; Overload 0.5A/250V fast fuse; Max. burden 250 mV (700 mV on 10A)
Resistance . . . . . Measure 0.1Ω to 20 MΩ on 6 ranges; 1 yr. accuracy ±1% (±2% on 20 MΩ); Overload 250 VDC or AC rms
Diode Check . . . Range 0∼1.5V @ 1 mA typ. open ckt. V 2.8 typ.; Overload 250 VDC or AC rms
Transistor Check . . hFE (NPN or PNP) 0∼1000; Vce = 2.8V
Continuity Check . . . Buzzer, R = <20Ω ±10Ω
Power . . . . 9V Battery, life >200 hr.
Size/Weight . . . . 6¼″ x 3⅓″ x 1″; ½ Lb.

PEN TYPE DIGITAL MULTIMETER

MODEL 3100



$55.

FEATURES

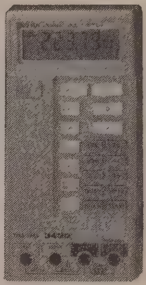
- Uses SOAR CORP. Custom 80 pin LSI chip for expanded range capability, low parts count for long term stability and accuracy.
- Small size, one hand operation, rugged ABS plastic case with RFL/EMI shielding.
- Measure DCV from 0.1 mV through 500V, ACV 1 mV through 500V and resistance from 0.1 Ohm through 20M Ohms.
- Has Continuity check with buzzer, and data hold switch.
- LCD 3½ digit display with annunciators, auto polarity and auto decimal.
- Comes complete with batteries, two interchangeable probe tips ground lead, alligator clip and carrying case.

SPECIFICATIONS

Display . . . . . . LCD 3½ digits reading of 1999 Display annunciators
Range . . . . Auto ranging
Polarity . . . Automatic no indication for positive polarity, minus (−) sign for negative polarity
Over range indication . MBS 1 or −1 indication
Data hold . . . . . Data hold in all ranges by the hold switch ON
Low battery indication . . . "B" mark is displayed when the battery voltage drops below operating voltage
Sampling . . . . 2 times/sec.
Operational temperature . . . 0∼40°C 80% RH MAX. (20 MΩ range: 70% RH)
Storage temperature . . . . . −20°C∼60°C 70% RH MAX.
Power Supply . . . . SR44 (1.55V) x 2
Power Consumption . . . . 5.5 mW
Battery Life . . . . ∼250 Hours
Size: . . . ∼6″ x ¾″ x 1¼″ LWH (Less Probe Tips) [150 mm x 19.5 mm x 30 mm] Probe Tips ½″ and 2″ (12 mm and 50 mm)

4½ DIGIT PORTABLE DMM

MODEL 3430



$339.

FEATURES

- SOAR CORP. Custom LSI Chip with 2500 count for extended range accuracy basic DCV ±0.4%.
- 13 Functions including dBm, Freq., Temp., Relative V_2 −V, Data and Peak Hold.
- True RMS, input resistance on 250 mV range 1000 MΩ, standard 10 MΩ all other.
- Full overload protection on all ranges except 10 Amperes.
- Auto or Manual range with full annunciators in LCD readout.
- Comes complete with safety test leads, 9V battery, fuse and spare, tilt stand, with optional AC Operation.

SPECIFICATIONS

DC Volts . . . Resolution 10 μV to 1000V on 5 ranges, accuracy ±0.04
AC Volts . . . Resolution 10 μV to 1000V on 5 ranges accuracy ±0.3∼0.5∼0.75%, Freq. 20 Hz∼30 kHz.
DC Current . . . Resolution 10 μA to 10 Amperes on 2 ranges accuracy ±0.25% & ±1%
AC Current . . . Resolution 10 μA to 10 Amperes on 2 ranges, accuracy ±0.5% & ±2%. Freq. 20 Hz∼10 kHz crest factor 3
Resistance . . . Resolution 0.01Ω to 25 MΩ on 6 ranges, accuracy ±0.06% to 0.75% on 25 MΩ range
Frequency . . . Resolution 0.001 Hz to 100 kHz on 4 auto ranges with 5 attenuator From 1:1 to 1:100000, AC coupled
ACV dBm . Auto ranging, 600Ω (1 mW>0 dBm) 0.775V = 0 dBm constant
Continuity Test . . . Buzzer sounds, if resistance in test circuit is 20Ω ±10Ω
Diode Test . . . Range 0∼2499 mV, Test Current ∼1 mA, open ckt.V∼5V
Peak Hold . . . For AC/DC Volts and current Min. Pulse Duration 5 msec. sensitivity same as range
Temperature . . . . . −50°C∼1250°C (−58°F ∼2282°F) Reads °C or °F K type sensor
Relative Test . . . . Touch Rel. Button and store input as zero. Ref displayed value is meas. value minus Ref Value
Data Hold . . . . . For AC/DC Volts and Current, Resistance, Temp. Diode, Ref.
3½ Digit Selectable . . . . When "ON" least significant digit is blanked
Size & Weight . . . 177 mm x 40 mm x 90 mm (∼7″ x 1½″ x 3½″) 380g. (13.5 oz.)

MODEL 3450 is the same as the Model 3430 but less Peak Hold, Temperature and AC V/A is average sensing.

WARRANTY: One Year Parts and Labor

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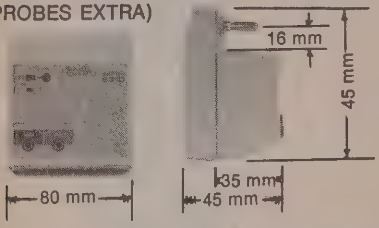
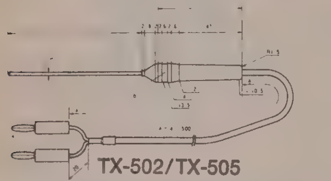
PROFESSIONAL ELECTRONIC INSTRUMENTS

DMM TEMPERATURE ADAPTER

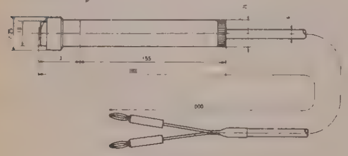
MODEL 9310
(PROBES EXTRA)



$75.



TX-502/TX-505



TX-506

FEATURES

Model 9310 Temperature Adaptor can be used with DMM's having a DC 200 mV range, 10 MΩ input resistance and standard ¾″ spaced banana plug inputs (see note below). The output can be switch set to indicate either °C or °F. The 9310 was designed to work with most K type (CA) bi-metal sensors, such as our TX-502, TX-505 and TX-506 available separately (see below).

NOTE: Where direct physical matching of the 9310 to the DMM inputs isn't possible, banana plug/jack leads can be used.

SPECIFICATIONS

(+23°C ±5°C)

Range .... −50°C~+700°C ±(1% rdg. +2°C); Resolution 1°C or −58°F~+1292°F ±(1% rdg. +4°F) Resolution 1°F
Output Voltage ... On °C Setting: −5.0 mV~70.0 mV (Display reading −50~+700)
On °F Setting: −5.8 mV~129.2 mV (Display reading −58~1292)
Temperature Coefficient .... ±(0.05% of rdg. +0.2°C)
Low Battery Indication ..... Power "ON" LED flashes
Battery (supplied) ..... One 9V transistor type
Weight (less battery) ... 250 grams (~½ lb.) less battery
Accuracy of Probes ... −50°C~200°C, ±1°C to 400°C, ±2°C to 700°C ±.75 rdg.
TX-502 .... −50°C~200°C
TX-505 .... −50°C~700°C
Cable Length TX-502 and TX-505 ..... 125 cm (~5 ft.)
Bi-Metal Probes Class .75 CA Type K
TX-506 ..... −50°C~600°C - For Surface Measurements
Cable Length .... 125 cm (~5 ft.)
Sensor same as TX-502/505

DMM AC/DC HI-CURRENT ADAPTOR

MODEL 9320
(INCLUDES MODEL 9321 BELOW)

$89.

FEATURES

The 9320 was designed by SOAR to be used with the 9321 AC/DC clamp probe described below. It can be used with all DMM's having a DC 200 mV range, 10 MΩ input resistance and standard ¾″ spaced banana plug inputs. The physical dimensions are the same as Model 9310. Model 9320 provides the capability to measure high AC/DC current allowing technicians to extend the use of their DMM to measure motor, automobile, truck, boat, aircraft, appliance and other high current drain devices.

SPECIFICATIONS

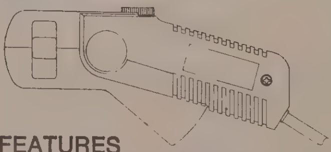
(+23°C ±5°C)

Range .... DC - 0~200A, AC - 0~150A ±(0.5% rdg. +0.2% FS) accuracy for 9320 only*
Resolution .... 1 ampere AC/DC
AC Frequency Response .... 50 to 100 Hz
Output Voltage ..... DC - 0~20.0 mV (display reading 0~200)
AC - 0~15.0 mV (display reading 0~150)
Low Battery Indication ...... Power "ON" LED flashes
Battery (supplied) ..... One 9V transistor type
Weight (less battery) .... ~130 grams (~⅓ lb.) less battery

*Accuracy 9320 and 9321:
DC - 0~200A ±(3% rdg. +2 dgt.)
AC - 0~50A ±(2% rdg. +2 dgt.)

AC/DC CLAMP PROBE

MODEL 9321



$29.

FEATURES

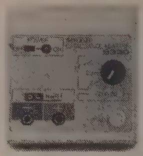
The 9321 was designed by SOAR to be used with the 9320. It uses a standard clamp around for all current measurements. Uses Hall effect sensor.

SPECIFICATIONS

Range .... DC - 0~200A ±(3% rdg. +2 dgt.) with zero adjust
AC - 0~150A ±(2% rdg. +2 dgt.) with zero adjust
Cable Length .... ~1.5 meter (5¾ ft.)
I.D. Jaw Size ... 10 mm x 12 mm (2/5″ x 1/2″) Can fit cable up to 8 mm diameter
Weight .... 220 grams (~½ lb.)

DMM CAPACITANCE ADAPTER

MODEL 9330



$55.

FEATURES

The 9330 was designed by SOAR to be used with DMM's having a DC 200 mV range; 10 MΩ input resistance and standard ¾″ spaced banana plug inputs. The physical dimensions are the same as Model 9310. Ideal for measuring capacitance in cable, switches, components as well as capacitors.

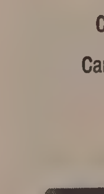
SPECIFICATIONS

(+23°C ±5°C)

Range .. 2 nF, Accuracy ±(0.8% rdg. +0.4% FS); 20 nF, 200 nF, 2 μF, Accuracy ±(0.8% rdg. + 0.2% FS); 20 μF, 200 μF, Accuracy ±(1.0% rdg. +0.2% FS); Resolution - one picofarad
Output Voltage .... 0~199.9 mV (Display 0~1999)
Test Method .... Same as DMM dual slope integrating
Low Battery Indication ..... Power "ON" LED flashes
Battery (supplied) ..... One 9V transistor type
Weight ..... 200 grams (<½ lb.) less battery

CARRYING CASES

Fits 8050, All ME-500 Series, 3030, 3050



CC-531 with belt loop and Velcro close lid.
$9.90

CC-02 with shoulder strap Velcro close. Can use DMM in case.
$9.90

Fits SX-200 and SX-220
CC-200 with shoulder strap, Velcro close. Can use VOM in case.
$8.75

WARRANTY: One Year Parts and Labor

ALL PRICES SHOWN SUBJECT TO CHANGE WITHOUT NOTICE. PRICES SHOWN ARE FOR QUANTITIES OF 1 TO 3 PIECES OF A TYPE, DISCOUNTS AVAILABLE FOR HIGHER QUANTITIES.

SEE OUR PAGES IN SECTION 2975

SOAR corporation

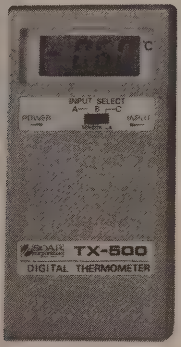
NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

3½ DIGIT LCD TEMPERATURE METER

MODEL TX-500

(includes TX-502)



$169.
(TX-505) $45.
(TX-506) $75.
(TX-512)
(TX-502)

FEATURES

- Three separate inputs for selective temp. monitoring.
- 3½ Digit LCD reads directly in °C.
- Portable, thin design with rugged ABS plastic case makes this unit easy to use and transport conveniently.
- Comes complete with TX-502 (−50°C to 200°C) Bi-Metal Probe. Class .75 accuracy ±3°C (Typ. ±1°C) CA (K Type), and battery.
- TX-506 Surface Measurement Probe −50°C to 600°C available separately.

SPECIFICATIONS

Meter Range	−50°C∼+1200°C (−58°F∼2200°F)
Input Z	100 kΩ
Sampling Rate	0.4 sec

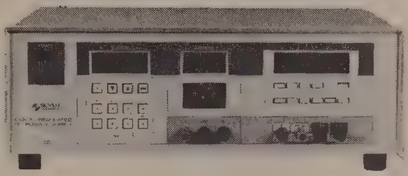
UNIT OPERATING TEMPERATURE	READING ACCURACY −50°C to 0°C	0°C to 700°C (1200°C)*
23°C ±5°C	±2%	±(0.5% rdg. +1°C)
0°C to 18°C 28°C to 40°C	±3%	±(0.5% rdg. +2°C)

Battery Life	>150 hours typical
Display	3½ Digit LCD, Resolution 1°C
Oper./Stor. Temp.	0°C to 40°C/−20°C to +60°C
Power	One 9V transistor type battery
Size/Weight	5¾″ x 3″ x ⅞″, ∼1 Lb.
TX-505 Access Probe	Thermocouple sensor type CA, −50°C to 700°C, Class .75 accuracy 0°C to 400°C ±3°C, to 700°C ±0.75%

* with special thermocouple sensor probe

16 STATION MEMORY DC POWER SUPPLIES

MODEL 7103



$1135.

FEATURES

- SOAR CORP. exclusive constant voltage/constant current design assures stable output plus load protection.
- Pre-set up to 16 different voltage settings for instant pushbutton recall with remote sensing.
- Large bright ¾″ LED's simultaneously monitor both voltage and current.
- Rear panel connector allows remote switching of all 16 preselected voltage settings. Output switching time to full on between station settings is 100 msec.
- Ideal for laboratory, production line or the design engineer's bench.
- Full 5-function, 26 range auto- and manual-ranging DMM for circuit investigation.

SPECIFICATIONS

(POWER SUPPLY)

Voltage Readout	3 digit LED
Voltage Setting Resolution	100 mV
Current Readout	2 digit LED
Current Setting Resolution	100 mA
V and A Readout Accuracy	±1 digit
Voltage Selection	Two micro-touch switches for up/down
Current Selection	Two 0 to 9 thumbwheel switches
Output Selection	8 touch-button switches
Output Switching Time	From 0 to "full on", 100 msec
Warm-up Time	Unit is fully-stable in 30 minutes

All models can run either Series or Parallel operation.

Decimal point blinks when constant current is stabilizing.

Output	CV/V, 0 to 36V; CC/A 0 to 3A
Line Reg.	5mV, 5mA; Ripple 1mV, 1mA (p-p)
Load Reg.	CV ±0.04%; CC ±0.5%
Temp. Coeff.	±40PPM/°C Typical

DMM SECTION

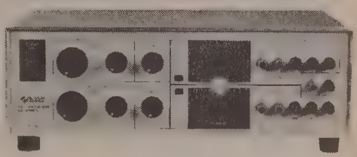
DCV	0.1mV to 1000V ±0.5%
ACV	1mV to 750V, 40 to 500 Hz
Resistance	0.1Ω to 20MΩ
DCA	0.1μA to 3A
ACA	0.1μA to 3A
Continuity Beeper	
Size/Weight	5″ x 15⅜″ x 14″, ∼30 Lbs.

DMM

Number of Digits	3½ LED
Operational Mode	Auto or manual
Annunciators	LED Indicator
Function/Range Selector	Tactile Switch

DUAL AND TRIPLE OUTPUT DC POWER SUPPLIES

MODELS 7200, 7201, 7202, 7203



7200/$699. 7202/$665.
7201/$620. 7203/$665.

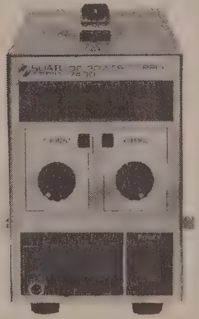
FEATURES

- Three dual output and one triple output DC voltage sources, ideal for working with today's advanced microprocessor circuits.
- SOAR designed circuit assures stable outputs even under wide line and/or load fluctuations.
- Large bright LED readout-to-monitors voltage and current simultaneously.
- Constant voltage/constant current design for load protection, unit fuse protected.
- Remote sensing terminals are provided to maintain regulation at the load.

7200 — Output 1 to 6V @ 0 to 5A and 10 to 15V @ 0 to 10A
7201 — Output Dual 0 to 25V @ 0 to 3A
7202 — Output Dual 0 to 20V @ 0 to 2A Plus Fixed 5V @ 3A
7203 — Output Dual 0 to 36V @ 0 to 3A
Size and Weight — All 5″ x 15⅜″ x 14″; 30 lbs.

SINGLE OUTPUT DC POWER SUPPLIES

MODELS 7400, 7401, 7402, 7403



7400/$235.
7401/$275.
7402/$275.
7403/$320.

FEATURES

- Rugged full-steel case, with compact size ideal for bench use.
- Digital readout of voltage or current for precise setting or monitoring.
- Uses temperature compensated tuner diode for reference voltage.
- Constant voltage/constant current design for maximum load protection, short circuit at output will cause voltage to drop to zero.
- Extremely stable design assures excellent line/load regulation with minimum noise.

7400 — Output 0 to 25V @ 0 to 1.5A
7401 — Output 0 to 25V @ 0 to 3A
7402 — Output 0 to 36V @ 0 to 2A
7403 — Output 0 to 36V @ 0 to 3A
Size and Weight — 6¼″ x 4⅜″ x 13⅛″; 13 lbs.

WARRANTY: One Year Parts and Labor

ALL PRICES SHOWN SUBJECT TO CHANGE WITHOUT NOTICE. PRICES SHOWN ARE FOR QUANTITIES OF 1 TO 3 PIECES OF A TYPE, DISCOUNTS AVAILABLE FOR HIGHER QUANTITIES.

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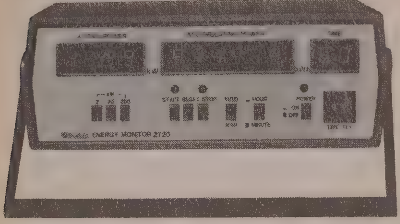
NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

kW/kWh ENERGY MONITOR

MODEL 2720



$995.

FEATURES

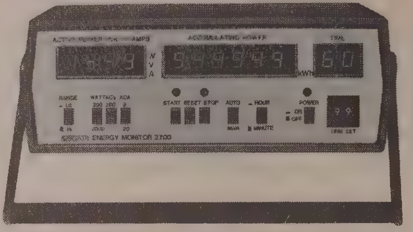
- Measure effective power to 200 kW, accumulated power to 10,000 kWh.
- Can be used with single or three phase systems, and measure unbalanced and distorted wave forms.
- Small and light weight, easy to transport.
- Built-in small load self compensation circuit.
- Auto/Manual time setting from 1 minute to 99 hours.
- Equipped with recorder output terminals.
- Comes complete with two clamp-on current probes and one 3-conductor voltage cable assembly, 3 spare fuses and carry case for accessories.

SPECIFICATIONS

LOAD
Voltage .... 80 to 600 Vrms Max.
Current .... 0 to 500 Arms per CT
Frequency .... 50 Hz to 400 Hz
Power (Max) .... 200 kW
kW Unit .... 2 range 20 kW/200 kW
Resolution .... 0.01 kW/0.1 kW
Accuracy .. ±0.5% of rdg. ±5 dgt (cosϕ = 1) ±1% of rdg. ±8 dgt (cosϕ = 0.5)
kWh ... 999.999 kWh (minute or hour) 20 kW range
9999.99 kWh (minute or hour) 200 kW range
Accuracy .... ±0.5% of rdg. (cosϕ = 1) ±1% of rdg. (cosϕ = 0.5)
Timer Set .... Auto or manual 0 to 99 minutes or hours. Accuracy - ±1 sec.
Operating Temp. .. 0° to 40°C (32°F to 104°F) 80% RH
Storage Temp. .... −20°C~60°C (−4°F to 140°F) 90% RH
Digital Display .. Power readout (kW) 3½ digit LED, 1999 Max.; Accumulated (kWh) 6 digit LED, 9999.99 Max.; Elapsed Time (minutes/hours) 2 digit LED 99 Max.
Overage Indicator ... "Power" (kW) blanking of all digits except the leading "1"; "Accumulated" (kWh) overload lamp goes "on"
Size .... 4⅓" x 12" x 10¼" (HWD) (110 x 305 x 260 mm)
Weight .... 8¾ Lbs. (4 kg.)

APPLIANCE ENERGY MONITOR

MODEL 2700



$840.

FEATURES

- Auto-zero function.
- True RMS voltage/current readout.
- Low cost.
- Setting "Time" (Max. 99 hours).
- With output terminal for Recorder (MR-200) and printer (2762).
- Ideal for measuring appliance power usage.
- Simple to use, 3 conductor female plug input for fast appliance operating parameter monitoring.

SPECIFICATIONS

Single Phase Active Power, AC Volts, AC Current
Power 200W/2000W
Voltage 200V
Current 2A/20A
Display ... 1999 LED (Overload indication "1" in display)
Voltage Scope ... 85~120V/120V/220V/240V ±10%
Max. Voltage .... 120V rms/120V/220V/240V ±10%
Current Scope .... 200W - 0~2.4A 2000W - 0~20A. Continuous Use Rating Current 15A rms
Frequency .... 50 Hz or 60 Hz
Output Voltage (Rear) ..... 1V at full scale of display
Accuracy ....(23°C ±5°C)
Power ... ±(0.7% of rdg. +5 dgt.) Cos ϕ = 1 ±(1% of rdg. +5 dgt.) Cos ϕ = 0.5
Voltage .... ±(0.5% of rdg. +3 dgt.)
Current .... ±(0.5% of rdg. +5 dgt.)
Output Voltage ..... ±(1% of rdg. +0.5% of F.S.) Cos ϕ = 0.5~1
Single Phase Power Accumulation
Minutes ...... Max. Accumulated 99.9999 kWh
Hours .... Max Accumulated 999.999 kWh
Display .... LED 6 digits (Over range lamp)
General
Power Source .... AC 85~120V/220V (50 or 60 Hz)
Dimension .... 4⅛" (H) x 11" (W) x 9¾" (D) (105 x 280 x 250 mm)
Weight .... Approx. 3 kgs., 6⅔ lbs.

DIGITAL CLAMP TESTER

MODELS 2200, 2210 2220

Models 2210/2220

Model 2200

2200/ $85.
2210/ $110.
2220/ $135.

FEATURES

- Large 3½ digit LCD readout easy to read, with annunciators.
- Autoranging on all functions eliminates the need to change ranges.
- Continuity buzzer.
- Electronic data hold switch freezes readings (2200, 2210).
- Peak detector for measuring current and voltage surges (2220).
- Temperature range...Models 2210 and 2220 uses optional K type temp. probes listed below.
- Tough ABS plastic housing.
- Comes complete with carrying case, batteries, and voltage/ohms safety test leads.

SPECIFICATIONS

Display ... 3.5 digit LCD, max. reading 1999, with annunciators
Range Switching .... Auto-ranging
Overrange Indication . Most significant digit "1"
AC Amps ...... 200/1000A ±(1.2% ±2 dgt) Resolution 0.1A
AC Volts .... 200/1000V ±(1.0% ±3 dgt) Resolution 0.1V
Ohms .... 200/2000Ω ±(0.7% ±3 dgt) Resolution 0.1Ω
Temp. ...... −50~700°C ±(3.0% ±3 dgt) Resolution 1°C (2210, 2220)
Continuity Check ... 20Ω ±10Ω or less (200Ω range)
Peak Hold .... ±1.5% (2220)
Battery .... UM-3 (1.5V) x 2 (2200, 2210) S-006P (9V) x 1 (2220)
Jaw Size .... 3½" O.D., 2" I.D.
Size & Weight ... 3½" W x 10¼" H x 1⅓" D; ~¾ Lbs.

- Optional Accessories, Temp. Probe
  TX-502 (−50~+200°C, Free Air type) $35.
  TX-506 (−50~+600°C, Surface type) $69.
  TX-506L (−50~+600°C, Surface "L" type) $139.00.
  TX-505 (−50~+700°C, Free Air type) $45.
  TX-512 (−50~+1200°C, Free Air type) $110.00.

WARRANTY: One Year Parts and Labor
ALL PRICES SHOWN SUBJECT TO CHANGE WITHOUT NOTICE. PRICES SHOWN ARE FOR QUANTITIES OF 1 TO 3 PIECES OF A TYPE, DISCOUNTS AVAILABLE FOR HIGHER QUANTITIES.
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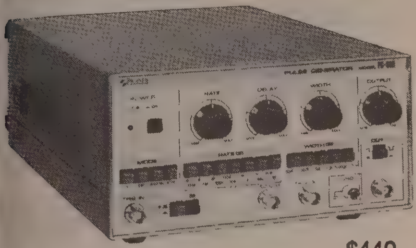
NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

10 MHz PULSE GENERATOR

MODEL PG-905



$449.

FEATURES

- Generates high quality general purpose pulse signals for many applications such as logic and digital circuits, analog circuits as well as some mechanical devices.
- The wide pulse repetition rate range is continuously variable from 1 Hz to 10 MHz. Very fast rise and fall time pulses are obtained through a current mirror circuit.
- Can be used as a crystal controlled oscillator for seven calibrated frequencies from 10 Hz to 10 MHz . . . with its built-in crystal oscillator circuit and external input mode the input signal can be inverted.
- Delay time can be continuously varied from 0 to 2 μsec. Can be used with no delay oscilloscope to display full wave-forms.

SPECIFICATIONS

Crystal Mode	Rep. output 10, 100, 1k, 10k, 100k, 1M, 10M (Hz)
Int. Mode Rep. Rate	1 Hz to 10 MHz in 7 ranges + vernier
Ext. Mode Trigger Input	10 Hz to 10 MHz, +1V to −1V p-p Sine or Sq.
Output	Crystal controlled with better than 10^{-5} stability at 10 Hz, 100 Hz, 1k, 10k, 100k, 1M, 10M (Hz)
Manual Control	Single Pulse Output
Delay	0 to 2 μs variable
Pulse Width	50 ns to 5 ms in 5 ranges + vernier
Pulse Output	5V to 0.5V into 50Ω load, 10V to 1V open circuit
Rise and Fall	~10 ns
Trigger Output	5V/20 ns/Zo = 50Ω
Oscillator Output	5V/Zo = 50Ω
Oper. Temp.	40° to 105°F.
Power	18 VA; 120V/240V ±10% 50/60 Hz switchable
Size/Weight	4⅓″ x 8⅔″ x 11⅞″, ~10 Lbs.

AC CURRENT/LEAKAGE CLAMP-AROUND TESTERS

MODELS CLM-40DX, CLM-40SD

CLM-40DX/$299.
CLM-40SD/$189.

FEATURES

- Read AC current/leakage from 1 mA (DX); 40 mA (SD).
- No need to interrupt (break) AC line(s) to make leakage or regular AC current measurements.
- Also measure AC volts, ohms and temperature.
- Comes complete with voltage/resistance probes, spare fuse, battery and carrying case.
- High accuracy reading with "Hold Reading" Switch.
- Has Recorder Output and is uninfluenced by close external magnetic fields.

SPECIFICATIONS

CLM-40DX

AC Current	1 mA to 100 mA, 300 mA, 1, 30, 300A; 50/60 Hz
AC Voltage	0-500V; 50/60 Hz
Resistance	0-50 kΩ (2 kΩ center)
Temperature	0 to 200°C (32° to 392°F)

CLM-40SD

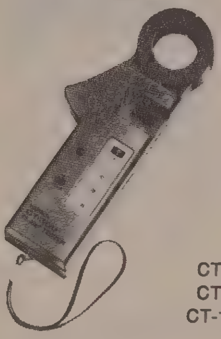
AC Current	40 mA to 1, 3, 10, 30, 100A; 50/60 Hz
AC Voltage	0-500V, 50/60 Hz
Resistance	0-1 kΩ (20Ω center)

CLM-40DX/CLM-40SD

Accuracy	Both units all functions/ranges ±3% F.S.
Volt. Withstand	2000V AC both units
Clamp Jaw Size	1½″ I.D. (both units)
Size/Weight	(both units) 8″ x 2″ x 1½″, 1 Lb.

CLAMP-AROUND MULTI-FUNCTION AC CURRENT TESTERS

MODELS CT-300, CT-600, CT-1200



CT-300/$69.
CT-600/$74.
CT-1200/$99.
$19.50.
TEMP PROBE TP-150

FEATURES

- No need to interrupt (break) AC line to make measurements.
- Rugged Taut Band meter movement, color coded for fast sure readings.
- Comes complete with voltage/resistance probes, battery, spare fuse and carrying case.
- All units have wrist straps, and meter "Hold Reading" switches.
- Rotary scales permit large uncluttered separate range/function displays.
- Readings are uninfluenced by external magnetic fields.
- All models are provided with a temperature range function to facilitate optional thermistor temperature probe.

SPECIFICATIONS

MODEL CT-300

AC Current	0 to 6, 15, 60, 150, 300A; 50/60 Hz
AC Voltage	0 to 150, 300, 600V; 50/60 Hz
Resistance	0 to 2.5 kΩ (25Ω center)
Temperature	−30°C to ~+150°C (−22°F ~+302°F)
Size/Weight	9½″ x 2½″ x 1½″, 1 Lb.

MODEL CT-600

AC Current	0 to 6, 15, 60, 150, 600A

MODEL CT-1200

AC Current	0 to 60, 150, 300, 600, 1200A

CT-300/CT-600

Clamp Jaw Size	2¼″ O.D., 1½″ I.D.

CT-1200

Clamp Jaw Size	3¼″ O.D., 2⅛″ I.D.

WARRANTY: One Year Parts and Labor

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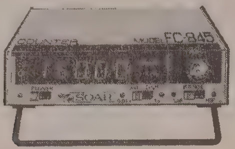
SOAR corporation

NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

150 MHz MINI-FREQ. COUNTER
MODEL FC-845



$149.

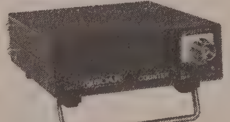
FEATURES

- Readout - 4½ digit LED plus Over-Gate MHz-kHz and Lo Battery Indicators.
- Small size, Battery or AC operation for portable, bench or built-in application.
- Comes complete with batteries and test lead.

SPECIFICATIONS

Range .... Low 5 Hz to 1999.9 kHz
High 0.01 MHz to ≥150 MHz
Resolution .... Low ±5 Hz; High 10 kHz
Sensivity .... 30 mV (2 MHz~120 MHz)
50 mV~30 mV (5 Hz~2 MHz, 120 MHz~~150 MHz)
Input (Max.) .... 5 Hz~1 kHz, 50 Vrms; 1 kHz ~100 kHz, 20 Vrms; 100 kHz ~150 MHz, 5 Vrms; BNC connector
Gate .... Two position slide switch 0.01, 1 sec.
Crystal Frequency .... 3.2768 MHz
Accuracy at 0.01 sec, 100 PPM ±1 dgt.
NOTE: When slide switch is in MHz position, you read first 4½ digits of input, when in kHz position you read last four digits.
Power .... 6 "AA" size batteries provided or optional AC adapter
Size ... 1¼" x 4" x 4¼" (HWD) (32 x 100 x 120 mm)
Weight .... 1⅞ Lbs. (850g.)

50 MHz MINI-FREQUENCY COUNTER
MODEL FC-841



$99.

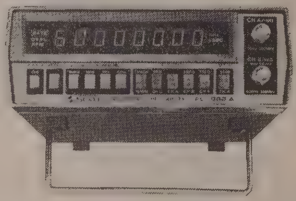
FEATURES

- Small size portable battery operated (AC adaptor available) 50 MHz frequency counter.
- Front panel gate switch allows 10 Hz resolution at all input frequencies.
- Ideal for monitoring signals either mobile or fixed location.

SPECIFICATIONS

Range .... kHz setting measure 10 Hz to 99.99 kHz, MHz setting measure 10 kHz to 50.12 MHz
Sensitivity .... 60 mV~20V
Crystal Frequency .... 3.2768 MHz
Input .... BNC, provided with input cable
Number Digits .... 4 LED, 7 segment with MHz/kHz indicator
Power ...... 4 "A" size batteries provided or optional AC adaptor
Size/Weight . 1¼" x 4" x 4¾" (HWD), 1⅞ Lb.

550 MHz 150 MHz MULTI-FUNCTION COUNTER
MODELS FC-882A, FC-881A, FC-864A



FC-882A/ $699.
FC-881A/ $545.
FC-864A/ $440.

Multi-Function Counters provide Frequency, Period and RPM measurements. Not shown but identical in appearance and size **MODEL FC-864A 8 DIGIT** and **MODEL FC-881A 8 DIGIT** to 150 MHz and same specs as **MODEL FC-882A.**

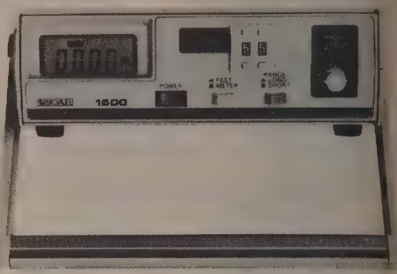
FEATURES

- Fast selection of all functions with push-button ease.
- All units are designed in a compact and rugged all steel case that provides RFI shielding for readings that are unaffected by stray signals.
- Model FC-882A and FC-881A are supplied with a TCXO for enhanced accuracy, test cable and spare fuse.

SPECIFICATIONS

Range .... FC-882A, 10 Hz to 100 MHz, CHB, 50 MHz to 550 MHz; FC-881A and FC-864A, 10 Hz to 150 MHz
Resolution .... 0.1 Hz, 1Hz, 10Hz, 100Hz
Gate Time .... 10s, 1s, 0.1s, 0.01s; FC-882A, CH"B", 6s, 0.6s, 0.06s
Period .... Range 100 ms to 1 µs
Resolution .... 0.1 µs, 10 ns, 1 ns, 0.1 ns
Multiply .... x 10^0, x 10^1, x 10^2, x 10^3
Accuracy .... ±1 count ± Time Base ±Trig. Error
RPM ...... 10^4 Pulse/s, Gate 6s, 0.6s, 0.06s
Accuracy .... ±1 Count
Input Sensitivity . 10 to 100 Hz, and 100 MHz to 150 MHz, 35 mV; 100 Hz to 100 MHz, 20 mV; FC-882A CH"B", 15 mV, CH"C" 5 to 20 Vp-p
CH"A" Attenuator .... 20 dB
Overload Protection .... <1 kHz, 250 Vrms to 100 kHz, 20 Vrms to 150 MHz, 5 Vrms; CH"B" 5 Vrms; CH "C" 20 Vrms
Time Base .... 10 MHz, 0 to 40°C ±5 x 10^{-7}
Ageing .... FC-864A, 3 x 10^{-6}/Year; FC-881A, FC-882A, 1 x 10^{-6}/Year
Output Level, TTL; Input Level 2.5 Vp-p to 10 Vp-p; Input Z ~600Ω
Power .... 115V or 220V, 50/60 Hz
Size/Weight .... 2½" x 7" x 7⅞", 2⅔ Lbs.

CABLE LENGTH CHECKER
MODEL 1500



$499.

FEATURES

- Measures co-axial cable length and indicates termination as either a short or open on 4 digit LCD readout with annunciators.
- Can measure coax cable either strung out or on the reel, from 10 feet up to 6500 foot runs.
- Small size, battery portable, supplied with 6 Ni-Cad batteries and recharger, cigarette lighter adaptor plus short hook-up cable BNC to two alligator clips.

SPECIFICATIONS

Measuring Method .. Pulse reflection technique
Cable Type .... All type metallic co-axial cable
Meter Display ... Feet or meter, open or short, 4 digit LCD
Range ..... Short 3~200 Meter (10 to 650 ft)
Long 200~2000 Meter (650 to 6500 ft)
Accuracy .... ±1% of full scale reading
Resolution .... 1 foot or 1 meter
Cable Dielectric Constant, set by digital switches 0.1~.99 $\left(\frac{1}{\sqrt{\text{Dielectric}}}\right)$
Dynamic Range .... 26 dB
Cable Connector .... BNC front panel
Operating Temp. .... 0°C~45°C & <85% RH
Storage Temp. ... −20°C~+60°C <70% RH
Power Consumption .... ~330 mA
Size .... 2¼" x 7¼" x 7⅛" HWD
Weight .... 3 Lbs. (with batteries)

NEW $49.00.

RD-111 RESISTOR SUBSTITUTION BOX

1 ohm to 11 Meg Ohms in 1 Ohm steps.
Accuracy .... ±1%
Power .... 1 Watt, 28 Slide Switches, Three 5 Way binding posts
Size .... 4" x 6" x 2"

DMM ACCESSORIES

UP-11 Transistor Test Leads for 8050 .. $4.50
UP-12 IC (Mini-Hook) Test Leads Slip on Over Regular Test Lead Points .. $4.15
UP-13 Universal Test Lead Kit has Banana Plugs, Test Points, Spade Lugs, Shielded Clips, 52" Leads . $7.50
TLD-1 Deluxe Leads, Two Banana Plugs to Shielded Alligator Clips on 30" Two Conductor Single Cable $6.00
MQ-62 AC Adaptor $12.00

WARRANTY: One Year Parts and Labor

ALL PRICES SHOWN SUBJECT TO CHANGE WITHOUT NOTICE. PRICES SHOWN ARE FOR QUANTITIES OF 1 TO 3 PIECES OF A TYPE, DISCOUNTS AVAILABLE FOR HIGHER QUANTITIES.

SEE OUR PAGES IN SECTION 2975

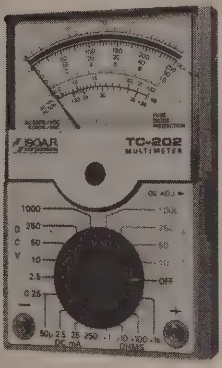
SOAR corporation

NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

WORLD'S THINNEST 20 kΩ/VDC VOM

MODEL TC-202



$36.50

FEATURES

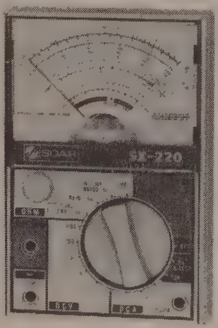
- World's thinnest full size VOM, fits in shirt-pocket.
- Comes complete with spare snap-in fuse, probes, soft leather-like carrying case and battery.
- Fuse protected circuit, diode protected meter.
- Three color coded meter face and panel for easy sure measurement reading, mirror scale.
- Handsomely styled in rugged ABS plastic case.
- Ideally suited for the technician on the go.

SPECIFICATIONS

DC Volts .... 0 to 0.25, 2.5, 10, 50, 250, 1000 (20 kΩ/V) ±3% F.S.
AC Volts ..... 0 to 10, 50, 250, 1000 (9 kΩ/V) ±4% F.S.
DC mA .... 0 to 50 μA, 2.5, 25, 250 mA (250 mV drop) ±3% F.S.
Resistance .... RX1, RX10, RX100, RX1k, READ 0 to 2 MΩ (20Ω center scale)
dB Ranges . −20 to +22 dB on 10 VAC range, +20 to +36 dB on 50 VAC range
Size/Weight ...... 5⅛″ x 3⅜″ x ¾″, ⅜ Lb.

SUPER PERFORMANCE VOM

MODEL SX-220
(20 kΩ/VDC)



$29.95

FEATURES

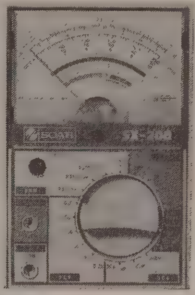
- Continuity buzzer for easy "No-Look" circuit or cable check.
- 10 Ampere DC current range, also capacitance & battery check.
- Inside mechanism is fully guarded by shock-resistant ABS plastic housing, which guarantees long lasting trouble free operation.
- High quality core-magnet type meter movement is used as the indicator so that the instrument can be free from the influence of outside magnetic fields.
- The SX-220 is specially designed with no metallic part on the front surface of the housing.
- With TP-150 Thermometer Probe optionally obtained, temperature measurement is possible on a doubly graduated scale showing both Celsius and Fahrenheit.

SPECIFICATIONS

MEASURING RANGE
DC Voltage (DCV) ..... 0.25, 2.5, 10, 50, 250, 1000(V)
AC Voltage (ACV) .... 10, 50, 250, 1000(V)
DC Current (DCA) . 50μ, 5m, 25m, 250m, 10(A)
Resistance (OHM) Rx1, 10, 100, 1k
Load Current (LI) .... 75m (Rx1), 7.5m (Rx10), 750μ (Rx100), 75μ (Rx1k) (A)
Decibel (dB) .... −20∼+62 (dBm)
Battery Test .... 1.5V & 9V
Capacitance (C) ... 200P∼0.25μ (F) at 50 Hz
Temperature (TEMP) . −20∼+200 degrees C. 0∼400 degrees F.
Sensitivity .... 20 kΩ/VDC, 8 kΩ/VAC
Accuracy ...... DCV ±3% FS, ACV ±4% FS, DCA ±3% FS, ohm/dB ±3%/±4% of arc
Continuity Test (CONT) ... By buzzer sound at Rx1 range (Buzzer will sound less than 20 ohms)
Power . One penlite (AA) cell, 1.5V DC included
Extra Circuitry ..... Meter protection and Fuse
Dimensions/Weight .. 90(W) x 135(H) x 30 (D) mm, 210 grams
Accessories Included .. 2 test leads & 0.5A fuse
Optional Accessory ...... Model TP-150 Temp Probe $19.50

7 FUNCTION 20 kΩ/V VOM

MODEL SX-200



$28.

FEATURES

- 7 functions including L.I. Range; and Battery Check for 1.5 and 9V types.
- Has Fuse & Diode Protection plus Mirrored Scale.
- Comes complete with Probes and Battery.

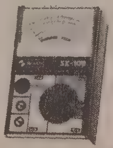
SPECIFICATIONS

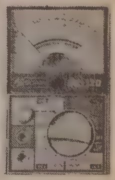
DCV .. 0.25, 2.5, 10, 50, 250, 1000V (20 kΩ/V)
ACV .... 10, 50, 250, 1000V (8 kΩ/V)
DC mA .... 50 μA, 5, 25, 250 mA
Resistance ..... Rx1, 10, 100, 1k (20Ω center)
LI ..... 75 mA (Rx1), 7.5 mA (Rx10), 750 μA (Rx100) 75 μA (Rx1k)
dB .... +20∼+58 dB
Size .. 3½″ x 5⅛″ x 5⅛″ (90 x 135 x 35 mm)
Weight .... ∼½ Lb. (250 g.)

POCKET SIZE VOMs

MODEL SX-100
2 kΩ/V

MODEL SX-120
20 kΩ/V





SX-100/$18.75
SX-120/$25.00

Both units are fuse protected and have mirrored scales, also 1.5V battery check function.

SPECIFICATIONS

DCV ... 0.25, 2.5, 10, 50, 250, 1000 (SX-120, 20 kΩ/V; SX-100, 2 kΩV & no 0.25V
ACV ..... 10, 50, 250, 1000 (SX-120, 8 kΩ/V; SX-100, 2 kΩ/V)
DC mA .... SX-120, 50 μA, 5, 250 mA; SX-100, 500 μA, 5, 250 mA
Resistance .... Rx1k (Center 20Ω) [SX-100 Center 5Ω]
dB .... −20∼+22 dB both units
Size ... 2½″ x 4″ x 1⅛″ (66 x 100 x 31 mm) both units
Weight .... ⅓ Lb. (150 g.) both units

WARRANTY: One Year Parts and Labor
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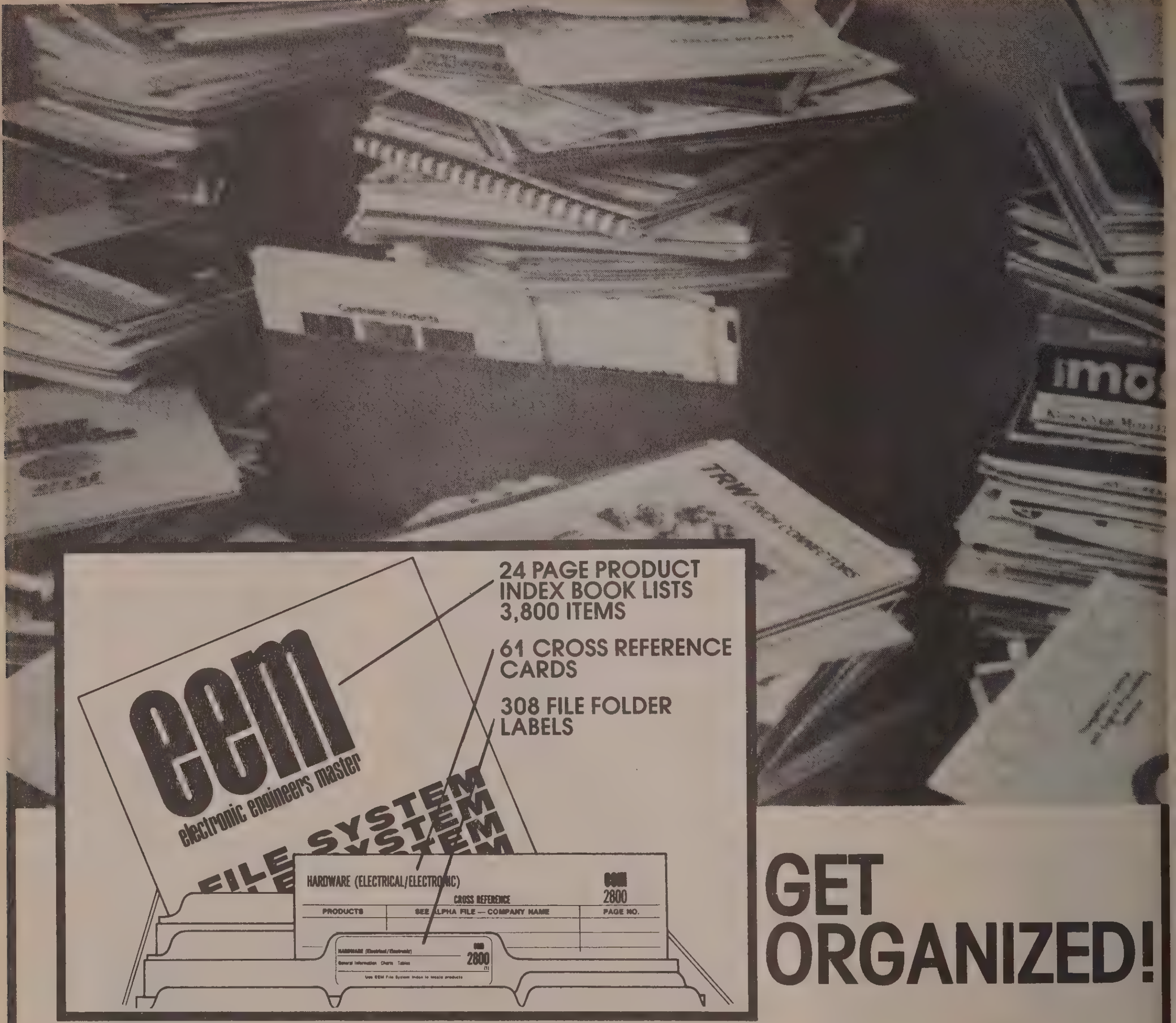
SEE OUR PAGES IN SECTION 2975


eem
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FILE SYSTEM
HARDWARE (ELECTRICAL/ELECTRONIC)
CROSS REFERENCE
2800
PRODUCTS
SEE ALPHA FILE — COMPANY NAME
PAGE NO.
TRW
imo

24 PAGE PRODUCT INDEX BOOK LISTS 3,800 ITEMS

61 CROSS REFERENCE CARDS

308 FILE FOLDER LABELS

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Synchro/Resolver Instrumentation

Phase Angle Voltmeters

Models 225, 225/Ratiometer Digital Phase Angle Voltmeters

This series of instruments provides the digital equivalent of the well-known Phase Angle Voltmeter, but with significant increases in both precision and speed of measurement. Voltage measurements include total, fundamental, in-phase and quadrature. Full-scale voltage ranges (10mV to 1000V) and phase angle (359.9°) are directly read on a 4½ digit display. Voltage ranges may be pushbutton selected or auto-ranged. All models provide for both manual and remote programming or optional 488 IB (IEEE-STD-488-1978) interface bus. Digital outputs include reading, mode, range and polarity information as well as data status signals. Long-term use of this instrument series is assured since field-change of frequency plug-in modules requires only a routine recalibration procedure. An added ratiometric option (designated 225/Ratiometer) provides direct reading of ratio. No adjustments are required and accuracies of 0.2% are obtainable.

Model 321 Wideband Phase Angle Voltmeter

The Model 321 features broadband phase sensitive operation at any frequency between 10 Hz and 100 kHz. Odd and even harmonic rejection exceeds 40 dB and phase accuracy is typically 0.5°. In addition to phase angle; total, fundamental, in-phase and quadrature voltages can be measured. Due to a new digital lock-on circuit, the reference can vary from 150 mV to 150V without adjustment or calibration. The 321's versatility and accuracy make it ideally suited for both laboratory and bench use

Model 213C Phase Angle Voltmeters

Successor to the famous VM-202, provides phase-sensitive measurement at a single pre-specified frequency from 30 Hz to 10kHz with ±5% frequency bandwidth (without adjustment). Full scale measurement from 300uV to 300V. The Model 213C has signal and reference isolation.

Programmable Resolver/Synchro Simulators

RESOLVER•SYNCHRO SIMULATOR
NORTH ATLANTIC 5310

Model 5310 Programmable Resolver/Synchro Simulator

The Model 5310 can be used as a bench-top Resolver / Synchro Simulator or as a completely programmable device for ATE systems.

The unit features fully isolated inputs and outputs and is protected against accidental short circuits and overloads on the output and overvoltage and transients on the power line input.

Standard features include full remote programmability for line-to-line level, reference levels, synchro or resolver mode and output angle. Remote control is parallel BCD or binary bussable tri-state; IEEE-488-1978 GPIB is available. The 5310 also has full front-panel controls for manual operation.

Featuring 18 bit resolution, 3.0VA output and 36 arc second accuracy, the 5310 is ideally suited for many commercial and military applications.

Angle Position Indicators

Series 800, 801, 8300, 8800 Angle Position Indicators

All North Atlantic industries' Angle Positions Indicators offer a combination of LSI - enhanced reliability, low cost and features never before available. The 800 Synchro Panel Meter features 0.1° resolution, small size, type II tracking and full pin programming at a very low price. Many options, including user settable variable scale, are available. The model 801 is physically identical to the 800 but offers an additional decade of resolution and an accuracy to 0.03°. Other features include rear switch programmable synchro/resolver and line-to-line selection, and tri-state BCD outputs.

The 8300 offers 0.01° resolution and accuracy to 0.03°. Through the use of direct hard-wire programming in the mating rear connector, mode and line-to-line are selected (resolver or synchro 11.8V, 26V or 90V) for each of the two front panel pushbuttons. The reference can vary between 47 and 440 Hz.

The 8800 achieves state-of-the-art performance with full type II tracking and auto phase correction. Featuring 0.001° resolution and 0.004° accuracy the 8800 accepts any standard line-to-line level without preselecting or pre-programming the input signal. The 8810 bench top or ATE version is available with the 488-IB (IEEE-STD-488).

Resolver Synchro Simulators/ Standards & Bridges

Models 530, 530/20, 532 Resolver Synchro Simulators/Standards

These simulators provide the ideal outputs for driving resolvers and synchros at 11.8, 26, 90 and 115V line-to-line voltages. The reference frequency can be 50 Hz to 11 kHz depending on model

Accuracies of up to 2 arc seconds are available. Standard resolutions are .0001°, .001°, and 5°. The 530 and 530/20 are 19'' rack mountable; the 532 is a thumbwheel settable DPM style unit.

Models 540/10 Resolver Synchro Bridge

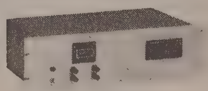
These bridges permit direct measurement of resolver and synchro transmitters. They feature a constant null gradient output voltage, isolated input and output, and input impedance over 500K. The Model 540/10 features 2 arc second accuracy over the band of 400 Hz to 800 Hz. Standard resolution is .001°. All units are 19″ rack mountable.

north atlantic
Instrument Div.

60 Plant Avenue,
Hauppauge, NY 11788
(516) 582-6500
(800) 645-5292
TWX 510-227-9660
Cable: NO ATLANTIC

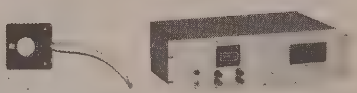
AC WATT-HOUR METER WH30 SERIES

SINGLE PHASE 50/60 Hz MODELS



WITH INTERNAL SENSOR

MODEL NUMBER WH30-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR*
1	0 to 150	0 to 5	600	0.1	Internal
2	0 to 300	0 to 5	1.2K	1	Internal
3	0 to 600	0 to 5	2.5K	1	Internal
10	0 to 150	0 to 10	1.2K	1	Internal
11	0 to 300	0 to 10	2.5K	1	Internal
12	0 to 600	0 to 10	5K	1	Internal
19	0 to 150	0 to 15	2K	1	Internal
20	0 to 300	0 to 15	4K	1	Internal
21	0 to 600	0 to 15	8K	1	Internal
28	0 to 150	0 to 50	6K	1	Internal
29	0 to 300	0 to 50	12K	1	Internal
30	0 to 600	0 to 50	25K	10	Internal
49	0 to 150	0 to 50	6K	1	Internal
50	0 to 300	0 to 50	12K	1	Internal
51	0 to 600	0 to 50	25K	10	Internal



SUPPLIED WITH CURRENT TRANSDUCERS

31	0 to 150	0 to 100	12K	10	C
32	0 to 300	0 to 100	25K	10	C
33	0 to 600	0 to 100	50K	10	C
34	0 to 150	0 to 200	25K	10	D
35	0 to 300	0 to 200	50K	10	D
36	0 to 600	0 to 200	100K	10	D
37	0 to 150	0 to 400	50K	10	D
38	0 to 300	0 to 400	100K	10	D
39	0 to 600	0 to 400	200K	100	D
40	0 to 150	0 to 600	80K	10	E
41	0 to 300	0 to 600	150K	100	E
42	0 to 600	0 to 600	300K	100	E
43	0 to 150	0 to 1K	120K	100	E
44	0 to 300	0 to 1K	250K	100	E
45	0 to 600	0 to 1K	500K	100	E
46	0 to 150	0 to 2K	250K	100	E
47	0 to 300	0 to 2K	500K	100	E
48	0 to 600	0 to 2K	1M	100	E

SUPPLIED WITH CURRENT TRANSFORMERS

58	0 to 150	0 to 100	12K	1	W
59	0 to 300	0 to 100	25K	10	W
60	0 to 600	0 to 100	50K	10	W
67	0 to 150	0 to 200	25K	10	W
68	0 to 300	0 to 200	50K	10	W
69	0 to 600	0 to 200	100K	10	W
76	0 to 150	0 to 400	50K	10	X
77	0 to 300	0 to 400	100K	10	X
78	0 to 600	0 to 400	200K	100	X
85	0 to 150	0 to 600	80K	10	X
86	0 to 300	0 to 600	150K	100	X
87	0 to 600	0 ot 600	300K	100	X
94	0 to 150	0 to 1K	120K	100	Y
95	0 to 300	0 to 1K	250K	100	Y
96	0 to 600	0 to 1K	500K	100	Y

* 100 Amperes and above, 3 External Sensors are supplied

FEATURES:

- Accurate measurement of watt-hours consumed by equipment
- Accurate for any conditions of phase, voltage unbalance, current unbalance and power factor
- Output is proportional to true power delivered to the load
- Meters using internal sensors or sensors C, D, or E provide excellent current transient response for measuring SCR control, chopped waveforms, or application where harmonics are present
- Highly-accurate, without worrying about the inaccuracies of current transformers and potential transformers
- Current sensors are included and calibrated with the watt-hour meter (where required)
- For interface with recorders, data loggers, computer or other instrumentation
- Wide Frequency Range: 48 to 70 Hz

SPECIFICATIONS:

INPUT:

Voltage: See Tables

Current: See Tables

Frequency Range: 48 to 70 Hz

Power Factor Range: Unity to Lead or Lag 0

Response (Transient — 90%):
  <100 microseconds with models using internal and sensors C, D and E
  1 millisecond with models using current sensors W, X and Y

Burden:
  Voltage: 1.25 VA
  Current: 1.25 VA

Current Overload (Continuous):
  2 X Rating: 1 Ampere thru 15 Ampere and Current Transformer Models
  50 X Rating: Current Transducer Models C, D and E
  10 Seconds: 6 X Rating

Dielectric Test (Input/Output/Case): 1500 VAC

Specifications continued on next page

OHIO SEMITRONICS, INC.

1205 CHESAPEAKE AVENUE, COLUMBUS, OHIO 43212-2287
PHONE (614) 486-9561 • TWX 810-482-1630

SPECIFICATIONS (cont.):

OUTPUT:

Wattmeter: 3½ digit DPM

Watt-Hour Counter: 6 digit with pushbutton reset (LCD) with battery back up

Analog Output:
10 VDC represents full scale watts
Analog W-H output available as option

Response: 250 milliseconds

Pulse Output: 4 Volt peak for external counter

Temperature Effect:
±0.5% FS +15°C to +35°C
±1.0% FS −10°C to +60°C

ACCURACY:

±0.5% FS power

GENERAL:

Instrument Size: 19″ x 5¼″ x 11″ W x H x D except Models WH3-52, thru 57, these are 19″ x 10½″ x 11″ W x H x D

Instrument Power:
115 VAC ±15% 50/60 Hertz
230 VAC 50 Hertz available

OPTIONS:

No load offset control

Split core on transducer models

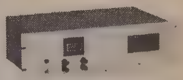
Analog meter, BCD output, analog W-H output

6 digit electromechanical counter

FOR DIMENSIONS REQUEST CATALOG #983

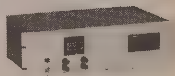
3 PHASE 3 WIRE 50/60 Hz MODELS

WITH INTERNAL SENSOR



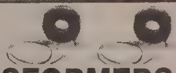
MODEL NUMBER WH30-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR*
4†	0 to 150	0 to 5	1.2K	1	Internal
5	0 to 300	0 to 5	2.5K	1	Internal
6	0 to 600	0 to 5	5K	1	Internal
13†	0 to 150	0 to 10	2.5K	1	Internal
14	0 to 300	0 to 10	5K	1	Internal
15	0 to 600	0 to 10	10K	1	Internal
22†	0 to 150	0 to 15	4K	1	Internal
23	0 to 300	0 to 15	8K	1	Internal
24	0 to 600	0 to 15	15K	10	Internal
52†	0 to 150	0 to 50	12K	1	Internal
53	0 to 300	0 to 50	25K	10	Internal
54	0 to 600	0 to 50	50K	10	Internal

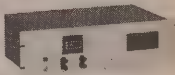
SUPPLIED WITH CURRENT TRANSDUCERS



MODEL NUMBER WH30-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR*
31-2†	0 to 150	0 to 100	20K	10	C
32-2	0 to 300	0 to 100	40K	10	C
33-2	0 to 600	0 to 100	80K	10	C

SUPPLIED WITH CURRENT TRANSFORMERS



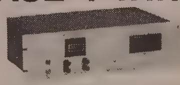


MODEL NUMBER WH30-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR*
61†	0 to 150	0 to 100	25K	10	W
62	0 to 300	0 to 100	50K	10	W
63	0 to 600	0 to 100	100K	10	W
70†	0 to 150	0 to 200	50K	10	W
71	0 to 300	0 to 200	100K	10	W
72	0 to 600	0 to 200	200K	100	W
79†	0 to 150	0 to 400	100K	10	X
80	0 to 300	0 to 400	200K	100	X
81	0 to 600	0 to 400	400K	100	X
88†	0 to 150	0 to 600	150K	100	X
89	0 to 300	0 to 600	300K	100	X
90	0 to 600	0 to 600	600K	100	X
97†	0 to 150	0 to 1K	250K	100	Y
98	0 to 300	0 to 1K	500K	100	Y
99	0 to 600	0 to 1K	1M	100	Y

* 100 Amperes and above, 2 External Sensors are supplied.
† May be used in 120V, 1ϕ, 3 Wire Edison Systems.

3 PHASE 4 WIRE 50/60 Hz MODELS

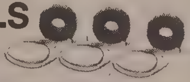
WITH INTERNAL SENSOR

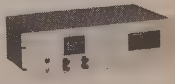


MODEL NUMBER WH30-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR
7	0 to 150	0 to 5	2K	1	Internal
8	0 to 300	0 to 5	4K	1	Internal
9	0 to 600	0 to 5	8K	1	Internal
16	0 to 150	0 to 10	4K	1	Internal
17	0 to 300	0 to 10	8K	1	Internal
18	0 to 600	0 to 10	15K	10	Internal
25	0 to 150	0 to 15	6K	1	Internal
26	0 to 300	0 to 15	12K	1	Internal
27	0 to 600	0 to 15	25K	10	Internal
55	0 to 150	0 to 50	20K	10	Internal
56	0 to 300	0 to 50	40K	10	Internal
57	0 to 600	0 to 50	80K	10	Internal

‡ 100 Amperes and above, 3 External Sensors are supplied.

SUPPLIED WITH CURRENT TRANSFORMERS





MODEL NUMBER WH30-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR‡
64	0 to 150	0 to 100	40K	10	W
65	0 to 300	0 to 100	80K	10	W
66	0 to 600	0 to 100	150K	100	W
73	0 to 150	0 to 200	80K	10	W
74	0 to 300	0 to 200	150K	100	W
75	0 to 600	0 to 200	300K	100	W
82	0 to 150	0 to 400	150K	100	X
83	0 to 300	0 to 400	300K	100	X
84	0 to 600	0 to 400	600K	100	X
91	0 to 150	0 to 600	250K	100	X
92	0 to 300	0 to 600	500K	100	X
93	0 to 600	0 to 600	1M	100	X
100	0 to 150	0 to 1K	360K	100	Y
101	0 to 300	0 to 1K	800K	100	Y
102	0 to 600	0 to 1K	1.5M	1000	Y

OHIO SEMITRONICS, INC.

1205 CHESAPEAKE AVENUE, COLUMBUS, OHIO 43212-2287
PHONE (614) 486-9561 • TWX 810-482-1630

DC TO 100 Hz WATT-HOUR METER WH70 SERIES

MEASURES AND DISPLAYS WATTS AND WATT-HOURS

FEATURES:

- Accurate measurement of watt-hours consumed by equipment
- Highly-accurate, without worrying about the inaccuracies of shunts
- Current transducers are included and are calibrated with the watt-hour meter (where required)
- For interface with recorders, data loggers, computer of other instrumentation
- Wide frequency range, ideal for variable frequency applications
- Responds accurately to AC or DC components
- Suited for complex wave shapes
- 3 phase models available on request

SPECIFICATIONS:

INPUT:

Voltage: See Tables

Current: See Tables

Frequency Range: DC to 100 Hz

Power Factor Range: Unity to lead or lag 0

Response (Transient — 90%): <50 microseconds

Burden:
  Voltage: >1 megohm
  Current: 0.25 VA 5 thru 15 Amp
    0 VA 50 thru 2000 Amp

Current Overload (continuous):
  2 X Rating: 1 Ampere thru 15 Ampere
  50 X Rating: Current Transducer Models C, D and E
  10 Seconds: 6 X Rating

Dielectric Test (Input/Output/Case): 1500 VAC

Surge: Withstands IEEE SWC Test

OUTPUT:

Wattmeter: 3½ digit DPM

Watt-Hour Counter: 6 digit with pushbutton reset (LCD) with battery back up

Analog Output: 10 VDC represents full scale watts
  Analog W-H output available as option

Response: 250 milliseconds

Pulse Output: 4 volt peak for external counter

Temperature Effect:
  ±0.5% FS +15°C to +35°C
  ±1.0% FS −10°C to +60°C

ACCURACY:

Watt-Hour Counter: ±0.5% FS

Analog Wattmeter: ±1.5% FS

Electrical Outputs: ±0.5% FS

GENERAL:

Instrument Size: 19″ x 5¼″ x 11″ W x H x D

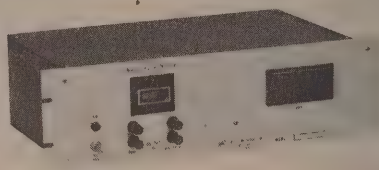
Instrument Power:
  115 VAC ±15% 50/60 Hertz
  230 VAC 50 Hertz available

OPTIONS:

No load offset control

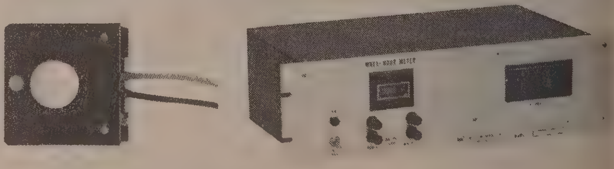
Split core on transducer models

Analog meter, BCD output, analog W-H output



STANDARD DC MODELS

MODEL NUMBER WH70-	VOLTAGE RANGE	CURRENT RANGE	METER FULL SCALE WATTS	W-H PER COUNT	CURRENT SENSOR*
1	0 to 150	0 to 5	600	0.1	Internal
2	0 to 300	0 to 5	1.2K	1	Internal
3	0 to 600	0 to 5	2.5K	1	Internal
10	0 to 150	0 to 10	1.2K	1	Internal
11	0 to 300	0 to 10	2.5K	1	Internal
12	0 to 600	0 to 10	5.0K	1	Internal
19	0 to 150	0 to 15	2.0K	1	Internal
20	0 to 300	0 to 15	4K	1	Internal
21	0 to 600	0 to 15	8K	1	Internal
28	0 to 150	0 to 50	6K	1	Internal
29	0 to 300	0 to 50	12K	1	Internal
30	0 to 600	0 to 50	25K	10	Internal



SUPPLIED WITH CURRENT SENSOR

31	0 to 150	0 to 100	12K	1	C
32	0 to 300	0 to 100	25K	10	C
33	0 to 600	0 to 100	50K	10	C
34	0 to 150	0 to 200	25K	10	D
35	0 to 300	0 to 200	50K	10	D
36	0 to 600	0 to 200	100K	10	D
37	0 to 150	0 to 400	50K	10	D
38	0 to 300	0 to 400	100K	10	D
39	0 to 600	0 to 400	200K	100	D
40	0 to 150	0 to 600	80K	10	E
41	0 to 300	0 to 600	150K	100	E
42	0 to 600	0 to 600	300K	100	E
43	0 to 150	0 to 1K	120K	100	E
44	0 to 300	0 to 1K	250K	100	E
45	0 to 600	0 ot 1K	500K	100	E
46	0 to 150	0 to 2K	250K	100	E
47	0 to 300	0 to 2K	500K	100	E
48	0 to 600	0 to 2K	1M	100	E

* 100 Amperes and above, 1 External Transducer is supplied.

FOR DIMENSIONS REQUEST CATALOG #980

OHIO SEMITRONICS, INC.

1205 CHESAPEAKE AVENUE, COLUMBUS, OHIO 43212-2287
PHONE (614) 486-9561 • TWX 810-482-1630

OSI DC AMPERE-HOUR METER AH70 SERIES

MEASURES AND DISPLAYS AMPERES AND AMPERE-HOURS

FEATURES:

- Accurate measurement and display of DC ampere-hours consumed by equipment
- Highly-accurate, without worrying about the inaccuracies of shunts
- Current transducers are included and are calibrated with the ampere meter (where required)
- For interface with recorders, data loggers, computer of other instrumentation

SPECIFICATIONS:

INPUT:

Overload (continuous):
2 X Rating (5-50 Ampere)
50 X Rating (100A-10KA)

DC Insertion Loss:
<0.01V X I (5-50 Amp)
Zero (100A-10 KA)

Isolation:
1.5 KV (5-50 Amperes)
5 KV (100A-10 KA)

Response: (Transient) 50 microsecond

Dielectric Test: Withstands IEEE SWC Test

OUTPUT:

Ampere Hour Counter: 6 digit pushbutton reset, LCD with battery backup

Ammeter: 3½ digit DPM

Electrical Output:
10 VDC FS for Current
4V Pulse (Amp-hour)

Response Time: 250 milliseconds

Accuracy and Linearity:
±0.5% FS (5A-2 KA)
±1.0% FS (5 KA-10 KA)

Meter: 1.5% FS

Electrical Output:
±0.5% FS (5A-2 KA)
±1.0% FS (5 KA-10 KA)

Zero Drift (max.)
±0.1% FS of rated Ampere hour per hour

Temperature Effect (0 to 40°C): ±0.1% FS ±1% of reading

Instrument Case Size: 19″ x 5¼″ x 11″ W x H x D

External Transducer: See Table

GENERAL:

Instrument Size: 19″ x 5¼″ x 11″ W x H x D

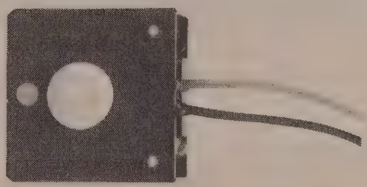
Instrument Power:
115 VAC ±15% 50/60 Herzt
230 VAC 50 Hertz available

OPTIONS:

No load offset control
Split core on transducer models
Analog meter, BCD output, analog A-H output

STANDARD DC MODELS

MODEL NUMBER AH70-	INPUT CURRENT RANGE	METER FULL SCALE CURRENT	A-H PER COUNT	CURRENT SENSOR*
5	0 to 5	5	.001	Internal
10	0 to 10	10	.001	Internal
25	0 to 25	25	.01	Internal
50	0 to 50	50	.01	Internal



SUPPLIED WITH CURRENT SENSOR

100	0 to 100	100	.01	C
200	0 to 200	200	.1	D
400	0 to 400	400	.1	D
600	0 to 600	600	.1	E
1K	0 to 1K	1K	.1	E
2K	0 to 2K	2K	1	E
5K	0 to 5K	5K	1	G
10K	0 to 10K	10K	1	H

* 100 Amperes and above, 1 External Transducer is supplied.

NOTE: Models listed above are unipolar. For bipolar units add a BP after the model number.

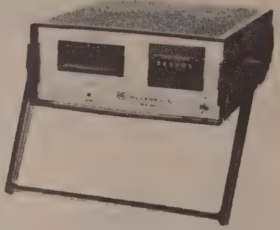
FOR DIMENSIONS REQUEST CATALOG #983

OHIO SEMITRONICS, INC.
1205 CHESAPEAKE AVENUE, COLUMBUS, OHIO 43212-2287
PHONE (614) 486-9561 • TWX 810-482-1630

OSI ENERGY MONITORING INSTRUMENTS EM SERIES

FEATURES:

- Portable
- Easy to use, convenient way to measure electrical power
- 0.5% accuracy
- Digital display
- Totalizes electrical energy EM-5
- Single phase AC
- Isolated 0 to 10 VDC analog output EM-2 and EM-5



EM-5 WATT-HOUR METER

FEATURES:

- Acts as an in-line extension cord
- Totalizes electrical energy
- Measures electrical power

Input Voltage Range: 83 to 135 VAC
Input Current Range: 0 to 10 amperes AC
Frequency Range: 50 to 70 Hertz
Power Factor Range: Unity to Lead, Lag 0
Overload Current:
  15 amperes continuous
  50 amperes 5 seconds per hour
Input Response: <1 millisecond
Display:
  Meter: 3½ digit 0 to 1500 watts
  Counter: 6 digit, 1 watt-hour per count (pushbutton reset)

Output:
  Analog Signal: 0 to 10 VDC represents 1200 watts
  Response: 250 milliseconds
  Load on Output: >2K ohms
Accuracy: Includes set-point, linearity, and power factor error
  Watts: ±0.5% FS (1200 watts)
  Watt-Hours: ±0.5%
Temperature Effect: 0 to 40°C, ±1% of reading, ±0.1% FS
Instrument Power: 115 VAC, ±10%, 60 Hertz, 5 watts
Case Size: 10″ W x 4″ H x 9″ D overall

EM-3 AC MULTIPURPOSE METER

FEATURES:

- Acts as an in-line extension cord
- Measures current, voltage, and power

Input Voltage Range: 0 to 150 VAC

Input Current Range: 0 to 10 amperes AC

Burden (at maximum rated input):
  Voltage: 1.25 VA
  Current: 1.25 VA

Frequency Range: 50 to 70 Hertz

Power Factor Range: Unity to Lead, Lag 0

Overload Current:
  15 amperes continuous
  50 amperes 5 seconds per hour

Input Response: <1 millisecond

- Binding posts are provided for
- Connection of an external AC electrical power source

Display:
  Meter: 3½ digit
  Current: 0 to 10.0 amperes AC
  Voltage: 0 to 150.0 volts AC
  Watts: 0 to 1500 watts
Accuracy: Includes set-point, linearity, and power factor error
  Current: ±0.5%
  Voltage: ±0.5%
  Watts: ±0.5%
Temperature Effect: 0 to 40°C, ±1% of reading, ±0.1% FS
Instrument Power: 115 VAC, ±10%, 60 Hertz, 5 watts

EM-2 AC WATTMETER

FEATURES:

- Measures electrical power
- Voltage range switch

Input Voltage Range: 0 to 150 VAC or 300 VAC
Input Current Range: 0 to 10 amperes AC
Burden (at maximum rated input):
  Voltage: 1.25 VA
  Current: 1.25 VA
Frequency Range: 50 to 70 Hertz
Power Factor Range: Unity to Lead, Lag 0
Overload Current:
  15 amperes continuous
  50 amperes 5 seconds per hour
Input Response: <1 millisecond
Display:
  Meter: 3½ digit, 0 to 1500 watts at 120 volts, 0 to 1999 watts at 240 volts

- 120V or 220V range
- Load easily connected

Output:
  Analog Signal: 0 to 10 VDC represents 1000 watts or 2000 watts
  Response: 250 milliseconds
  Load on Output: >2K ohms

Accuracy: Includes set-point, linearity, and power factor error
  Watts: ±0.5% FS (1200 watts on 120 volt range and 2000 watts on 300 volt range)

Temperature Effect: 0 to 40°C, ±1% of reading, ±0.1% FS

Instrument Power: 115 VAC, ±10%, 60 Hertz, 5 watts

OHIO SEMITRONICS, INC.

1205 CHESAPEAKE AVENUE, COLUMBUS, OHIO 43212-2287
PHONE (614) 486-9561 • TWX 810-482-1630

POWER TEST PANELS

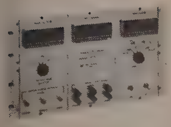
MODEL PTP-990 POWER TEST PANEL

FEATURES AND APPLICATIONS:

- Commercial appliance testing
- Core loss testing
- Motor testing
- Large electrical machinery testing

The PTP-990 contains all necessary voltage, current, and power transducers, contactors, and circuit breakers. The operator selects the required service, voltage, and current range, connects the equipment to be tested to the PTP-990, and pushes the test button. The PTP-990 displays current, voltage, and power on digital panel meters. BCD outputs may be provided for a data collection system or microprocessor interface. This power test panel represents the capabilities of OSI to manufacture test equipment to meet customer needs.

MODULAR TEST PANEL



FEATURES AND APPLICATIONS

- Appliance testing
- Process monitoring
- Transient power determination
- Prototype characterization
- Production and quality testing
- Motor efficiencies
- Assembly line power consumption
- Sub station monitoring

OSI manufactures a complete line of Modular Power Test Panels, including volt, ampere, watt, and watt-hour modules. The flexibility of modular construction allows future expansion of a basic test panel.

Modules are available for 1 phase or poly phase power measurements. Voltage modules are available for 120, 240, and 480 volts, DC to 400 Hz. Current modules are available from 1 Amp through 2000 Amps.

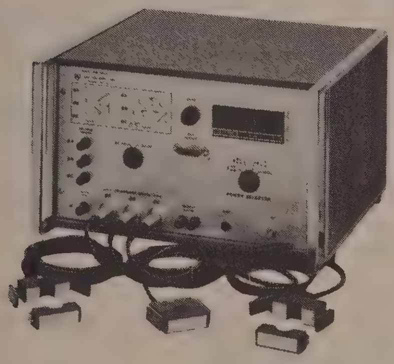
Each module has a 0 to 10 volt DC analog signal output. This isolated output provides a signal suitable for recording or display purposes.

Split core (clamp-on) transducers are available on 100 Ampere and higher current levels so that the modular test panel may be installed in the system without disconnecting the current leads.

These test panels are designed to meet Federal Regulations requiring manufacturer's to rate electrical power and energy consumption of their products. A detailed brochure provides information helpful in the selection of optimum units for particular testing or monitoring needs.

DIGITAL WATT-METER WM SERIES

MODEL WM-365A DC TO 5 KHz RESPONSE



FEATURES AND APPLICATIONS:

- Traction motor monitoring
- Drive motor monitoring
- Power converters
- Variable frequency motor drives
- Power systems with DC components
- Power systems with nonsymmetrical wave shapes
- Power system protection
- Power data for computer input

SPECIFICATIONS:

Input Voltage Range	0 to 500 Volts DC or RMS line-to-line or line-to-neutral.
Input Current Range	0 to 100 Amperes DC or RMS per line through transducer.
Frequency Range	DC to 400 Hertz.
Full Scale Power	150.0 Kilowatts for 3 phase. 50.0 Kilowatts per phase or in single phase.
Meter Indication	3½ digit display with 0.1 Kilowatt resolution.
Electrical Output	0 to 5 Volts DC for 0 to 150 KW in total power arrangement. 0 to 5 Volts DC for 0 to 50 KW in single phase arrangement.
BCD Output	A BCD coded output is available on the front panel.
Electrical Isolation	1000 Volts DC or RMS between any line and output terminals.
Accuracy	±1 per cent of full scale in temperature range of 15 to 35°C and with power factor of .5 lead to .5 lag.
Case Size	17 x 10 x 14 inches.
Power Requirements For Electronics	120 Volt 60 Hertz

OHIO SEMITRONICS, INC.

1205 CHESAPEAKE AVENUE, COLUMBUS, OHIO 43212-2287
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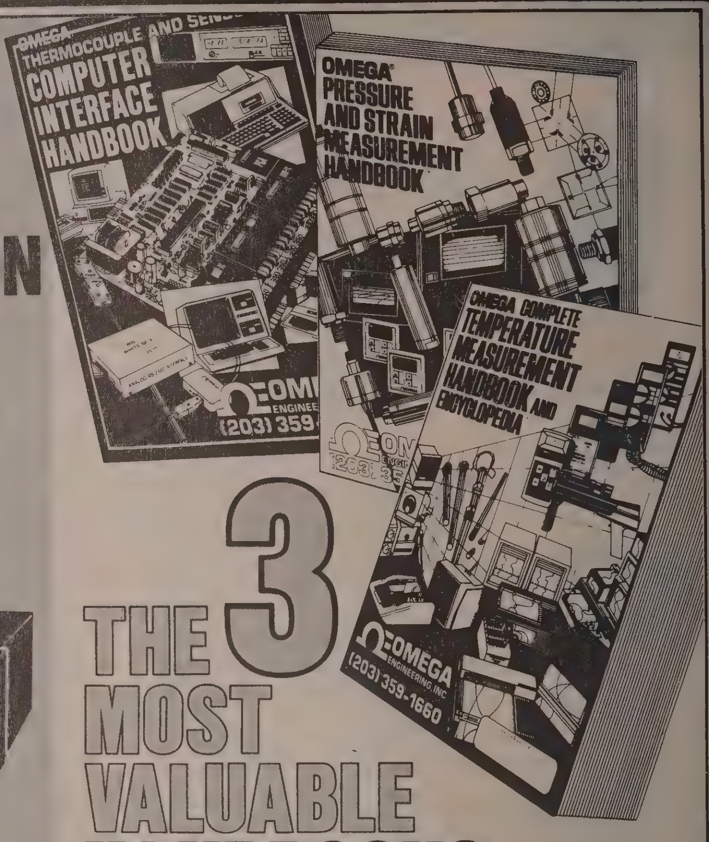
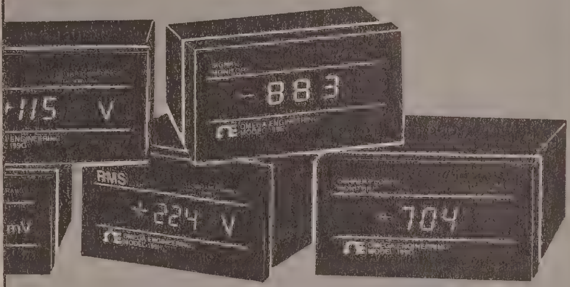
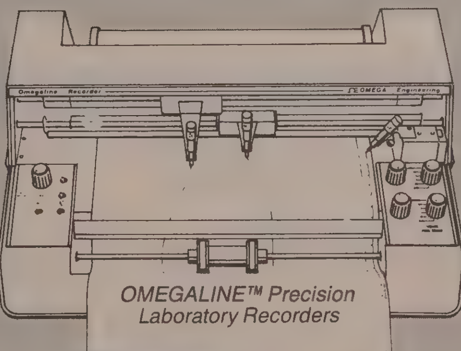
TEST AND MEASUREMENT INSTRUMENTATION

For Temperature, Pressure and Strain

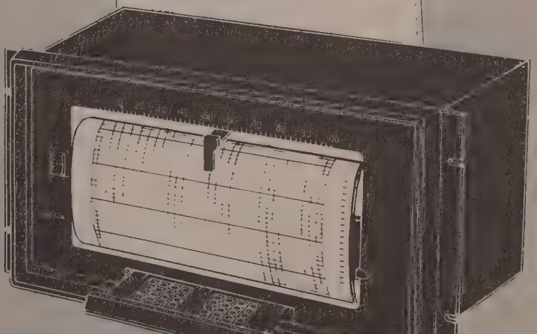

OMEGA THERMOCOUPLE AND SENSOR COMPUTER INTERFACE HANDBOOK
OMEGA ENGINEERING (203) 359-
OMEGA PRESSURE AND STRAIN MEASUREMENT HANDBOOK
OMEGA COMPLETE TEMPERATURE MEASUREMENT HANDBOOK AND ENCYCLOPEDIA
OMEGA ENGINEERING, INC. (203) 359-1660


-115 V
-883
RMS
+224 V
-704
mV

199-E Voltage Meter for Pressure Tranducers and Other 0 to 10 Volt Input Types


Omegaline Recorder
OMEGA Engineering

OMEGALINE™ Precision Laboratory Recorders



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PPM, INC.

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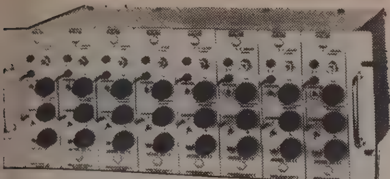
Cleveland, Ohio 44122 • (216) 292-6006



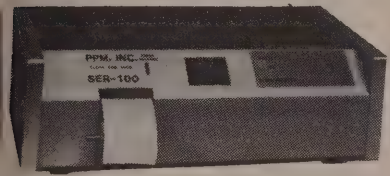
SIGNAL CONDITIONERS

PPM SIGNAL CONDITIONERS PROVIDE ULTRA-STABLE EXCITATION, BRIDGE BALANCE, AND MONITORING CIRCUITS FOR USE WITH STRAIN-GAGE AND RTD TRANSDUCERS.

MODEL SG-11 (ILLUSTRATED ABOVE, EIGHT UNITS IN ENCLOSURE) HAS AN INDIVIDUAL POWER SUPPLY PER CHANNEL FOR MAXIMUM ISOLATION (APPROACHING BATTERY OPERATION). THOUSANDS OF SG-11 UNITS ARE IN OPERATION AT N.A.S.A. AND INDUSTRIAL LABORATORIES THROUGHOUT THE WORLD.

MODEL SG-16 (NOT ILLUSTRATED) PROVIDES LOWEST-COST QUANTITY SIGNAL CONDITIONING. A 20-CHANNEL SYSTEM WITH COMMON POWER SUPPLY IS AVAILABLE AT $100/CHANNEL WITHOUT AMPLIFIERS. AMPLIFIER OPTIONS RANGE FROM $15/CHANNEL FOR 10 MA GALVO DRIVERS TO $150/CHANNEL FOR LOW-DRIFT DIFFERENTIAL AMPLIFIERS.

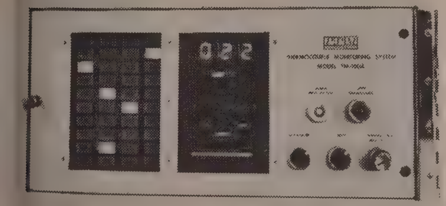
MODEL SG-11 PLUG-IN UNIT:	$249.50
MODEL SG-11-R (SOLDER-TERMINALS) ENCLOSURE:	199.00
MODEL SG-11-RC (MS-CONNECTORS) ENCLOSURE:	595.00



SEQUENTIAL EVENT RECORDERS

THE MODEL SER-100 SERIES OF SEQUENTIAL EVENTS RECORDERS PROVIDE A PRINTED RECORD OF THE TIME AND SEQUENCE OF INDEPENDENT ON/OFF EVENTS OCCURRING AT A NUMBER OF POINTS. THE SER-100 MAY BE SET TO RECORD EITHER THE TURN-ON TIME OR THE TURN-OFF TIME, OR BOTH, ALONG WITH THE POINT IDENTIFICATION.

MODEL SER-100 WITH 16 INPUTS:	$3,500.00
EACH ADDITIONAL 16 INPUTS:	300.00



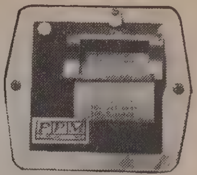
THERMOCOUPLE MONITOR

THE MODEL TM-100A SCANS UP TO 100 THERMOCOUPLES, DISPLAYING TEMPERATURE DIGITALLY. A HIGH-LOW LIMIT CIRCUIT COMPARES THE TEMPERATURE WITH PRESET THUMBWHEEL SWITCH SETTINGS; A LAMP MATRIX DISPLAYS ALL OUT-OF-LIMIT CHANNELS. INTERFACES PROVIDE FOR PRINTOUT OR COMPUTER ENTRY OF DATA.

DIGITAL TIMERS-PROGRAMMERS

THE EP- SERIES OF DIGITAL ELECTRONIC PROGRAMMERS PROVIDE RELAY OR SOLID-STATE SWITCH OPERATION AT DIGITALLY-PRESET START AND STOP TIMES. EACH CHANNEL OPERATES INDEPENDENTLY. UNITS ARE AVAILABLE FROM 1 TO 1000 CHANNELS, WITH TIMING FROM MICROSECONDS TO HOURS.

FOR PRICING, CONSULT FACTORY OR SALES REP.



THERMAL PRINTERS

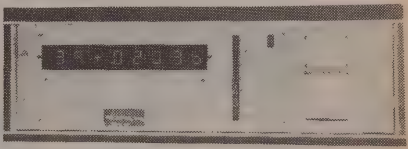
THE TP-100 SERIES IS A LINE OF SILENT ALPHA-NUMERIC THERMAL PRINTERS. QUIET, RELIABLE OPERATION, LONG LIFE, AND MODERATE COST RESULT FROM THE USE OF A SIMPLE MECHANISM WHOSE ONLY FUNCTION IS TO ADVANCE PAPER. EASE OF LOADING AND LOW MAINTENANCE MAKE THESE UNITS IDEAL FOR MEDICAL USE.

STANDARD MODELS ARE 12 (TP-112), 20 (TP-120), AND 40 (TP-140) COLUMNS. AVAILABLE TO OEM'S ARE 80 OR 120 COLUMN UNITS, AS WELL AS GRAPHIC STRIP-CHART RECORDERS WITH RESOLUTION TO 200 DOTS/INCH.

MODEL TP-112 (ILLUSTRATED) FITS INTO A PANEL CUT-OUT 3 INCHES HIGH BY 3.5 INCHES WIDE. IT INCLUDES DRIVE ELECTRONICS AND REQUIRES 8-BIT PARELLEL INPUT DATA. RS-232 OPTION IS AVAILABLE.

MODEL TP-112 (AS SHOWN):	$595.00
MODEL TP-112 WITH CABINET & POWER SUPPLY:	895.00

SUBSTANTIAL DISCOUNTS ON VOLUME OEM ORDERS.

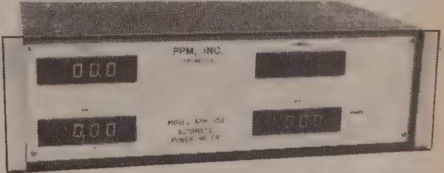


DATA LOGGERS

THE MODEL DL-3 IS A COMPLETE DATA ACQUISITION SYSTEM IN A COMPACT, PORTABLE PACKAGE. IT SCANS UP TO 256 INPUTS, DIGITIZES THEM, AND PRINTS OUT THE VALUES BY MEANS OF A BUILT-IN THERMAL PRINTER.

OPTIONS INCLUDE: FLOATING DECIMAL POINT, INTERNAL CALENDAR-CLOCK, STRAIN-GAGE OT THERMOCOUPLE CONDITIONING, COMPUTER INTERFACE, LIMIT COMPARATOR, AND ENGINEERING UNITS CONVERSION.

MODEL DL-3 WITH 16 CHANNELS:	$2,500.00
MODEL DL-3 WITH 256 CHANNELS:	5,000.00



AUTOMATIC POWER METER

THE MODEL APM-100 AUTOMATIC POWER METER DISPLAYS "TRUE RMS" VOLTS, AMPERES, KW, AND POWER FACTOR SIMULTANEOUSLY ON FOUR 3.5 DIGIT DISPLAYS. FULL-SCALE RANGES ARE: 1000 OR 199.9 VOLTS, 19.99 AMPERES, 19.99 OR 1.999 KW, AND 1.000 POWER FACTOR. RANGE-CHANGING IS AUTOMATIC. ACCURACY IS ± 0.3% OF FULL-SCALE FROM DC TO 1000 HZ.

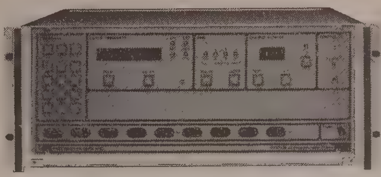
THE MODEL APM-10 PROVIDES THE SAME READINGS AS ABOVE ON A SINGLE READOUT UNIT WITH MANUAL SWITCHING. ACCURACY IS ± 0.5% OF FULL-SCALE.

MODEL APM-100 (ILLUSTRATED):	$2,500.00
MODEL APM-10 (NOT ILLUSTRATED):	1,000.00

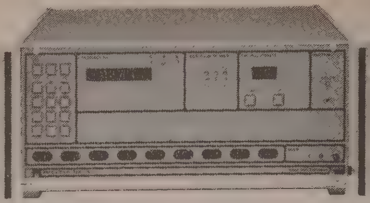
PROM PROGRAMMERS

PPM OFFERS A LINE OF PROM PROGRAMMERS TO PROGRAM EPROMS, BI-POLAR PROMS, AND PLA'S. THESE PROGRAMMERS ARE LOW-COST DEDICATED UNITS, EACH HANDLING A FAMILY OF SIMILAR DEVICES. OUR SPECIALTY IS OEM VOLUME CUSTOM REQUIREMENTS, BUT SINGLE UNITS ARE AVAILABLE.

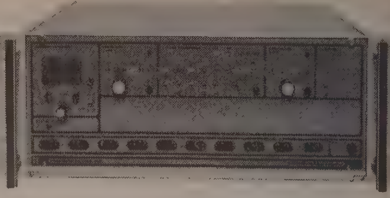
MODEL EPROM 2700 (PROGRAMS 2716 SERIES):	$1,000.00



32 and 64 Channel Anti-Alias Filters
For HP, LP, TD, BP, BR, too. Save 25-50% per channel over 16 channel systems. 2½-3 digit resolution. Wide variety of options, including economical fixed frequency filters.

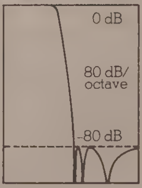


Super BP and More
Industry's first multichannel, programmable frequency-band translator. 80 dB/bandwidth-octave skirts for super BP. Zooms in to extend performance of systems for spectrum analysis, beam forming and modal analysis.



16 Channel Filter-Amp
Save 25-35% by buying one instrument instead of two. 62 programmable cut-off frequencies. DC differential input state with 100 dB CMRR. Programmable prefilter and post-filter gain of 1-1000.

BEGONE CURSED ALIAS



You want data clean and meaningful for digital conversion.

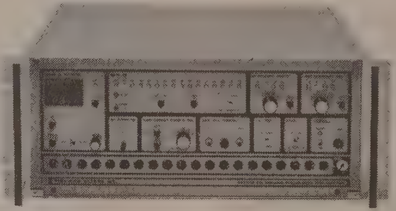
We keep extending our line of Precision Conditioners™ to do it your way.

We were first to provide 80 dB/octave attenuation and time delay filters superior to Bessel in multichannel, programmable filter systems. And we did it with 1° phase match.

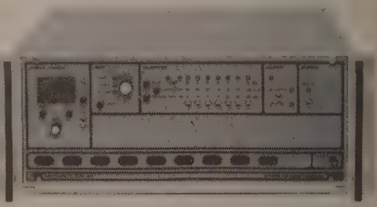
We were also first to provide standard GPIB, parallel and serial interfaces for filter systems and other Precision Conditioners you can put under computer control.

Dual Channel Anti-Alias Filter
For HP, LP, TD, BP, BR, too. 124 programmable cut-off frequencies. Frequency range of .01 Hz to 150 kHz. Gain 1, 2, 5 and 10.

Gain-Ranging Amps
Programmable or automatic. Provide conditioning needed to store signals of wide dynamic range within the limited dynamic range of magnetic tape. No manual logging needed.



Multimode Conditioner
16 channels, each with choice of strain, charge and voltage conditioning. All functions, including calibration, are programmable for computer control. Usually teams with filter-amp.

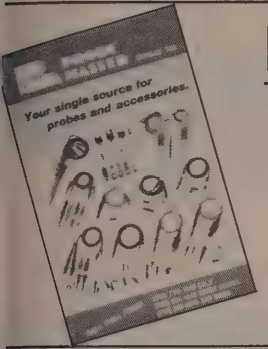


Call 607-277-3550.
Or write for specs and demonstration. Telex 646846.

PRECISION FILTERS, INC.
240 Cherry Street, Ithaca, New York 14850

†See detailed catalog pages in Sections 1100 and 2700.

PROBE MASTER INC. • 4898 RONSON CT., SAN DIEGO, CA 92111



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NEW! MINIATURE SCOPE PROBE

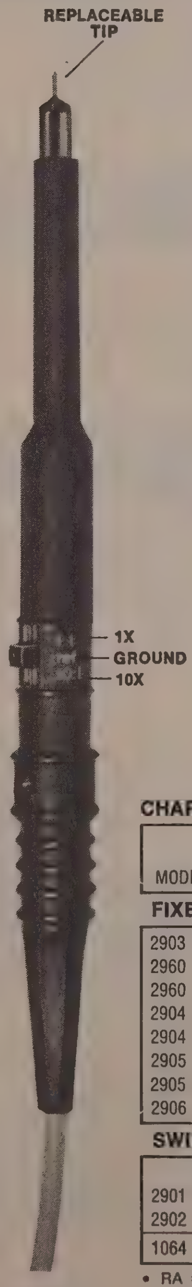
FROM $30 TO $60

The Probe Master 2900 series oscilloscope probes combine the characteristics of high performance, and fast rise time pulse response, with a **slender design** to meet the needs of today's micro electronics.

The **miniature tip** is ideal for accessing high density boards and hard to reach test points. By locating the high and low frequency compensation circuits in the BNC end of the cable, the design of the probe has become light weight and slender for easy handling.

Other features of the 2900 series probes include a replaceable probe tip, replaceable ground lead and a Readout Actuator option (RA).

The Readout Actuator option (permanently attached) is available on the 10x fixed attenuation probes only. This option provides the necessary resistor circuit to change the range factor on the model 465, 475, 485 and 7000 series Tektronix scopes.



ACTUAL SIZE

GROUP A STANDARD ACCESSORIES
(included with each probe)

PM1065	Sprung Hook	A	$4.30
PM1070	Trimmer Tool	B	$ .70
PM1069	BNC Adapter	C	$2.50
PM1068	Tip Insulator	D	$ .60
PM1067	IC Tip Cover	E	$ .60
PM1066	Spare Probe Tip	F	$1.60
PM1008	Ground Lead 6″	G	$2.00
PM1002	Storage Pounch	(NOT SHOWN)	$ .70

GROUP B ENGINEER ACCESSORY KIT (OPTIONAL)
(add $12.00 for this group) PM1064

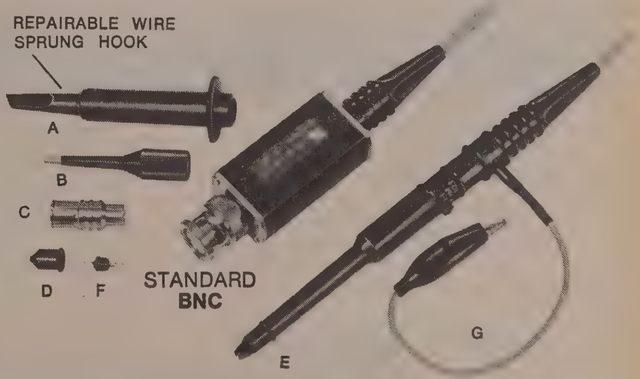
PM1073	Alligator Tip	$3.00
PM1071	Wire Wrap Adapter, Tip	$3.50
PM1072	Wire Wrap Adapter, Gnd.	$3.00
PM1052	Micro Sprung Hook	$2.50
PM1009	Ground Lead 12″	$2.00

2900 SERIES HIGH PERFORMANCE 60 MHz to 250 MHz BANDWIDTH

- RUGGED • RELIABLE
- REASONABLE
- REPLACEMENT TIP & GROUND LEAD
- ADJUSTABLE LF & HF RESPONSE
- ACCEPTS MOST TEK & HP ACCESSORIES
- COMPENSATION FOR MOST SCOPES

READOUT ACTUATOR (RA) OPTION
SWITCHES READOUT ON TEKTRONIX 465, 475, 485 & 7000 SERIES SCOPES (FOR 10X PROBES ONLY)

STANDARD ACCESSORIES



CHARACTERISTICS

MODEL	ATTENUATION	CABLE TERMINATION	BAND WIDTH (MHz)	RISE TIME (NS)	LOADING		DC MAX.	PRICE
					CAP. (PF)	*RES. (M-OHM)		
FIXED ATTENUATION								
2903	1X	STD	25	11	40	1	600V	$25.00
2960	10X	STD	60	5.8	16	10	500V	$30.00
2960 RA	10X	RA	60	5.8	16	10	500V	$40.00
2904	10X	STD	100	3.5	17	10	600V	$35.00
2904 RA	10X	RA	100	3.5	17	10	600V	$45.00
2905	10X	STD	250	1.5	17	10	600V	$45.00
2905 RA	10X	RA	250	1.5	17	10	600V	$55.00
2906	100X	STD	70	5.0	6	100	1.2KV	$55.00
SWITCHED								
			10X/1X	10X/1X	10X/1X	10X/1X		
2901	10X, 1X, GND	STD	100/5	3.5/70	17/100	10/1	600V	$39.00
2902	10X, 1X, GND	STD	250/5	1.5/70	17/100	10/1	600V	$49.00
1064	Engineers Accessory Kit							$12.00

- RA = Readout Actuator, STD = Standard BNC • Cable length 5½ ft.
- On switched probes, probe tip is grounded thru a 9 Meg OHM resistor, when switch is in the GND position • 10X compensation range, 15 to 50 PF

* With 1 Meg OHM Scopes

PTS

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Accurate, stable, quiet frequencies on command, fast. For NMR, imaging, SATCOM, surveillance, ATE. Sources adapting to your needs with options. High demonstrated reliability. Thousands in use.

PTS 040

Range: 0.1-40MHz
Resolution: 0.1Hz-100KHz (opt.)
Switching: 5-20μs
Output: +3 to +13dBm: 50 ohm
Spurious Outputs: −75dB

Phase Noise: −75dBc, (0-15KHz)
Freq. St'd: Oven, TCXO, Ext.
Interface: BCD par. or GPIB
Size: 19″W, 5¼″H, 18″D
Price: $4,175.00*

Other Options:
Progr. Attenuator, 0-90dB
(or 0-99dB with GPIB)
nx10MHz output 20-140MHz
or any 10MHz multiple
from 20-140MHz.

PTS 160

Range: 0.1-160MHz
Resolution: 0.1Hz-100KHz (opt.)
Switching: 5-20μs
Output: +3 to +13dBm: 50 ohm
Spurious Outputs: −75dB

Phase Noise: −70dBc, (0-15KHz)
Freq. St'd: Oven, TCXO, Ext.
Interface: BCD par. or GPIB
Size: 19″W, 5¼″H, 18″D
Price: $5,400.00*

Other Options:
Progr. Attenuator, 0-90dB
(or 0-99dB with GPIB)
nx10MHz output 20-140MHz
or any 10MHz multiple
from 20-140MHz.

PTS 200

Range: 1-200MHz
Resolution: 0.1Hz-100KHz (opt.)
Switching: 5-20μs
Output: +3 to +13dBm: 50 ohm
Spurious Outputs: −70dB

Phase Noise: −70dBc, (0-15KHz)
Freq. St'd: Oven, TCXO, Ext.
Interface: BCD par. or GPIB
Size: 19″W, 5¼″H, 18″D
Price: $6,150.00*

Other Options:
Progr. Attenuator, 0-90dB
(or 0-99dB with GPIB)
nx10MHz output 20-140MHz
or any 10MHz multiple
from 20-140MHz.

PTS 500

Range: 1-500MHz
Resolution: 0.2Hz-100KHz (opt.)
Switching: 5-20μs
Output: +3 to +13dBm: 50 ohm
Spurious Outputs: −70dB

Phase Noise: −63dBc, (0-15KHz)
Freq. St'd: Oven, TCXO, Ext.
Interface: BCD par. or GPIB
Size: 19″W, 5¼″H, 18″D
Price: $7,250.00*

Other Options:
nx10MHz output, 20-140MHz,
or any 10MHz multiple
from 20-140MHz.

*Prices are US only, manual & remote, 1Hz res. with oven std.

PROGRAMMED TEST SOURCES, INC.
Beaver Brook Rd. Littleton, MA 01460 617-486-3008

APO-6

QUANTUM DATA

COLOR CHARACTER GENERATOR

MODEL 801C

The Quantum Model 801C is a programmable RGB video test generator for use in development and manufacture of color monitors and terminals. The unit can be programmed to duplicate the video signals of a given CRT terminal or specific video application. Formats for many CRT applications may be stored in the Model 801C's EPROM, making it an excellent production test generator for companies who manufacture color display monitors for use in terminals. The Model 801C has all the features of the Model 801A plus color capabilities with sixteen selectable color patterns. These patterns allow testing for purity, convergence, gun tracking, geometry, bandwidth, focus, and brightness. Video amplifier characteristics may be accurately determined as color is switched on a dot basis.

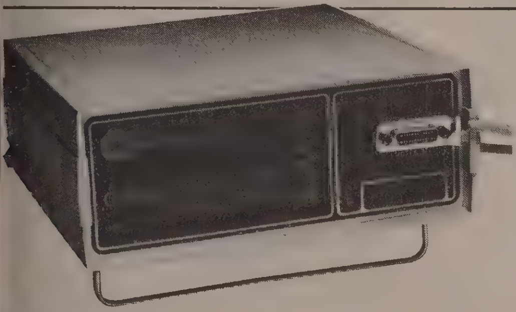
APPLICATIONS

- Production testing of CRT displays.
- Aids in testing of newly designed CRT displays.
- Incoming inspection of OEM CRT displays.

COLOR CHARACTER GENERATOR
801C
QUANTUM DATA

FEATURES

- Sixteen selectable color patterns.
- Programmable dot clock range of 1.024-32.768 MHz color, 1.024-65.520 MHz monochrome.
- Internal frequency synthesizer for variable dot clocks with crystal accuracy.
- Auto-sequencing-color-pattern changes character and background colors to assure equal phosphor usage for life test applications.
- Five selectable monochrome patterns (including crosshatch).
- Lockout switch inhibits unauthorized format tampering.
- 64 character library or make your own characters.
- Up to 256 characters/row by 128 character row/frame (including blanking).
- Custom characters programmable from the keypad.
- Interlace and non-interlace modes.
- Negative video capability.
- Non-volatile CMOS memory stores and recalls four color or monochrome formats.
- EPROM storage of up to 141 user formats.
- Both video and sync timing are entirely programmable by the user.
- Automatic frequency calculation from entered parameters.
- Coded error messages to help identify invalid formats.
- Resident performance check formats.



COLOR SYSTEMS GENERATOR

MODEL 801CE

Now you can bring all of the signal generating power of our Model 801C under direct computer control.

APPLICATIONS

- Computer controlled testing of O.E.M. CRT displays.
- Automatic alignment of CRT displays.
- Mass storage and distribution of test signal formats (in the lab and on the production floor).
- Remotely control custom designed signal buffers and control panels (using the Interflex Bus™).

FEATURES (in addition to those provided by the Model 801C)

- A computer interface to the world standard IEEE-488 General Purpose Interface Bus (GPIB) instead of the 801C's front keypad.
- A computer interface to Quantum Data's Interflex Bus™. Allows the direct attachment of custom-designed devices at very low cost.
- Easy-to-use commands that allow you to program your own custom patterns.
- Thirty-four (34) additional color patterns.

NEW

THE OPIX IMAGER

The OPIX Imager is an extremely flexible test instrument for evaluating raster scanned CRT displays, video DAC's, and video signal formats.

- Full color graphics to 200 MHz dot rate.
- RS232 and IEEE-488 GPIB interfaces.
- Simultaneous video channels.
- Video distribution capabilities for an entire production line.
- Video and sync timing variable on a dot and line basis.
- All timing and color mapping user programmable.

COMPUTERIZED ADJUSTMENT TOOL

CAT 2000

The CAT 2000 allows you to adjust pots, coils and trimmers under direct computer control which interfaces easily through the IEEE-488 GPIB and has accuracy greater than .03 degrees.

APPLICATIONS

- Automating operator based electronic adjustments.
- Perfect tool for addition to adjustment robotics systems.
- Verification of trimmer range.
- Automatic calibration or adjustment.

FEATURES

- A very simple program instruction set.
- Programmable torque of 0-15 ounce inches.
- Velocities up to 5 revolutions per second under program control.
- Rack mountable.
- An increasing family of tools aimed toward the automated industry needs.

BENEFITS

- Saves time by adjusting multi-turn controls stop to stop in just seconds.
- Consistently accurate due to computer control.
- Payback is usually within 6 months.
- Precision unmatched by manual methods of the past.
- Eliminates operator error.
- Reduced operator fatigue.
- Increased product quality.
- Drastically reduces finished product reject rate by having accurate adjustment.

QUANTUM DATA
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COUNTERS
CURRENT TRANSFORMERS
DECADE BOXES
DESIGN & MANUFACTURE CUSTOM TEST EQUIPMENT
DIELECTIC BREAKDOWN TESTER
EARTH TESTERS
ELECTRONIC TEACHING AIDS
GAS INDICATING/ANALYSIS EQUIPMENT
GEL TIME METER
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HYPOT TESTERS
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MULTIMETERS—ANALOG/DIGITAL
OSCILLOSCOPES
PANEL METERS—ANALOG/DIGITAL
PHASE SEQUENCE INDICATOR
PORTABLE STANDARDS
POWER SUPPLIES
PRINTERS
RECORDERS
SAFETY TEST SET (Electrical Tools)
SERVICE & CALIBRATION ON PORTABLE TEST EQUIPMENT (Trace to N.B.S.)
SHUNTS
SOUND LEVEL METERS
STREET LIGHT TESTER
SWITCHBOARD METERS
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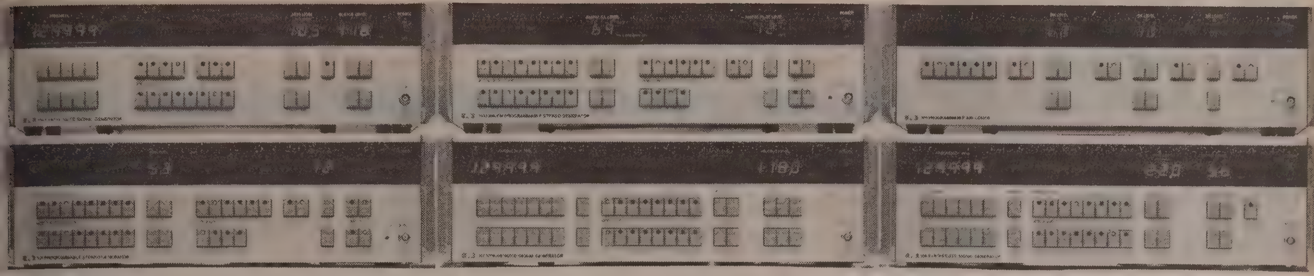


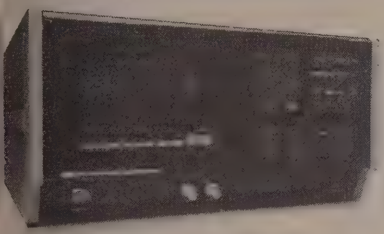
SIGNAL GENERATION

RE107 RE503 RE502
These latest additions to the RE family are capable of producing an AM stereo signal of the Motorola or Magnavox configuration as well as the conventional AM/FM stereo signals. The RE107 is a fully programmable, synthesized signal generator. The RE503 and RE502 are programmable AM & FM stereo generators. A variety of interfaces are available including IEEE/IEC, BCD, and a setup storing memory option.

RE104 RE501
Providing digital programmability, these units are ideal for production applications. These units have the same interface options as the RE107, RE502, and RE503. The RE501 produces the conventional AM/FM stereo signals while the RE104 produces the RF signal in the frequency range of 150 kHz to 30 MHz and 86 MHz to 130 MHz.

RE101 SMG40
These compact instruments are designed exclusively for bench top testing of high quality receivers. The RE101 has a frequency range of 150 kHz to 30 MHz and 87 MHz to 130 MHz. The output is continuously variable with a range of 140 dB up to 1.0V rms RF Output Level. Sweep capabilities are built-in for alignment applications. Signal purity achieved is <.05% THD for FM and <.3% THD for AM. Stereo signals maintain a channel separation in excess of 60 dB.

AUDIO ANALYSIS



RE201 Dual Channel Audio Analyzer
The RE201 makes measurements in the 20 Hz to 25 kHz bandwidth by use of FFT analysis and real-time measurements. It is capable of measuring THD, TIM, IM (SMPTE), DFIM (CCIF), Frequency, Phase, Separation/Crosstalk, RMS (selective, peak), DC, and Wow & Flutter. This multi-processor unit is designed for maximum flexibility with a menu selectable operating system controlled from the front panel keyboard and displayed on the 9" CRT. The maximum capabilities allow THD measurements to less than 0.003%, IM to less than 0.03%, and frequency resolution down to 4 Hz with 80 dB isolation.
The audio source option, digitally generates user programmable waveforms including the complex distortion waveforms and multi-tone signals containing up to 8 single tones. The RE201 is one of the most extensively EMI shielded instruments in the industry. It is fully programmable through the IEEE 488 bus and produces a hard copy of the CRT display through the RS 232 bus.

RE256
The RE256 Dual Channel Audio Analyzer performs the full complement of audio measurements as the RE201 with the exception of DC and Phase. The RE256 meets demanding production needs by providing RMS voltage measurements in 8 msec, frequency measurements in 180 msec, and programmable digital filters for limited bandwidth measurements. Communication is achieved via IEEE 488 bus and a separate controller. Results can be displayed on the RE902 CRT which is provided with the RE256.

RE402/403
The RE402/403 bench top instruments are designed for accurate wow and flutter measurements. The RE402 is capable of measuring frequency drift to an absolute accuracy of 0.01%. Selectable measuring parameters conform to DIN, CCIR, IEC, NAB and JIS standards. The RE403 is a low frequency analyzer, providing 30 discrete LED spectral component displays with 1/3 octave spacing from .2 to 200 Hz.

COMPONENT TESTING

CLT1
Using the non-linearity concept of testing active and passive components, the CLT1 has achieved the West German and Japanese standard for reliability testing. The CLT1 measures the third harmonic voltage generated by a pure 10 kHz input, and can isolate this harmonic 150 dB below the fundamental. With an impedance range of less than 1 ohm to 100 Mega ohms, and the ability to measure up to more than 10 components per second, the CLT1 is an ideal tool instrument for fast, reliable life testing of all components.

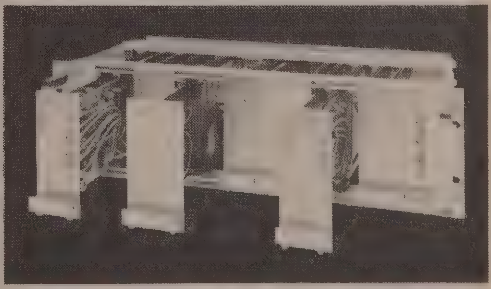
IM6 MEGOHMMETER
The IM6 is a logarithmically scaled measuring device capable of measuring 1 to 10^9 Mohm or 1pA to 1mA in one range. Measurement voltages from 1 to 999 volts in one volt increments are selectable.

MM2 RLC METER
The MM2 is an RLC Meter capable of measuring resistance 3 ohm to 1 Mohm f.s.d., capacitance 3 pF to 100 μF, and 3 μH to 100H f.s.d. Test frequencies range from 1.6 MHz to 160 Hz dependent upon the range. Results are displayed on an analog meter.

FIBER OPTICS

RE601
Optical Time Domain Reflectometer
A patented photon-counting technique, combined with statistical data processing, allows an 80 dB two-way dynamic range to be achieved at 850 nm wavelengths on graded index optical fiber. Measuring such parameters as overall loss or (in real time) splice and connector loss is done from a self contained front panel keyboard. Variable attenuation accuracy of 0.01 dB or better or distance measurements from 0 to 20 km, with a resolution of 5 m to 20 m, can also be made from the keyboard. Any segment of the measured cable can be isolated and evaluated extensively; the results can also be sent to a digital or analog X-Y recorder through IEEE 488 or RS 232C.

Digital Transmission Systems
Digital transmission systems that handle NTSC, PAL or SECAM video signals and up to 18 audio signals on a single optical fiber. Optical transmitter and receiver operate in the short or long wavelength regions. Repeater spacings of more than 60 km are attainable. The equipment is designed as modular rack-mountable units featuring remote monitoring and alarm indicators.
System capabilities include bit-rate transmission to 280 Mb/sec (90 Mb/s & 140 M/bs also available). Applications include network television, secure communications, long-distance telecommunications and CATV trunking.



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Electronics for Test and Communication

RE INSTRUMENTS CORPORATION
31029 Center Ridge Road
Westlake, Ohio 44145
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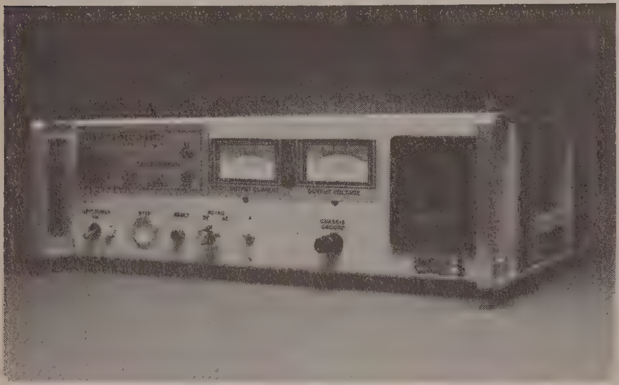
Formerly Radiometer Electronics U.S., Inc

ROD-L

ELECTRONICS, INC.

M100DC HIPOT TESTER



SPECIFICATIONS

Input: 115/230 VAC, 50-60 Hz
Output: Zero to 5.5 kV @ 5 mA (Adj.)
Voltage Rate of Rise: 5000 V/sec. — 50 V/sec. (Adj.)
Test Time: 1-90 seconds (Adj.)
Dimensions: 16¾″ x 5¼″ x 13¼″ (43 x 13 x 34 cm)
Weight: 24 lbs. (11 Kg) net

FEATURES

Ammeter: Reads total output current
The new M100DC Hipot Tester is completely automatic and safe to use. It enables quality assurance and production test personnel to fully comply with worldwide testing standards such as: UL, BSI, VDE, IEC and others.

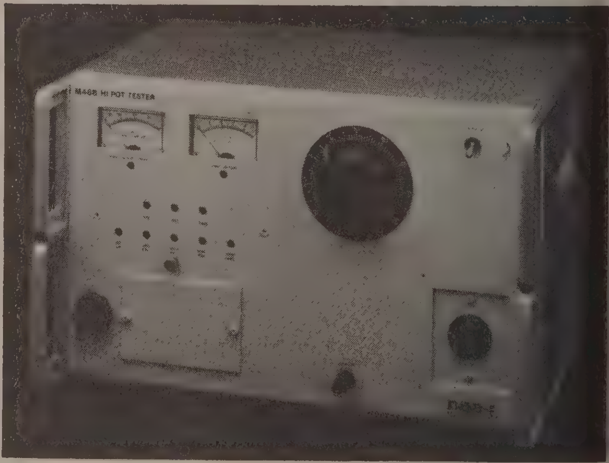
The M100DC performs both high voltage leakage tests and the usual hipot tests. As a special feature, the M100DC performs a one Ampere, AC ground continuity test before and during the hipot test. This continuous test ensures an established ground path between the M100DC and the device under test.

An unusual feature of this precision instrument is its ability to completely shut down the applied high voltage in two milliseconds and at the same time totally discharge the device under test. This action occurs at the conclusion of each test (pass or fail) and ensures a non-destructive test. The output is always clamped to ground until the test is initiated to make certain there are no floating voltages present between tests.

The M100DC includes all of the standard ROD-L solid-state, voltage-control circuitry for precise testing. Voltage regulation is within 1% at full rated load. The circuitry includes a unique auto-calibration mode which enables the desired test voltage and the current trip point to be adjusted. This eliminates the requirement for external meters or loads. Both the voltage rate of rise and the test time are adjustable at the rear panel while the front panel "A/B" switch selects t desired combination of rate of rise and test time each position.

The M100DC is equipped with standard ROD-L fron panel indicators including: Ready, Testing, V-Se I-Set, High Voltage "ON", "FAIL" warning light, Aud ible alarm, Ammeter and Voltmeter, Power switc A/B set-up switch, Rest pushbutton switch, AC/D mode selector switch, Chassis ground binding pos and a "Test Start" switch. The maximum output ratin is 5.5 kVDC at 5 milliamperes. The voltage rate of ris is adjustable from 5000 V/sec. to 50 V/sec. and a tes time lasting from 1 to 90 seconds may be selected. Many options are also available.

MODEL M488 BUS-COMPATIBLE HIPOT TEST SYSTEM



SPECIFICATIONS

Input Power: 115/230 VAC, 50-60 Hz, 300 watts, max mum, 30 watts typical
Test Voltage: User specified — up to 5000 VAC
Output Current: 50 milliamperes, maximum
Voltage Rate of Rise: Three preset rates — each ca range from 1 to 30 seconds
Test Interval: 1 to 90 seconds (bus programmable)
Shutdown: Within 2 milliseconds after any test — pas or fail — without voltage-transient generation
Dimensions: 13½″ x 11″ x 16¾″ (34 cm x 26 cm x 43 c
Weight: 45 lbs. (20.5 Kg)
Color: Mint-gray/olive-gray

ELECTRONICS, INC.

EATURES

- erforms A-C insulation breakdown and ground continuity tests
- pplies a test potential up to 5000 VAC at 50 milliamperes
- 488 Bus-compatible — enables remote programming of test time, voltage rate of rise, current trip points — plus data logging during each test
- omplies with UL, VDE, CSA, BSI and IEC Standards

he M488 Hipot Test System is a self-contained, rugged nstrument that can be operated either manually, or via 488-bus interface. The bus feature is particularly aluable in fast, efficient testing of electronic and elecrical products — hipot testing of power supplies and omponents such as transformers, line filters and ables.

us Programming — Data Logging

he test cycle is fully automatic. The M488 will raise the applied voltage at a predetermined rate of rise, up o the desired test voltage level, and then maintain it or the test time desired. Output voltage, rate of rise, est time and current trip point are bus controlled. Via he bus, the computer can also interrogate the M488 o learn what failure occurred, such as arc or ground ontinuity. It can also request the magnitudes of the otal (complex) current and the resistive (real) current. n addition, a status update of current test parameters an be transmitted.

ontinuous Ground Continuity Monitoring

unique feature of the M488 is its ability to test and ontinuously monitor ground continuity for the duration f each hipot test. This ensures that an inadvertent hock does not occur to the operator and that the quipment undergoing test is not damaged.

or safety, a second security "CHASSIS GROUND" ust be connected to a secure, low-resistance point on he unit under test. The security "CHASSIS GROUND" f the unit under test is monitored and tested electroncally while the high voltage is applied. If the ground ails during the test, the M488 automatically activates ailure operation, i.e., high voltage is shut down and here is a visual and audible alarm.

ow-Voltage, Dead-Short Test

nsures that the device does not have a dead-short rom the energized circuit to ground. The test load ust be at least 1000 ohms. If not, a failure indication s generated.

Superior Safety Features

Designed with operator safety as the primary design rule, the new Hipot Test System incorporates traditional, ROD-L safety features. Electronic shutdown occurs within 2 milliseconds if either dielectric breakdown, over current, or a ground continuity fault occurs. To prevent turn-on surges, high-voltage application is governed by an electronically-controlled rate-of-rise circuit and zero-crossing turn on. A visual indicator warns the operator whenever voltage is present at the test socket. Other indicators, both visual and audible, denote ground continuity loop failure, arc detection and excessive current (both real and total).

Programming Details

Bus Address: Select address from 0 to 30

Test Parameter Configuration: Hipot test parameters — voltage, test time, voltage rate of rise, current trip points — are sent to the M488 before a test can begin. Each number is passed with a semi-colon between it and the next number to delimit the respective parameter fields.

End-of-Line Delimiters: The M488 will support all reasonable combinations of line delimiters — e.g., CR, LF, or EOI (End-or-Identify)

Starting a Test: Send "G" or "GET"

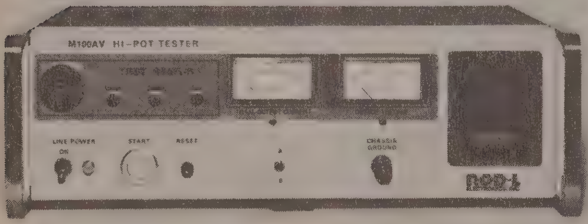
To Request An Update Message: Send "?" at the desired sample point. Set M488 to *TALKER* to receive data. During the test, the Update Message includes the voltage and current as well as the status of the test, and seconds remaining in the test

To Halt or Reset the M488: Send "DCL" (device clear) at any time. This will always asynchronously reset the M488

Test Time-Out: The M488 will either send a "SRQ" (service request) at the end of the test, or it will simply time-out and wait for the final update request from the controller, or DCL

ROD-L ELECTRONICS, INC.

M100/M500 HIPOT/DIELECTRIC WITHSTAND TESTERS



The M100 and M500 Series of ROD-L hipot/dielectric withstand testers are similar in standard features. Both series are made to the highest quality/safety standard. Both series are available in adjustable voltage models.

All models can be specified with or without the adjustable "Real Current Trip Point" feature on the rear panel. "Total Current Trip Point" (Adjustable) is standard on all models in both series. The adjustable voltage models feature rugged varible transformers with precision adjustment features for easy resetting to preselected ranges.

A full range of options is available with all models and in both series as shown in the table.

ROD-L can provide custom designed testers to fit virtually any hipot or similar testing situation. Call the factory in Menlo Park or contact your nearest ROD-L technical representative as listed in EEM's "Yellow Pages."

SPECIFICATIONS

Input: 115/230 VAC, 50/60 Hz: 500 watt maximum
Output: Voltage 0-5000 VAC (user specified)
Voltage Rate of Rise: 5000 V/sec to 50 V/sec
Test Time: Adjustable from 1 second to 90 secs.

CONTROLS/INDICATORS

Voltmeter: Accurate to ±3% F.S.
Ammeter: Total Current accurate to ±3%
Safety Ground: Reject level .5 ohm or .1 ohm (user specified)
Dimensions: 16¾" x 5¼" x 13¼" (43 x 13 x 34 cm) rack mountable
Weight: 30-35 lbs. (13.6 - 15.9 Kg)

FEATURES

- Front panel receptacle, rated to withstand 8000V, for direct plug-in of device under test or for plug-in of test fixture.
- Security chassis receptacle for ground continuity tests. Test performed for duration of Hipot Test at 1 Amp at 1 Volt; .1 ohm or .5 ohm resistance (user specified).
- Analog current and voltage output meters for easy reading.
- Electronically controlled voltage rate-of-rise to ensure gradual, smooth and consistent rise time (eliminates harmful voltage spikes).
- Electronically controlled voltage shutdown. Fast shutdown (2 ms) prevents harm to operator and protects the device under test.
- Electronic, adjustable timing circuit to provide accurate, reliable test time.
- Completely solid state for reliability.
- Rack mountable.
- Audible and visual indication of breakdown and continuity failure.
- Recessed START button to prevent accidental testing.
- Compliance to all U.L., C.S.A., B.S.I., V.D.E., I.E.C., and F.C.C., etc. test requirements.
- Rate of rise and test time select switch allow easy test parameter changes.
- Over current failure potentiometers allow continuous trip point selection of any current level up to full scale output (real current failure potentiometer available on BV model only).
- Variac allows continuous output voltage selection from zero to full scale.

M100AVS5 SERIES

Maximum Output Voltage	Maximum Current Limit			
	10 mA	25 mA	40 mA	50 mA
1500 VAC	●	●	●	●
2800 VAC	●	●	●	
5000 VAC	●	●		

M500AVS5 SERIES

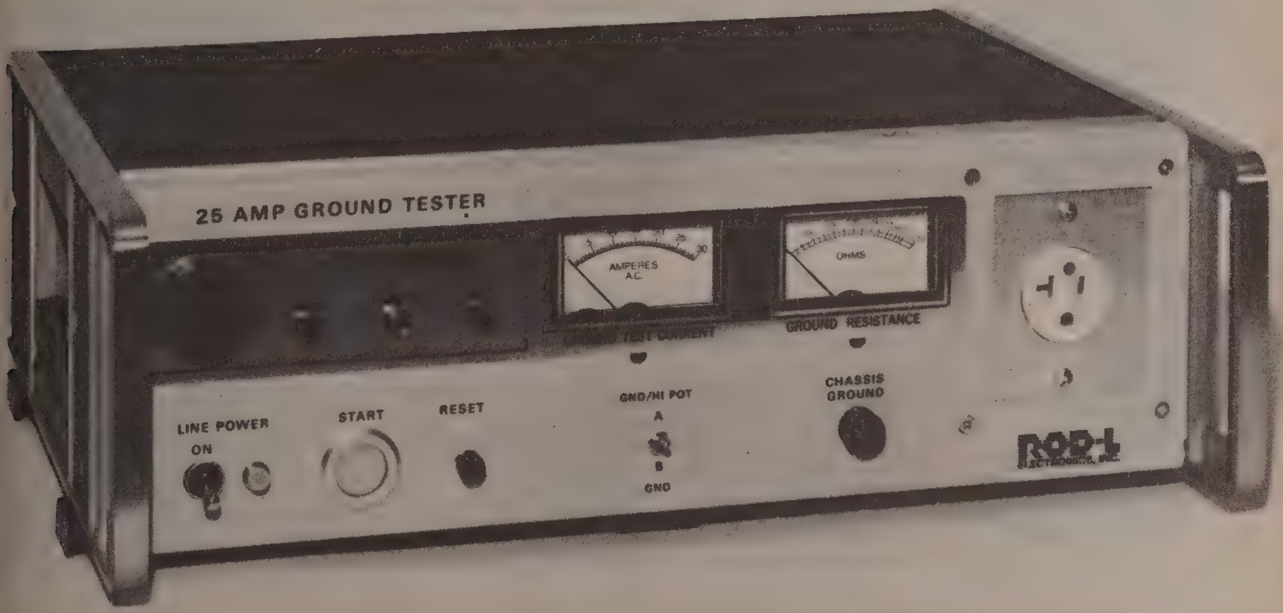
Maximum Output Voltage	Maximum Current Limit		
	100 mA	200 mA	350 mA
1500 VAC	●	●	●
2800 VAC	●	●	
5000 VAC	●		

OPTIONS

Suffix	Description
01	Remote Control — used TTL control signals
02	Front Panel test time adjustment
03	Front Panel rise time adjustment
04	Under-Current/Dual Interlocked start switch
06	Rear Panel lockout cover
08	5 Position switch selected failure point
09	100 μA F.S. trip
10	Audible Test tone
14	Special pin configuration — rear panel H.V. connecto
15	Rack mount kit
16	Divide by 10 current trip
18	Ohms sense

ROD-L ELECTRONICS, INC.

25 AMP GROUND CONTINUITY TESTER



ROD-L Ground Continuity Testers are manufactured to he most rigorous quality standards to ensure maxinum accuracy for testing and the greatest degree of safety for the operators. The standard ground coninuity tester shown here is equipped for 2.5 Volts output and 25 Amps (40 Amps maximum available). This equipment is rack mountable and may be nterconnected with other ROD-L test equipment for a complete testing system.

An interesting combination consists of the 25 Amp Ground Tester in combination with any ROD-L hipot ester. The ground tester features a hipot interface as standard equipment. Remote controls may be specified as an option. This tester is essential equipment for esting your products in compliance with European safety standards such as B.S.I. (United Kingdom) and V.D.E. (Germany).

SPECIFICATIONS

Input: 115/230 VAC, 50-60 Hz

Output: 2.5 Volts (fixed), 25 Amps (40 Amps max available)

Voltage Risetime: Instant ON at zero crossing

Test Time: 5 - 7 seconds recommended, internally controlled

CONTROLS

Ammeter: Indicates actual ground current 0-30 Amps. Accurate to ±5% F.S.

Ohm Meter: 0-0.15 ohms. Accurate to ±5% F.S.

Dimensions: 16¾″ x 5¼″ x 13¼″ (43 x 13 x 34 cm). Rack mountable.

Weight: 20 - 23 lbs. (9.1 to 10.4 Kg)

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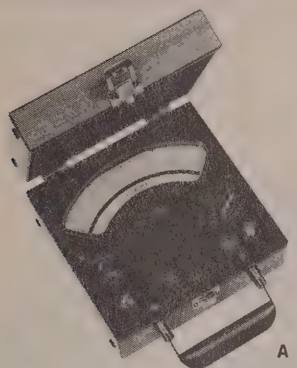
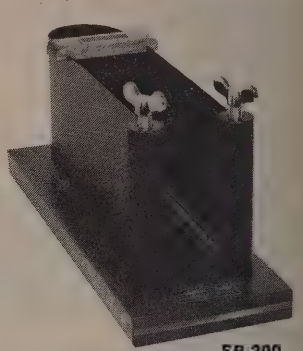
THERMOCOUPLE METERS
AC-DC WATTMETERS


A

Thermocouple instruments offer the user significant advantages in frequency response and sensitivity over other AC types with true rms response. They can be used on DC and AC from 7 cps to 20 Mc/s, and in instances where UHF thermal converters are employed, this frequency range can be extended to over 100 Mc/s. **Sensitive Research** thermoelements have excellent AC/DC transfer characteristics (low reversal). Thermocouple instruments can be calibrated directly on DC and only their AC/DC difference, or frequency influence, has to be checked by AC transfer methods. A thermocouple field replacement feature (TRF) is supplied in the Models A and AU. Automatic or manual "Push to Read" overload protection is available. Automatic temperature compensation from 20° to 30° C is standard (except University Model).


SR-300

Standard Current Shunts

RF

Audio Frequency Volt and Milliammeters

Model A series consists of AC/DC multirange milliammeters and single or multirange voltmeters. Accuracy is ±0.5% fs (±0.75% for instruments with fs ranges of 3 ma or less or a sensitivity of 500 ohms/v). Multirange combinations are offered from 1 ma to 1.5 amps; 0.2 v to 1.5 kv. Frequency range is 7 cps to 7 Kc/s on voltage and 7 cps to 15 Kc/s on current. Sensitivity is 100, 200 or 500 ohms/v. 6.3" scale length. (Single range milliammeters have a frequency response up to 1 Mc/s and are listed under Model RF.) Model AU is identical to the Model A, except frequency range is extended to 35 Kc/s on voltage and 20 Kc/s on current.

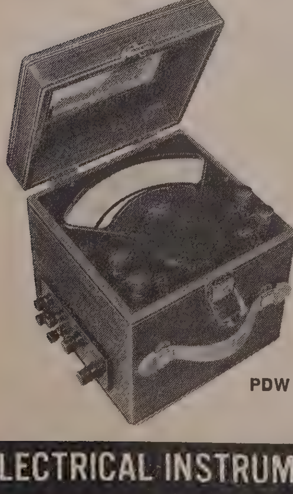
University

Radio Frequency Volt, Amp and Milliammeters

Model RF series consists of AC/DC single range and multirange instruments for use up to 20 Mc/s. Model RF multirange voltmeters utilize special switching to increase frequency range considerably beyond normal limits of other instruments containing this operational feature. Frequency influence is negligible over the first 20% of their frequency span. Accuracy is ±0.5% fs + (±0.5% max. frequency influence) on multirange units from 1 v (5 Mc/s) to 300 v (150 Kc/s). Instruments with a single range of 1 v or 3 v have a ±0.5% frequency response to 10 Mc/s. RF ammeters and milliammeters are available with accuracies of ±1% fs from 1 ma to 100 amps. 6.3" scale length.

Compact Thermocouple Instruments

University Model comprises a series of ±0.75% accurate, low cost, small sized milliammeters and voltmeters for AC/DC measurements up to 7.5 Kc/s (single range milliammeters up to 500 Kc/s). Multirange instruments are switch controlled. Up to 7 fs ranges available from 2 ma to 1 amp or 200 mv to 300 v (100 or 500 ohms/v). 4" scale length. University Model is comparable in general construction quality to Model A, but has certain limitations in range, frequency response, resolution and the accessory features it can contain (temperature compensation, TRF, etc.), because of relatively small size.


PDW

Polyphase Wattmeters

Model PDW is a multirange 2 element AC/DC electrodynamometer wattmeter for the measurement of single and 3 phase power down to 50% PF and up to 800 cps. Can be used in 3 phase 3 wire circuits, single phase 3 wire circuits and 3 phase 4 wire circuits. Indicates 3 phase power for any combination of balanced or unbalanced loads. Accuracy ±0.5% fs. 6.3" scale length. Model PDLW is a ±0.75% accurate wattmeter for use down to 20% PF and up to 500 cps. 5.2" scale length. Compensating inductor available for third leg of 3 phase circuits to balance load imposed by wattmeter insertion.

ELECTRICAL INSTRUMENT SERVICE, INC. *25 DOCK STREET, MT. VERNON, N.Y. 10550*

AC-DC WATTMETERS GENERAL PURPOSE INSTRUMENTS

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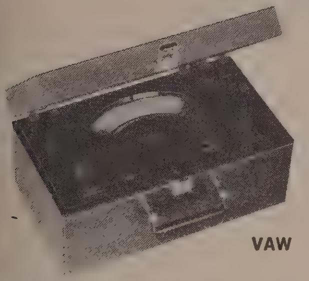

VAW

Volt-Amp-Wattmeter

Model VAW, volt-amp-wattmeters, are transformer-coupled electrodynamometers that make 50 to 125 cps or 50 to 800 cps tare-free compensated measurements of AC power down to 50% PF in 12 ranges from 12.5 w to 5 kw fs. Has potential drop ranges of 25/50/100/200/500 v fs; current ranges of 0.5/15/10 amps fs (12.5/25 w and 25/50 v included in 50 to 125 cps model only). Accuracy on current and voltage ranges ±0.5% fs; on watts ±0.75% fs. Switch controlled ranges. Measures all circuit parameters without necessity of changing external connections. Special 10 ma range for current measurements only. 5.2″ scale length. Self-contained in portable case.

Single Phase Wattmeters

Model DW is a ±0.25% accurate single phase AC/DC electrodynamometer wattmeter for use down to 50% PF and frequencies of 25 to 800 cps (2500 cps on special order). Overall accuracy, ruggedness and stability make it ideally suited for use as either a calibration standard or general purpose testing instrument. 6.3″ scale length. Y Boxes available for measurements of balanced 3 phase power. Model DLW is a single phase ±0.5% accurate wattmeter for use down to 20% PF and up to 500 cps. University Model, having accuracies of ±0.5% fs down to 50% PF and ±0.75% down to 20% PF, is a compact version of the Models DW and DLW. Has the advantage of being more economically priced than these instruments while covering essentially the same wide measuring range. Molded bakelite case. 4″ scale length.

DW

Differential Instruments

Model SD measures the difference between two DC currents or voltages. Inputs are isolated. Accuracy is ±0.5% fs for most ranges between 2 μa and 500 ma. Normally furnished zero center. Uniqueness is ability to withstand sustained overloads of 1000% which results in a 10X increase in comparison accuracy and scale resolution. 5.2″ scale length. Model JD is a differential galvanometer with a 3.25″ scale length that permits higher sensitivity. Suitable for horizontal bench mounting. Model JDJW-4 is an edgewise panel instrument with a 4″ scale length.

DC Reference Standards

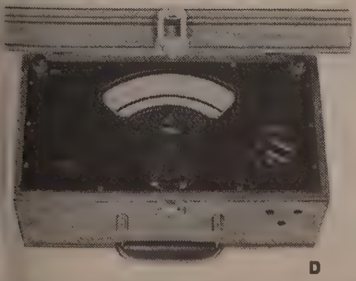
Model C is a rugged ±0.25% fs accurate permanent magnet moving coil electrical indicating instrument. Moving element features an exceptionally high torque to weight ratio. 6.3″ scale length. Up to 9 self contained ranges available in switch controlled multirange combs. from 50 μv and 50 mv DC fs. Millivoltmeter available calibrated for use with external heavy current shunts. Sensitivities to 20,000 ohms/v. Design emphasis is on stability and sturdiness for long term accuracy and reliability.

Model S is a deluxe high sensitivity ±0.5% fs accurate instrument of the same superb quality and physical dimensions as the Model C. Up to 9 switch controlled ranges in various combs. available from 1.5 μa to 1 mv fs. Sensitivities to 500,000 ohms/v (1,000,000 ohms/v when zero center). Constant resistance multirange microammeters available for special applications. Low range millivoltmeters are particularly suited for use with thermal converters for ultra high frequency AC measurements. Model HS is an ultra high sensitivity multirange millivoltmeter designed mainly for use in corrosion and electrolysis measurements. Model J is a ±0.5% accurate instrument made primarily to use as a bench mounted, pointer type, high sensitivity galvanometer.

N51

Model N is a low cost permanent magnet moving coil instrument with many features of higher priced indicators. Accuracy is ±0.5% or ±0.25% fs as required. Housed in a rugged plastic case for field use. Up to 5 switch controlled ranges available from 50 μa and 50 μv (up to 50 amps self contained). Sensitivities to 5000 ohms/v. 6.1″ scale length.

University Model is a low cost, compact, ±0.5% accurate version of the Model S, having slightly less sensitivity and resolution. Up to 5 switch controlled, self contained ranges from 2 μa and 2 mv fs. Sensitivities to 5000 ohms/v. 4″ scale length. Model UTS is a portable DC test set with 4 University Model indicating instruments to measure from 50 μa to 60 amps and 20 mv to 1200 v. Contains a Wheatstone Bridge, a decade resistance box and all necessary switching and facilities to make potentiometer voltmeter, zero resistance, DC power and high resistance voltmeter measurements.


D

AC and AC/DC Reference Standards

Model D is a rugged AC/DC ±0.25% fs accurate dynamometer electrical indicating instrument. 6.3″ scale length. Up to 4 self contained ranges available in switch controlled multirange combs. from 1.5 to 1000 v and 5 ma to 20 amps. Frequency response DC, 25 to 2500 cps.

Model MI is a rugged ±0.5% fs accurate moving iron electrical indicating instrument. Up to 3 self contained ranges available from 10 ma to 20 amps and 7.5 to 750 v. Frequency response 25 to 500 cps. 6.3″ scale length. Special transformer coupled voltmeter has 8 switch controlled ranges from 3 to 750 v fs. Model NSI is a low cost ±0.5% fs accurate version of the Model MI. Housed in a molded plastic field case. 6″ scale length. University Model is a compact low cost ±0.5% fs accurate version of the Model D. Up to 4 ranges available from 10 ma to 1 amps and 30 to 750 v. Frequency response DC, 25 to 125 cps (500 cps on special order). 4″ scale length.

ELECTRICAL INSTRUMENT SERVICE, INC. *25 DOCK STREET, MT. VERNON, N.Y. 10550*

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HIGH VOLTAGE MEASUREMENT

PARK

High Voltage Divider

Model PARK Voltage Divider is constructed to a design by J. H. Park. (Ref: "Journal of Research" of National Bureau of Standards, Engineering and Instrumentation Vol. 66C, No. 1, Jan.—Mar., 1962. Reprints available upon request.) It is similar to the NBS standard employed in their calibration of high voltage instruments. Each 100 kv divider consists of 100 individually shielded one-megohm resistors, matched to each other to achieve an approximate temperature coefficient of less than 1 ppm/°C, and connected in series to form a vertical helix between a ground plate and a high voltage electrode. Uniquely shielded, testing indicates that corona, heating and leakage errors are less than 10 ppm at less than 10 ppm at 50 kv and 50 ppm at 100 kv.

The divider's special "hat" is designed to give uniform gradients from the high voltage electrode to ground and allows stacking of additional 100 kv units for higher voltage measurements. Each unit is only 22¼" high! DC Ratio Accuracy: ±.05%, 100 kv to 1 v; ±.5%, 100 kv to 1 kv. AC Ratio Accuracy: ±.5%, 50 kv (max.) to 500 v. (60 cps only). Recommended readout instrument at 1 v output tap is a precision DC potentiometer, at 1 kv tap (.5 kv on AC) recommended instrument is a ±.5% accurate electrostatic voltmeter (**Sensitive Research** Model ESD described below).

Special High Voltage Dividers

Based on experience with the many Park Dividers already manufactured and their proved reliability, special designs have been constructed and proposed. These special dividers are essentially the same as the Park except for such criteria as sensitivity and size. Designs up to 600 KV DC at ±1% accuracy have been constructed and successfully used by our customers. Dividers for use up to 1,000,000 volts are under consideration. Although most designs considered so far have been for single ranges, there is no particular objection to building a divider with several ranges. Present certification by NBS is limited to 100 KV but higher ranges can be calibrated by "bootstrapping" methods.

DCHI

DC Kilovoltmeter (multirange)

Model DCHI is a multirange permanent magnet moving coil, DC kilovoltmeter. Available at 50,000 ohms/v, ±1% fs accuracy, ranges of 1.5/3/7.5/15 kv or 3/7.5/15/30 kv, and at 75,000 ohms/v, ±.5% fs accuracy, ranges of 2/5/10/20 kv. The indicator is a University Model ±.5% accurate microammeter with a 4" scale length. It is self-contained in a moulded bakelite case and internally bracketed to the instrument panel. Size: 13¾" x 7½" x 8" h.

ELECTROSTATIC VOLTMETER

ESH

Electrostatic Voltmeter (high voltage)

Model ESH AC/DC electrostatic voltmeter is available as a single range instrument up to 100 kv fs (140 kv DC only), or with as many as 4 switch-controlled ranges from 5 to 50 kv fs. DC input resistances to 5 x 10^{15} ohms. Capacitance varies from approx. 30 mmfd on 5 kv range to 10 mmfd on 50-100 kv ranges. Reads true RMS. Accuracy is ±1% fs (±.5% up to 30 kv on special order). 6" scale length. Transit lock and brackets for panel mounting available. Maximum frequency usage is expressed as follows: f = 2 fCE, where f = max. allowable operating frequency, C = capacitance of instrument in farads, E = voltage in volts.

ESD

Electrostatic Voltmeter (portable)

Model ESD portable AC/DC electrostatic voltmeter is available as a single or multirange instrument to measure from 120 to 6 kv fs. Insulation resistance is 1 x 10^{15} ohms. Capacitance varies from approx. 225 mmfd for a 120 v range to 20 mmfd for a 6 kv range. Multirange instruments are designed for AC/DC measurements on first range, AC only on higher ranges. ±.5% to 1% fs accuracy (±1.5% for ranges of 150 v and less). 5.2" scale length. Size: 7¾" x 7½" x 6$\frac{1}{16}$". Available as edgewise panel instrument with the same performance characteristics except insulation resistance approx. 1 x 10^{13} ohms.

Electrostatic Voltmeter (small portable)

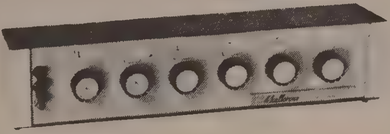
University Model is a smaller, more economical version of the portable Model ESD. Single and multirange instruments available from 300 v to 5 kv fs. ±1% fs accuracy. 4" scale length. Moulded bakelite case. Size 5¼" x 5" x 4⅜".

ELECTRICAL INSTRUMENT SERVICE, INC. *25 DOCK STREET, MT. VERNON, N.Y. 10550*

PRECISION INSTRUMENTS

PRECISION RESISTANCE DECADES

SERIES 6800



SPECIFICATIONS

DC Accuracy at Terminals

±.02% 10 ohms and above

±.003 ohms below 10Ω

Zero Resistance

2 milliohms ±2 milliohms per decade (approximate). Each instrument is supplied with exact reading.

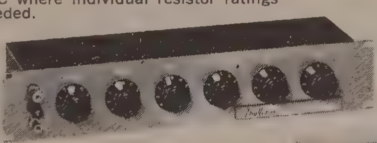
Wattage Rating per Step

½ watt above 1 ohm, ¼ watt for .1 ohm steps, .16 watt for .01 ohm steps.

Maximum Voltage

1500 volts DC where individual resistor ratings are not exceeded.

SERIES 800



SPECIFICATIONS

Resistor DC Accuracy

±.05% 10 ohms and above
±1% .1 ohm to 10 ohms
±5% .01 ohm to .1 ohm

Stability per Year

±.01% when operated within rated wattages over 10°C-40°C range.

Temperature Coefficient

Less than ±20 PPM 20°C-30°C.

Maximum Wattage

½ watt per resistor.

Maximum Voltage

2000 volts DC if wattage rating for resistors is not exceeded.

6800 SERIES BENCH AND RACK MOUNTED DECADE MODELS

Bench Model No.	Rack Model No.	No. Dials	Resistance Step Increments (Ohms)	Total Resistance (Ohms)	Bench Size (Inches)
6840	6840 RM	4	.01	111.1	17⅓ x 5 x 5
6841	6841 RM	4	.1	1,111	17⅓ x 5 x 5
6842	6842 RM	4	1	11,111	17⅓ x 5 x 5
6843	6843 RM	4	10	111,110	17⅓ x 5 x 5
6844	6844 RM	4	100	111,000	17⅓ x 5 x 5
6845	6845 RM	4	1,000	110,000	17⅓ x 5 x 5
6850	6850 RM	5	.01	1,111.1	19½ x 5 x 5
6851	6851 RM	5	.1	11,111	19½ x 5 x 5
6852	6852 RM	5	1	111,110	19½ x 5 x 5
6853	6853 RM	5	10	111,100	19½ x 5 x 5
6854	6854 RM	5	100	111,000	19½ x 5 x 5
6860	6860 RM	6	.01	11,111.1	19½ x 5 x 5
6861	6861 RM	6	.1	111,111	19½ x 5 x 5
6862	6862 RM	6	1	111,110	19½ x 5 x 5
6863	6863 RM	6	10	111,100	19½ x 5 x 5

800 SERIES BENCH AND RACK MOUNTED MODELS

Bench Model No.	Rack Model No.	No. Dials	Resistance Step Increments (Ohms)	Total Resistance (Ohms)	Bench Size (Inches)
817-A	817 ARM	4	.01	111.1	9⅝ x 7¼ x 5¼
819	819 RM	4	.1	1,111	9⅝ x 7¼ x 5¼
825	825 RM	4	1	11,110	9⅝ x 7¼ x 5¼
826	826 RM	4	10	111,100	9⅝ x 7¼ x 5¼
827	827 RM	4	100	1,111,000	9⅝ x 7¼ x 5¼
828	828 RM	4	1,000	11,110,000	9⅝ x 7¼ x 5¼
817-B	817 BRM	5	.01	1,111.1	10⅞ x 6¼ x 5¼
8285	8285 RM	5	.1	11,111	10⅞ x 6¼ x 5¼
829	829 RM	5	1	111,110	10⅞ x 6¼ x 5¼
830	830 RM	5	10	1,111,100	10⅞ x 6¼ x 5¼
831	831 RM	5	100	11,111,000	10⅞ x 6¼ x 5¼
817-C	817 CRM	6	.01	11,111.1	10⅞ x 6¼ x 5¼
8315	8315 RM	6	.1	111,111	10⅞ x 6¼ x 5¼
832	832 RM	6	1	1,111,110	10⅞ x 6¼ x 5¼
833	833 RM	6	10	11,111,100	10⅞ x 6¼ x 5¼

6800 AND 400 SERIES UNMOUNTED DECADES — SPECS EQUAL TO 800 AND 6800 SERIES

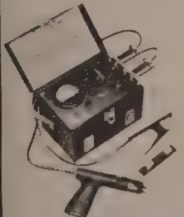
Dials	Ohm Steps	Total (Ohms) Resistance	Weight (Lbs.)	Model No.	Dimensions (Inches)	Model No.	Dimensions (Inches)
1	.01	.1	½	6800	2⅞ x 3	435	3 x 3
1	.1	1	½	6801	2⅞ x 3	436	3 x 3
1	1	10	½	6802	2⅞ x 3	437	3 x 3
1	10	100	½	6803	2⅞ x 3	438	3 x 3
1	100	1,000	½	6804	2⅞ x 3	439	3 x 3
1	1,000	10,000	½	6805	2⅞ x 3	440	3 x 3
1	10,000	100,000	½	6806	2⅞ x 3	441	3 x 3
1	100,000	1,000,000	½	6807	2⅞ x 3	442	3 x 3
1	1,000,000	10,000,000	½	6808	2⅞ x 3		

VALUE IN RESISTANCE MEASUREMENT

GALVANOMETER SYSTEMS WITH INTERNAL MAGNET CONSTRUCTION

Part No.	Sensitivity/ Div. in Micro-amps	Period Seconds	Coil Resistance	External Critical Damping Resistance
1961-A	1.0	3	250	950
1961-B	0.5	3	1000	2400
1961-C	2.0	3	50	125
1961-D	4.0	3	20	50
1966-B	0.25	4	1000	2000
1966-C	1.0	4	50	100
1964-D	1.5	4	30	40

670 SERIES LOW RESISTANCE TEST SETS

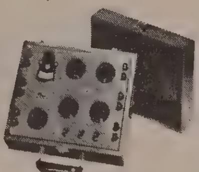


Six portable test sets offering the facility and operating speeds necessary for efficient production line testing of low resistances. Applications include the testing of welding bond resistances, welding cable resistances, switch contact resistances, etc. Six different measurement ranges (see chart below) with accuracies of ±5% of full scale values are available. A pistol grip probe and fixed clamp are standard accessories to facilitate production line tests.

657B pistol grip probe
676 fixed clamp
271 test standard 0.0025 ohm ±2%

Shallcross Type	No. of Ranges	Ranges in Ohms — Reading From 0 to Full Scale Value Indicated
670-A	6	0.001 0.005 0.01 0.05 0.10 0.50
673-D	5	0.005 0.01 0.50 1.0 5.0

638-R KELVIN WHEATSTONE BRIDGE



A portable Kelvin Wheatstone Bridge offering exceptional versatility and practicality. Wide measurement range is afforded by integrated Kelvin (.001 ohm to 10 ohms) and Wheatstone (1 ohm to 11 megohms) circuits. Internal galvanometer and compartment for 3 (1.5 volt) flashlight batteries supply portable operation in 0.1 ohm to 50,000 ohm range. Binding posts to connect external galvanometer (.005MA/MM sensitivity) and power supply (1 to 45 volts) supplied for higher resistance measurements. Limits of error are ±.75% (Kelvin circuit) and ±.2% (Wheatstone circuit). Rheostat arm is brought out to two binding posts to provide resistance decade operation (11,110 ohms on 1 ohm step increments) with ±.1% accuracy above 10 ohms and ±.25% for 1 ohm steps. Separate current and potential terminals are available for low resistance measurements.

6100 WHEATSTONE-FAULT LOCATION BRIDGE

All purpose portable instrument for laboratory and field resistance measurements. Fault location capabilities of wires and cables performed with, Murray, Varley, Hilborn and Fisher loop tests. DC resistance from 1 ohm to 1.011 megohms with ±2% limit of error. Built-in galvanometer and compartment for 3 (1.5 volt) flashlight batteries permit portable measurements to 50,000 ohms — binding posts to connect external galvanometer and power supply available for testing of higher resistances. Rheostat arm of bridge connects to two binding posts for decade resistance operation. Available housed in weatherproof metal case and removable lid or with wooden case and removable lid.

SHALLTRONIX CORPORATION

P.O. BOX 235, SELMA, NORTH CAROLINA 27576
TELEPHONE: (919) 965-6346

Coil & Winding Testers

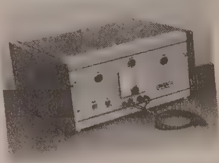
WRITE FOR DATA SHEETS ON THE UNITS SHOWN. ALL ARE STANDARD PR-ff-OD-f1-UCTION ITEMS, AVAILABLE FOR EARLY DELIVERY . . . LET US QUOTE ON YOUR REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL TEST EQUIPMENT.

SLAUGHTER COMPANY

P.O. BOX 1805 ARDMORE, OKLAHOMA 73402
TELEPHONE (405) 223-4773

Ground Lead Tester

checks resistance at high current



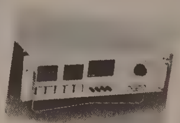
SERIES **204**

0/.25 ohms

TESTS GROUND LEAD INTEGRITY UNDER HIGH CURRENT—RESPONDS TO POOR CONNECTIONS AND FAULTY STRIPPING—MEASURES ACTUAL AC RESISTANCE—GO/NO-GO OPERATION FOR HIGH PRODUCTION.

Precision Digital Ohmmeter

. . . for accurate resistance testing



SERIES **203**

0.001 — 19.99K Ohms Range

CONSTANT CURRENT 4 WIRE SYSTEM . . . SELF PROTECTING . . . GO/NO-GO LIMIT STYLE WITH BUZZER REJECTION SIGNAL . . . 3½ DIGIT READOUT.

Adjustable Limit Megohmmeter

. . . with buzzer signal on rejections

SERIES **205**

1 to 20,000 Megohms

DRIFT FREE . . . NO WARM-UP . . . RUGGED TAUT BAND MOVEMENT . . . ADJUSTABLE REJECTION LIMIT WITH BUZZER SIGNAL.

Resistance Deviation Bridge

. . . for precision high speed testing

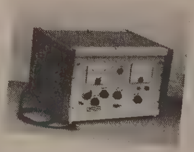
SERIES **223**

0.01/10,000 Ohms

LESS THAN 0.2 SEC. RESPONSE . . . SOLID STATE . . . SELF CALIBRATING INDICATES PERCENT DEVIATION . . . ADJUSTABLE HIGH/LOW LIMITS WITH BUZZER SIGNAL FOR GO/NO-GO TESTING.

Adjustable HI Voltage Surge Tester

. . . tests coils and windings for shorts
. . . grounds
. . . opens



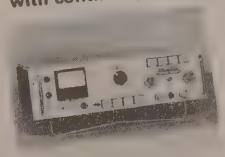
SERIES **648**

Ratings to 10,000 Volts

DIRECT READING PULSE-SURGE TESTER . . . REQUIRES NO ACTIVE MASTER . . . PRECISE ENERGY CONTROL . . . GO/NO-GO OPERATION FOR UNSKILLED PERSONNEL.

Combination Dielectric Tester

with continuity test for
ground lead
line shorts
line opens
breakdowns

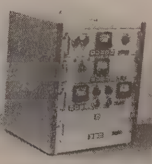


SERIES **116**

SERIES 116 BREAKDOWN TEST CIRCUITRY COMBINED WITH GROUND LEAD CONTINUITY TEST SECTION AUTOMATICALLY PERFORMS GROUND LEAD AND DIELECTRIC TESTS IN SEQUENCE IDEAL FINAL TEST STATION FOR SIMPLE APPLIANCES.

Automatic Coil & Winding Test Station

micro-processor controlled . . . coils
. . . armatures
. . . stators
. . . fields



SERIES **720**

Test Rates to 1000 Parts per Hour

READY-TO-GO PACKAGE HANDLES 90% OF COIL WINDING TEST APPLICATIONS . . . QUICK CHANGE TEST FIXTURES . . . FULLY AUTOMATIC GO/NO-GO CYCLE.

Automatic Test Equipment

WRITE FOR DETAILS ON THE EQUIPMENT SHOWN. THESE THESE ARE FULLY ENGINEERED, PROVEN, STANDARD DESIGNS AVAILABLE ON A REASONABLE DELIVERY SCHEDULE . . . LET US QUOTE ON YOUR REQUIREMENTS.

SLAUGHTER COMPANY

P.O. BOX 1805 ARDMORE, OKLAHOMA 73402
TELEPHONE (405) 223-4773

High Speed Circuit Tester

. . . for accuracy and integrity

SERIES **703**

3000 Tests per Minute

SELF PROGRAMMING FOR TESTING UP TO 500 POINTS . . . MICRO PROCESSOR CONTROLLED . . . GO/NO-GO OPERATION DIGITAL READOUT OF FAULT AND LOCATION.

Automatic Cable & Harness Tester

. . . for continuity . . . breakdowns
. . . megohms

SERIES **707**

Expandable to 500 Points

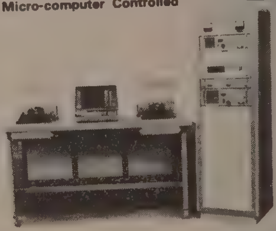
Micro-Processor Controlled

SELF PROGRAMMING WITH MAGNETIC TAPE CASSETTE STORAGE AND RECOVERY OF PROGRAMS . . . MODULAR CONSTRUCTION . . . TESTING RATES TO 3000 CIRCUITS PER MINUTE . . . GO/NO-GO OPERATION . . . DIGITAL READOUT.

Automatic Test System GPIB Configuration

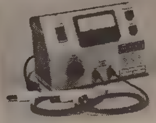
Micro-computer Controlled

SERIES **727**



MOST SOPHISTICATED AVAILABLE . . STANDARD GPIB BUS . . FULLY PROGRAMMABLE COMPONENT TEST PANELS AND OTHER SYSTEM ELEMENTS . . . TURN KEY (INCLUDING SOFT WARE) OR COMPONENT ELEMENT FORM . . .

NEW - Design To Meet Advanced Agency Requirements High Voltage Dielectric Strength Tester



Model
306-3.0

Variable Voltage to 3 Kilovolts AC
Variable Sensitivity to 120 Kilohm or Better

THIS ADVANCED TESTER OFFERS GREATER SENSITIVITY AND MEETS NEWLY ESTABLISHED AGENCY REQUIREMENTS. **ENGINEERED FOR MAXIMUM OPERATOR CONVENIENCE AND SAFETY.**

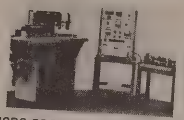
PROGRAMMABLE INSULATION LEAKAGE TESTERS

PROGRAMMABLE ON IEEE-488 GPIB

SERIES
727

VOLTAGE AMPLITUDE ... VOLTAGE RATE OF RISE/FALL ... CURRENT LIMIT THRESHOLD ... REAL/TOTAL I SELECT (AC UNIT) ... DWELL TIME ... CHARGE TIME (DC UNIT)
- ARC DETECTION CIRCUITRY
- ZERO CROSSING H.V. ENABLE
- COMBINATION CABINET (EIA OR BENCH-TOP)

Time Sharing ATE Package For High Speed Testing Of Wound Armatures



SERIES
720 ES

MICRO-PROCESSOR BASED CONTROL . . . FLEXIBLE TIME SHARING OF MODULAR INSTRUMENTATION EQUIPMENT BETWEEN AUTOMATED IN-LINE TEST STATION AND OFF-LINE MANUAL REPAIR TEST FIXTURE. TURN KEY PACKAGE PROVIDES A COMPLETE ELECTRICAL SCAN TESTING SCHEDULE.

SLAUGHTER COMPANY

TURN-KEY TEST SYSTEMS ARE CREATED BY COMBINING OUR STANDARD FIELD TESTED AND REFINED UNITS AS NECESSARY TO DO THE JOB AT HAND. WHEN YOU COME TO US FOR A TEST SYSTEM, YOU DO NOT HAVE TO PAY FOR ENGINEERING THE JOB FROM THE BOTTOM UP, NOR DO YOU HAVE TO LIVE THROUGH AN EXTENSIVE DE-BUGGING PERIOD.

STANDARD PRACTICE IS TO SUPPLY ALL SYSTEMS IN SOLID STATE MICRO-PROCESSOR CONTROL CONFIGURATION.

Test With Confidence

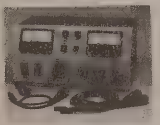
New Products for 1984

WRITE FOR DATA SHEETS ON THE INSTRUMENTS SHOWN . . . ALL ARE STANDARD PRODUCTION MODELS, AVAILABLE FOR IMMEDIATE DELIVERY FROM STOCK . LET US QUOTE ON YOUR REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL TEST EQUIPMENT.

SLAUGHTER COMPANY

P.O. BOX 1805 ARDMORE, OKLAHOMA 73402
TELEPHONE (405) 223-4773

INSULATION LEAKAGE TESTER WITH GROUNG LEAD VERIFICATION



MODEL
303

MEETS
120 KILOHM
REQUIREMENTS

ADJUSTABLE 3 KVAC PRESETTABLE LIMIT TO 10MA
REDUNDANT SAFETY CUT-OFF

THREE WIRE GROUNDED OR UNGROUNDED WORKPIECES ARE AUTOMATICALLY CHECKED FOR GROUND LEAD CONTINUITY THROUGH SWITCHABLE DEAD METAL RETURN LEAD AS A PREREQUISITE TO HIGH VOLTAGE INSULATION LEAKAGE TEST. MULTIPLE HIGH VOLTAGE OUTPUTS INCLUDE NEMA RECEPTACLES FOR 120 VAC AND 240 VAC PRODUCTS PLUS RECESSED HIGH VOLTAGE SOCKETS FOR UTILITY CLIP-ON LEADS.

Insulation Testers

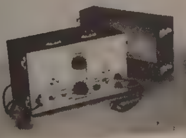
WRITE FOR DATA SHEETS ON THE INSTRUMENTS SHOWN . . . ALL ARE STANDARD PRODUCTION MODELS, AVAILABLE FOR IMMEDIATE DELIVERY FROM STOCK . . LET US QUOTE ON YOUR REQUIREMENTS FOR MODIFIED UNITS OR SPECIAL TEST EQUIPMENT.

SLAUGHTER COMPANY

P.O. BOX 1805 ARDMORE, OKLAHOMA 73402
TELEPHONE (405) 223-4773

High-voltage Leakage Tester

checks insulation for . . . leakage
. . . grounds
. . . . . arcing



MODEL
122

16 lb. Portable for lab and field work

VARIABLE VOLTAGE RATINGS TO 2.5 KV AC & DC. DUAL RANGE LEAKAGE METER 0/100/1000 µa . . . CAPACITY COMPENSATION . . . MEASURES INSULATION RESISTANCE, CAPACITY, POWER FACTOR.

High-voltage Insulation Tester

with buzzer signal on breakdowns
. . . grounds
. . . . shorts

MODEL
101

Watch what you are doing . . . not the tester

SIX TEST VOLTAGES . . . 500 TO 2500 V.A.C. PRICED SO YOU CAN AFFORD TO SPOT A FEW ALONG YOUR ASSEMBLY LINES.

High-voltage Leakage Tester

audibly signals excess leakage
. . . grounds
. . . . . arcing

MODEL
103

Measures Leakage . . . not capacity current

TEST VOLTAGE CONTINUOUSLY VARIABLE ADJUSTABLE LEAKAGE LIMIT . . . CAPACITY COMPENSATION ON AC TESTS . . . RATINGS TO 10,000 VOLTS AC & DC . . . LIMITED ENERGY . . . NON-DESTRUCTIVE . . . FOR LAB AND PRODUCTION LINE SERVICE.

Adjustable High-voltage Tester

with buzzer signal on breakdowns
. . . grounds
. . . . shorts

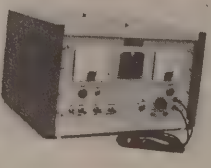
MODEL
106

Voltmeter shows actual Test Voltage

CONTINUOUSLY VARIABLE TEST VOLTAGE RATINGS TO 10,000 VOLTS AC & DC . . . RECOMMENDED FOR BREAKDOWN TESTING AT FINAL ASSEMBLY AND INSPECTION

Automatic H-V Insulation Tester

for precision checking . . . breakdowns
. . . leakage
. . . grounds



MODEL
103-MP

Automatic Test Cycle

FULLY AUTOMATIC TEST CYCLE . . . CONTROLLED RATE-OF-RISE . . . ADJUSTABLE TEST VOLTAGE, DWELL TIME, & LEAKAGE LIMIT . . . CAPACITY COMPENSATION ON AC TEST . . . FOR PRECISION TEST OF CRITICAL PARTS & ASSEMBLIES . . .

Simpson®

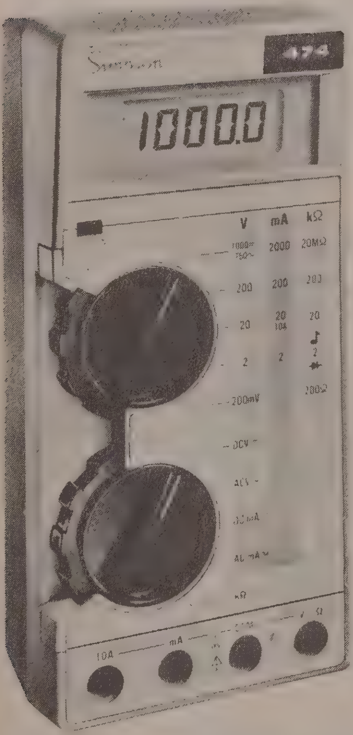
WIDEST SELECTION OF RELIABLE SIMPSON TEST INSTRUMENTS

MANUFACTURED ALL IN U.S.A.

Available at Your Local Distributor . . .

Only Simpson lets you select from 29 UL listed analog and digital test instruments. Plus these new latest additions to the growing family of Simpson DMMs and VOMs. Over 100 instruments in all!

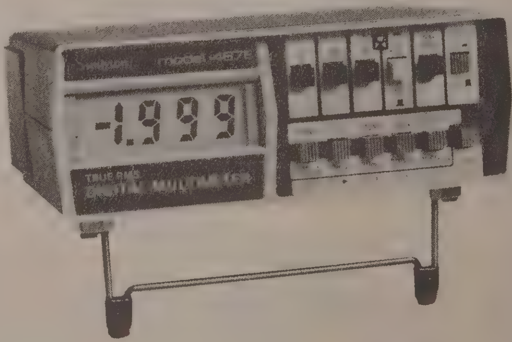
Write for Free Catalog!



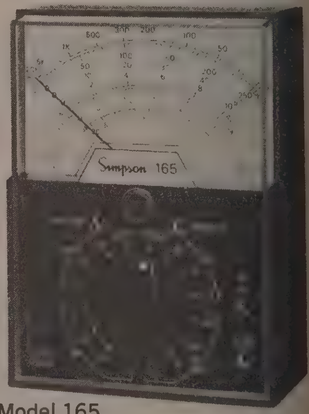
NEW Lowest Cost Hand Held 4½ Digit 474™ DMM $219

NEW! 360 Series 3 Digital VOM $275

WORLD FAMOUS 260® Series 7 VOM UL Listed $119



NEW! Economy Priced Model 467E Hand Portable DMM $225



NEW! Model 165 Handi VOM $78

Prices and Specifications Subject to Change Without Notice.

Simpson®

MANY OTHER INSTRUMENTS IN STOCK AT YOUR LOCAL ELECTRONICS DISTRIBUTOR

SIMPSON ELECTRIC COMPANY
(312) 697-2260 • Telex 72-2416 • Cable SIMELCO
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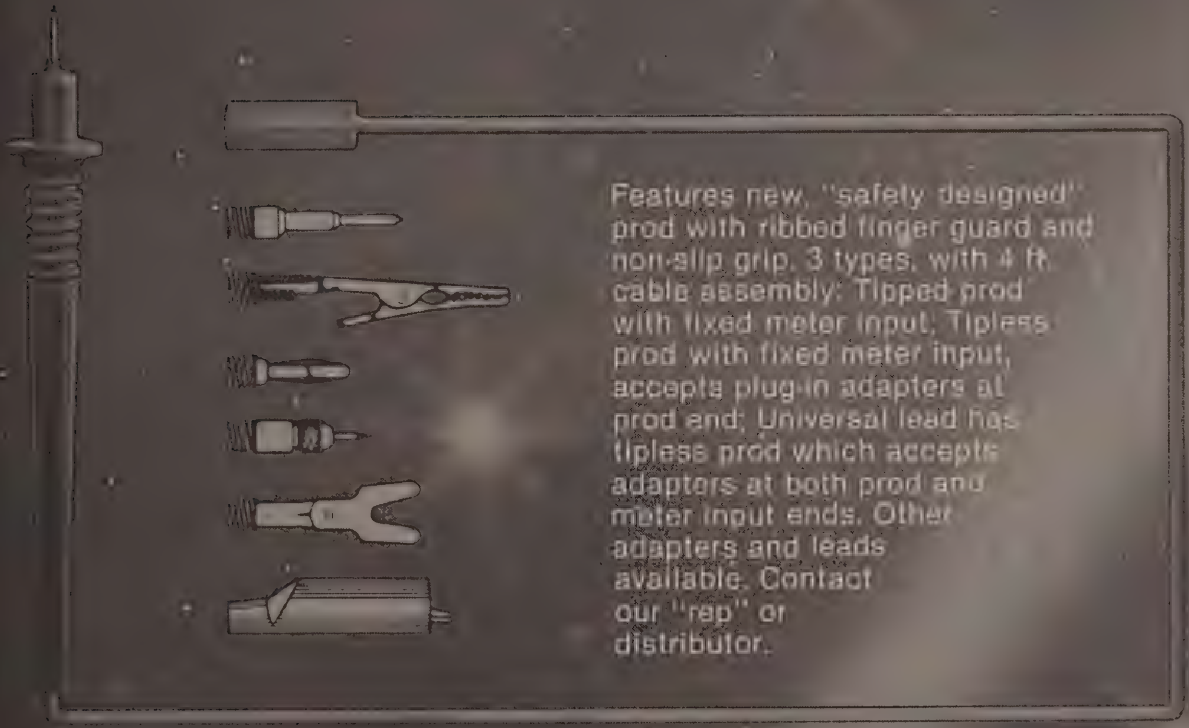
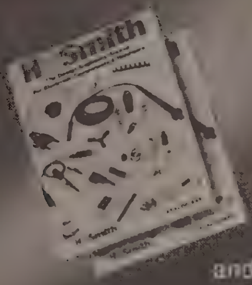
HHSmith

FUTURETECH™

"Safety" Test Leads & Prods



Features new, "safety designed" prod with ribbed finger guard and non-slip grip. 3 types, with 4 ft cable assembly: Tipped prod with fixed meter input; Tipless prod with fixed meter input, accepts plug-in adapters at prod end; Universal lead has tipless prod which accepts adapters at both prod and meter input ends. Other adapters and leads available. Contact our "rep" or distributor.



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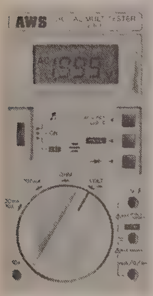
Kulka Smith.

HHSmith **Interconnect Devices & Mechanical Hardware**

KULKA SMITH, INC., A North American Philips Company
1913 Atlantic Avenue, Manasquan, NJ 08736 Tel. (201) 223-9400 TWX 710-723-4410

See EEM pages **2•1565** and **2•1865** for more HHSmith Products

A.W. SPERRY INSTRUMENTS INC.



EASY-METER™ AUTORANGING DIGITAL MULTIMETER EZ-6111 EZ-6221

FEATURES

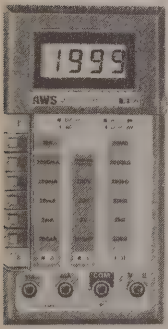
Autoranging in volts and ohms ranges.
Manual range selection in all functions.
Diode test function.
Audible continuity indication with five settings.
Normal and low power ohm ranges.
10A AC/DC range.
Overload protection on all ranges.
Shock resistant ABS plastic housing.
Two "AA" 1.5V batteries last 300 hours.
3½ digit display shows numerals, function and indicators.
Single rotary switch for function selection.
Separate compartment for batteries, fuse and spare fuse.
±0.5% (EZ-6111) & ±0.8% (EZ-6221) of reading DCV accuracy.

PACKAGING

Models EZ-6111 & EZ-6221 each come complete with TL-35 Test Leads, two (2) B-1 Batteries, two (2) F-8 Fuses, one (1) AG-940 Alligator Clip, #139 Operating instructions and One-Year Warranty.

SPECIFICATIONS

DC VOLTS/RANGES—200 mVdc; 2, 20, 200, 1000 Vdc
EZ-6111 Accuracy 18°-28°C—±0.5% rdg ±4d
EZ-6221 Accuracy 18°-28°C—±0.8% rdg ±4d
AC VOLTS/RANGES—2, 20, 200, 600 Vac
DC CURRENT/RANGES—20*, 200 mAdc; 10 Adc
AC CURRENT/RANGES—20*, 200 mAac; 10 Aac
RESISTANCE/RANGES—200Ω; 2, 20, 200, 2000 KΩ
LOW POWER RESISTANCE/RANGES—2, 20, 200, 2000 KΩ
* on EZ-6111 only



PUSHBUTTON DIGITAL MULTIMETER DM-3010

FEATURES

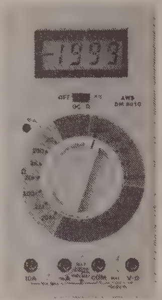
Built in tilt stand.
200 hour battery life.
Hi and low power ohms in all resistance ranges.
10A AC/DC range.
UL 1244 Type test leads.
Color coordinated range, function and input jacks.
Auto zero, auto polarity.
Overload protection on all ranges.
500V DC/AC protection on all resistance ranges.
Hi power ohms for diode tests.
Low power ohms for in circuit resistance measurements.
Recessed safety designed input jacks.

PACKAGING

Model DM-3010 comes complete with TL-39 test leads, B-4 battery, F-11 fuse, spare fuse, SPB-138 operating instructions and warranty card.

SPECIFICATIONS

DC VOLTS/RANGES—200 mVdc; 2, 20, 200, 1000 Vdc
Accuracy 18°-28°C—±0.5% rdg +1d
AC VOLTS/RANGES—200 mVac 2, 20, 200, 750 Vac
DC CURRENT/RANGES—200 μAdc; 2, 20, 200, 2000 mAdc; 10 Adc
AC CURRENT/RANGES—200 μAac; 2, 20, 200, 2000 mAac; 10 Aac
RESISTANCE/RANGES—200 Ω; 2, 20, 200 KΩ; 2, 20 MΩ



ROTARY SWITCH DIGITAL MULTIMETER DM-8010

FEATURES

Built in tilt stand.
200 hour battery life.
Instant continuity buzzer.
10A AC/DC range.
UL 1244 Type test leads.
Color coordinated range, function and input jacks.
Auto zero, auto polarity.
Overload protection on all ranges.
500V DC/AC protection on all resistance ranges.
Diode test function.
Low power ohms for in circuit resistance measurements.
Recessed safety designed input jacks.
±0.25% of reading DCV accuracy.

PACKAGING

Model DM-8010 comes complete with TL-42 test leads, B-4 battery, F-14 fuse, spare fuse, Form #147 operating instructions and warranty card.

SPECIFICATIONS

DC VOLTS/RANGES—200 mVdc; 2, 20, 200, 1000 Vdc
AC VOLTS/RANGES—200 mVac; 2, 20, 200, 750 Vac
DC CURRENT/RANGES—20, 200 μAdc; 2, 20, 200 mAdc; 10 Adc
AC CURRENT/RANGES—20, 200 μAac; 2, 20, 200 mAac; 10 Adc
RESISTANCE/RANGES—20, 200Ω; 2, 20, 200 KΩ; 2, 20 MΩ

ELECTRO PROBE DIGITAL MULTIMETER MODEL 6590

FEATURES

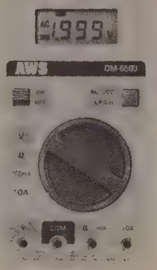
Easy Operation—Autoranging System requires no range selection.
Easy Reading—Automatic indication on display of units, signs, polarity, decimal points, overrange and battery warning.
Low Battery Consumption—3 mW, 200 hours continuous operation (with 1107 SO batteries).
Autozeroing—Requires no zero adjust.
Buzzer Warning System—Increases safety in operation.
Shock Resistant—Housed in ABS plastic cases.
Miniature Size—Lightweight. Compact.
±0.5% of reading DCV accuracy.

PACKAGING

The DM-6590 is packed in a Unit Box, with One (1) TL-40 Test Lead, One (1) AG-940 Detachable Alligator Clip, Two (2) B-6 Batteries installed, Carrying Case C-34, Form #145 Operating Instructions and Warranty Card, all ready to use.

SPECIFICATIONS

DC VOLTS/RANGES—2, 20, 200, 500 Vdc
AC VOLTS/RANGES—2, 20, 200, 500 Vac
RESISTANCE/RANGES—2, 20, 200, 2000 KΩ
DCV accuracy ±0.5% rdg ±4 dgt



AUTORANGING DIGITAL MULTIMETER DM-6500

FEATURES

Autoranging—Requires no range selection
Easy Reading—Automatic indication on display of units, signs, polarity, decimal points, overrange and battery warning
Low Battery Consumption—5 mW, 300 hour continuous use with two (2) 1.5V "AA" batteries.
Fuse Protection—Special Arc Quenching Fuse covers misapplication of up to 250 V ac/dc on Ohms and mA ranges.
Added Safety Construction—Insulated Test Lead Plug seats ⅛" below front panel surface for greater safety and added insulation of the banana plug.
Buzzer Warning System—Increases safety in operation, decreases possibility of error.
Autozeroing—Requires no zero adjust.
Shock Resistant—Housed in ABS plastics.
Hand-Held—Lightweight. Compact.
±0.5% of reading DCV accuracy.

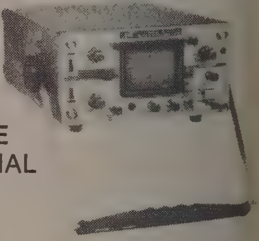
PACKAGING

Model DM-6500 comes complete with TL-35 test leads, two (2) B-1 batteries, F-13 fuse, spare fuse, #138 operating instructions and warranty card.

SPECIFICATIONS

DC VOLTS/RANGES—200 mVdc; 2, 20, 200, 1000 Vdc
AC VOLTS/RANGES—2, 20, 200, 600 Vac
DC CURRENT/RANGES—200 mAdc; 10 Adc
AC CURRENT/RANGES—200 mAac; 10 Aac
RESISTANCE/RANGES—200Ω; 2, 20, 200, 2000 KΩ

OSCILLOSCOPES



315P PORTABLE W/INTERNAL BATTERY PAK

- 15 MHz Dual Trace
- Automatic Battery Recharge
- Weighs Only 5.5 kg. (12.1 lbs.) w/Battery

A. W. Sperry Model 315P—Net Each	$800.00
A. W. Sperry Case C-40—Net Each	64.50
A. W. Sperry Probe TP-60—Net Each	49.95

620C 20 MHz DUAL-TRACE W/BUILT-IN COMPONENT CHECKER

- TV Video Sync
- Z Axis
- X-Y Mode

A. W. Sperry Model 620C—Net Each	$785.00
A. W. Sperry Probe TP-60—Net Each	49.95

The complete AWS line of portable analog & digital multimeters, snap-arounds, power meters, insulation testers, oscilloscopes and accessories are in stock at your local distributor — call our toll free number for the nearest distributor and our full line catalog.

245 MARCUS BLVD., HAUPPAUGE, NY 11788
800-645-5398 TOLL-FREE
(NY, HAWAII, ALASKA CALL COLLECT (516) 231-7050)

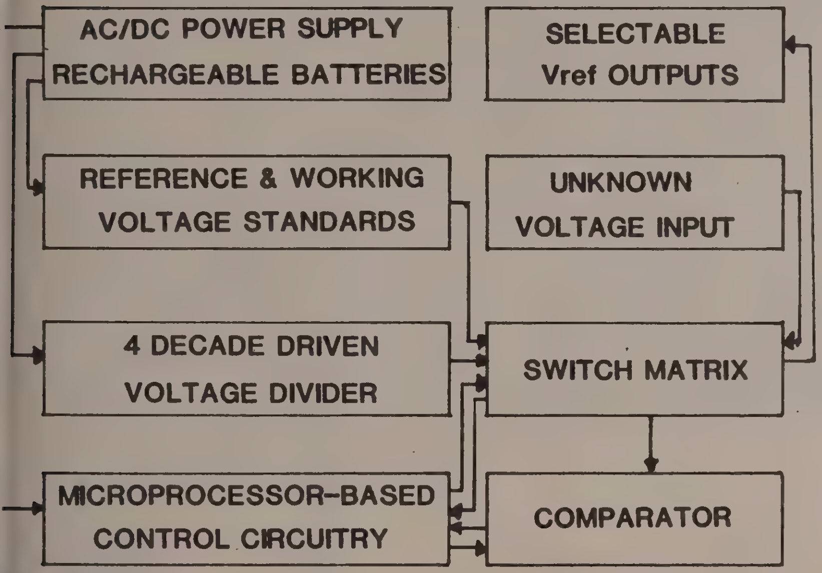
STANDARD REFERENCE LABS, INC.

STANDARDS FOR REAL-WORLD USE

COAN PLACE / P.O. BOX 388, METUCHEN, NJ 08840
(201) 549-9280/9282 TWX 710-998-0503

- ► 1 PPM/YR SOLID STATE DC VOLTAGE TRANSPORT STANDARDS
- ► 10 PPM/YR SOLID STATE DCV MINI PACKAGES
- ► 10 PPM/YR VOLTAGE REFERENCE DIODES
- ► FRACTIONAL PPM DCV RATIO CALIBRATORS
- ► WHITE NOISE (GAUSSIAN) GENERATORS

MODERNIZE YOUR NBS-TRACEABLE DC LAB


AC/DC POWER SUPPLY
RECHARGEABLE BATTERIES
SELECTABLE
Vref OUTPUTS
REFERENCE & WORKING
VOLTAGE STANDARDS
UNKNOWN
VOLTAGE INPUT
4 DECADE DRIVEN
VOLTAGE DIVIDER
SWITCH MATRIX
MICROPROCESSOR-BASED
CONTROL CIRCUITRY
COMPARATOR

Block Diagram:
Microprocessor-Based, Menu-Driven, Automatic, DC Voltage Ratio Calibrator — Precision Voltage Source.

FIELD-KOEP AUTOMATIC DC VOLTAGE RATIO CALIBRATOR — SOURCE

Prime Feature:

- Automatic in situ verification of voltage ratio, using a driven voltage divider.

Some Applications:

- Automatic intercomparison of saturated cells and solid state standards.
- Automatic calibration of 6½, 7½, and 8½ digit DVM's.
- Automatic calibration of calibrators.
- Automatic source of prime reference voltages from 1 mV to 11V in 1 mV steps.

TRANCELL® FAMILY

Transportable Solid State DC Voltage Reference Standards

- Ovenized and non-ovenized.
- NBS calibratable.
- 1ppm/year guaranteed.
- 1, 2, 3, or 4 diode-cells.
- Rechargeable battery powered. Up to 100 hour battery self contained and up to 200 hours with use of an external battery pack.

CERTAVOLT®

MINIATURE MODULES AND TCM SERIES PRECISION DCV MODULES

- Up to 2ppm/year output stability.
- Up to 0.05ppm max. noise
- Input approx. 24VDC.
- Output any value from 10mV to 20V.

STANDARD
REF LABS

WHITE NOISE (GAUSSIAN) GENERATORS

Diodes: D07 Pkg., 10Hz-500MHz, with output levels to 10μV/$\sqrt{}$Hz.

Modules: Include amplifier to produce outputs to 30,000μV/$\sqrt{}$Hz.

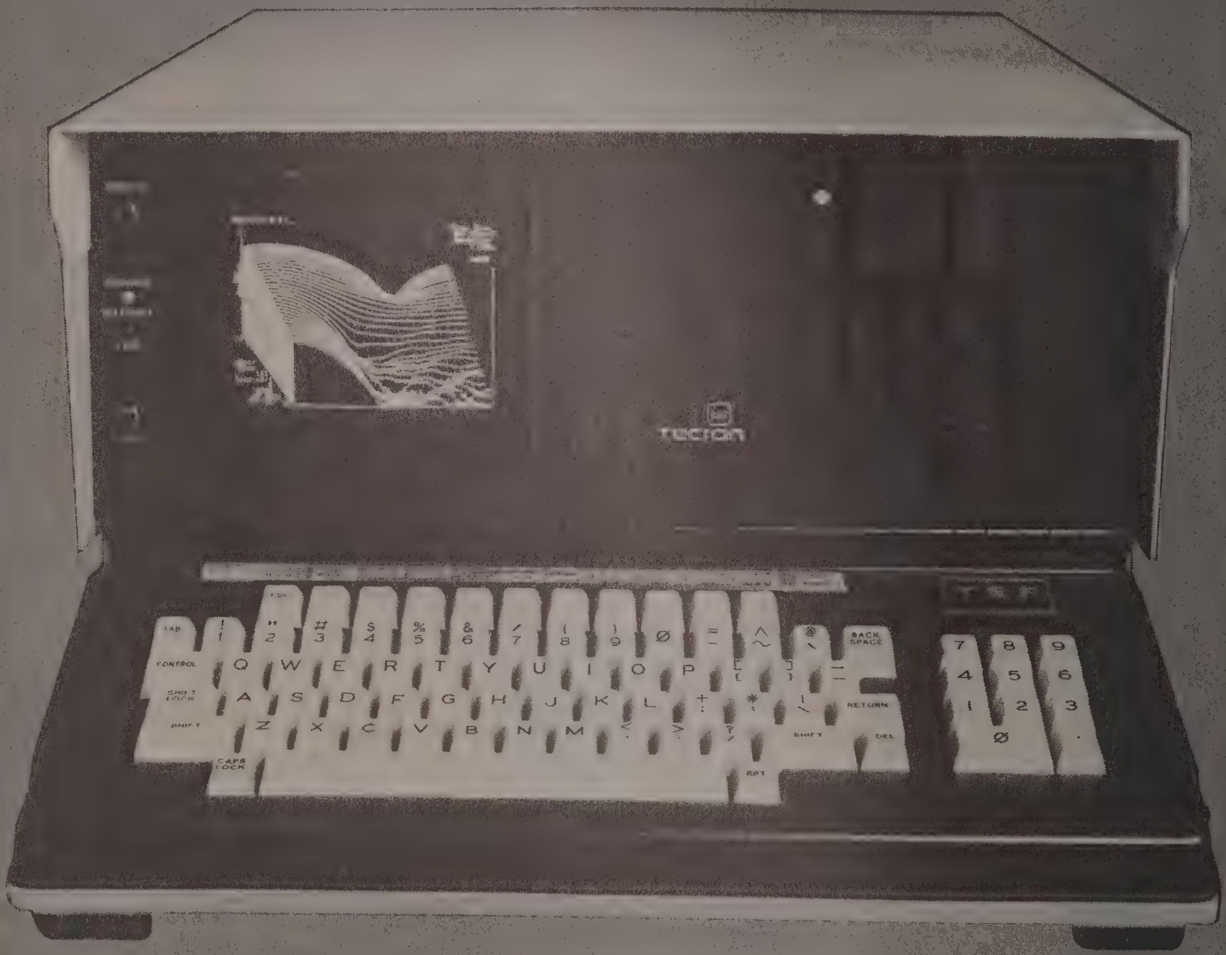
CERTACELL®

LINE POWERED DCV STANDARD

(otherwise same as the CERTAVOLT)

PPPS ULTRA STABLE POWER SUPPLIES

Provide constant voltage output with stability of 1ppm/8 hours.



tecron.

TEF SYSTEM 10
AUDIO SPECTRUM ANALYZER/COMPUTER

TEF® SYSTEM 10

Specifications

Input

Gain range: 0 to 66 dB in 6 dB steps
Maximum input voltage: 7.0 volts peak
AC/DC coupling: switch selectable
Bandwidth: DC to greater than 100KHz
AC 1.6 Hz to greater than 100KHz
Integration: Single or double beginning at 4 Hz
Impedance: DC, 1000 megohm; AC, 1 megohm
Connectors (software selectable):
- XLR Balanced (5 pin) w/guard & phantom supply
- BNC Noninverting
- BNC Inverting
- BNC Monitor Output (buffered)
  - Max. output voltage 7.0 volts peak
  - Max. output current 15 mA peak
  - Output impedance 600 ohm

IF

Gain range: 0 to 45 dB in 3 dB steps
Bandwidth: Gaussian filter approx. 0.116Hz to 20,000Hz
Brick-wall cutoff filter: 2Hz to 25,000 Hz
Dual IF strip filtering:
- Analytic signal (both real and imaginary parts)
- Synchronously sampled
- 12 bit A to D converters

Data Storage

On disk in real and imaginary (16 bit words)
780K of file space on 1 Mbyte 5¼″ mini-floppy disk
Dual disk optional
Stored data may be displayed in other formats and printed at later date

Sweep Rate

293 Hz/sec to 75,143 Hz/sec
Adjustable start and stop frequencies
TDS response measurable at DC using quadrature
Sweeps through 0Hz

Time offset

0 to 240 sec in 1 microsec steps

FFT

1024 samples 400 lines displayed
Window function is software selectable
Hamming, Hanning, and Flat (rectangular) included, other windows optional
Execution time approx. .6 sec using LSI floating-point/math processor

ETC

Bandwidth automatically coordinated with the selected sweep

TDS

Bandwidth selectable: 0.116 Hz to 20 KHz

Oscillator outputs

Phase coherent digitally synthesized oscillators
Analysis frequency range: -31,620Hz to 31,620Hz
Source impedance: 600 ohms
Test oscillator voltage: .01 to 2.55 vrms open circuit (15 mA peak maximum current)
Analysis Oscillator voltage: 2.56 vrms open circuit quadrature outputs

Automatic documentation

Setup information saved on disk for all measurements made. Previous setups may be quickly loaded from disk.
Operator free-form remarks saved with setup data.

On-line operator's manual

User alterable disk files explaining operation associated with every menu.

RPN calculator program, built-in

Display:

7″ flat-face green raster scan w/rear panel video out (75 ohms)
- Range: 72 dB in 3,6 or 12 dB per division
- Screen: 8 divisions on screen
- Dynamic range: 70 dB or better
- Cursor: Follows actual data

Reference, constants and display units

Velocity and units (reference to seconds)
Transducer coefficient and units (reference to volts)
0 dB reference in user units
(All may be changed to suit the user)

Power input

AC voltage: 100, 110, 120, 200, 220, 240 (2A. maximum at 120 volts AC)
DC voltage: 10 to 15 volts (10A. maximum)
Protected against load dump transients
Internal batteries for 15 min. of operation

Printer output:

Epson MX-80, MX-100 or FX80
Contact TECRON for other printer software drivers.

Standard Equipment

TEF® System 10 with:
One 5″ disk drive
One Input Module
Two RS-232 ports
One RS-170 video port
TEF Operator's Manual
CP/M Manual
One CP/M Distribution Disk
One TEF Distribution Disk
One TEF Working Disk

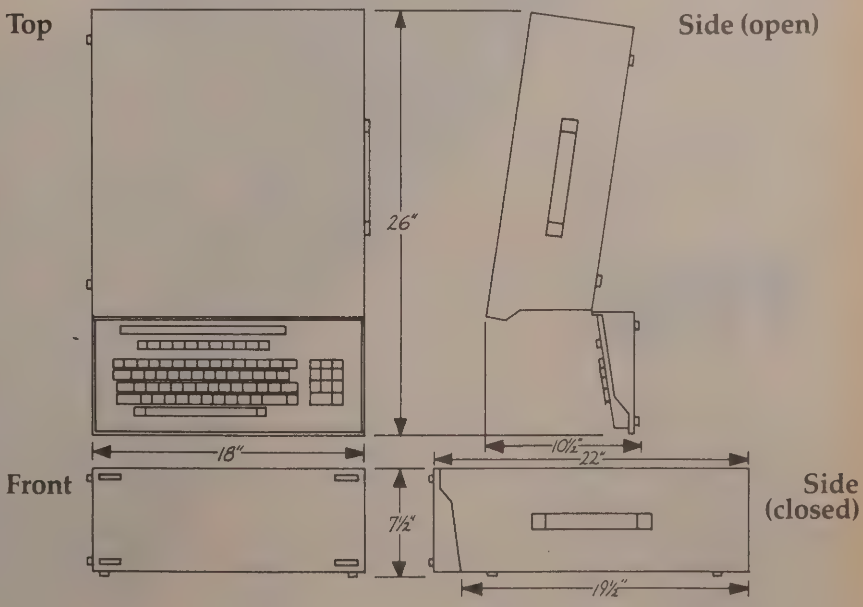
Optional Equipment

Dual Disk Drive
One Windows Disk, providing over 100 different windows (HAMMING is standard for TEF) for FFT data processing.
IEEE 488 (GPIB or HPIB)
Parallel Port
8″ Disk Drive Port
Input Module B
TEF Computer Programming Manual
Contact TECRON for information on currently available software options.

Bibliography

TECRON has compiled an extensive bibliography on TDS and ETC measurements. A free copy will be sent on request.

Dimension Drawings



DO YOU STILL SET-UP YOUR UUT'S ONE AT A TIME?

With T-Bar TESS, Test Equipment Switching Systems, you can increase your productivity by substantially reducing your test transport and set-up times. TESS interfaces between your existing test equipment and your units under test to speed your test procedures, eliminate downtime, and reduce test equipment connector failure.

T-Bar TESS offers test switching systems that are compatible with virtually any electrical test equipment or analog or digital transducer for testing electrical or physical measurements such as voltage, current, resistance, pressure, or other measurement. They offer bi-directional transparency, and are available in 4 circuit, 23 circuit, and other multiples.

Controls for manual, remote, or computer-driven operations ensure your technicians of no waiting periods between tests. And, T-Bar TESS pays for itself in increased productivity.

T-Bar TESS is supported by more than 20 years of experience in network and computer switching, with customized test switching installations serving companies worldwide. To learn more about how T-Bar TESS can help you on a one-to-one basis, call or write:

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141 Danbury Road,
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(203) 834-8150.
Telex 710-479-3216.

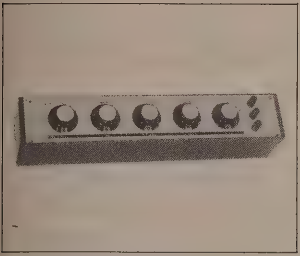
T·bar® INCORPORATED

TETTEX INSTRUMENTS INC

P.O. BOX 281, 1055 WEST GERMANTOWN PIKE, FAIRVIEW VILLAGE, PA 19409 U.S.A., TEL. (215) 539-6050, TELEX 753899TETTEX

Precision Instruments

Type 1100



Resistance Decades
Type 1100

Accy: 0.01% - 0.05%
Range: 0.01 . . . 11M

Capacitance Decades
Type 1200

Accy: 0.1% - 0.5%
Range: 50 pF . . . 11 µF

Inductance Decades
Type 1300

Accy: 0.5%
Range: 0.1 mH . . . 111.1H

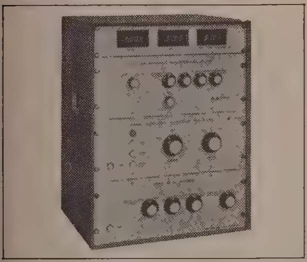
Standard Resistors
Type 3200

Application as calibration standards, shunts, range extension of bridges, etc. Low inductance and capacitance design.

High current capabilities with accuracy specified at 0.1W, 1W and 10W power levels. Temp. coefficient α and β indicated on calibration certificate.

Type	Value (Ω)	Accy (ppm)
3200	.1m	50
3201	1m	20
3202	10m	20
3203	100m	10
3204/74	1	10/1
3205/75	10	10/1
3206/76	100	10/1
3207/77	1K	10/1
3208/78	10K	10/1
3209/79	100K	10/2
3210/80	1M	20/3
3211	10M	30
3212	100M	200

Type 2761/65



Automatic instrument transformer test system
Type 2761/2765

Automatic test system for ratio and phase errors of current or potential transformers at 50 .... 60 Hz. Digital display of ratio error, phase angle and rated voltage/current. BCD-coded output for all three displays.

Measuring time: 0.4 sec. (2.5 sec. for increased accuracy).

Accuracy: 0.001% ±0.1 min.
Type 2761 for current transformers
Type 2765 for potential transformers

Precision resistance measuring bridge according to Wheatstone and Kelvin
Type 2205

Measuring ranges (5 decades):
Wheatstone-Bridge: 0.01Ω .... 11 MΩ
Kelvin-Bridge: $10^{-7}\Omega$ .... 110 Ω

Built-in standard resistors, electronic galvanometer and power supply for Wheatstone bridge.

Accuracies:
Wheatstone-Bridge:
±0.02% ±min. $1 \bullet 10^{-5}\Omega$
Kelvin-Bridge:
±0.03% ±min. $1 \bullet 10^{-9}\Omega$

Standard Capacitors
Types 3320, 3385, 3370/90

Loss free capacitance standards.

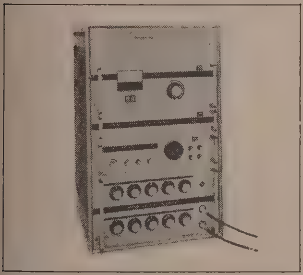
Dissipation factor $<1.10^{-5}$

Type 3320, 2 kV, Accy 0.005%
Values: 1 pF .... 10,000 pF, Air

Type 3385, 20 kV, Accy 0.005%
Value: 1000 pF, SF_6

Type 3370/90, Accy 0.03%
Value: 100 pF, 70 kV .... 300 kV, SF_6
50 pF, 400 kV .... 1000 kV, SF_6

Type 2822



Precision Dissipation Factor and Capacitance Measuring Bridge
Types 2821 and 2822

Specially for tests on liquid and solid insulating material samples, e.g. insulating oils, foils, paper etc. with guarded electrode capacitors types 2903 and 2914. Built-in power supply 0 .... 2000 V, null indicator and automatic guard potential regulator.

Frequency: 50 or 60 Hz

Measuring ranges:
C: 9 .... 10,000 pF
tan δ: $1 \bullet 10^{-5}$ 10

Accuracies:
C: ±0.5%
tan δ: ±1 .... $2 \bullet 10^{-5}$

Guard Ring Capacitors
Types 2903, 2914

Guarded measuring cells for determining dielectric constant and dissipation factor tan delta of liquid (2903) and solid (2914) insulation materials. (Oil, paper, film, resin, etc.). Built-in heaters and vacuum ports. Max. temp. 150°C and 300°C resp. Max. test voltage 2 kV, test frequency 20 Hz to 10 KHz.

Current Instrument Transformers
Types 4761, 4764, 4766

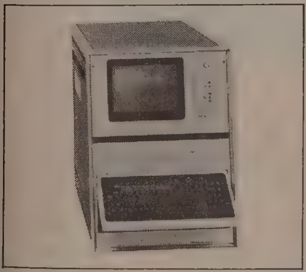
Precision current transformers with zero-flux design according to Souders. Recommended for CT-testing, range extension, power measurements, etc.

Accuracy: ±0.001% ±0.05 min.
1% .... 200% of Inom

Secondary current: 1 and 5A

Primary current:
4761: 1A to 1000A, 10 ratios
4764: 5A to 5000A, 300 ratios
4766: 5000A, 10,000A

Type 2876



Automatic Digital Measuring Bridge
Type 2876

Microprocessor controlled bridge for measuring capacitance and dissipation factor of high voltage apparatus.

Measuring Ranges:
C: 10 pF . . . 100 µF
Accy: ±0.1%
Tanδ: 10^{-5} . . . 1.999 (199%)
Accy: ±1% of rdg $\pm 2 \bullet 10^{-5}$
Voltage: 100V . . . 1999 kV
Accy: ±1.5%
Test Voltg: 600V. . . 1000 kV, 50/60 Hz
Interface: IEEE 488, RS-232
Options: Printer, Power supply control, Software

Portable capacitance and tanδ measuring bridge
Type 2808/5282

Newly developed measuring bridge with differential transformer for field measurements. Built-in null indicator with battery, direct reading of capacitance and dissipation factor.

12 k / Power Supply

Measuring ranges:
C: 1 pF . . . 0.11 µF
tan: $1 \bullet 10^{-4}$. . . 1.1 (110%)
Accuracies: C: ±0.1%
tanδ: $\pm 1 \bullet 10^{-4}$

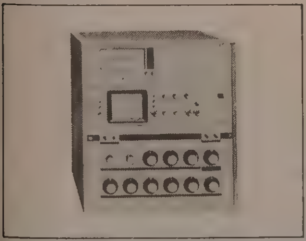
Precision capacitance and dissipation factor measuring system
Type 2811

Ratio arm bridge combined with oscilloscopic null indicator.
Frequency: 50 and 60 Hz

Measuring ranges:
C: 5 pF .... 1.111 µF
tan δ: $1 \bullet 10^{-5}$ 11

Accuracies:
C: ±0.1%
tan δ: $1 \bullet 10^{-5}$ ±1% of rdg.

Type 9120



Partial Discharge Measuring System
Type 9120

Modular partial discharge detection system for Laboratory and field measurements

—Oscilloscope and Meter indicator
—Wideband amplifier 10 kHz . . . 200 kHz
—Narrow band amplifier, tunable, 50 kHz . . . 2 MH
—Plug-ins for customized applications
—Calibrator 0 . . . . 1000 pC

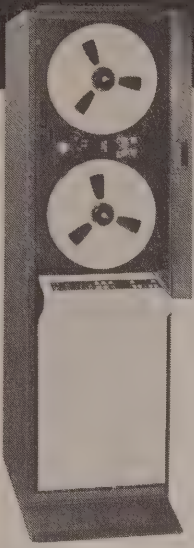
Other Instruments and Accessories

2108	Portable RLC Bridge
2122	Digital Milliohmmeter
2211	Precision Wheatstone Bridge
2222	Precision Kelvin Bridge
2227	Digital Microohmmeter
2283	Power Transformer Test System
2300	Potentiometers
2791	Automatic Transformer Turns Ratio Meter
2805	C and Tan Delta Bridge
2832	AC Resistance Bridge
2873	Automatic Cap. Bridge
3400	Inductance Standards (0.1-10H)
3600	Current and Potential Burdens
4850	Electronic Voltage Dividers
4874	Precision CT/PT 200 kV•5000A
5260	High Current Power Supplies
5270	High Voltage Power Supplies
5431	Megohmmeter 2.5/5 kV
5516	Meter Nullindicator
5517	Oscilloscope Nullindicator
8871	Wire Holding Device
9410	Cable Termination System

Instruments and systems can be built to customer specifications. This bulletin includes only the most important instruments out of over 200 items. Please inquire for more detailed bulletins or application notes on your particular needs.

THORN EMI

Instrumentation Recorders



SE9000 16 inch Laboratory Recorders

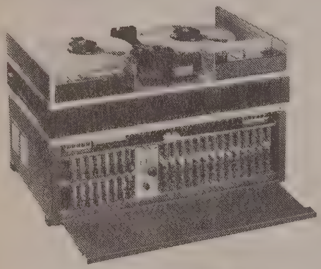
Full 42 track record/reproduce in single 6 foot rack. 7, 14, 28, 32, and 42 track, field convertible. 9 electronically switchable speeds, 15/16 -240 ips. IRIG Intermediate and Wideband; 4 MHz direct, 1 MHz FM, 40 kbpi HDDR; modular for any mix. Built-in calibrator for performance verification. Built-in tape cleaner. Optional IEEE-488 interface.

New SE9000HD High Density Digital Recording Systems

Packing density over 40 kbpi using standard headstacks and tape. Auto-ranging bit synchronization, microprocessor selection of tape speed for optimum packing density. Fully bi-directional operation, including error correction. Serial/parallel conversion, or individual synchronous or asynchronous parallel inputs. Rates to 150 Mbps.

New "Wrap Around" HDDR Conversion

Converts your present wideband direct recorder to HDDR capability. Includes encoding, auto-ranging bit synchronization, error correction, serial/parallel conversion, bidirectional operation. Capabilities to 40 kbpi with your standard IRIG headstacks.

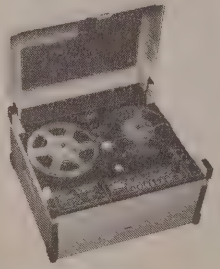


SE7000A, C, and D Field Portable Recorders

IRIG Intermediate and Wideband Group 1 recorders. 7 to 42 tracks. FM, direct, and HDDR in any mix, plus voice log. ½ and 1 inch tape, field convertible. 15/16 to 120 ips, tachometer or tape controlled. Built-in calibrator. Hand held or rack mounted remote controls. Optional 20-39 Vdc power, and IEEE-488 interface.

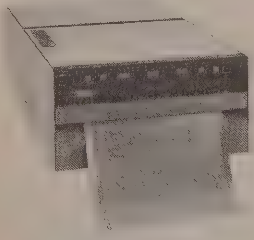
SE7000M Wideband

IRIG Wideband capabilities in the SE7000 chassis. 2MHz direct, 500 kHz FM, 30 kbpi HDDR. 7 or 14 track. Built-in calibrator. Optional 20-39 Vdc power, and IEEE-488 interface.



Lightweight SE3000 Series

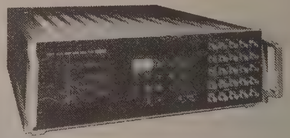
offers heavyweight features. ¼ inch or ½ inch tape, field convertible. 4, 8, or 14 modular channels in any mix of FM, direct, or HDDR. Buy and carry only the channels you need. 8 speeds, 15/32 to 60 ips. Record up to 34 hours continuously. Built-in calibrator. Operates on 11-30 Vdc or 100-250 Vac (48-420 Hz). Optional IEEE-488 interface.



SE6300 Direct Writing UV Oscillographic Recorder

Up to 24 channels with either 8″ or 12″ wide paper. Frequency response to 8500 Hz. Chart speeds from 0.02 ips to 200 ips.

SE2550 Transient Recorder



4 or 8 channels with up to 32k memory per channel. Microprocessor controlled. 1MHz sampling rate with 10 bit resolution.

THORN EMI Technology Inc.

8601 Dunwoody Place, Atlanta, GA 30338 Tel: (404) 587-0017
TWX: 810-766-2267 Toll Free: 800-243-2572
A THORN EMI company

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  Telephone: (714) 261-0141
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  Telephone: (703) 620-6056
- Sunnyvale, CA 94086
  Telephone: (408) 732-9027
- Framingham, MA 01701
  Telephone: (617) 875-5858
- Albuquerque, NM 87110
  Telephone: (505) 884-0541

International:

THORN EMI Datatech Ltd.
Spur Road, Feltham, Middlesex
TW14 OTD, England
Telephone: 01-890-1477 Telex: 23995

TOROTRON CORP. DEPT. EM, 230 EAST 7th STREET, MOUNT VERNON, NY 10550, (914) 664-2050

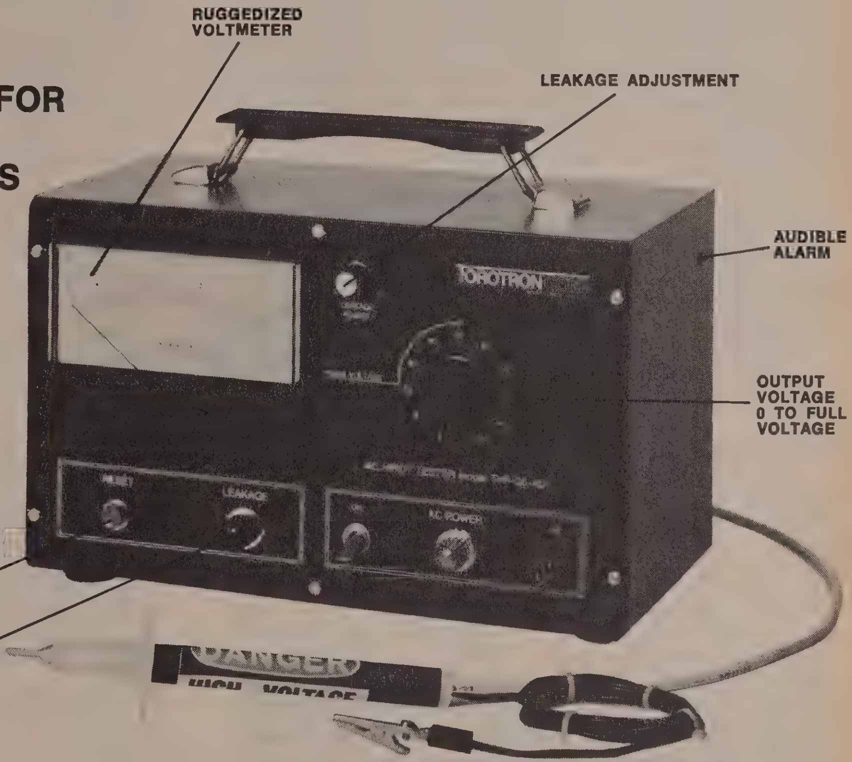
AC & DC Hipot Insulation Testers

Application: • Production testing for insulation resistance. Dielectric withstand, etc. • Motors • High Voltage Capacitor • Wire & Cable • Dielectric Materials • Transformers & Coils • Bushing & Insulators • High Voltage Rectifiers • **UL Listed Electrical Hi Pot Tests.**

THP-AD Hipot Series

AC & DC DIELECTRIC WITHSTANDING TESTER FOR MAKING U.L. LISTED ELECTRICAL HIPOT TESTS

Model THP-05-AD High Quality, Low Cost, AC & DC High Voltage Insulation Tester. Makes fast, accurate dielectric withstanding tests of Appliances, Motors, Coils, Transformers, Electronic Components, Insulation Materials, etc.



FEATURES:

- **High Voltage Output Control**
  Continuously variable from zero to full voltage.
- **Solid State Visual and Audible Alarm**
  Adjustable from 500 μA to 5 mA breakdown current.
- **Latching Relay**
  Shuts off power when breakdown current exceeds preset limit: keeps audible alarm on until defective part is removed and tester reset.
- **Voltage Monitoring**
  Actual output voltage monitored by rugged, 4½", mirror scale taut band kilovoltmeter.
- **Shielded Output Cable**
  Shielded cable with attached high voltage probe; separate ground lead.
- **Polarity**
  DC models: Probe output voltage negative with respect to ground.

SPECIFICATIONS:

Input	115 Vac, 60 Hz, 3A Max., 120W at full load
Size and Weight	7"H x 12"W x 6"D. Approx. 18 lb
Meter	Accuracy ±2% of full scale
Output Voltage	0 to full voltage, see table
Short Circuit Current	Transformer output capability 18 mA at full voltage

AC SERIES

Model	Output Voltage	Price 1 to 5
THP-03-AD	0-3 KVAC	$350.00
THP-05-AD	0-5 KVAC	$375.00
THP-10-AD	0-10 KVAC	$720.00

DC SERIES

Model	Output Voltage	Price 1 to 5
THP-03D-AD	0-3 KVDC	$350.00
THP-04D-AD	0-4 KVDC	$375.00
THP-07D-AD	0-7 KVDC	$620.00
THP-12D-AD	0-12 KVDC	$720.00

Note: Discount 5% 6 to 10. For larger quantities request quote.

ALSO AVAILABLE FROM TOROTRON: A Complete Line of Custom High Voltage Power Supplies, Regulated or Unregulated. CONTACT FACTORY DIRECT FOR INFORMATION.

Specifications and price subject to change without notice.

Transistor Devices Inc.

274 S. SALEM ST., RANDOLPH, NJ 07869
TELEPHONE: (201) 361-6622

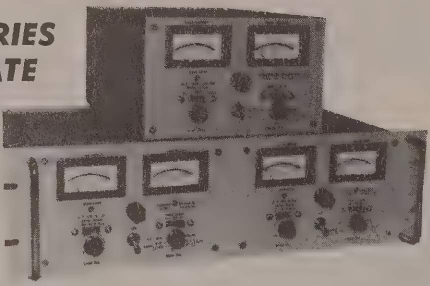
DYNALOAD POWER SUPPLY TEST EQUIPMENT

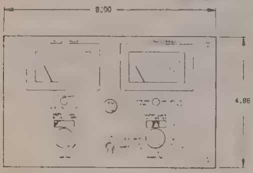
WHY THE DYNALOAD? Transistor Devices, Inc., has been a leader in the custom designed power supply field for over 20 years. We have developed over 3000 different power supplies and continue to produce many of them all the time. Testing these supplies would involve a multiplicity of power resistors and clip leads, resulting in a very long changeover time from one model to another, were it not for the Dynaload series of dynamic load test equipment. We developed the Dynaload series and used them successfully in our test department, improving on them and adding new features as we needed them. The models we are now able to offer represent over 10 years of experience in solving problems with the Dynaload.

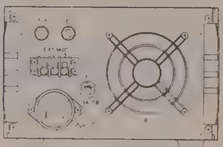
WHAT IS A DYNALOAD? The Dynaload is a solid state electrical load, designed for both special and production test of power supplies, servo systems, DC generators, and similar power equipment. The mode selector switch permits the instantaneous choice of constant resistance, constant current, or constant voltage load characteristics over a wide dynamic range. Provision is also made for external programming for automatic test equipment or for simulating special time-varying loads such as circuit breakers or digital printers.

We couldn't buy one this good, but you can!!

DLR SERIES STEADY STATE ELECTRICAL LOADS



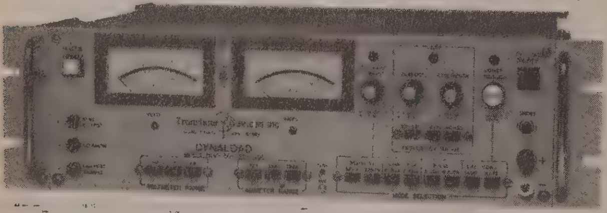


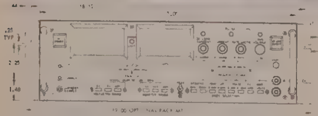


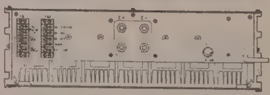
SPECIFICATIONS

MODEL	DLR 50-15-150A	DLR 130-5-100A	DLR 400-1.5-100
Operating Voltage	3-50V	5-130V	30-400V
Load Current	0-15A	0-5A	0-1.5A
Maximum Power	150W	100W	100W
Voltmeter Ranges	0-6V 0-18V 0-60V	0-18V 0-60V 0-180V	0-60V 0-180V 0-600V
Ammeter Ranges	0-1.8A 0-6A 0-18A	0-.6A 0-1.8A 0-6A	0-.18A 0-.6A 0-1.8A
Resistance Ranges	0-.5A/V 0-3A/V	0-.1A/V 0-1A/V	0-.003A/V 0-.01A/V
Constant Current Ranges	0-3A 0-15A	0-1.5A 0-5A	0-.3A 0-1.5A
Program Input	All models 0-6V @ 1mA		
Program Linearity	All models less than ±1% from 10% full load		
Response Time	All models less than 50 μsec		
Constant Voltage	0-50V	0-130V	0-400V
Meter Accuracy	All models less than ±3%		
Overvoltage	60V max	150V max	500V max
Current Limit	20A max	7A max	2A max
Power Limit	200W max	150W max	150W max

DLVP SERIES – PROGRAMMABLE VARIABLE PULSE-WIDTH DYNALOADS



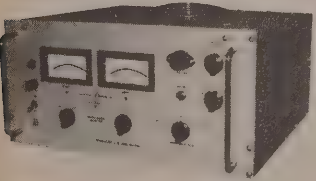


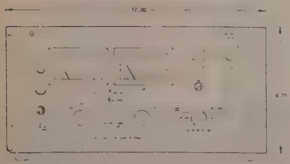


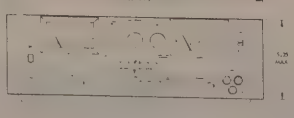
SPECIFICATIONS

MODEL	DLVP-50-120-1500	DLVP 130-110-1000
Operating Voltage	3-50V	5-130V
Load Current	0-120A	0-110A
Maximum Power	1500W	1000W
Voltmeter Ranges	0-6V 0-18V 0-60V	0-18V 0-60V 0-180V
Ammeter Ranges	0-12A 0-36A 0-120A	0-12A 0-36A 0-120A
Resistance Ranges	0-5A/V 0-30A/V	02A/V 0-20 A/V
Constant Ranges	0-30A 0-120A	0-30A 0-110A
Program Input	0-10V @ 1mA	0-10V @ 1mA
Program Linearity	Less than ±1%	Less than ±1%
Pulse Width	10-100% duty cycle	10-100% duty cycle
Response Time	Less than 50 μsec 0-120A	Less than 50 μsec 0-110A
Constant Voltage	3-50V	5-130V
Meter Accuracy	Less than 3%	Less than 3%
Overvoltage	60V max	145V max
Overcurrent	130A max	125A max

DLP and DLR 400-15-2500 STEADY-STATE ELECTRICAL LOADS







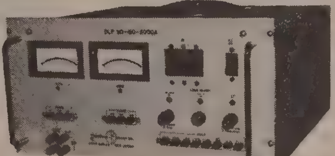
SPECIFICATIONS

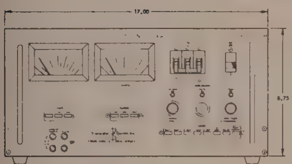
MODEL	DLR 400-15-2500	DLP 50-60-1000A
Operating Voltage	30-400V	3-50V
Load Current	0-15A	0-60A
Maximum Power	2500W	1000W
Voltmeter Ranges	0-60V 0-180V 0-600V	0-6V 0-18V 0-60V
Ammeter Ranges	0-1.8A 0-6A 0-18A	0-6A 0-18A 0-60A
Resistance Ranges	0-.03A/V 0-.1A/V	1A/V 10A/V
Constant Current Ranges	0-3A 0-15A	0-10A 0-60A
Program Input	All models 0-6V @ 1mA	
Program Linearity	All models less than ±1% from 10% to full load	
Response Time	All models less than 50 μsec	
Meter Accuracy	All models less than ±3%	
Constant Voltage	0-400V	0-50V
Overvoltage	500V max	60V max
Current Limit	20A max	68A max
Power Limit	3000W max	1200W max

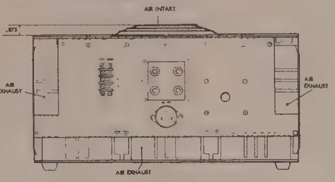
Transistor Devices Inc.

274 S. SALEM ST., RANDOLPH, NJ 07869
TELEPHONE: (201) 361-6622

DLP HIGH POWER SERIES PULSE AND STEADY STATE ELECTRICAL LOADS



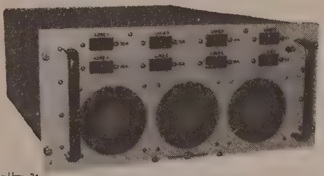


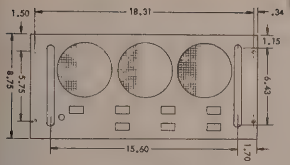


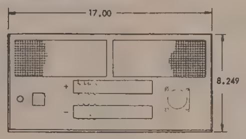
SPECIFICATIONS

MODEL	DLP 50-150-3000A	DLP 130-50-2500A
Operating Voltage	3-50V	5-130V
Load Current	0-150A	0-50A
Maximum Power	3000W	2500W
Voltmeter Ranges	0-6V 0-18V 0-60V	0-18V 0-60V 0-180V
Ammeter Ranges	0-18A 0-60A 0-180A	0-6A 0-18A 0-60A
Resistance Ranges	5A/V 30A/V	1A/V 10A/V
Constant Ranges	0-30A 0-150A	0-10A 0-50A
Pulse Load Range	0-150A peak	0-50A peak
Program Input	All models 0-6V @ 1mA	
Program Linearity	All models less than ±1% from 10% full load	
Frequency Adjust	All models 500-5K Hz	
Pulse Width	All models 50% Duty Cycle	
Response Time	All models less than 50 μsec	
Meter Accuracy	All models less than ±3%	
Constant Voltage	0-50V	0-130V
Overvoltage	60V max	150V max
Current Limit	180A max	60A max
Power Limit	3400W max	3000W max

CUSTOM PROGRAMMABLE LOADS





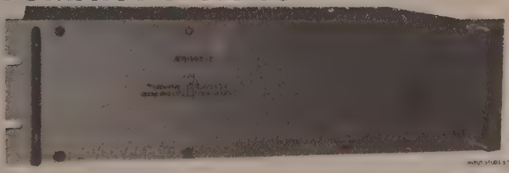


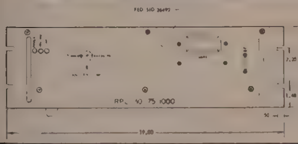
SPECIFICATIONS 8 MODULES MAX

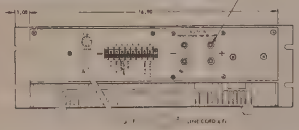
MODEL	MODULE "A"	MODULE "B"	MODULE "C"	MODULE "D"
Operating Voltage	3-50V	3-50V	7-130V	10-250V
Load Current	0-15A	0-30A	0-15A	0-5A
Maximum Power	150W	500W	750W	750W
Program Input	0-10 @ 1 mA			
Program Ranges	0-15A	0-30A	0-15A	0-5A
Program Linearity	1%	1%	1%	1%
Load Regulation	.5%	.5%	.5%	.5%
Overvoltage	60V max	60V max	150V max	300V max
Current Limit	20A max	40A max	20A max	7A max
Power Limit	200W max	700W max	1000W max	1000A max

Optional modules are available. Please consult factory for further information.

RPL 130-75-1000 — REMOTELY PROGRAMMABLE, DYNALOAD FOR AUTOMATIC TESTING





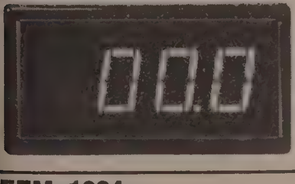


SPECIFICATIONS

MODEL	RPL 130-75-1000
Operating Voltage	2-130V
Load Current	0-75A
Maximum Power	1000W
Program Input	0-10V @ 1mA
Program Linearity	Less than 1%
Load Regulation	Less than 1%
Response Time	Less than 50 μsec
Overvoltage	150V max
Overcurrent	85A max
Overpower	1200W max
Remote Turn On	Negative TTL signal 3mA max
Remote Short Circuit	Negative TTL signal 3mA max
Current Sample Output	1mv/A
Fault Alarms	Individual LED indicators for: Overvoltage condition Current/power limit condition Overtemperature condition

OPTIONS

OPTIONAL AC INPUTS: 230 VAC ±10% - 47-63 Hz
115 VAC ±10% - 380-420 Hz



OPTIONAL DIGITAL METERS

With the exception of the low power DLR series, a 3½-digit digital meter can be installed in any model. These meters are accurate to ±1%.

SPS-2569
PROGRAM ISOLATOR
IN
OUT

OPTIONAL PROGRAM ISOLATOR

This option allows for the multiple programming of several Dynaloads from one program source, without interconnecting the DC load returns. This option is available as a factory-installed unit or can be purchased as a separate module, designated SPS 2569.

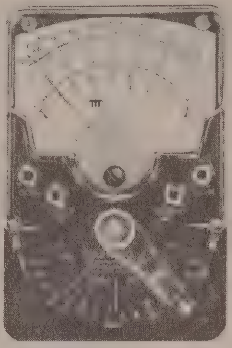
TRIPLETT

MODEL 310 V-O-M TYPE 5

1. Drop-resistant, hand-size V-O-M with high-impact thermoplastic case.
2. 20,000 Ohms per Volt DC and 5,000 Ohms per volt AC; diode overload protection with fused Rx1 Ohms range.
3. Single enclosed range switch; direct reading AC Amp range to facilitate clamp-on AC Ammeter usage.

RANGES

DC Volts: 0-3-12-60-300-1200 (20,000 Ohms per Volt).
AC Volts: 0-3-12-60-300-1200 (5,000 Ohms per Volt).
Ohms: 0-20k-200k-2MΩ-20MΩ (200 Ohm center scale on low range).
DC Microamperes: 0-600 at 250 mV.
DC Milliamperes: 0-6-60 at approx. 250 mV; 0-600 at approx. 330 mV.
Accuracy: ±3% DC; ±4% AC; (full scale).
Scale Length: 2⅛″.
Meter: Self-shielded; diode overload protected, fused Rx1 ohms range; spring backed jewels.
Case: Molded, black, high impact thermoplastic with slide latch cover for access to batteries and fuse, 2¾″w x $1\frac{5}{16}$″d x 4¼″ h.
Batteries: NEDA 15V 220 (1), 1½V 910F (1): Complete with 42″ leads, screw-on insulated alligator clips, batteries and instruction manual. Shpg. Wt. 2 lbs.
Model 310
Cat. No. 3018 ....$70.00



ACCESSORIES FOR 310's

Model 10 Clamp-on AC Ammeter—For 310, 310-FET & 310T. Ranges, 0-6-12-30-60-120-300.
Cat. No. 60-211 ....$34.70

Model 101 Line Separator—Divides two conductor cords direct or increases Model 10 sensitivity 10x and 20x.
Cat. No. 60-218 ....$13.70

Model 311 Lead—42″ long lead to separate Model 10 from 310 unit for easy reading in awkward spots.
Cat. No. 79-416 .... $7.50

Model 369 Carrying Case—For Model 310's.
Cat. No. 10-1258 ....$8.50

Model 79-153 Needle Tip Replacement Lead—For Model 310 series.
Cat. No. 79-153 ....$6.80

MODEL 310-C V-O-M TYPE 5

1. Drop-resistant, hand-size V-O-M with high-impact thermoplastic case.
2. 20,000 Ohms per volt DC and 15,000 Ohms per volt AC; diode overload protection with fused Rx1 Ohms range.
3. Single, enclosed range switch minimizes error; DC polarity-reversing switch.

RANGES

DC Volts: 0-3-12-60-300-600 (20,000 Ohms per Volt).
AC Volts: 0-3-12-60-300-600 (15,000 Ohms per Volt).
Ohms: 0-20k-200k-2MΩ-20MΩ (200 Ohm center scale on low range).
DC Microamperes: 0-600 at 250 mV.
DC Milliamperes: 0-6-60 at approx. 250 mV; 0-600 at approx. 330 mV.
Accuracy: ±3% DC; ±4% AC; (full scale).
Scale Length: 2⅛″.
Meter: Self-shielded, diode overload protected suspension movement; fused Rx1 ohms range; DC polarity-reversing switch; single, enclosed range switch.
Case: Molded black, 2¾″w X 1-5/16″d x 4¼″h.
Batteries: NEDA 15V 220 (1), 1½V 910F (1).

Complete with 42″ leads, screw-on insulated alligator clips, batteries and instruction manual. Shpg. Wt. 2 lbs.
Model 310-C
Cat. No. 3022 ....$97.00

ACCESSORIES FOR 310-C

Model 10-C Clamp-on AC Ammeter—For 310-C. Ranges, 0-6-12-30-60-120-300.
Cat. No. 60-335 ....$34.70

Model 101 Line Separator—Divides two conductor cords direct or increases Model 110-C sensitivity 10x and 20x.
Cat. No. 60-218 ....$13.70

Model 311 Lead—42″ long lead to separate Model 10-C from 310-C unit for easy reading in awkward spots.
Cat. No. 79-416 .... $7.50

Model 369 Carrying Case—For Model 310's.
Cat. No. 10-1258 ....$8.50

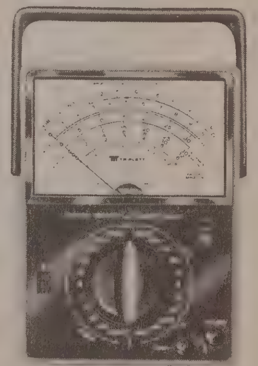
Model 79-153 Needle Tip Replacement Lead—For Model 310 series.
Cat. No. 79-153 ....$6.80

MODEL 60 V-O-M TYPE 2

1. X'TRA Rugged—Will withstand an accidental drop up to a five foot height.
2. Overload Protected—All ranges protected by diode and unusual three fuse arrangement, including ⅛ amp, 1 amp and 2 amp/1000V fuses.
3. Safety Designed For You—Designed to most rigid safety standards; completely insulated unit including newly designed safety leads.

RANGES

DC Volts: 0-0.3-1-3-10-30-100-300-1000 (Approx. 20,000 Ohms per Volt).
AC Volts: 0-3-10-30-100-300-1000 (Approx. 5,000 Ohms per Volt).
Ohms: 0-1k-10k-100k-1MΩ-10-MΩ (12 Ohms center scale on low range).
DC Microamperes: 0-100 at approx. 320 mV.
DC Milliamperes: 0-10-100-1000 at approx. 320 mV.
Decibels: −20 to +52 ("0"-db at 1mW on 600 Ohm line).
Accuracy: ±2% DC; ±3% AC; (full scale).
Scale Length: 4½″.
X'TRA Rugged: will withstand an accidental drop up to a five foot height with deviation from stated accuracy not exceeding ±4%.
Overload Protected: All ranges protected by diodes and unusual three fuse arrangement, including ⅛ amp, 1 amp and 2 amp/1000V fuses.
Safety Designed to most rigid safety standards to prevent explosive arcs in high energy circuits, up to the 2 amp/1000V (20kW) fuse capacity.



Meter: Diode overload protected ruggedized suspension meter movement module, all range polarity reversing switch.
Confidence test: Reassurance check of instrument meter.
Case: Molded, orange, high impact thermoplastic; easy external access sealed battery and fuse compartment; handle holds tester at 30° angle; 5¼″W X 7¼″H X 3¼″D.
Batteries: NEDA 9V 1604 (1), 1½V 13F (1).
Complete with 48″ safety test leads, screw-on insulated alligator clips, batteries, spare 1/8A and 1A fuses and instruction manual. Shpg. Wt. 4 lbs.
Model 60
Cat. No. 3145 ....$147.00

MODEL 60-NA V-O-M TYPE 2

1. X'TRA Rugged—50 ranges with mirror scale and ±1½% DC accuracy—will withstand an accidental drop up to a five foot height.
2. Overload Protected—All ranges protected by diode and unusual three fuse arrangement, including ⅛ amp, 1 amp and 2 amp/1000V fuses.
3. Safety Designed For You—Designed to most rigid safety standards; completely insulated unit including newly designed safety leads.

RANGES

DC Volts: 0-0.3-1-3-10-30-100-300-1000 (10,000 Ohms/Volt). 0-0.15-0.5-1.5-5-15-50-150-500 (20,000 Ohms/Volt).
AC Volts: 0-3-30-100-300-1000 (Approx. 5,000 Ohms/Volt). 0-1.5-15-50-150-500 (Approx. 10,000 Ohms/Volt).
Ohms: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ (6 Ohm center scale).
DC Microamperes: 0-50-100-500.
DC Milliamperes: 0-1-5-10-50-100-500-1000.
Decibels: −26 to +52 ("0" dBm at 1mW on 600 Ohm line).
Output Volts (AC): 0-3-30-100-300 (5,000 Ohms/Volt). 0-1.5-15-50-150 (10,000 Ohms/Volt).
Accuracy: ± 1½% DC; ±3% AC; (full scale).
Frequency Compensated.
Scale Length: 4½″.
X'TRA Rugged. See Model 60.
Overload Protected. See Model 60.

Safety Designed. See Model 60.
Meter: Diode overload protected ruggedized suspension meter movement, ½% resistors.
Confidence Test: See Model 60.
Case: Molded, gray, high impact thermoplastic; external access sealed battery and fuse compartment; handle holds tester at 30° angle; 5¼″W X 7½″H X 3¼″D.
Batteries: NEDA 30V 210 (1), 1½V 13F (1).
Complete with 48″ safety test leads, screw-on insulated alligator clips, batteries, spare ⅛A and 1A fuses and instruction manual. Shpg. Wt. 4 lbs.
Model 60-NA
Cat. No. 3151 ....$199.00

TRIPLETT
BLUFFTON, OHIO 45817
TEL. (419) 358-5015 TWX 810-490-2400

THE MARK OF QUALITY
OVER 75 YEARS

MODEL 310-FET—TYPE 2

1. Hand-size FET V-O-M with 10 megohm DC input resistance and diode overload-protected suspension movement.

2. Low voltage range of 300 mV DC; X1 megohm range.

3. Single range switch; DC polarity-reversing switch.

RANGES

DC Volts: 0-0.3-1.2-6-30-120-600. Input resistance 10 megohms.

AC Volts: 0-3-12-60-300-600 (5,000 Ohms per Volt).

Ohms: 0-5k-500k-50MΩ-5,000-MΩ (50 Ohm center scale on low range).

DC Milliamperes: 0-0.12-1.2 at 300 mV.

Accuracy: ±3% DC; ±4% AC; (full scale).

Scale Length: 2⅛".

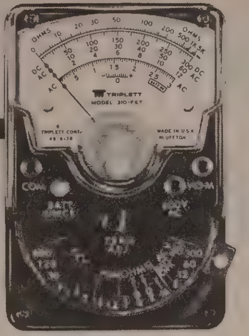
Meter: Self-shielded, diode overload protected suspension movement; DC polarity-reversing switch.

Case: Molded, black, 2¾"w X 1-5/16"d X 4¼"h.

Batteries: NEDA 7V 1501M (1), 1½V 910A (1).

Complete with 42" leads, screw-on insulated alligator clips, batteries and instruction manual. Shpg. Wt. 2 lbs.

Model 310-FET
Cat. No. 3027 ....**$133.00**



ACCESSORIES FOR 310's

Model 10 Clamp-on AC Ammeter—For 310, 310-FET & 310-T. Ranges, 0-6-12-30-60-120-300.
Cat. No. 60-211 ......**$34.70**

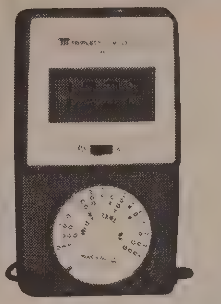
Model 101 Line Separator—Divides two conductor cords direct or increases Model 10 sensitivity 10x and 20x.
Cat. No. 60-218 ....**$13.70**

Model 311 Lead—42" long lead to separate Model 10 from 310 unit for easy reading in awkward spots.
Cat. No. 79-416 ....**$7.50**

Model 369 Carrying Case—For Model 310's.
Cat. No. 10-1258 ....**$8.50**

Model 79-153 Needle Tip Replacement Lead—For Model 310 series.
Cat. No. 79-153 ....**$6.80**

MODEL 3400 DMM TYPE 2



1. HAND-SIZE, 3½ Digit, single range switch—6 function, 24 ranges with Hi and Low Power Ohms. Auto-Zero and Auto-polarity.

2. OVERLOAD PROTECTION — Protected up to 1000 volts with special 2A/600V fuse arrangement; no nuisance fuse blows in volt and ohm ranges.

3. BATTERY LIFE—500 hour typical with 9V battery display has low battery indication with 8 hours battery life remaining.

RANGES

DC Volts: 0-0.2, ±0.15% Rdg. ±1 digit. 0-2-20-200. ±0.2% Rdg. ±1 digit. 0-1000, ±0.5% Rdg. ±1 digit. Input impedance all ranges: 10 Meg. Full scale step response: 1 sec. max.

AC Volts: 0-0.2-2-20-200, ±0.6% Rdg. ±2 digits. 0-1000, ±1.0% Rdg. ±2 digits. Input impedance all ranges: 10 Meg. Full scale step response: 5 sec. max.

Low Power Ohms: 0-200-20K-2M ±0.3% Rdg. ±1 digit. Max. open circuit voltage. 3V. Full scale step response: 2 sec. max.

Hi Power Ohms: 0-2K-200K, 0.3% Rdg. ±1 digit. 0-20M, ±1.0% Rdg. ±1 digit. Max. open circuit voltage 3V. Full scale step response: 2 sec. except 20M range, 8 sec. max.

DC Milliamperes: 0-2-20-200, ±1.0% Rdg. ±1 digit. 0-2000, ±1.5% Rdg. ±1 digit. Voltage drop across input, 200mV. Full scale step response: 1 sec. max.

AC Milliamperes: 0-2-20-200, ±1.5% Rdg. ±2 digits. 0-2000, ±2.0% Rdg. ±2 digits. Voltage drop across input. 200mV RMS. Full scale step response: 5 sec. max.

CONSTRUCTION

Display: 0.5", 3½ digit LCD.

Overrange Indication:

AC Frequency Response: 50Hz to 400Hz, all ranges.

Battery: NEDA 9V. 1604A (1).

Low Battery Indication:

Fuse: 2 Amp/600 Volt.

Case: Molded, fiesta tan high impact thermoplastic with non-slip "finger tread" surface finish.

Dimensions: Approx. 3"w x 5⅜"l x 1½"d.

Weight: Approx. 10 oz.

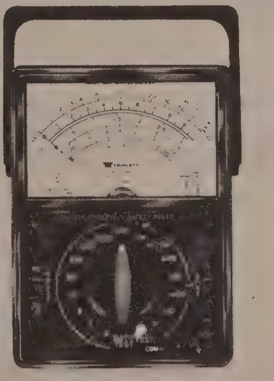
Model 3400, complete with one year warranty, 36" test leads, screw on insulated alligator clips. Wire tilt stand, 9V battery and instruction manual.
Cat. No. 3400 ....**$130.00**

MODEL 64 VOLT-OHMMETER

1. X'TRA Rugged/Overload Protected (all ranges)/Safety Designed solid state Volt-Ohmmeter.
2. Low-Power Ohms—LPΩ™ —6 ranges with 90mV power source for in-circuit measurements plus junction test circuit.
3. Exclusive Triplett Micro Power — TMP™ — permits continuous operation with carbon battery life in excess of a year.

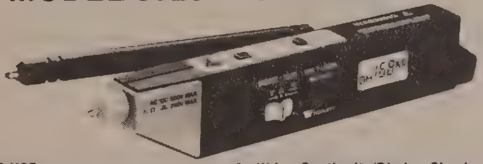
RANGES

DC Volts: 0-0.3-1-3-10-30-100-300-1000. Input res. 11.12 MΩ.
AC Volts: 0-0.3-1-3-10-30-100-300-1000. Input imp. 10 MΩ. Frequency range 20Hz to 20kHz, except 300 and 1000V.
Ohms-Low Power: 0-1k-10k-100k-1MΩ-10MΩ-100MΩ. (Max. voltage 90mV, max. power 0.8mW, 10 Ohm center scale).
Ohms-Conventional: 1000MΩ. (Max. voltage 0.9V, max. power 0.08μW, 10M ohm center scale).
Junction Test: checks diodes and transistor junctions (silicon-germanium-open or shorted); forward and reverse conduction. (Max. V. 0.9V, max. power 0.8mW).
Decibels: −30dB to +32dB.
Accuracy: ±3% F.S., all ranges.
Scale Length: 4½".
X'TRA Rugged: Will withstand an accidental drop up to a five foot height with deviation from stated accuracy not exceeding ±4%.
Overload Protected: All ranges protected by diodes and unusual two fuse arrangement, including 1 amp and 2 amp/1000V fuses.



Safety Designed to most rigid safety standards to prevent explosive arcs in high energy circuits, up to the 2 amp/1000V (20kW) fuse capacity.
Meter: Diode overload protected suspension movement module.
Case: Molded, green, high impact thermoplastic; external access sealed battery and fuse compartment; 5¼"W X 7½"H X 3¼"D.
Batteries: NEDA 9V 1604 (2), 1½V 13F (1).
Complete with 48" safety test leads, screw-on insulated alligator clips, batteries, spare 1A fuse and instruction manual. Shpg. Wt. 4 lbs.
Model 64
Cat. No. 3152 .... **$202.00**

MODEL 3525 DIGI-PROBE™



EASY TO USE
Fully automatic range selection for volts and ohm functions; readout is in hand with option of Data Hold switch. Just "touch & test."
EASY TO CARRY
Comes complete with shirt pocket carrying case.
EASY CONTINUITY CHECKING
Fast audible continuity tone.
EASY DIODE CHECKING
Both checks and classifies germanium and silicon diodes.
OVERLOAD PROTECTION
Internal overload protection to 750 VAC/DC in voltage ranges and 250 VAC/DC in ohms and continuity ranges.

RANGES

DC Volts—Range selection fully automatic. 0-2V, 20V, 200V, ±0.75% Rdg. +2 digits. 0-500V. ±1.0% Rdg. +2 digits. Input impedance: Greater than 10 Meg all ranges. Full scale step response: 4 sec. maximum.
AC Volts—Range selection fully automatic. 0-2V, 20V, 200V, 500V, ±1.25% Rdg. +4 digits.
Input Impedance: Greater than 10 Meg all ranges.
Full scale step response: 5 sec. maximum.
Ohms—Range selection fully automatic. 0-2k, 20k, 200k, ±0.75% Rdg.+3 digits. 0-2,000k, ±1.25% Rdg. +3 digits. Will read to 2,999k ohms in overrange. Maximum open circuit voltage: less than 0.45V.
Full scale step response: 5 sec. maximum.

Audible Continuity/Diode Check—Threshold level: audible tone with resistance of approximately 4000 ohms or less. Indication: 4kHz tone and ≏ on LCD. Response time: less than 1 msec. Maximum open circuit voltage: 1.5V.

CONSTRUCTION

Display: 5mm, 3½ digit LCD.
Overrange Indication:
Overload Protection: up to 750 VDC, 530 V RMS or 750 VAC Peak and 250 V AC/DC on ohms for 1 minute.
Continuity-Audible Tone: Activated with resistance levels of 1.5k to 15k Ω, typically 4k Ω, a 4kHz tone will be heard, the tone response is less than 1 msec.
AC Frequency Response: 40Hz to 500Hz all ranges.
Battery: Two 1½V Button Type—NEDA 1107 SO silver oxide, 1166A alkaline.
Battery Life: 100 hours typical silver oxide, 70 hours alkaline.
Low Battery Indication:
Data Hold: When DH button depressed, will hold all readings except continuity, "DH" shows on display.
Case: Molded black high impact thermoplastic with textured surface finish.
Dimensions: Approx. 6⅜" long x 1⅛" wide x ¾" deep (162mm x 28mm x 20mm.)
Weight: 2½ oz. (0.07 kg).
Complete with one year warranty, 2-1½ V batteries, attached 28" test lead, instruction manual and carrying case.
Model 3525
Cat. No. 3525 .... **$65.00**

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BLUFFTON, OHIO 45817
TEL. (419) 358-5015 TWX 810-490-2400

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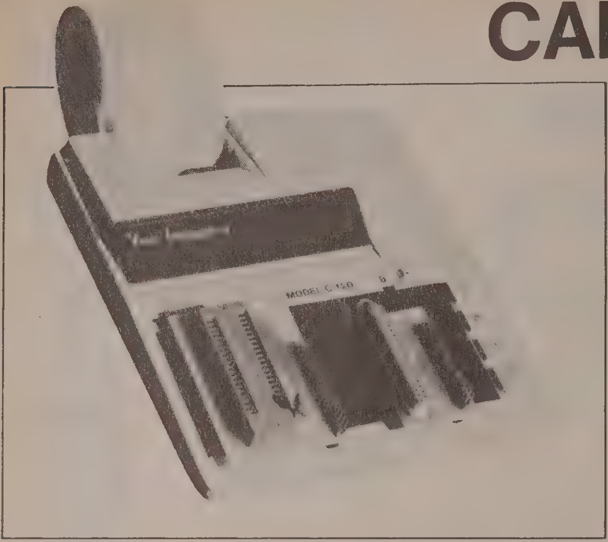
OVER 75 YEARS



CABLE TESTING INSTRUMENT

Model C 120

GENERAL DESCRIPTION

- Self programming
- Adaptable to a variety of cable connectors
- Checks continuity as well as for shorts, opens and miswires
- Rapid pass/fail testing
- Point to point wire listing
- Signature analysis eliminates keeping "known good" cable on hand

FUNCTIONS AND FEATURES

- Tests cables up to 60 conductors.
- Configured to different connector styles by plugging in cable adaptor boards.
- Programmed by pressing the "Memorize Signature" key when a good cable is connected.
- Point to point hard copy wiring list can be obtained by pressing the "Module Terminations" key.
- Pass/fail test for a cable is initiated by pressing the "Check cable" key. The test is performed in less than two seconds.
- Individual conductors identified by just touching with the probe lead.

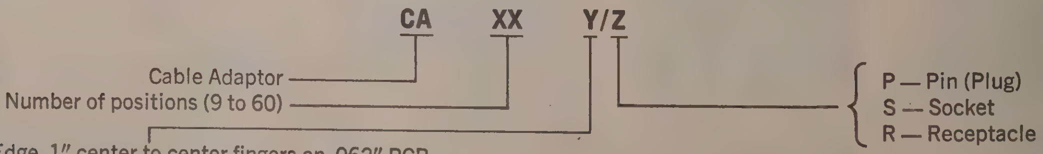
SPECIFICATIONS

Dimensions:	8 x 7.3 x 1.6″
Power:	Four AA batteries or AC wall adaptor 110V ±10%
Test Socket:	Two 60 pin sockets into which cable adaptors (optional) are inserted
Probe Option:	Identifies conductors plugged into socket A by touching with probe lead
Switches:	Power on/off Printer on/off Paper feed Memorize signature Module terminations Check cable
Printer:	18 characters/line max Paper plain — 2¼″ width Character printer — impact

Self Test:	Performs self test upon powering up
Sensitivity:	Short circuit < 3K ohms Open circuit > 10K ohms Test voltage < 6V Test current < 2 mA
Interwire Capacitance:	10,000 pF max
Indicators:	Flashing red LED indicates fail Flashing green LED indicates pass
Operating Temperature:	32°F to 105°F (0°C to 40°C)
Storage Temperature:	−40°F to 165°F (−40°C to 74°C)

CABLE ADAPTORS

PART NUMBER ORDERING SYSTEM



CE — Card Edge .1″ center to center fingers on .062″ PCB
D — Subminiature 'D' Example: EIA RS232; RS449
DIP — Dual Inline Package 14, 16 pin row spacing is .3″; 24, 40 pin row spacing is .6″. Socket version is zero insertion pressure.
FC — Flat Cable 12″ of color coded 28AWG cable stripped and tinned. Utilized in wiring special connector types.
H — Header universal dual row .1″ center to center spacing plug has .025″ posts.
RC — Ribbon Connector Example: Telco 25 pair; Centronics type; Champ; Series 57; IEEE488; GPIB/HPIB.

Should you have any questions regarding our company or products, please contact us. Also if you require assistance in the design of a custom cable adaptor we will be very happy to work with you. When you do have a need for a cable tester it is available for immediate delivery, and we will consider it a pleasure to supply you.

VI

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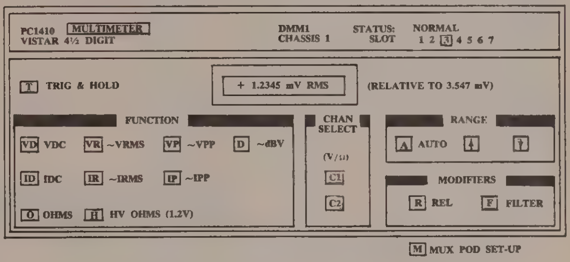
PERSONAL COMPUTER INSTRUMENT SYSTEM

- Lab-grade electronic T&M instruments.
- IBM-PC/XT* compatible plug-in modules.
- Hardware/Software tailored for both lab bench and manufacturing environments.
- Compatible with IEEE488 systems.
- No software skills needed with Manual or Step Procedure modes.
- Expanding instrument library, starting with:
  - PC1010: 200KHZ, –90dBr THD Oscillator
  - PC1020: 11MHZ, Function Generator
  - PC1030: Triple Output d.c. Supply
  - PC1040: 4½ Digit Multimeter
  - PC1850: 16 channel Analog Multiplexer
  - PC1320: IEEE488 Interface

*IBM-PC/IBM-XT are Trademarks of International Business Machine Corp.

SERIES PC1000

CAN YOU OPERATE MANUAL MULTIMETERS, OSCILLATORS, ETC.? Then you already know how to operate the VISTAR PC1000 ATE Instrument System! Push a button on the modular instrument panel and your CRT monitor displays a "front panel" similar to that below. One or two keystrokes sets up any instrument function and all settings may be disk stored (Step Procedure Mode) giving you the ability to semi-automatically (or automatically) test your cards & components.



At a system cost comparable to manual instruments, the VISTAR PC1000 System will shorten your engineering lab, pilot production, and production electronic testing without requiring you to become an expert programmer. Your IEEE488 instruments may also be compatibly blended with the PC1000 using the PC1320 interface module. All modular instruments are electrically and mechanically compatible with the IBM-PC mainframe.

VISTAR CORPORATION
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Tampa, FL 33625
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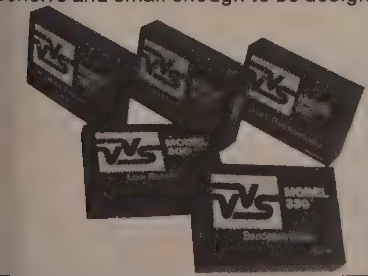
PROGRAMMABLE MINI-INSTRUMENTS

Get your products to the marketplace faster and test them quickly by designing-in these ready-made mini-programmable instrument modules! Most of these instuments employ a new proprietary precision voltage variable conductance technology which gives you low-cost, infinite-resolution programmability in active RC filters, oscillators, and attenuators. The instrument's key parameter (e.g. filter cutoff frequency) is voltage tunable over, typically, a 100:1 range. Use a simple panel pot or micro-computer controlled DAC to set this parameter. Other programmable parameters (e.g. band switching) are TTL level controlled. These mini-instruments provide distortion, dynamic range, and programmability features normally only associated with costly IEEE488 bus instruments yet are inexpensive and small enough to be designed into your OEM equipment. Signals from d.c. to over 5MHZ may be processed with this technology and VVS invites you to discuss your special needs should this standard product line not satisfy your requirements.



KEY SPECIFICATIONS

- dc to over 100KHZ frequencies.
- 100:1 tuning range on each band.
- Filters have over 90dB dynamic range.
- Oscillator THD: As low as –95dBr.
- Control Speed: 10 millisec typ.
- PWA mountable, 3.5x2.5x0.8 inch typ.
- Low Cost ($75 to $150 typ.)

STANDARD INSTRUMENT SERIES

- Series 300: Low Pass Filters (4 Poles).
- Series 310: High Pass Filters (4 Poles).
- Series 330: Band Pass Filters (2 Pole Pair).
- Series 400: Oscillators (Quad. Outputs).
- Series 270: L-Pad Attenuators.
- Model 130: Frequency Tracker.
- Model 620: Std. Bus 6 Pole Low-Pass Filter (Anti-aliasing).

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A Division of Vistar Corp.

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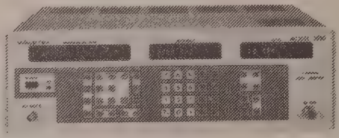
WAVETEK

P.O. Box 190, Beech Grove, IN 46107. Phone (317) 788-5960

Signal Generators



Wavetek offers a complete line of precision, synthesized signal generators. Models 3510 and 3520 are microprocessor-based, fully GPIB programmable 1 GHz and 2 GHz instruments. Nine other signal generator models, plus a long list of options and accessories, allow you to select an instrument that will meet your exact needs.

Frequency Range	Model	Price ($)	RF Output Range	Frequency Accuracy	Resolution	Mod. Modes	Frequency Programmability
1-520 MHz	3000	$3795	+13 to −137 dBm	± 0.001% (Typical: 0.0002%)	1 kHz	AM, FM	BCD standard. GPIB optional.
	3000-200	5385					
	3001	4545					
1 kHz-520 MHz	3002	5495					
1-520 MHz	3003	5495				AM, FM Also sim. AM, FM	
1 kHz-520 MHz	3004	5495			100 Hz		
1-520 MHz	3005	5495					
1 kHz-520 MHz	3006	5495					
1-1000 MHz	3010	5495					
1-1040 MHz	3510	6195					GPIB standard.
1-2080 MHz	3520	7995	+10 to −137 dBm				

Sweep/Signal Generators

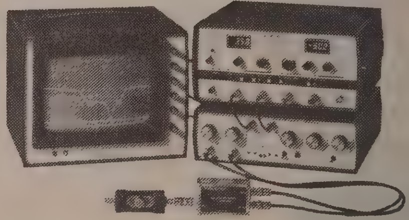
Wavetek's complete line of precision, sweep/signal generators allows you to meet your sweep requirements with a minimum investment. Model 2005 is an extremely broadband 1 to 4500 MHz sweep generator that offers a level of performance previously only available in UHF sweepers. Other Wavetek models cover the frequency range from 500 kHz to 4.5 GHz. Crystal-controlled marker systems are available for all Wavetek sweepers.

Frequency Range Single Band	Model	Price ($)	Maximum Sweep Width	RF Output Range
1.0 MHz-400 MHz	1062	$1285	Full band	+ 10 to −60 dBm
1.0 MHz-1000 MHz	1080	2995	Full band	+ 13 to −70 dBm
1.0 MHz-1000 MHz	1081	2995	Full band	75 ohm version
2.5 GHz-3.5 GHz	1083	3495	Full band	+ 13 to −60 dBm
3.5 GHz-4.5 GHz	1084	3495	Full band	+ 13 to −60 dBm
Multiband				
1 MHz-1400 MHz	2000	3475	500 MHz	+ 10 to −80 dBm
1 MHz-1400 MHz	2001	3475	500 MHz	+ 10 to −80 dBm
1 MHz-2500 MHz	2002A	5675	Full band	+ 13 to −77 dBm
1 MHz-2500 MHz	2002B	5675	Full band	+ 13 to −77 dBm
1 MHz-4500 MHz	2005	7775	Full band	+ 13 to −57 dBm

Scalar Analyzer System

Wavetek's Scalar Analyzer System permits active or passive components to be tested for insertion gain or loss, as well as return loss. Our Model 1080 Sweep Generator combines with the Model 1077 Sweep Comparator, the Model 1905 X-Y Display Oscilloscope, and the FB-40-50 Return Loss Bridge to create an ideal system for testing in the 1 to 1,000 MHz range.

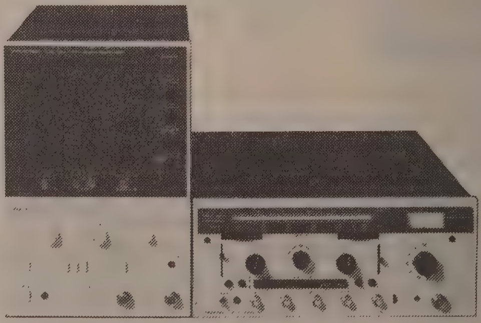
Total System: $5590



Group Delay Analyzer

The Model 4501 Group Delay Analyzer provides a fast, accurate, low-cost method for measuring variations in group delay over the 5 to 2000 MHz range. The analyzer eliminates time-consuming point-by-point measurements and elaborate computations necessary with other more expensive techniques. The Model 4501 is designed for use with Wavetek's Model 2002B Sweep Generator and Model 4602 Digital Storage Display Oscilloscope. The Model 4501 is also compatible with a variety of Wavetek's other sweep generators and display oscilloscopes.

Model 4501 Group Delay Analyzer: $4975
Model 4602 Digital Storage Display Oscilloscope: $2395
Model 2002B Sweep Generator: $5675



X-Y Display Oscilloscopes

Wavetek oscilloscopes satisfy the needs of engineering laboratories, production facilities, bench applications, OEMs and educational institutions. Single or dual-trace models are available in 12-inch or 9-inch CRTs with electromagnetic deflection. The large, bright, focused trace ensures easy viewing from several feet away.

Model	Price ($)	CRT Size
1901C	$ 925	12-inch
1903	1375	12-inch
1905	775	9-inch
1910	1295	12-inch
1951 (OEM)	745	12-inch
1955 (OEM)	645	9-inch

Wavetek also manufactures products for the CATV, TV and Two-Way Communications industries, as well as a variety of microwave components.
For information, phone TOLL FREE 1-800-428-4424.

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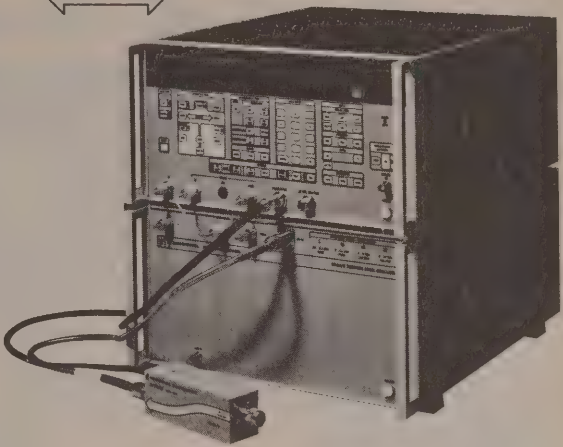
VM-24

Signal Generator Calibrator, Frequency, Power Meter

IEEE-488

A unique portable microprocessor-controlled instrument offering convenience **plus** speed and accuracy

- Attenuation — 0 to > 100 dB with up to 0.001 dB resolution
- Power — minimum range of +20 to −90 dBm ±0.5 dB with a resolution of 0.01 dB
- Frequency — 30 Hz to 18 GHz with an accuracy of 0.0001%, ±1 count
- Modulation Parameters with accuracies better than 2%; AM, 0 to 90%; FM, 0 to 300 kHz deviation
- IEEE-488 Bus Compatible/Local programming feature
- Calibrates all types of signal generators — (whether synthesized or free-running)



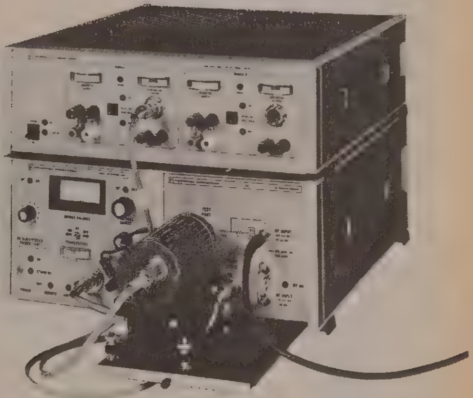
SYSTEM II

Automatic Power Meter Calibration System & Precision Power Meter

IEEE-488

Ideal for primary and secondary laboratories, quality control centers, maintenance depots, and production lines

- 10 MHz to 18 GHz
- Typically 0.1% Repeatability
- NBS Traceability
- 1.2% to 2.5% Accuracies
- IEEE-488 Bus Controlled
- Power levels of 0.5 and 1 to 10 mW in 1 mW steps
- Operable by laboratory or production personnel



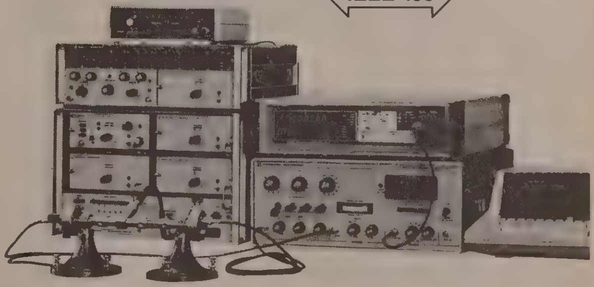
1810A

Dual Channel Stabilized RF Ratio Meter

IEEE-488

Still the best for Swept and Fixed Frequency RF Insertion Loss, Return Loss, Gain and VSWR Measurements

- 50 MHz to 18 GHz
- 30 dB Dynamic Range
- ±0.02 dB/10 dB accuracy
- Better than 0.002 dB resolution at slow sweep speeds
- Typically 150 msec per frequency measurement
- Accurate measurements — even with sources containing harmonics as high as −20 dBc



C-41A

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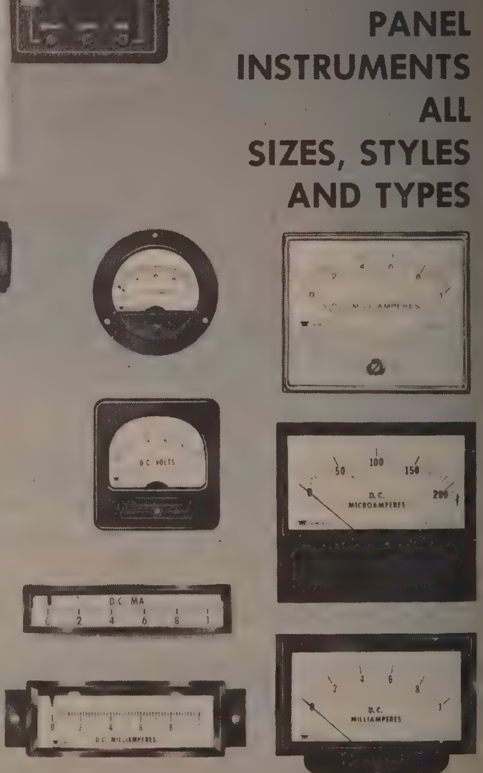
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OVER 75 YEARS

**Triplett performance . . .
a tough act to follow**

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419-358-5015 TWX 810-490-2400

DIGITAL PANEL METERS

Manufacturer	EEM Page No.	Model/Series	Number of Digits (Number of Counts) 3 (999)	3½ (1999)	3¾ (3999-5999)	4 (9999)	4½ (19999)	4¾ (39999-59999)	Function General Purpose	Temperature	Pressure	Weight	RPM	Process Control	Other	Type of Display	Power Requirements AC Line	+5 VDC	BCD Output
Datel	3•1323	DM/DVC		●			●		●							LCD/LED	●	●	●
DCI Inc.	3•1324	All		●	●	●	●	●	●	●	●	●	●	●	●	LED			●
Dixson Instrs.	3•1325	051/101				●			●	●				●		LED		●	
Digitec	3•1326	IQ		●		●	●		●	●	●	●	●	●	●				●
	3•1327	2770/80A		●			●			●				●	●				●
Electro Industries	3•1328	FF/FVA/FVD/FAD/FT		●					●						●	LED	●		
	3•1328	PF		●					●						●	LED	●		
	3•1329	VA		●					●						●	LED	●		●
	3•1329	LF				●			●						●	LED	●		●
	3•1329	LM	●						●						●	LED	●		●
Lincoln Instrs.	3•1334	All		●			●	●	●						●	LED	●	●	●
Modutec	3•1335	D		●					●	●						LCD/LED	●	●	
NES, Inc.	3•1338- 3•1341	Slimline	●	●	●	●	●	●	●	●	●	●	●	●	●	LCD/LED	●	●	●
Newport	3•1342 3•1343	All		●	●		●	●	●	●	●	●	●	●	●	LEC/LED/GP	●	●	●
North Atlantic	3•1345	800/801			●	Opt.									●	LED			●
Omega Engrg.	3•1346	199	●											●					
Simpson	3•1350	—		●					●							LED	●	●	
	3•1350	2840		●			●		●							LED	●	●	
	3•1350	2850							●							LED/GP	●	●	●
Texmate	3•1352	PM-35		●					●							LCD/LED		●	Opt.
	3•1352	PM-45					●		●							LCD/LED		●	●
	3•1352	DM		●			●		●							LCD/LED		●	●
	3•1352	CM-35		●										●		LCD			
	3•1355	TM		●						●						LCD/LED			
	3•1355	PC					●								●	LCD/LED			
	3•1355	RD					●									LED/LCD			
	3•1355	RP		●			●									LED	●		Opt.
Velonex	3•1359	31	●						●							LED	Opt.	●	●
	3•1359	36/37		●					●							LCD/LED	Opt.	●	●
	3•1359	41				●			●							LED	Opt.	●	●
	3•1359	46					●		●							LED	Opt.	●	●

For manufacturers' sales offices, see yellow pages

ANALOG PANEL METERS

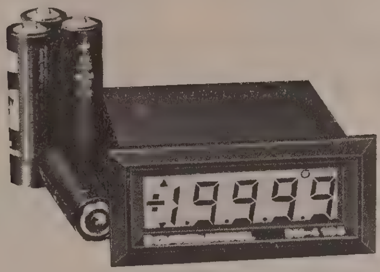
Manufacturer	EEM Page No.	Model/Series	Type			Size (Inches)												
			Moving Coil	Moving Iron	Taut Band	1½ & Under	2	2½	3	3½	4	4½	5	Over 5	Edgewise	Illuminated	Custom	Bargraph
Dixson Instrs.	3•1325	051/101	●	●							●		●		●	●	●	●
Emico	3•1330	60			●			●		●		●					●	
	3•1330	50		●				●									●	
	3•1330	44		●					●						●			
	3•1330	13/13F		●											●		●	
	3•1330	B02/12		●		●									●			
	3•1330	58		●				●										
	3•1331	25	●		●			●										
	3•1331	250	●		●			●										
JBT Instruments	3•1332	All	●	●	●		●	●	●	●	●					●	●	
Jewell	3•1333	All	●	●	●	●	●	●	●	●	●	●	●		●	●	●	
Modutec	3•1336	S		●	●	●		●		●		●		●		●	●	
	3•1336	W & WM		●	●			●		●		●				●	●	
	3•1336	PB		●	●	●		●		●							●	
	3•1337	M	●			●	●	●		●					●		●	
Omega Engrg.	3•1346	All								●		●		●				
Shogyo	3•1348	S, SR				●	●	●	●	●					●	●		
	3•1349	All				●	●	●	●		●							
Simpson	3•1350	All	●	●	●	●		●		●		●			●			
Texmate	3•1352	AM														●		●
Triplett	3•1357	G/GLB	●	●	●	●		●		●		●		●	●	●	●	
	3•1357	M/R	●	●	●	●		●		●		●		●				
	3•1357	Phenolic	●	●	●			●		●		●		●				

MINIATURE DIGITAL INSTRUMENTS

ULTRA-LOW COST OEM

- Tiny 2″ x 3.5″ single-board with .62″ panel depth
- Accepts components for 2 to 200V, 20μA to 2A, and digital ohmmeter ranges
- Noise-rejecting balanced differential inputs
- 5 Vdc power @ 280 mA

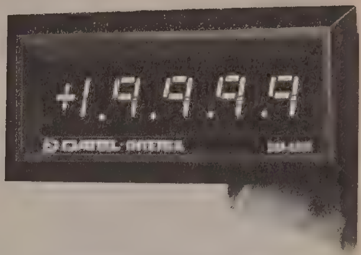
DM-31



BATTERY-POWERED 4½ DIGIT DIFFERENTIAL LCD

- True balanced differential inputs, 1000 Megohm input impedance, 5 pA bias current.
- Needs only 15 milliwatts (5 Vdc @ 3 mA)
- Autozeroing with ratiometric reference for drift correction.
- Digit-serial multiplexed BCD data outputs for remote DM-4106 slave display or computer input.

DM-4105



MINIATURE LOW-COST DIFFERENTIAL 4½ DIGIT

- True balanced differential inputs, 1000 Megohm input impedance, 5 pA bias current.
- Bright 0.3″ high LED displays +5 Vdc power at 200 mA
- Autozeroing with ratiometric reference for drift correction.
- Digit-serial multiplexed BCD data outputs for remote DM-4102 slave display or computer input.

DM-4200

CLR
A
B
C
D
E
F
7
8
9
4
5
6
1
2
3
0
Ent

PROGRAMMABLE VOLTAGE CALIBRATOR

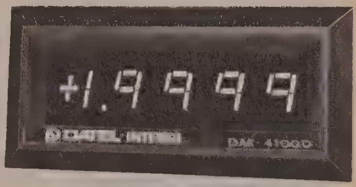
- Accuracy ±.015% Traceable to NBS
- 4½ digit LCD display 100 microvolt resolution
- Low power requirement 9V transistor battery operation
- Two modes of operation Decimal/Hexadecimal entry
- AC adapter/charger operation

DVC-350

LOW-COST MULTIRANGE

- Accepts user-installed components for:
- Any voltage range ±2V to ±200V
- Any current range ±20 μA to ±2A
- Digital Ohmmeter 200Ω to 10MΩFS
- Offset pot for 4-20 mA and others
- Noise-rejecting balanced differential input
- +5 Vdc power @ 280 mA

DM-3100N



MICROBUSSABLE 3-STATE BCD DIFFERENTIAL

- 4½ digit data gated out in 4-bit nibbles, full parallel selectable
- Connects directly to shared microprocessor busses
- 1000 Megohm input impedance, 5 pA bias current
- Autozeroed, ratiometric to correct drift
- 5 Vdc power @ 580 mA

DM-4101D

SEND FOR YOUR FREE DIGITAL INSTRUMENT BROCHURE

DATEL

11 CABOT BOULEVARD, MANSFIELD, MA 02048/TEL. (617)339-9341/TWX 710-346-1953/TLX 951340
• Santa Ana, CA (714) 835-2751 • Sunnyvale, CA (408) 733-2424 • Los Angeles, CA (213) 933-7256
• OVERSEAS: DATEL (UNITED KINGDOM) TEL. BASINGSTOKE (256)69085 • DATEL (FRANCE) TEL. 602 57 11
• DATEL(GERMANY)TEL.(89)530741 • DATEL(JAPAN)TOKYO TEL. 793-1031 • DATEL(JAPAN)OSAKA TEL. 06-3542025

Digital Panel Counters, Timers, Tachometers, Voltmeters, Controllers, Temperature Indicators for Systems or Stand-Alone Use

DCI
DIGITAL CLOCK
12.58.00
DCI
8888

Enhance Process Controller performance with panel instruments from DCI

Time-of-Day and Calendar Clocks with BCD outputs and Battery Back-up provide master timing for your process controller. Remote Readouts accept BCD information and display in digital form. Digital Comparators and Counter/Comparators give convenient remote setpoint control via thumbwheel switches.

Timing, Counting and Controlling

Totalizing counters and Timers measure, display and control time from microseconds to hours. Display events per unit time (Frequency, RPM, etc.), measure low frequencies (100 Hz. and below) with resolution to .01 Hz in one second, or perform bi-directional counting at rates up to 1MHz.

DCI
UP/DOWN COUNTER
892630
DCI
RPM
4759
DCI
SECONDS
9563
START
STOP
RESET

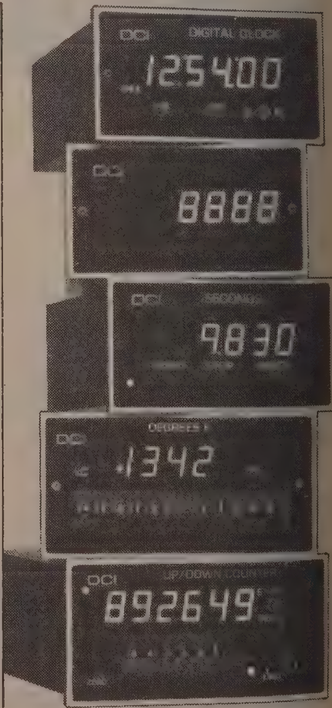
DCI
DEGREES C
1342
VOLTS
13.427
POUNDS
1142

Monitor and Control Process Variables

High/Low Setpoint Controller monitors and controls process variables such as Temperature, DC Voltage, AC Voltage, 4-20 ma. current loop and many others.

- 4 or 4½ Digit display
- Heavy-duty relay closures
- Analog output
- Transducer excitation voltage
- Easily scaled to read out in engineering units
- Differential input
- BCD Outputs

DCI has a whole stack of reliable solutions for your measurement/control problems, all with BCD outputs, aluminum cases, .56″ high-efficiency LED Displays and Remote-Control inputs. For more information or applications assistance call Bill Cook at (913) 782-5672 or write 720 E. Dennis, Olathe, Kansas 66061.

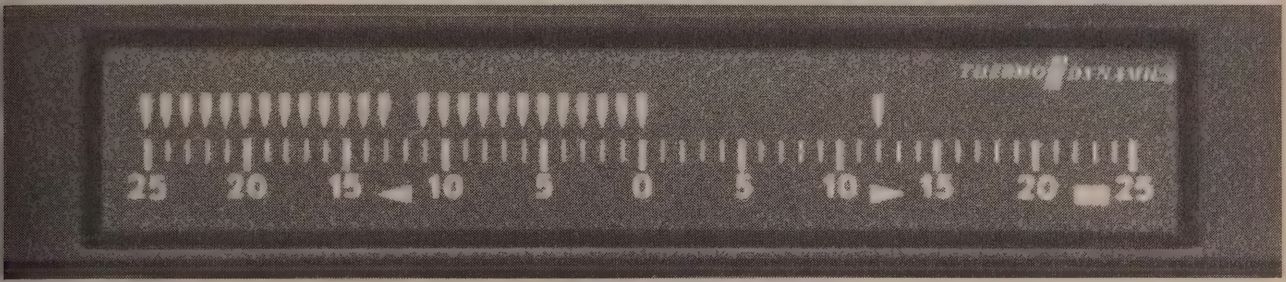

DCI
DIGITAL CLOCK
125400
DCI
8888
DCI
SECONDS
9830
DCI
DEGREES F
1342
DCI
UP/DOWN COUNTER
892649

DCI incorporated

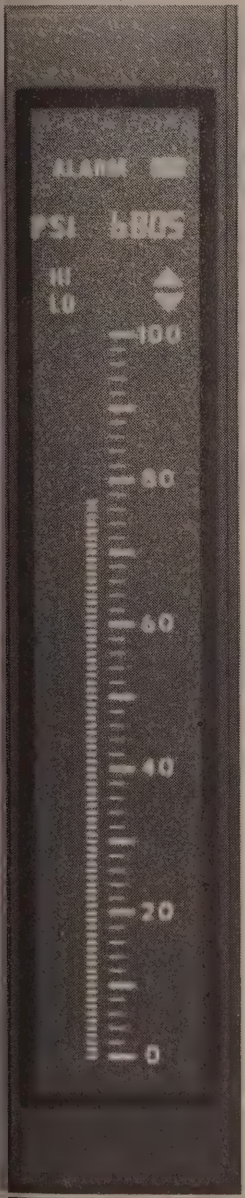
720 EAST DENNIS/OLATHE, KANSAS 66061 • (913) 782-5672

DIXSON INSTRUMENTS
DIVISION OF DIXSON, INCORPORATED

BARGRAPH METER/CONTROLLER


THERMO DYNAMICS
25
20
15
10
5
0
5
10
15
20
25

MODEL 051 ▲
FULL SIZE
MODEL 101 ▼


ALARM
PSI
6805
HI
LO
100
80
60
40
20
0

- **STATE OF THE ART TECHNOLOGY**
- **MICROPROCESSOR BASED**
- **ANALOG/DIGITAL DISPLAY**
- **ILLUMINATED SCALE**
- **SHOCK/VIBRATION IMMUNE**
- **RAPID RESPONSE**
- **THREE SETPOINTS**
- **EXTERNAL SET POINT OUTPUTS**
- **+5 VDC OPERATION**
- **MILITARIZED MODELS**
- **AUDIO VU/PPM MODELS**
- **SWITCHBOARD MODELS (250°)**

Dixson Bargraph—
Meter/Controllers are solid state instruments that can be used in unlimited measuring and controlling applications. They combine the instant trend recognition of an analog meter with the precision of a 2½ or 4 digit LED display. The Model 101 provides a 1.0% resolution. In addition, these instruments may be used as HI-LO Controllers or Annunciators in process or other control applications.

The analog scale, set point annunciators and digital display are red LED's. In addition to displaying readings, the LO, HI and ALARM set points may be utilized to activate external devices. Flashing segments indicate under/over range conditions.

The analog display is available in the bar mode with center or end scale zero. The Model 051 features a 5″ scale divided into 51 segments. The 101 has a 4″ scale with 101 segments.

Sensitivity ranges include both AC and DC currents and voltages for virtually any application as follows:
DC Volts: 50mv to 250V
DC Current: 50ua to 5A
AC Volts: 250mv to 250V
AC Current: 1ma to 5A.

Set point controls are normally supplied internally to prevent tampering. As an option they may be front panel mounted for easy accessibility. The HI point must always be higher than LO, but the ALARM may be set anywhere. The internal microprocessor provides a "failsafe" condition by always reading the initial settings at startup. Keylocks are recommended for critical applications.

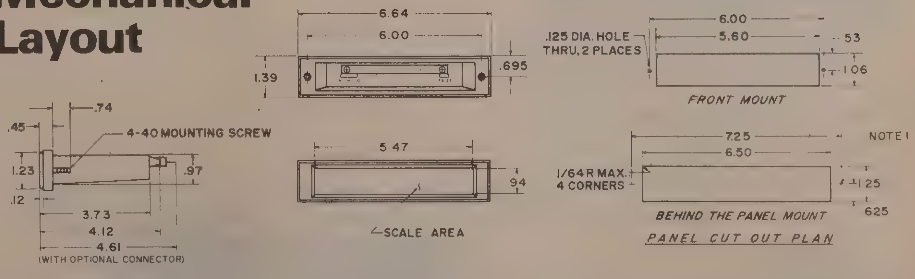
Dixson Bargraph Meter/Controllers are supplied in handsome black NORYL or ABS complying with UL94V-0 or -1. The P/C board protrudes at the back for easy engagement with an edge connector or terminal block.

Operating temperature range is from 0° to 60° C. Current drain: Model 101 300ma; Model 051 670ma.

Options for the bargraph include: set points, center zero, 2½ or 4 digit readout, differential input model, recorder drive analog output, hold function, suppressed scales, custom algorithms and scales, digital interface model.

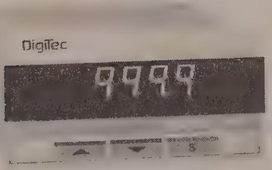
Accessories include: Edge connector, terminal block interface, power supply. Unit pricing ranges from $80.00 to $300.00 with options. For complete details call for a catalog.

Mechanical Layout

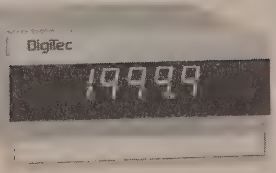

6.64
6.00
1.39
.695
.125 DIA. HOLE THRU, 2 PLACES
6.00
5.60
.53
.106
FRONT MOUNT
.74
.45
4-40 MOUNTING SCREW
1.23
.97
.12
3.73
4.12
4.61
(WITH OPTIONAL CONNECTOR)
5.47
.94
SCALE AREA
7.25
6.50
NOTE 1
1/64 R MAX. 4 CORNERS
1.25
.625
BEHIND THE PANEL MOUNT
PANEL CUT OUT PLAN

BOX 1449, GRAND JUNCTION, CO 81502 • (303) 242-8863 EXT 223 • TWX 910-929-9661

Digitec Intelligent Panel Instruments



IQ-280 TC Temperature meter with 0.1° resolution



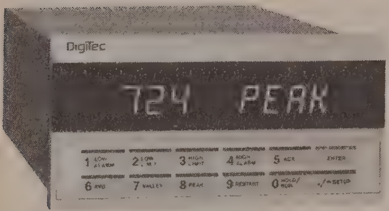
IQ-280 DC Voltage meter

IQ-280 Series Panel Meters – Bulletin 2800-1
New intelligent IQ-280 panel meters incorporate microprocessor technology to offer accuracy and versatility at a reasonable price.

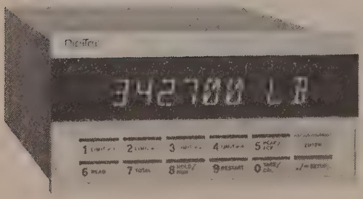
Choose from three designs: exclusive 3½ or 4 digit meters with accuracy to 0.02% or 4½ digit meters, accurate to 0.01%, for high resolution applications.

All models feature NEMA 12 sealed case, impervious to industrial environments. ⅛ DIN size fits standard panel meter cutout.

- Panel thermometers with 1° and 0.1° accuracy.
- DC voltage/current meters from 200mA-1000V.
- Process variable meters with front-panel digital offset and scale.
- TC, RTD, AD/DC volts & current, resistance, true rms, strain gages.
- SelfCal™ autocalibration for assured accuracy without adjustments.
- Dual high/low digital setpoints with open collector outputs available.
- Optional BCD and serial data outputs for off-the-shelf system interface.
- Optional front panel keypad control.



IQ-400 Process Variable Monitor & Controller



IQ-400 Strain Gage Monitor & Controller

IQ-400 Series Monitors & Controllers – Bulletin 4000-1
New intelligent IQ-400 panel monitors and controllers display present readings plus averages, minimums, maximums, labels, alarm messages, and more. Four setpoints and two open collector outputs for on-off control included. Front panel operator keypad controls display.

Nine-character alphanumeric display also provides prompting for easy step-by-step setup procedure. SelfCal™ A/D autocalibration for continuous high-accuracy readings. Optional analog output and data communications I/O. Standard size DIN case NEMA 12 for industrial environments fits 68mm x 138mm cutout.

Temperature

- TC and RTD models with built-in linearization.
- Display temperature, average, min, max, limits, and messages.
- Selectable °C or °F.

Process Variable

- Programmable scale and offset.
- Accepts all process transmitter and transducer input.
- Display process readings, averages, peaks, valleys, limits and messages.

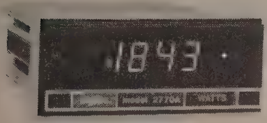
Strain Gage

- Displays strain gage or load cell readings.
- Computes totals, net and gross.
- Built-in gage/cell excitation voltage source.

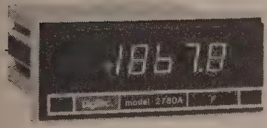
Digitec Corporation, 918 Woodley Road, P.O. Box 458,
Dayton, Ohio 45401, Tel. (513) 254-6251. Telex (310) 687-4219.

DigiTec®

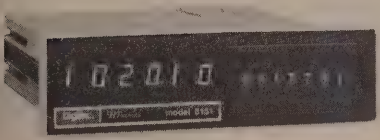
Digitec Digital Panel Instruments



3½ and 4½ digit DPMs



Thermometers



Counters/Timers

Measure any parameter with reliable, high-accuracy Digitec panel instrumentation. Designed and built for demanding industrial applications, these panel-mount instruments offer performance, adaptability, and a full range of options to simplify system standardization.

Series 2770A and 2780A Panel Instrumentation – Bulletin 0801
- High-accuracy 3½ and 4½ digit models.
- Panel meters: AC and DC current and voltage, true rms, strain gage/load cell.
- Process monitors: accept any process transmitter/transducer input.
- Panel thermometers: TC, RTD and thermistor inputs.
- Optional BCD outputs.
- Every unit burned in for assured reliability.

Counter/Timers – Bulletins 2414 and 2415
- Fast computed display of low input rates – down to one pulse in 1000 sec.
- Uni- and bidirectional counting, timing, totalizing, and control.
- Factored counting and timing.

Digitec Instruments

5810 thermometer °C
1888
FUNCTION

Model 5810 Portable Thermometer

- Portable thermometers – Bulletin **3200.**
- Calibrators – Bulletin **4031.**
- Analog multiplexers.
- Comparators.

Digitec Corporation, 918 Woodley Road, P.O. Box 458,
Dayton, Ohio 45401, Tel. (513) 254-6251. Telex (310) 687-4219.

DigiTec®

Electro Industries

SOLID STATE DIGITAL SWITCH BOARD INSTRUMENTS

SPECIFICATIONS COMMON TO ALL MODELS

ACCURACY

DC VOLTS, DC AMPS .05% of the reading ± 1 digit

AC VOLTS, AC AMPS .35% of the reading ± 1 digit

POWER REQUIREMENT

115 ± 15% 6va 47 - 44 Hz

230v ± 15% 6va 47 - 440 Hz (Suffix A)

DIGITAL DISPLAY

High intensity ,8" L.E.D.

FREQUENCY

MODEL #	FREQUENCY RANGE	FREQUENCY ACCURACY
FF 60	5,00 - 99.99 Hz	± 1 Digit over operating temperature range
FF 400	50.0 - 999.9 Hz.	
FF 1000	5 - 9999 Hz.	

SAMPLE RATE

1 second

DC VOLTS

MODEL #	F.S. RANGE	INPUT
FVD 10	9.999 VDC	Direct
FVD 100	99.99 VDC	Direct
FVD 6000	600.0 VDC	Direct

NEW!

AC VOLTS

MODEL #	F.S. RANGE	INPUT
FVA10	9.999 VAC	Direct
FVA100	99.99 VAC	Direct
FVA600	600.00 VAC	Direct
FVA120*	* *	PT (120V) Secondary)

*To be use with 120 V seconadry PT

**Indicate primary voltage when ordering

DC AMPS

MODEL #	F.S. RANGE	INPUT
FAD10	9.999 A	Direct
FAD20	25.00	Direct
FAD100*	* *	Shunt

*To be used with a 100mV Shunt

**Indicate rate of Shunt when ordering

AC AMPS

MODEL #	F.S. RANGE	INPUT
FAA10	9.999 A	Direct
FAA20	25.00 A	Direct
FAA5*	* *	CT (5 Amp secondary)

*To be used with 5 Amp CT.

**Indicate primary current on CT when ordering

TRANSDUCER READOUT

MODEL #	F.S. RANGE	INPUT RANGE
FT 1	* *	0 - 1 MA
FT 5	* *	0 - 5 MA
FT 16	* *	0 - 16 MA
FT 20	* *	4 - 20 MA

**Indicate F.S. Reading including ubits when ordering. Specify type of engineering unit.

OPTIONS

1. True RMS reading (for AC models) add Suffix RMS.
2. 220v Power Input add Suffix A.

SOLID STATE DIGITAL KILOWATT/KILOWATT HOUR & POWER FACTOR MONITORS

1999
W/KWH MONITOR

A highly acurate multirange instrument which measures true Kilowatt and Kilowatt Hour.

Range is selected by choosing proper CT and changing dip switches located behind front panel.

MODELS

K Watt Only	K Watt & K Watt Hour
W 101 .....single phase	WH101 ....single phase
W 201 .....3 phase delta	WH 201 ....3 phase delta
W 301 .....3 phase Y	WH 301 ....3 phase Y

METER RANGES

Full Scale Reading	Current Input		Voltage Range
1.999 KW	15 amps direct		0-300 VAC max.
19.99 KW	100/5ct,50/5ct, 25/5ct	5A	0-600 VAC max (use suffix G)
199.9 KW	1,000/5ct, 500/5ct, 250/5ct		
1999 KW	10,000/5ct, 5,000/5ct, 2,500/5ct		

A truly power factor monitor, using digital techniques to calculate the Vectorial Ratio between Watts and Vars.

MODELS

PF 100 Single phase 1 element

PF 200 Three phase delta 2 element

PF 250 Three phase * 2½ element *

PF 300 Three phase * 3 element **

* ½ element will assume a uniform voltage

** PF300 has a larger case

METER RANGE

Voltage	Current
0 to 300 VAC max.	5A
Suffix G 0-600V	15A

Options

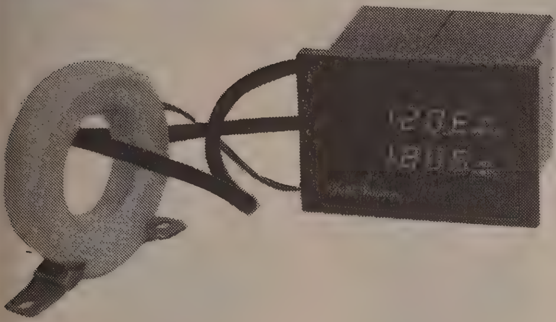
A. Power input 220 ± 20% (suffix A);

B. B.C.D. output (suffix N)

ELECTRO INDUSTRIES / PANEL METER DIVISION / Dept EM, 316 Westbury Ave./ Carle Place, NY 11514/(516) 334-0870

Electro Industries

SOLID-STATE DIGITAL VOLTS AMPERES MONITOR



This solid state digital AC/Volts/Amp Monitor takes the place of two conventional meters plus providing an unambiguous bright LED readout and saving panel space. BCD output is optional.

SPECIFICATIONS COMMON TO ALL MODELS

VOLTAGE RANGE

F.S. Reading	Resolution
199.9V	.1V
600V (Suffix G)	1V

ACCURACY

AC volt .35% of the reading ± 1 digit
AC Amps .5% of the reading ± 1 digit
DC volt .25% of the reading ± 1 digit
DC Amps .35% of the reading ± 1 digit

FREQUENCY RANGE

47-440Hz

POWER REQUIREMENTS

115v. ± 15% 5VA max.
Suffix A 230v. ± 15% 5VA max.

SIZE

4.75″ W x 3.25″ H x 3.50″ L
Panel cut out required
4.125″ x 3.125″

DIGITAL DISPLAYS

L.E.D. .43″ high

MODELS		CURRENT	
AC	DC	F.S. reading	Resolution
VA 20	VA 20DC	1.999 (direct)	.001A
VA 200	VA 200DC	19.99 (direct)	.01A
VA 2000*	VA 2000DC**	199.9 or 1999	.1A or 1A

*Use with 200/5 ct for 199.9 amps
Use with 2000/5 ct for 1999 amps

**Use with 200 amps/100 Mv shunt for 199.9 amps
Use with 2000 amps/100 Mv shunt for 1999 amps

SOLID-STATE DIGITAL FREQUENCY MONITOR

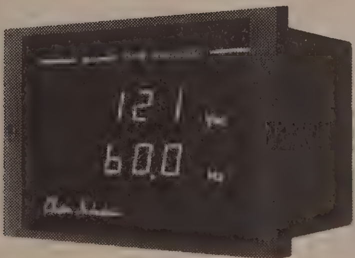
Designed to satisfy the requirements of high resolution at low frequency and fast updating. The fast up-date feature is achieved thru the use of phase locked loop techniques. The Oscillator is crystal controlled, and free of calibration requirements. BCD output is optional.

SPECIFICATIONS COMMON TO ALL UNITS

INPUT VOLTAGE RANGE: 2 - 300V
FREQUENCY ACCURACY: ±1 Digit over operating temperature range
SAMPLE RATE: 1 second
DIGITAL DISPLAY: LED — .43″ high
SIZE: 4.75″ W x 3.25″ H x 3.50″ L
OPTIONS: BCD output Option N

MODELS	FREQUENCY RANGE	FREQUENCY RESOLUTION
LF 60	5.00 - 99.99 Hz.	.01 Hz.
LF 400	50.0 - 999.9 Hz.	.1 Hz.
LF 60-8	5.00 - 999.9 Hz.	.01 & .1 Hz. (Auto Range)
LF 1000	5 - 9999 Hz.	1. Hz.

SOLID-STATE DIGITAL POWER LINE MONITOR



This unique device combines the display of both AC Volts and Frequency on a bright 3 digit LED display with a resolution of up to 1 volt and 0.1 Hz. Designed for panel mounting, this instrument offers reliable and stable operation. BCD output is optional.

SPECIFICATIONS COMMON TO ALL UNITS

OPERATING RANGE:

Voltage: 85-145V
Suffix A - 170-270V
(When power input is parallel with the measurement input)
Measurement input is 0 - 300V
(When applying a fixed power input voltage)

VOLTAGE ACCURACY:

Voltage — ±.5% f.s. ±1 Digit

SAMPLE RATE:

Voltage — 30m sec. - 600m sec.

DIGITAL DISPLAYS:

LED — .43″ high

SIZE: 4.75″ W x 3.25″ H x 3.50″ L
Panel cut out required
4.125″ x 3.125″

OPTIONS: Opto Isolator Multiplexed BCD output Option N.
600 VAC range for volts display Option G.

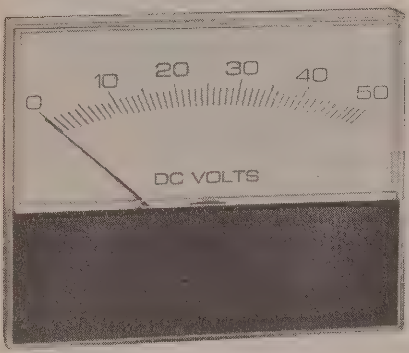
MODELS	FREQUENCY RANGE	FREQUENCY ACCURACY		SAMPLE RATE FREQUENCY
LM 150	———	———		———
LM 160	42 - 99 Hz.	±1 Hz.		1 sec.
LM 1400	42 - 999 Hz.	±.1 Hz.	Crystal Controlled	1 sec.
LM 1600	42.0 - 99.9 Hz.	±.1 Hz.		10 sec.
LM 1600-10	42.0 - 99.9 Hz.	±.1 Hz.		1 sec.
LM 1600-18	42.0 - 999 Hz.	±.1 Hz. ±1 Hz. (Auto Range)		1 sec.

ELECTRO INDUSTRIES/PANEL METER DIVISION/Dept. EM, 316 Westbury Ave./Carle Place, NY 11514/(516) 334-0870

EMICO
ELECTRICAL/ELECTRONIC INSTRUMENTS

A complete line of AC and DC analog meters and indicators. Shown here are just a few of the more popular EMICO products currently available for OEM applications.

TAUT BAND METERS



for Front Panel Mounting

Series 60

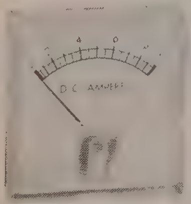
Three sizes to choose from: 2½", 3½", and 4½". These meters are handsome in design and lend a distinctive look to any control panel.

This model 64 series comes in all commonly used ranges: expanded scale, elapsed time, UV, and frequency (reed and electronic).

- ±2% FS accuracy in DC, 3% in AC
- ±1½% tracking, DC, ±2% AC
- Response time, 1.5 sec. maximum except 0-50 uA and below where response time is 3.0 sec. maximum
- ±1.5% FS
- Repeatability ±1.5% FS
- Self shielded
- Scale arc 100°

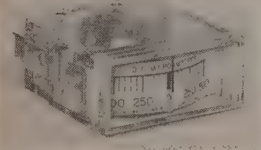
ANALOG METERS

Square-Shaped Panel Meters



Featuring the unique EMICO High-Tork movement, these versatile plastic bezel meters are available as AC or DC ammeters, voltmeters, and milliammeters in choice of three sizes. They can be supplied 2.3125" square (Model 42), 2.3690" square (Model 50 series), and 2.8125" square (Model 44). Additional sizes available in models with a metal bezel. All AC meters have 5% accuracy; DC meters available with 3% or 5% accuracy. Regardless of the type or size of the bezel, any model can be mounted into a 2-1/16" diameter panel hole.

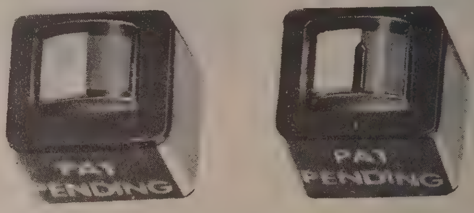
Edge-Reading Panel Meters



These space and cost saving meters, supplied with choice of flat-across front (Model 13-F) or curved-front (Model 13), are available as AC or DC ammeters, voltmeters, and milliammeters. They measure 1-13/16" x 3/4" and have clear molded plastic cases for easy illumination. Either 3% or 5% accuracy depending upon range. Standard quick disconnect-type terminal fits ¼" x .032" connector...screw-type also available. Can be supplied with zero-left, zero-center, or zero-right. Vertical or horizontal installation.

INDICATORS

Micro-Miniature Current Indicators



Measuring only ½" square, these rugged, dependable indicators (Model 802) are extra low in cost. Extremely popular to:

- Monitor on-off conditions
- Indicate battery-charge conditions
- Indicate circuit-operating conditions

Less than 2 milliwatts required to move flag or pointer. Overload capacity is 15 times current rating without burn-out or calibration shift. All models are packaged in a high-impact, clear plastic case and are available either with wire leads or plug-in jacks for ease of installation.

Edge-Reading Current Indicator

Model 12 is ideal as "go — no go" check on condition or to check circuit balance. Available in virtually any range up to a sweep of 100 milliamperes DC.

AMMETER Model 58

0
2
4
6
8
10
12
DC AMPERES

Compact size, 2.16 x 1.30; dependable and low in price; clean, modern design.
- Fast installation, snaps into panels .02 to .09
- Range 0 to 200 amperes
- Conventional terminals in lower ranges
- Above 30A. the terminals are replaced by a formed metal guide through which a charger lead is passed. A simple solution of hooking up heavy duty leads. Exceptionally low in price.

How to Order The more information you supply the better we can serve you. Information should include:
- Model number
- Ammeter, Milliameter or Voltmeter
- Range
- AC or DC
- Accuracy
- Zero-left, center or right
- Custom dial info
- Use of meter
- Quantity
- Delivery date(s)

For more information contact your nearest Emico representative or call factory direct.

THORN EMI

EMICO INCORPORATED

A Member of the THORN EMI Group

123 North Main Street, P.O. Box 368, Dublin, PA 18917 • Phone 215-249-9330 • TWX 510-665-9583

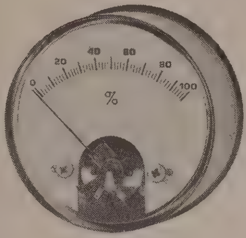
EMICO
ELECTRICAL INDICATORS AND GAUGES

Shown here are only a few of our line of instruments currently available to the automotive and heavy equipment OEM markets.

Industrial Process Meters...provide accurate readouts of flow meters and other industrial process instruments. Featuring polycarbonate covers and back, taut band/moving-coil movements, and banana plugs for easy installation.

Series 25

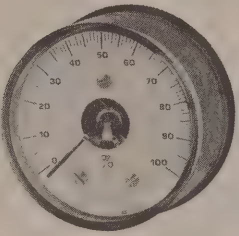
Size: 2.5" dia. at front; 2.75" dia. at flange; 1.45" deep
Scale: 90° arc, linear, length 2.0"



- Rugged taut band suspension
- 2% full scale accuracy
- Watertight, shock/vibration resistant

Accuracy: ± 2% of full scale
Inductance: -1.0 mH
Resistance: 5 ohms ± 20%
Temp. Coefficient: App. -.02%/°C

Series 250



Size: 2.5" dia. at front; 2.75" dia. at flange; 1.8" deep
Scale: 250° arc. linear, length 4.7"

Accuracy: ± 2% of full scale
Inductance: App. 0.95 mH
Resistance: 8.2 ohms ± 20%
Temp. Coefficient: App. -.02%/°C

Heavy Duty Electrical Gauges

Unaffected by vibration, harsh weather or tough abuse, these rugged 2" gauges are ideal on construction equipment, electric generators, and all types of vehicles. All gauges have internal lighting, glass lenses, easy to read dials; zinc-plated case, chrome or black anodized aluminum bezels. Pointer spans 90° on the dial.

Ammeter
Ranges: 60-0-60 — 30-0-30
15-0-15

0
20
40
60
OIL

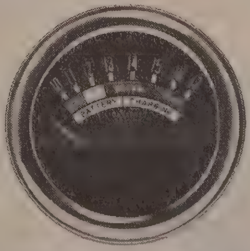
Oil Pressure Gauge
Range: 0-80 lbs.

60
160
200
250
TEMP

Temperature Gauge
Range: 60° - 250°

VOLTMETER

Designed for multi-purpose use, this voltmeter indicates voltage of battery at idle and under varying conditions. A red pointer indicates 10 to 17 volts on a clearly marked multi-color scale.



For 12-volt systems

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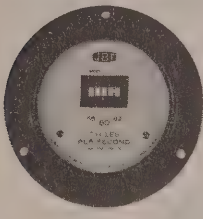
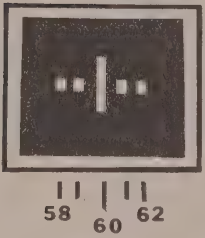
J-B-T INSTRUMENTS

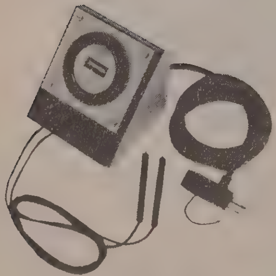


31-FX

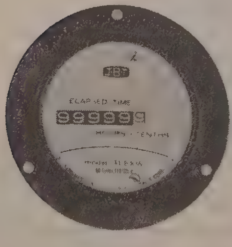


TYPICAL RESPONSE PATTERN

33-FB



34-FXP



31-EXW

VIBRATING REED FREQUENCY METERS

Operate on AC or interrupted DC to provide direct reading of frequency by viewing reed. Exceptional long-life and stability is assured by simple rugged construction. Standard meters are shown in table. Other styles and closer accuracies are available.

Model	Range Hz	Reeds	Hz/ Reed	Standard V.	Ω/V	Power Watts	Accuracy ±%	Size (In.)	Style
30-FX	48-52*	10	1	100-130	140	0.9	0.3	3½	Round Molded Case
31-FX	58-62†	5	1	100-130	120	1.0	0.3	3½	Round Molded Case
31-FX-7	57-63†	7	1	100-130	140	0.9	0.3	3½	Round Molded Case
33-FX	380-420	9	5	100-130	130	0.7	0.3	3½	Round Molded Case
34-FX	56-64†	9	1	100-130	140	0.9	0.3	3½	Round Molded Case
34-FX-Z	58-62†	9	0.5	100-130	140	0.9	0.2	3½	Round Molded Case
36-FX-21-115	380-420	21	2	100-130	130	0.7	0.3	3½	Round Molded Case
31-FHXX	58-62†	5	1	100-130	120	1.0	0.3	3½	Round Metal Case (Sealed)
31-FHXX-7	57-63†	7	1	100-130	140	0.9	0.3	3½	Round Metal Case (Sealed)
33-FHXX	380-420	9	5	100-130	130	0.7	0.3	3½	Round Metal Case (Sealed)
34-FHXX	56-64†	9	1	100-130	140	0.9	0.3	3½	Round Metal Case (Sealed)
36-FHXX-21-115	380-420	21	2	100-130	130	0.7	0.3	3½	Round Metal Case (Sealed)
23-FHXX	380-420	5	10	100-130	125	0.55	0.3	2½	Round Metal Case (Sealed)
15-FHAC	60 & 400	2	—	8-10	270	0.04	0.5	1½	Round Metal Case (Sealed)
15-FH-400	380-420	5	10	100-130	115	1.25	0.3	1½	Round Metal Case (Sealed)

* Also 58-62 † Also in 50 Hz range

NEW 34-FXP Portable Frequency Tester—To check generator loads, speeds, or performance; to verify unknown frequency at campsites; to simplify maintenance work, this 9-reed 56-64 Hz instrument is housed in a sturdy molded case 5½" x 5½" x 5¼" wide. Comes complete with prods and grounded plug-in cord.

ELAPSED TIME METERS (NON-RESETTABLE)

Used to record operating time of AC equipment synchronously by 1/10th hour steps up to 9,999.9 or 99,999.9 hours.

31-EGW-5: Supplied in a jewel-like case 3½" wide and 3" high. Reading to 9,999.9 hours for 110-125 VAC, 60 Hz.

31-EGW: Same as 31-EGW-5 except reading to 99,999.9 hours. 110-125 VAC, 60 Hz.

Both models available with half-bezel adapters 3.83" wide x 2.27" high as 13A-239 (metal) or 13A-234 (molded plastic).

31-EXW-5: 3½" round style shown to left. Meter reads to 9,999.9 hours and automatically resets to zero. Tenths are red on white with units white on black. Meets MIL-M-6B. 110-125 VAC, 60 Hz.

31-EX: Similar to 31-EXW-5 but with smaller numbers; same 3½" round case. Reads to 9,999.9 hours. 110-125 VAC, 60 Hz.

31-EX-200: Same as 31-EX except for 200-240 VAC, 60 Hz.

31-EXW: Versatile elapsed time meter in 3½" round case reading to 99,999.9 hours with large numerals same size as 31-EXW-5 and interchangeable with all FX type frequency meters. 110-125 VAC, 60 Hz.

31-ES: Same readout as 31-EX except housed in 3" black square molded case. Reads to 9,999.9 hours. 110-125 VAC, 60 Hz.

TEMPERATURE TESTERS & ACCESSORIES

J-B-T supplies several widely-used temperature measuring instruments and testers with a complete line of accessories for each.

23-JP-1: Portable indicating pyrometer in black vinyl carrying case. Reads from zero to 650°F on 2.48" scale in 10°F increments and readable to 3°F. Automatic ambient temperature correction for accurate reading. Supplied with attached SA-199 thermocouple, clip and convection shield with 5½ foot long cord.

32-JP-7P: An extremely versatile and easy to read pyrometer in a handsome black vinyl carrying case. Reads 0-650°F on a large 4" scale. Is supplied with the SA-199P plug-in thermocouple, clip and convection shield with a 5½ foot long cord. Widely used for checking appliances and electronic equipment. Also available with scale reading 0-1200°F.

32-JG: Laboratory pyrometers in three ranges, 0-650, 0-1200 or 0-2000°F with large easy to read dial, thermocouple, lead and connector block. Normally supplied in sloping front stand.

Write for catalog of temperature measuring accessories.

CALL OR WRITE FOR GENERAL CATALOG 180

J-B-T INSTRUMENTS, INC., BOX 1818, NEW HAVEN, CONNECTICUT 06508
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For over 45 years we've made standard and customized products which are reliable, rugged, accurate and competitively priced. This is how we've always done business . . . it's a family tradition.

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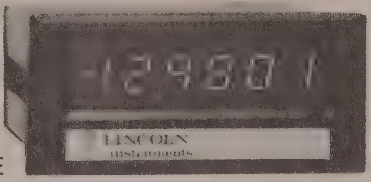
DIGITAL PANEL METER
5½ DIGIT **NOVA** MODEL

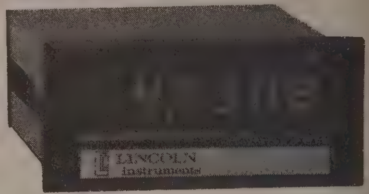


ULTRA HIGH-PERFORMANCE

±130000 COUNT RESOLUTION

- monolithic analog-to-digital converter
- high-efficiency 0.56″ red LEDs
- exceptional terminal linearity and accuracy stability
- standard NEMA case size
- ideal for use in high precision pressure and temperature indicators, test equipment & electronic scales
- rugged, anodized aluminum case

DIGITAL PANEL METER
4¾ DIGIT **ALTAIR** MODEL

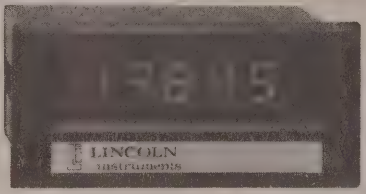


ULTRA HIGH-PERFORMANCE

±49999 COUNT RESOLUTION

- ±49,999 count resolution
- monolithic analog-to-digital converter
- rugged, anodized aluminum case
- standard NEMA case size
- high-efficiency 0.56″ red LEDs
- low component count, high reliability

DIGITAL PANEL METER
4½ DIGIT **STARTRAC** MODEL

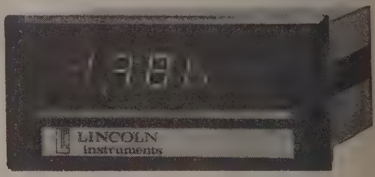


ULTRA HIGH-PERFORMANCE

±19999 COUNT RESOLUTION

- monolithic analog-to-digital converter
- high-efficiency 0.56″ red LEDs
- minimum component count ≃60 parts
- standard case size
- pin-for-pin interchangeable with Weston 2470 Data Tech 4412
- rugged, anodized aluminum case

DIGITAL PANEL METER
3½ DIGIT **ASTRA** MODEL



ULTRA HIGH-PERFORMANCE

±1999 COUNT RESOLUTION

- monolithic analog-to-digital converter
- rugged, anodized aluminum case
- standard case size
- minimum component count ≃60 parts
- high-efficiency 0.56″ red LEDs

ORDERING INFORMATION

NOVA—A—1 0—0

5½ digit model

Range
A=±1.30000v (RIN=1000MΩ)
B=±3.25000v (RIN=1000MΩ)
C=±6.50000v (RIN=1000MΩ)
D=±13.0000v (RIN=1MΩ)
E=±130.000v (RIN=1MΩ)
F=130.000 μa (RSH=10KΩ)
G=1.30000 ma (RSH=1KΩ)
H=13.0000 ma (RSH=100Ω)
J=130.000 ma (RSH=10Ω)

Input power option
-1=115 vac ±10% 50-60 hz
-2=220 vac ±10% 50-60 hz

Extra option
-0=none

Buffered, latched, parallel BCD output option
-0=without BCD option
-1=with BCD option

ALTAIR—A—1 0—1

4¾ digit model

Range
A=±499.99 mv (RIN=1000MΩ)
B=±4.9999v (RIN=1000MΩ)
C=±49.999v (RIN=1MΩ)
D=±499.99v (RIN=10MΩ)
E=49.999 μa
F=499.99 μa
G=4.9999 ma
H=49.999 ma
J=499.99 ma

Input power option
-1=115 vac ±10% 50-60 hz
-2=220 vac ±10% 50-60 hz

Option
-0=none

Buffered, latched, parallel BCD output option
-0=without BCD option
-1=with BCD option

STARTRAC—A—1 2—0

4½ digit model

Range
A=±199.99 mv (RIN=1000MΩ)
B=±1.9999v (RIN=1000MΩ)
C=±19.999v (RIN=1MΩ)
D=±199.99v (RIN=1MΩ)
E=19.999 μa (RSH=50KΩ)
F=199.99 μa (RSH=5KΩ)
G=1.9999 ma (RSH=500Ω)
H=19.999 ma (RSH=50Ω)
J=199.99 ma (RSH=5Ω)

Input power option
-1=115 vac ±10% 50-60 hz
-2=220 vac ±10% 50-60 hz
-3=±15 to ±18 vdc at 25 ma and +5 ±0.25 vdc at 200 ma

Interchangeability option
-0=none
-1=Weston model 2470
-2=Data Tech model 4412

Buffered, latched, parallel BCD output option
-0=without BCD option
-1=with BCD option

ASTRA—A—1 0—0

3½ digit model

Range
A=±199.9 mv (RIN=1000MΩ)
B=±1.999v (RIN=1000MΩ)
C=±19.99v (RIN=1MΩ)
D=±199.9v (RIN=1MΩ)
E=19.99 μa (RSH=10KΩ)
F=199.9 μa (RSH=1KΩ)
G=1.999 ma (RSH=100Ω)
H=19.99 ma (RSH=10Ω)
J=199.9 ma (RSH=1Ω)

Input power option
-1=115 vac ±10% 50-60 hz
-2=220 vac ±10% 50-60 hz
-3=±15 to ±18 vdc at 25 ma and +5 ±0.25 vdc at 200 ma

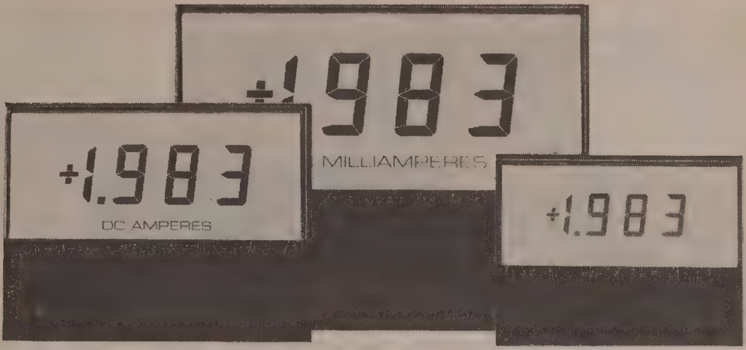
Extra option
-0=none

Buffered, latched, parallel BCD output option
-0=without BCD option
-1=with BCD option

DIGITAL Panel Meters MODUTEC

D SERIES—LCD readout

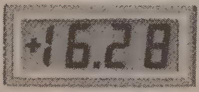
Surface Mount, Windo-Mount, Bezel Mount
2½", 3½", 4½" sizes



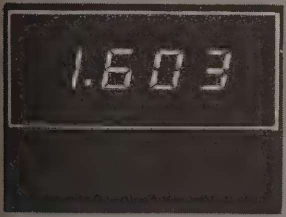
Interchangeable with Modutec S and W Series Analog Meters—same cases and covers, same cutouts, similar terminal arrangement.

- Good looking—*the most copied* meter design.
- Extra-large 3½ digit LCD readout.
- 5 power options—very low dissipation (8000 hr. 9V battery life typical).
- Standard AC & DC ranges, plus PYROMETERS and LOOP RECEIVERS.
- True diffused backlighting available.
- Threaded terminal studs—hookup like analog counterparts.
- Automatic polarity and decimal.

2" edgewise style
(flush mount only)
also available.



DH SERIES—3" LED readout

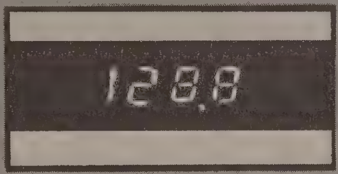


- **Extra-bright LED display, 11mm high.**
- **Flat back saves space and facilitates installation.**
- **Appearance compatible with Modutec D, S, and W Series.**
- **Automatic polarity indication.**
- **External decimal placement.**

A versatile space-saver that can be surface mounted, requiring only two ¼" holes, or Windo-mounted. Seven wire leads, for signal, power, and decimal location, are carried through the hollow mounted studs.

DM SERIES—DIN case

LED readout
AC and DC ranges



2DM Series—48 × 96mm size

1DM Series—24 × 96mm size, DC only

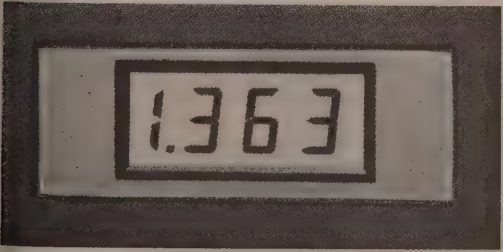
For users who prefer cases conforming with the widely accepted DIN Standards. They are easily installed, requiring but a single rectangular panel cutout.

- **Highly visible red LED display.**
- **Case configuration has worldwide acceptance.**
- **Attractive low-silhouette covers.**
- **Quick-connect push-on terminals.**
- **Automatic polarity indication.**

DT SERIES—DIN case

Excellent performance at low cost

- **Choice of AC or DC power.**
- **Case has worldwide acceptance. 48 × 96mm size.**
- **Automatic polarity indication.**
- **Convenient screw terminals on barrier strip.**



Good-looking DIN cases are fitted with installation hardware; the LCD displays offer fine legibility and low power consumption. This series makes digital metering possible on a small budget.

DTU SERIES

LED Display Module

PCB digital display modules can be supplied in DC ranges only, at very low cost. A low battery indication (LOBAT) is available.

Also in the Modutec Digital Line, and available by date of publication:
—Ultra-compact flat LCD display meters, with or without true backlighting;
—Single bar graphs, horizontal & vertical;
—Double vertical bar graphs.

Request Catalog DM3 – For fast service phone 1-800-METERS-1

THORN EMI

Modutec Incorporated
A THORN EMI company
18 Marshall St., P.O. Box 778, Norwalk, CT 06856 ■ (203) 853-3636 ■ TWX 710-468-2039

MODUTEC 2% Panel Meters

SPECIFICATIONS
Series PB, S, W, WM

Accuracy:

DC meters – ±2%

AC meters – ±2% iron vane
±3% moving coil rectifier type

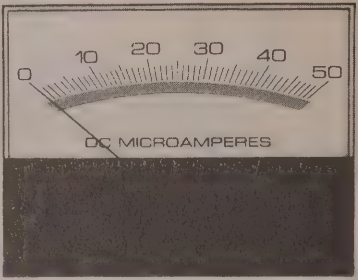
Tracking:

DC meters – ±1.5%

AC meters – ±2%, all types

Shielding:

All types are self-shielded, require no special calibration for steel or non-ferrous panel mounting.



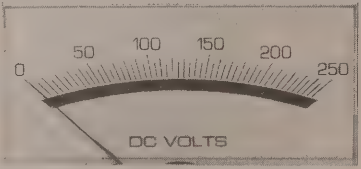
S SERIES—Surface Mount

Taut-band & Iron-vane types

1½", 2½", 3½", 4½", 5½", 8" sizes

The pleasing aspect ratio and impeccable styling of this series makes it the favorite among all panel meters. It is available in the widest spectrum of types and ranges, with many desirable factory options.

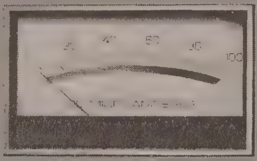
A clear cover version, finely ribbed on the inside, is available on order at no extra cost.



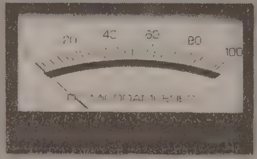
W SERIES— Windo-Mount

Taut-band & Iron-vane types

This original Modutec design provides a true flush mount, easily accomplished without special adapters. Attractive black or white edge options are available. **Ranges, sizes, prices:** Same as S Series, above.



Above: Style BA1 Below: Style BA3



Bezel Mounts

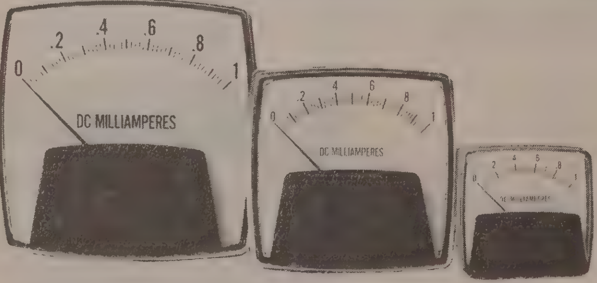
Bezel mounts are available for the S Series meters, in the two styles shown at right. These high-strength units provide handsome protection and attach the meter securely behind the panel. All hardware included. May be ordered in colors as well as black, sizes 1½" through 5½".

Optional Features

The following options are available in Modutec 2% meters, at very reasonable extra cost.

Improved accuracy
Colored fronts & bezels
Blank & custom dials
Custom resistance
Fast response
Custom pointers
High temperature case/cover
ANSI symbols on dial
Dead set pointer
Illumination
Mirror scale

Heavy damping
Single point calibration
Tinted covers
Improved resistance tolerance
Sealed case
Temperature compensation
Unit packaging
High resistance voltmeters
Metric studs and terminals
Insulated terminals
Rear zero adjust



PB SERIES

Surface Mount

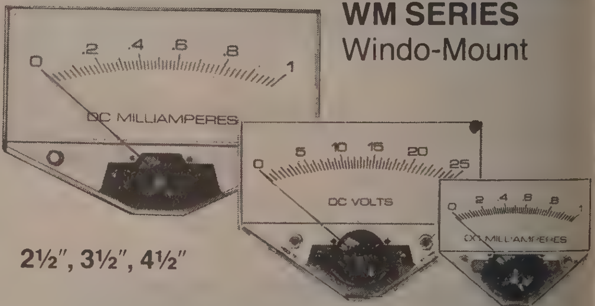
1½", 2½", 3½"—
Taut-band & Iron-vane

These meters have the bold-look styling that is preferred by many for industrial panel board applications. They have the same ranges and prices, size for size, as the S Series, above (VU ranges not available).

PB Series meters are furnished in the ANSI standard 3-stud mounting configuration, and are available for standard 4-stud mounting at no extra cost.

WM SERIES

Windo-Mount



2½", 3½", 4½"

These sophisticated "World Meters" have the following desirable features, found in no other one meter:

- **2% taut-band movements at low cost.**
- **Use less behind-panel space than any meters of equivalent size.**
- **Exceptionally small barrels are fully insulated.**
- **Front zero adjust standard, rear optional.**
- **Designed for shadow-free backlighting.**
- **Quick-connect terminals on case or barrel.**
- **Designed to facilitate PC board attachment.**
- **Many desirable options available.**

THORN EMI

Request Catalog 185A – For quick action phone 1-800-METERS-1

Modutec Incorporated

A THORN EMI company

18 Marshall St., P.O. Box 778, Norwalk, CT 06856 ■ (203) 853-3636 ■ TWX 710-468-2039

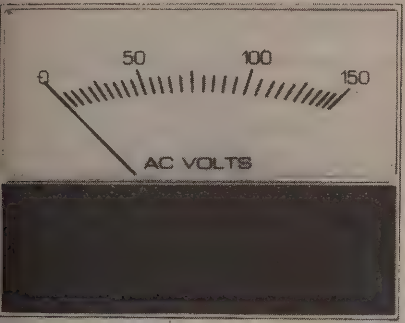
5% Panel Meters MODUTEC

M SERIES—Moving Magnet Type

For the user whose needs are served by their dependable 5% accuracy, these meters provide handsome styling at ow cost, in several configurations. They are nicely finished and detailed, with features not usually found in meters anywhere near their price range.

- **Surface or flush mount without modification.**
- **Zero adjusters standard (not on edgewise).**
- **Translucent dials permit diffused backlighting (optional on edgewise).**

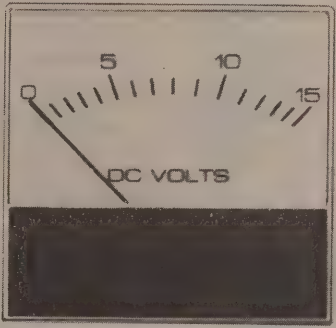
MAS Series—1½″, 2½″, 3½″



Beautiful contemporary designs with the typical Modutec low aspect ratio. All have operating zero adjusters and scales printed on translucent plastic, permitting reflection-free diffused backlighting.

Typical prices (500 units):
1½″ DC voltmeter—$5.60
2½″ DC voltmeter—$6.50
3½″ DC voltmeter—$6.80

OMS (1½″) & MSQ (2½″) Series



Traditional square meters with the look of the 80s and a low price tag, these have operating zero adjusters and scales printed on translucent plastic, permitting reflection-free diffused backlighting.

Typical prices (500 units):
OMS Series DC voltmeter—$5.15
MSQ Series DC voltmeter—$6.20

MD, ME, & MF Series 1¼″, 2″, 2½″ Edgewise Meters

DC AMPERES
0
2
4
6
8
10

Useful space-saving meters in three sizes, interchangeable with many meters from other sources, and featuring flat flush-to-panel covers. Internal backlighting optional on MD and MF meters.

Typical prices (500 units):
MD Series (1¼″) DC voltmeter—$4.70
ME Series (2″) DC voltmeter—$4.85
MF Series (2½″) DC voltmeter—$6.10

OPTIONS & MODIFICATIONS

Many desirable factory-installed options and modifications are available on M Series meters in quantities of 100 minimum. These are fully described in Catalog 125, available on your request.

Switchboard Meters MODUTEC

4SB Series—4½″ Square

1% moving-coil and iron-vane types
Meet requirements of ANSI Spec C39.1 for switchboard instruments.

0
50
100
150
200
250
AC
KILOWATTS

Available in the following ranges:

DC Microammeters	AC Voltmeters
DC Milliammeters	AC Varmeters
DC Ammeters	AC Wattmeters
DC Voltmeters	Frequency Meters
AC Ammeters	Synchroscopes

DN Series—DIN Spec Cases

Sizes: 48mm, 72mm, 96mm, 144mm
1½% moving-coil and iron-vane types
Meet IEC requirements

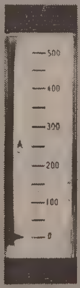
55
56
58
60
62
64
65
Hz

Available in the following ranges:

DC Microammeters	AC Voltmeters
DC Milliammeters	AC Varmeters
DC Ammeters	AC Wattmeters
DC Voltmeters	Frequency Meters
AC Ammeters	Synchroscopes

SBE Series—Edge Reading

Size (nominal) 1¾″ × 6½″
Meet requirements of ANSI Spec C39.1 for edge-reading meters.



Available in the following ranges:
- DC Microammeters
- DC Milliammeters
- DC Ammeters
- DC Voltmeters
- AC Ammeters
- AC Voltmeters
- AC Varmeters
- AC Wattmeters
- Frequency Meters

Special Purpose Meters

Blue-Dot Meters— meet MIL environmental specs.
Control Meters—new approach to IC control.
Lite-Box Meters— built-in through-the-dial lighting.
Trans-Lit Meters—S & W meters with backlighting.
Write or phone for information and literature.

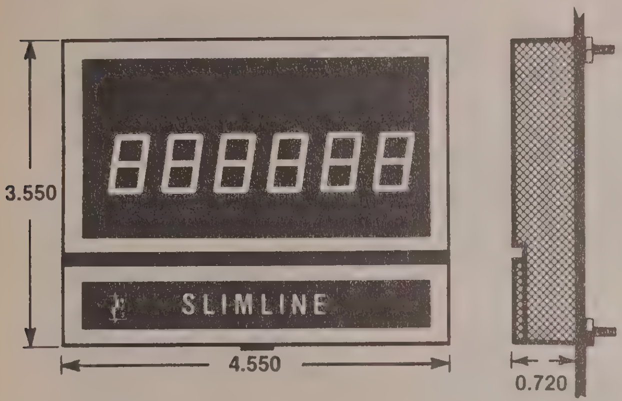
For full information phone 1-800-METERS-1

THORN EMI

Modutec Incorporated
A THORN EMI company
18 Marshall St., P.O. Box 778, Norwalk, CT 06856 ■ (203) 853-3636 ■ TWX 710-468-2039

SLIMLINE® METERS

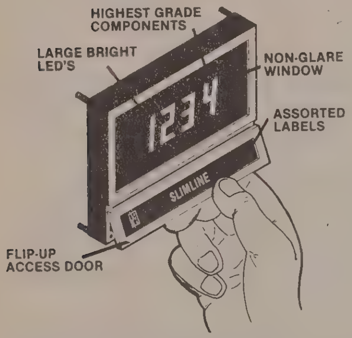
MORE THAN A METER


SLIMLINE
3.550
4.550
0.720

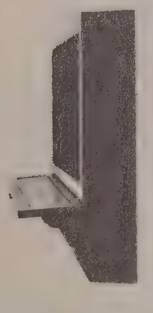
FEATURES

- **Best quality available**
- **Display only, parallel BCD, tri-state BCD, open collector and serial ASCII data outputs**
- **Large, bright LED display**
- **All meters in same Slimline case**
- **Front surface panel mounting**
- **Easy wiring and installation**
- **Flip-up door for easy access to controls**
- **Socketed parts for ease of maintenance**
- **Rugged industrial design; 3-year warranty**

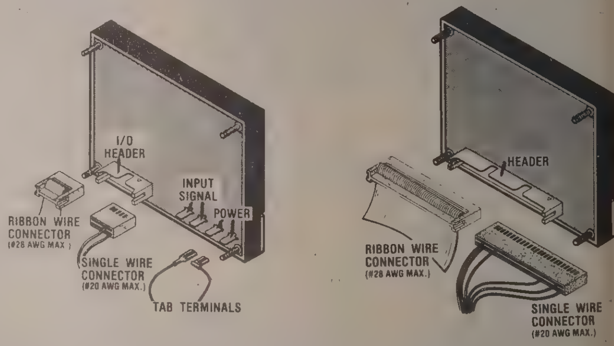
The modular Slimline System is flexible enough and affordable enough to keep you one step ahead of the competition. And it is only available from NES.


HIGHEST GRADE COMPONENTS
LARGE BRIGHT LED'S
NON-GLARE WINDOW
ASSORTED LABELS
1234
SLIMLINE
FLIP-UP ACCESS DOOR

Wired via tab terminals or connectors (10 or 50 pin)



Controls under flip-up door


I/O HEADER
INPUT SIGNAL
POWER
RIBBON WIRE CONNECTOR (#28 AWG MAX.)
SINGLE WIRE CONNECTOR (#20 AWG MAX.)
TAB TERMINALS
HEADER
RIBBON WIRE CONNECTOR (#28 AWG MAX.)
SINGLE WIRE CONNECTOR (#20 AWG MAX.)

Rear view showing 10 and 50 pin connectors

SLIMLINE QUALITY

Slimlines are the highest quality digital panel meters you can buy. From the conservative and flexible design approach to the best in components, no detail is overlooked. That is why Slimlines were chosen for the Space Shuttle, Air Force One, nuclear power installations and in virtually all industries. All Slimlines have a 3-year warranty.

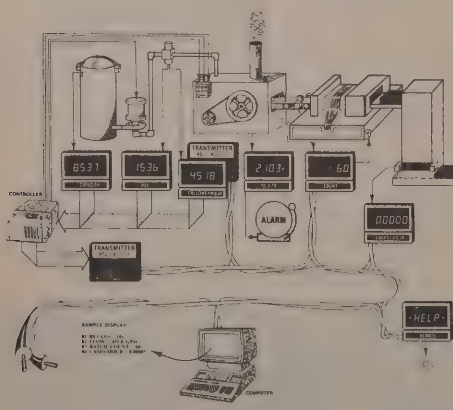
SLIMLINE VERSATILITY

Field scaleable means an uncomplicated way for you to change ranges, switch select your type of input, or adjust the noise/response filtering, all from under the flip-up door. Future expandability is assured. Slimlines offer fast and easy ways to change an individual meter or the whole system.

SLIMLINE VARIETY

NES digital panel meters can measure and display functions ranging from analog process or electrical signals to production rate or temperature. We offer meters with setpoints, BCD outputs and serial ASCII for control and communications. Slimlines can fulfill your requirements!

FROM SIMPLE METERING TO DATA ACQUISITION & TELEMETRY


8537
1536
TRANSMITTER
4518
2.103
60
CONTROLLER
ALARM
00000
TRANSMITTER
SAMPLE DISPLAY
-HELP-
COMPUTER

FEATURES

- **Fully compatible with most computers & programmable controllers**
- **Can transmit full 128 character ASCII set**
- **Up to 100 individually addressable meters on the same 2-wire data line**
- **Remote analog, digital and serial ASCII readouts**

Slimlines are ideal data gathering peripherals for computers and programmable controllers. They are available with serial ASCII outputs or a variety of BCD and open collector formats. Up to 100 individually addressable units can be connected on the same two-wire serial ASCII data line.

ASCII transmitter Bustles® convert parallel BCD (from programmable controllers or other Slimlines) to serial ASCII. Receiver Bustles® accept ASCII from any source and convert it to parallel BCD. Altogether, Slimline modules offer the most cost-effective means of gathering data in a system specially suited to your needs.

NES, Inc. ***NATIONWIDE ELECTRONIC SYSTEMS***
1536 Brandy Parkway, Streamwood, IL 60103 • (312) 289-8820

For other products in EEM from NES, see Sections 2000, 2200, 2325 & 2450.

SLIMLINE® METERS

MORE THAN A METER

235959
HR MIN SEC

CLOCKS & CALENDARS

Give accurate day and time-of-day for control panels, clock systems, programmable controllers, computers, etc. Can be expanded into battery back-up, master-slave and variable time zone clock systems. Units with readout only, BCD or ASCII output.

• 12 or 24 hour and hr/min or hr/min/sec format • 10, 50, 60 Hz or .005% crystal time base • Remote control capability standard • Day-of-year or automatic month/day • Automatic leap year • Hidden setting controls under flip-up door • Price: Clocks $152 - $295; Calendars $255 - $270.

9999
SECONDS

TIMERS & INVERVAL METERS

Manually or automatically time events. Control events after a countdown, count-up or at regularly recurring intervals. Use Interval Meters to measure on-time, off-time, time between pulses or pulse duration. Have BCD, serial ASCII, or switch outputs.

• 3, 4, 5 or 6 digit models • All display formats: decimal to hr/min/sec • Resolution to μS available • 50, 60 Hz or .005% crystal time base available • 0.2 - 80 VDC, 120, 240 VAC or switch input • Manual or remote control standard. • Models with internal digital preset limit • Price: $185 - $295.

38745
PARTS/MINUTE

RATEMETERS

Field scaleable to measure machine rate directly in any desired unit. For example, one pulse per bottle can be read out in six packs/minute, cases/hour, etc. Accepts pulse inputs from most transducers. Powerful μP-based circuitry allows flexibility.

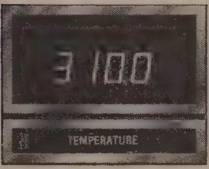
• 4, 4½ or 6 digit models • Pulses can go as low as 1 pulse per hour • 0.2 - 80 VDC switch input standard • Variable switch selected noise filtering • Easy switch programmable scaling • High accuracy crystal time base • Remote control capability • Price: $295 - $425.

999999
TOTAL

COUNTERS & TOTALIZERS

Units are available to: (1) count up, (2) count up and down, (3) count up or down to or from a preset limit, and (4) to divide the count by any 4-digit switch-selected number. Also Perma-stor® Memory (stores counts with no power needed).

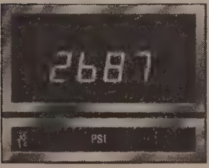
• 2, 3, 4, 5 or 6 digit models • 0.2 - 80 VDC, switch input standard • Easy, direct connection to rotary encoders • Manual or remote control • Variable switch-selected noise filtering • Rotary switches on preset limits and divide by "N" • Setting controls under flip-up door • Price: $160 - $418.



THERMOMETERS

Thermocouple types J, K, T, R, S, E to cover from −328° to 3,092°F (−200° to 1,700°C). Platinum 100Ω RTD from −58° to 1,112°F (−50° to 600°C). Thermistor from +32.0° to 212.0°F (0.0° to 100.0°C). All units are high accuracy and industrial designed.

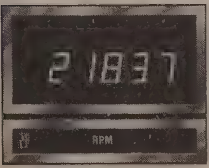
• Dual range models to display °C or °F • 0.1° resolution available • Long lead length compensation circuitry • Cold-junction compensation for thermocouple units • Ideal junction sensing • High accuracy continuous linearization over entire range • Price: $230 - $427.



PROCESS METERS

These meters take most standard DC process signals such as 4-20 mA, 0.5 V, 10-100Ω, etc. and display them in virtually any desired engineering units, i.e., a 4-20 mA loop can be read in PSI, gal/min, °F, %, etc. Models with setpoint outputs for control.

• DC voltage, current or resistance inputs • Wide range span & zero • Multi-turn coarse & fine pots on span & zero • Variable noise filter • Model changing resistor terminal mounted • Dual range models to display full scale or percent • Digital setpoints under flip-up door • Price: $208-$288.



TACHOMETERS

Scaleable to monitor RPM from a wide range of gears and inputs signals. Units can accept external time base signals to permit ratio measurements. Also can be set up to indicate scaled interval times. μP-based units do not require 60-tooth gears.

• 4, 4½ or 6 digit models • 0.2 - 80 VDC, switch input standard • Pulses can go as low as 1 pulse per hour • Remote control capability • Easy switch programmable field scaling • Optional ASCII outputs • High accuracy crystal time base • Setting controls under flip-up door • Price: $295-$425.

12:37 15
REMOTE

REMOTE DISPLAYS

Provide a large, bright readout from parallel BCD, octal or hexadecimal data. Optional latches for use with programmable controllers, computers, etc. Also, units available to accept serial ASCII input, and have ASCII output command switches.

• 3, 4, 5, 6 digit models • LCD units available • Selectable decimal point • Non-glare display window • Switches under flip-up door • Normal or inverted strobe capability • Parallel, strobe, RS232, RS422, 20/60 mA loop modes • Inputs from 5 - 48 VDC • Price: $154 - $214

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For other products in EEM from NES, see Sections 2000, 2200, 2325 & 2450.

NES

SLIMLINE® METERS

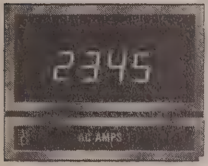
MORE THAN A METER

4406
TRMS VOLTS

VOLTMETERS

Measure AC, DC or TRMS volts from microvolts to kilovolts. Setpoint and ASCII output models available. Scaleable units allow easy special field calibration to most any input. TRMS units are switch-selectable to permit reading the DC component.

• Bi-polar, auto polarity operation and display •Auto zero and high stability circuitry • Decimal point selection • Switch selectable variable response time and noise filtering • High common mode rejection • High input impedance, no circuit loading • Digital preset limit • Price: $184 - $279.



AMMETERS

AC, DC, or TRMS current measurement from microamps to kiloamps. TRMS have switch selection to allow reading the DC component. 5 A scaleable units allow fast and easy custom field scaling. Dual set point units allow system control.

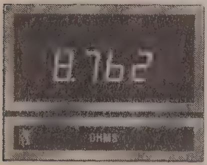
• Auto zero and high stability circuitry • Switch-selectable variable response time & noise filtering • Bi-polar, auto polarity operation and display • Low input impedance, minimum circuit loading • High common mode rejection • Digital preset limit • Price: $213 - $305.

1965
KILOWATTS

WATTMETERS

Read true alternating current (AC) watts directly. Unit automatically compensates for any power factor so it can be used with capacitive or inductive loads (leading or lagging current). Models available from microwatts to megawatts.

• Separate voltage and current inputs • High impedance circuitry on voltage input • Auto zero & high stability circuitry • Low input impedance on current input • Full differential on AC voltages • Optimized for 60 Hz operation • High common mode rejection • Price: $429.



OHMMETERS

Measure resistance from 1.999 ohms to 300.0 kΩ. Scaleable models have wide range span and zero adjust for easy field scaling, e.g. testing of weld joints in percent rather than resistance. Also with outputs of setpoints, BCD, ASCII, etc.

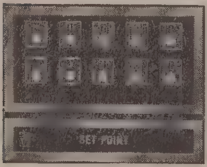
• Model changing resistors screw terminal mounted • 2-wire or 4-wire hook-up • Automatic or adjustable lead length compensation • Scaleable field set-up controls under flip-up access door • Internal high stability current source • Price: $223 - $305.

60000
HERTZ

FREQUENCY METERS

Measures from DC to 100 kHz by gated counter or calculation mode techniques. Selectable input averaging. Set point models as well as ASCII output models. Can be easily scaled to monitor frequency, ratio, deviation, percentage or period.

• 4 or 6 digit models • Switch-select input frequency roll-off • High noise rejection circuitry • Digital preset scaling • Fast updating with high resolution & high stability • Digitally scaled time bases • Easy controls under flip-up door • High accuracy crystal time base • Price: $295 - $425



COMPARATORS & PRELOADERS

Comparators take standard BCD input data and compare it against built-in switches, less than, equal to and greater than outputs with both polarities. Preloaders output tri-state parallel BCD to allow bussing many units to one input.

• Single or dual limit models • Removable knobs - manual for screwdriver setting • Polarity switches on all models • Voltage and ground outputs permit stacking • Red & green front panel LED's • Manual or remote activation • Have bus connected data lines • Price: $142 - $304.

89176
CASES / HOUR

METERS WITH SETPOINTS

Most any parameter (volts, amps, watts, temperature, counts, etc.) can be displayed **and** have dual setpoint outputs. These meters also have wide range capability. Input circuitry immune to electrical noise. Built with the very best quality parts.

• 2 to 6 digit models available • μprocessor-based • Full instrumentation input • RS232, RS422, 20/60 mA outputs available • Parallel or strobe BCD outputs available • Scale factor .000000001 to 59999 • 110-9600 baud • High electrical noise immunity circuitry • Price: $235 - $425.

528076
COUNTS

MINI-PERIPHERAL METERS (Setpoints available)

NES has a full line of meters to interface easily to your programmable controller, computer, processor, terminal, etc. Various controls, setpoints, parameters, as well as the outputs are all ASCII (RS232, RS422, 20/60 mA loop) compatible.

• Microprocessor-based circuitry • Baud rates from 110-9600 • Easily field programmable • Field selected message and input formatted • High electrical noise immunity • Output (display) or input (measure) units available • Price:$240-$435

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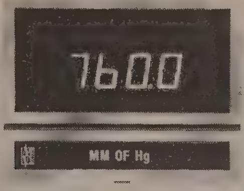
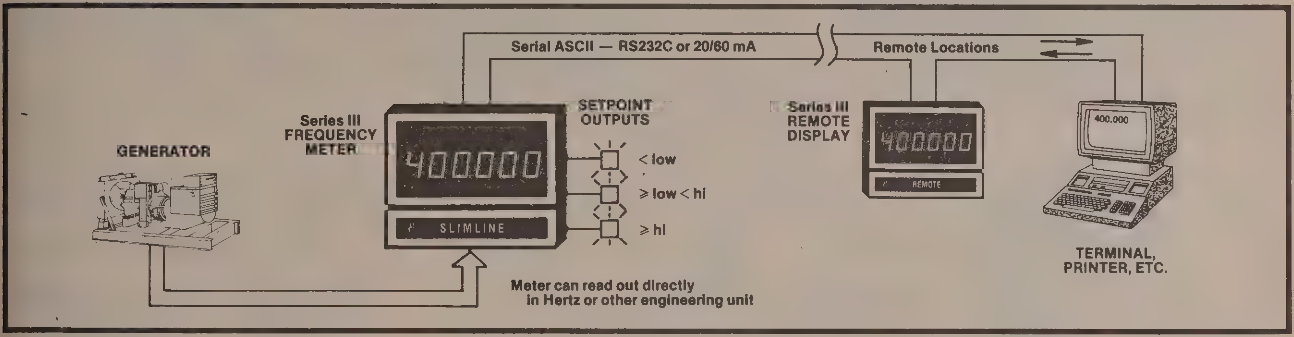
For other products in EEM from NES, see Sections 2000, 2200, 2325 & 2450.

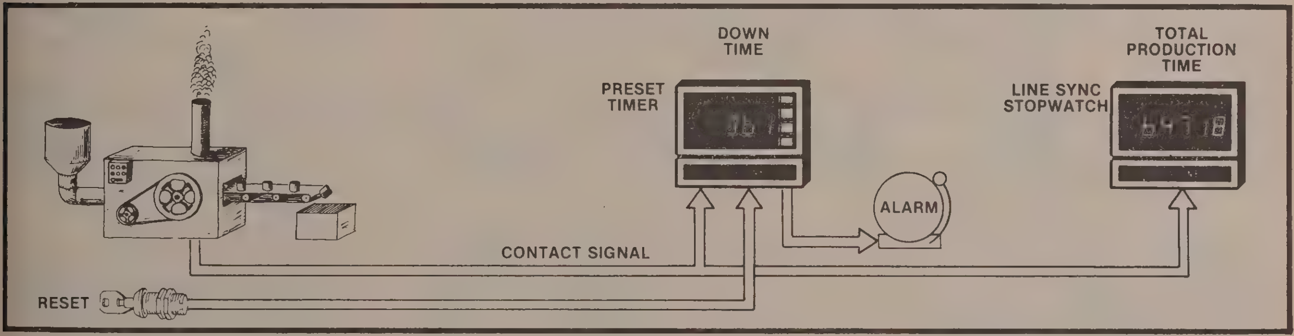
SLIMLINE® METERS

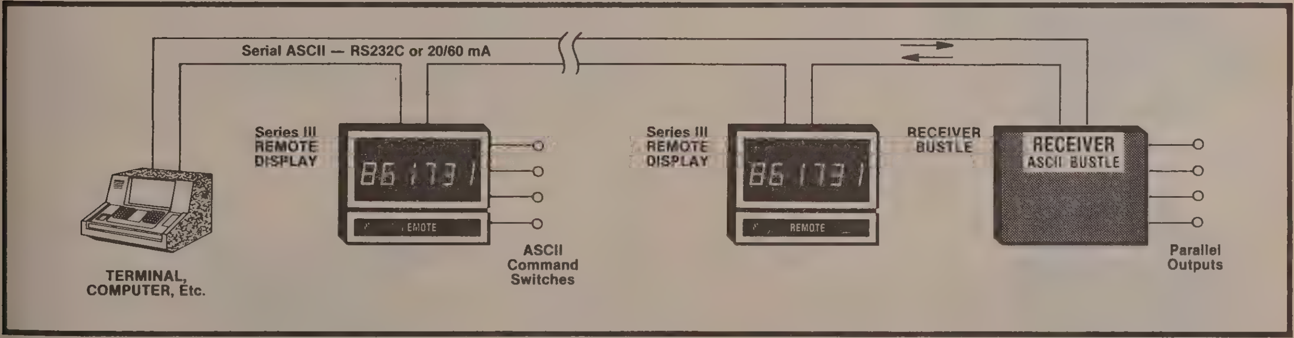
MORE THAN A METER

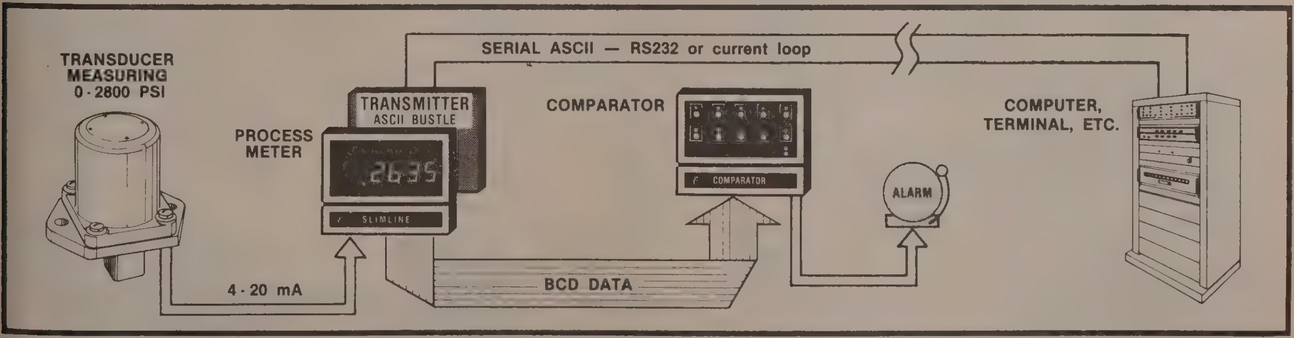

760.0
MM OF Hg

If you did not see the model you need, please ask. Our standard meters can usually be adapted to the most unusual applications. Also NES has one of the most aggressive new product development programs in the industry, so even if we do not have it today, we probably will have it tomorrow.


Serial ASCII — RS232C or 20/60 mA
Remote Locations
GENERATOR
Series III FREQUENCY METER
400000
SLIMLINE
SETPOINT OUTPUTS
< low
≥ low < hi
≥ hi
Series III REMOTE DISPLAY
400000
REMOTE
400.000
TERMINAL, PRINTER, ETC.
Meter can read out directly in Hertz or other engineering unit


DOWN TIME
PRESET TIMER
TOTAL PRODUCTION TIME
LINE SYNC STOPWATCH
ALARM
CONTACT SIGNAL
RESET


Serial ASCII — RS232C or 20/60 mA
Series III REMOTE DISPLAY
86 173 1
REMOTE
Series III REMOTE DISPLAY
86 173 1
REMOTE
RECEIVER BUSTLE
RECEIVER
ASCII BUSTLE
TERMINAL, COMPUTER, Etc.
ASCII Command Switches
Parallel Outputs


TRANSDUCER MEASURING 0-2800 PSI
SERIAL ASCII — RS232 or current loop
TRANSMITTER
ASCII BUSTLE
PROCESS METER
2635
SLIMLINE
COMPARATOR
COMPARATOR
ALARM
COMPUTER, TERMINAL, ETC.
4-20 mA
BCD DATA

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For other products in EEM from NES, see Sections 2000, 2200, 2325 & 2450.

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YOUR RELIABLE SOURCE FOR PANEL INSTRUMENTATION

MULTIPURPOSE DIGITAL PANEL METERS

MODEL 2004

Newport is your source for the most complete line of digital panel meters. Specialized models are available for a wide range of input signals. Input power can be 24 Vac, 120 Vac, 240 Vac, 5 Vdc, or 9-32 Vdc (isolated). Some models can take power directly off a 4-20 mA current loop (see Process Transmitter and Indicator Section).

Three types of displays are offered: LED, PGD (gas discharge), and LCD. Most units are designed for panel mounting in a standard 1/8 DIN cutout (92 x 45 mm). Some offer an optional case for mounting in a NEMA cutout (99.7 x 42.7 mm). Most models offer BCD as a standard feature or as an option to interface to printers, comparators, and other instruments.

			Signal					Case				Display			Power			Digital output	
Model	Display range (counts)	Readings per sec	DC	AC avg	AC rms	Process	Strain gauge	DIN size	NEMA size	Metal	Splash-proof lens	LED	LCD	PGD	120/240 Vac	5 Vdc	9-32 Vdc	BCD, non-isolated	BCD, isolated
QUANTA	± 1999	2.5	●	●	●	●	●	1/8			●	●	●		●	●	●		●
200A/S	± 1999	4-60	●							●				●	●			●	
201P	± 1999	2.5	●			●		1/8			●	●	●		●		●		
203A	± 1999	4	●	●	●			1/8	●		●	●			●	●	●	●	●
215	± 1999	2.5	●					1/16								●			
258	± 1999	.5-30	●					1/8			●			●	●			●	●
204B	± 3999	3.6	●	●	●	●	●	1/8	●		●	●			●	●	●	●	●
400A/S	± 3999	4-60	●							●				●	●			●	
204B, ER1	± 4999	3.5	●	●	●	●	●	1/8	●		●	●			●	●	●	●	●
400A/S, ER	± 4999	4-60	●							●				●	●			●	
204B, ER2	± 5999	3.4	●	●	●	●	●	1/8	●		●	●			●	●	●	●	●
2000B/S	±19999	4-30	●							●				●	●			●	
2003B	±19999	4.3	●	●	●		●	1/8	●		●	●			●	●	●	●	●
2520	±19999	2.5	●				●	1/16			●	●				●		●	
2000A/S	±39999	.5-20	●							●				●	●				●
2004	±39999	3.3	●	●	●	●	●	1/8	●		●	●			●	●	●	●	●
8203	±39999	4-30	●							●				●	●			●	
2004, ER1	±49999	3.2	●			●	●	1/8	●		●	●			●	●	●	●	●
2004, ER2	±59999	3.1	●			●	●	1/8	●		●	●			●	●	●	●	●
2004, ER3	±69999	3.0	●			●	●	1/8	●		●	●			●	●	●	●	●

QUANTA MODULAR METER/ CONTROLLERS

QUANTA LED

QUANTA LCD

The QUANTA series is a new achievement in modular 3 1/2-digit (± 1999 count) panel instruments. A universal, compact 1/8 DIN case houses a motherboard and up to three plug-in boards to provide an unmatched choice of signal conditioner inputs, analog outputs, and control outputs. Standard features of all QUANTA configurations include a screw terminal barrier strip for signal and power inputs and a 1 mV per count analog output to drive a chart recorder. The table serves as a configuration guide. Fully configured, scaled, and calibrated units are available from Newport's worldwide network of QUANTA distributors.

Model	Modules
Motherboards (with case & display)	
Q20xxx	LED, 120 Vac (50/60 Hz)
Q21xxx	LCD, 120 Vac (50/60 Hz)
Q22xxx	LED, 240 Vac (50/60 Hz)
Q23xxx	LCD, 240 Vac (50/60 Hz)
Q24xxx	LED, isolated 9-32 Vdc
Q25xxx	LCD, isolated 9-32 Vdc
Q26xxx	LED, 5 Vdc
Q27xxx	LCD, 5 Vdc
Q28xxx	LED, 24 Vac (50/60 Hz)
Q29xxx	LCD, 24 Vac (50/60 Hz)
Analog output boards (optional, maximum one)	
Q2x0xx	None (1 mV/count is standard)
Q2x1xx	0-5 Vdc
Q2x2xx	0-10 Vdc
Q2x3xx	0-1 mA (internally driven)
Q2x4xx	4-20 mA (internally driven)
Q2x5xx	4-20 mA (externally driven)
Control output boards (optional, maximum one)	
Q2xx0x	None
Q2xx1x	Dual-setpoint, dual 10 A relay
Q2xx2x	4-20 mA proportional
Q2xx3x	4-20 mA proportional plus time proportional 2 A relay
Q2xx4x	Parallel BCD, buffered, isolated
Signal conditioner input boards (one required, maximum one)	
Q2xxxA	DC voltage
Q2xxxB	DC current
Q2xxxC	AC AVG voltage
Q2xxxD	AC AVG current
Q2xxxF	AC RMS voltage
Q2xxxG	AC RMS current
Q2xxxH	Frequency/rate
Q2xxxJ	Type J thermocouple
Q2xxxK	Type K thermocouple
Q2xxxT	Type T thermocouple
Q2xxxN	3-wire ratio potentiometer
Q2xxxO	2- or 4-wire resistance
Q2xxxP	Process (span & zero adjust)
Q2xxxM	RTD, 1 degree resolution
Q2xxxR	RTD, .1 degree resolution
Q2xxxS	Strain gauge
Q2xxxZ	Prototype/kluge board

TEMPERATURE METERS

Newport offers a comprehensive line of DPMs for temperature measurement with direct thermocouple or 100-Ohm platinum RTD input. All models provide cold junction compensation, linearization, and scaling as needed to display degrees C or F. Input power can be 120/240 Vac, 5 Vdc, or isolated 9-32 Vdc. A plastic case for panel mounting in a 1/8 DIN cutout (92 x 45 mm) is standard. A bench-style case is optional.

QUANTA and Model 267B use signal conditioning boards for different inputs. Model 269 is a microcomputer based instrument which allows different thermocouple types to be selected by plug-in jumpers. Fully configured units of all series are available from Newport or its worldwide network of distributors.

MODEL 269

		Thermocouple type								RTD resolution			Display		Digital output		
Model	Range (counts)	J	K	T	E	R	S	B	W	1.0°	0.1°	0.01°	LED	LCD	BCD non-isolated	BCD isolated	Serial ASCII
QUANTA	–1999 to +1999	●	●	●						●	●		●	●		●	
267B	–2000 to +7800	●	●	●	●	●	●	●	●	●	●	●	●		●	●	
268	–1999 to +1999	●	●	●	●	●				●	●	●	●		●	●	
269	–1999 to +7999	●	●	●	●	●	●						●				●

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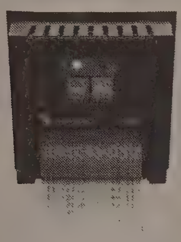
YOUR RELIABLE SOURCE FOR PANEL INSTRUMENTATION

PANEL-MOUNT COMPACT PRINTERS



MODEL 820A

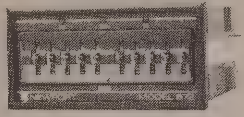
Newport's printers are compact, microcomputer controlled units for panel mounting in a standard 1/4 DIN cutout (92 x 92 mm). All models can print 20 columns at up to 1.5 lines per second on internally-stored thermal paper.

Model 820A features a built-in time-of-day clock and can turn any DPM or other instrument with BCD output into a datalogger by printing days, hours, minutes, readings, and engineering units. The addition of a Model 320 BCD bus controller allows one Model 820A printer to record data from up to 15 instruments.

Model	Interface	Special Features
820A	BCD, character serial BCD, character parallel	Time-of-day clock, .6 sec to 2 hr intervals
821	RS-232C or TTL serial ASCII 20 mA serial ASCII Centronics parallel ASCII	5 x 9 dot matrix, 102 alphanumeric characters
822	IEEE-488, listener	5 x 9 dot matrix, 102 alphanumeric characters
320	BCD bus controller	Connects up to 15 DPM's with BCD output to Model 820A printer

DIGITAL COMPARATOR/ CONTROLLERS

Newport's comparator/controllers accept BCD output from a DPM or other instrument and compare it to one (Model 871) or two (Model 872) thumbwheel-programmable setpoints to open or close 5A Form-C relays. They are designed for panel mounting in a 1/8 DIN cutout (92 x 45 mm). Model 872 can control one channel with hysteresis, one channel with two switching points for three-zone control, or two independent channels.



MODEL 872

Model	Relays	Control Function
871	1	HI-LO (1 channel)
872	1 2 2	HI-LO w/ hysteresis (1 channel) HI-GO-LO (1 channel) HI-LO and HI-LO (2 channels)

TACHOMETER/COUNTER/TIMERS AND CLOCK

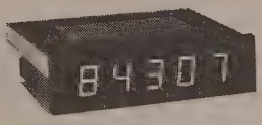
MODEL 6110

Models 6110 and 6130A can be used as tachometer, event counter, or time interval counter over a wide dynamic range. Model 6110 features a gas discharge display and a metal case. Model 6130A is an LED unit in a plastic case for panel mounting in a 1/8 DIN cutout (92 x 45 mm). Model 6720 is a 12- or 24-hour panel mountable clock with remote stopwatch capability. All units provide BCD output.

Model	Maximum counts	Frequency range	Frequency gate period	Stopwatch resolution
6110	999,999	DC to 1 MHz	10 ms to 6 sec	1 μs to 10 sec/count
6130A	99,999	DC to 10 MHz	100 ms to 10 sec	1 μs to 10 sec/count
6720	99:23:59	50/60 Hz line or internal crystal		0.1 sec

5-DIGIT REMOTE DISPLAYS

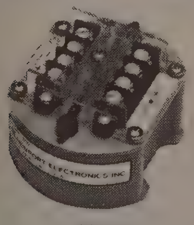
These units accept BCD output from a DPM or other instrument to provide a remote .56″ LED display. The appearance is that of a 1/8 DIN DPM (Model 6152) or 1/16 DIN DPM (Model 6153).



MODEL 6153

Model	Power	Panel Cutout
6152	120/240 Vac or 5 Vdc	92 x 45 mm
6153	5 Vdc	92 x 22.5 mm

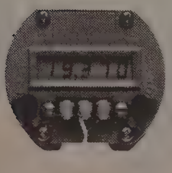
PROCESS TRANSMITTER AND INDICATORS



MODEL 502

Model 502 is a 4-20 mA two-wire thermocouple transmitter with outstanding industrial specs: waterproof housing, −40 to 85°C operating temperature, 500 Vrms input-to-output isolation, 120 Vac differential input and output protection, and 9 to 45 Vdc supply compliance. Model 508 is a current loop indicator, which derives its power directly from the current loop with a 2.5 Vdc voltage drop. Its 5-digit LCD readout can be programmed to show engineering units. It features the industrial specs of Model 502. Model 558 is an unsealed version of Model 508 for panel mounting in a 1/8 DIN cutout (92 x 45 mm). A splashproof lens is optional.

Model	Operating temperature	Input	Output	Programmable scaling	Case
502	−40 to 85°C	J, K, E, T thermocouples	4-20 mA	Zero Suppression to 800°C Span ranges from 50°C	63.5 mm H x 51.8 mm D Hockey puck
508	−40 to 85°C	4-20 mA, or 10-50 mA	±1999 display	±full scale zero 10% to 100% span	63.5 mm H x 51.8 mm D Hockey puck
558	0 to 60°C	4-20 mA, or 10-50 mA	±1999 display	±full scale zero 10% to 100% span	1/8 DIN, 84 mm D plastic case



MODEL 508

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

Synchro Panel Meters

North Atlantic's broad experience in advanced synchro/resolver instrumentation has resulted in the development of the Model 800 and Model 801 Synchro Panel Meters.

Designed for portable, system or test set applications, North Atlantic's Synchro Panel Meters can operate directly off the stator and rotor input signals, requiring no separate power. A broad frequency range of 47-1200Hz and programming for all standard synchros and resolvers results in maximum versatility for the user.

The 800 and 801 Synchro Panel Meters use a Type II tracking servo loop which results in no tracking lag error up to the maximum tracking rate. The bright and very large .56″ L.E.D. display allows readability even under the most difficult conditions. In addition, a tri-state parallel B.C.D. output is available at the rear panel connector for remote use. To permit data transfer to a computer or other digital device without having to freeze the converter, a data valid signal is available at the rear connector.

Both Synchro Panel Meters have a ±2° offset adjustment on the back panel to allow for final system zeroing without the sometimes difficult task of physically "tweaking in" a remote synchro.

A prime consideration in the circuit design of the Synchro Panel Meters was reliability and maintainability. No sealed modules are used; all components are accessible and test points are provided for signal tracing.

Model 800

- Resolution 0.1°
- Accuracy ±0.1° +1 LSB
- Range 0.0°-359.9° std.; ±179.9° optional
- Variable scaling 0000-9999 optional

Model 801

- Resolution 0.01°
- Accuracy ±0.05° std.; ±0.03° optional
- Range 0.00°-359.59°
- Degrees/Minutes Display optional

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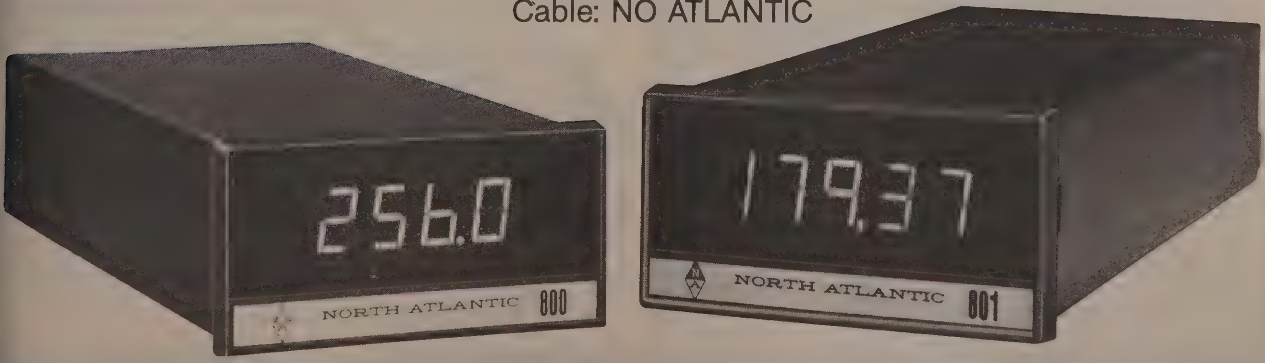
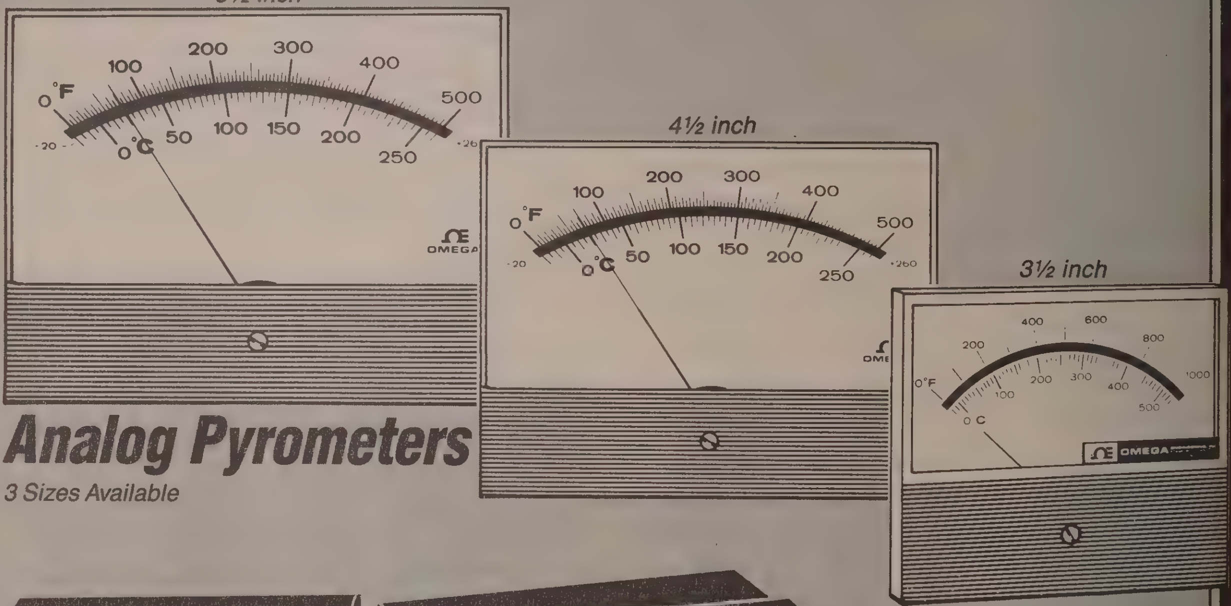


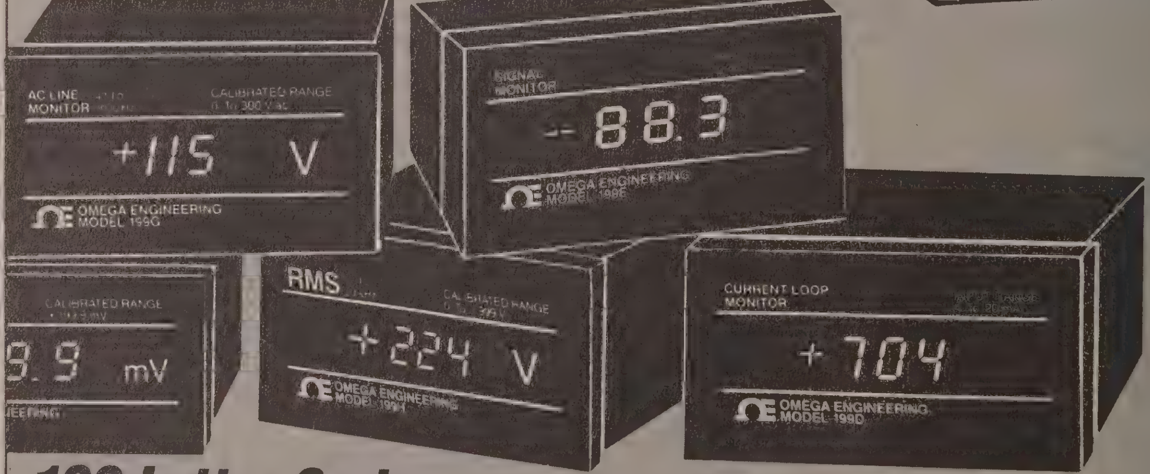
PANEL METERS ANALOG AND DIGITAL

For Temperature, Pressure and Strain


5½ inch
4½ inch
3½ inch
0 °F
100
200
300
400
500
0 °C
50
100
150
200
250
OMEGA

Analog Pyrometers

3 Sizes Available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+115 V
OMEGA ENGINEERING MODEL 199G
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88.3
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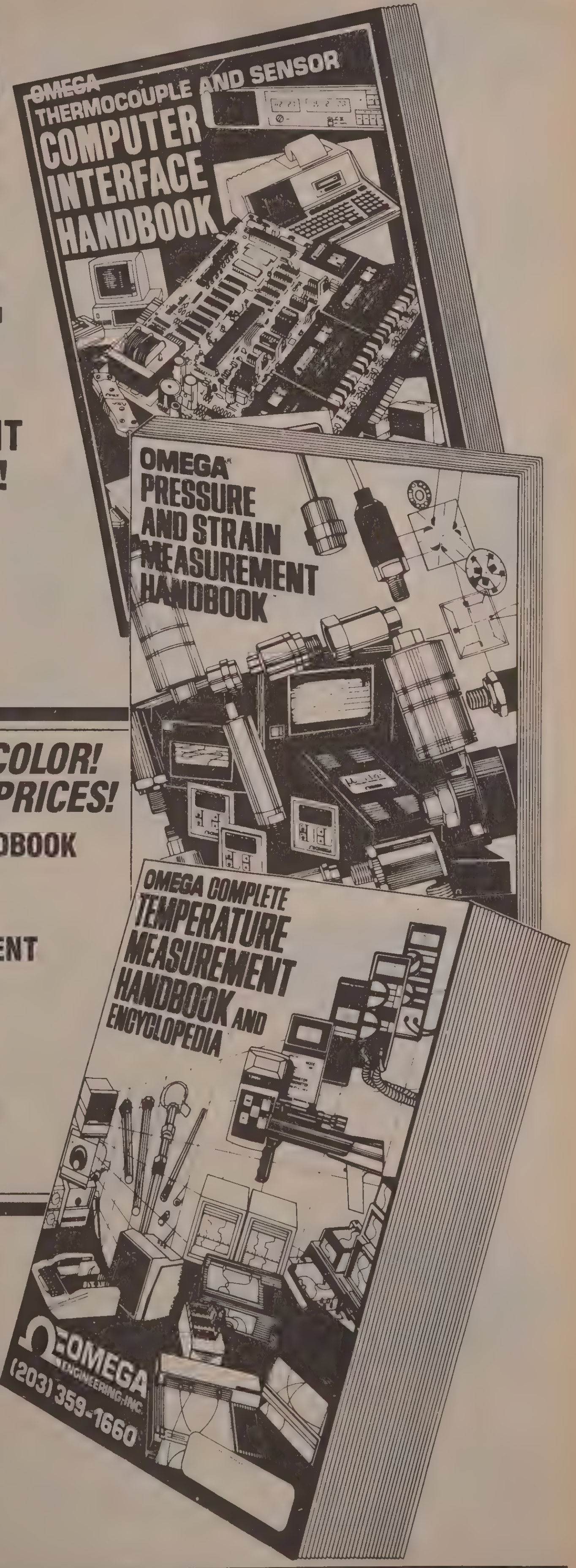
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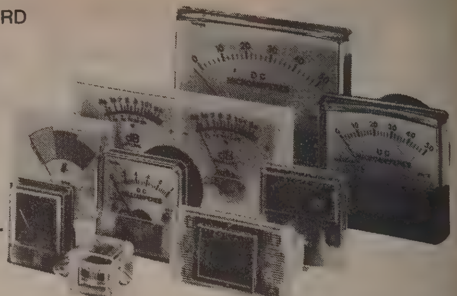
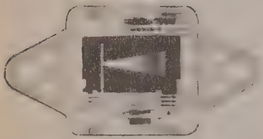


METERS
ELETRICAL INDICATING METERS

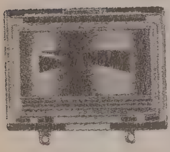

SR40

SR72

SR70

SR44

SR74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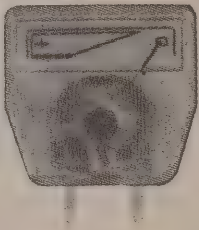
SY06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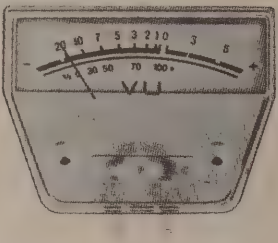
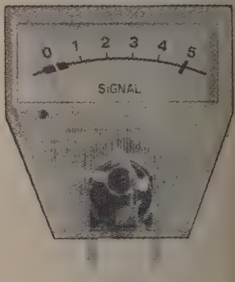
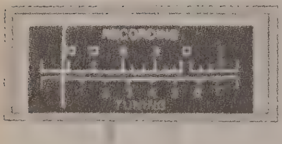


SY16



SP06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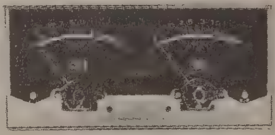
SR36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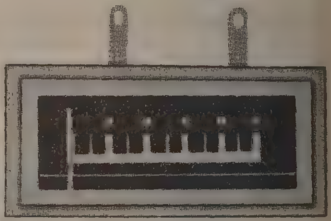
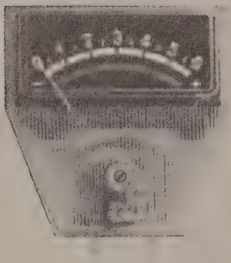
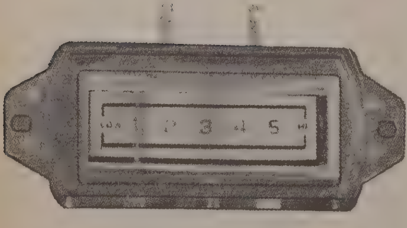

S92


SP08



SR32

Items shown represent a small portion of the full production line. Consult Shogyo for full line catalog.

MODEL	RANGE	RESISTANCE
SR40	0-100VA, 150VA, 200VA, 250VA, 300-400VA, 500VA	1800Ω, 1700Ω, 1500Ω, 1200Ω, 800Ω, 500Ω
SR44	0-100VA, 150VA, 200VA, 250VA, 300-400VA, 500VA	1800Ω, 1700Ω, 1500Ω, 1200Ω, 800Ω, 500Ω
SR70	0-300VA -400VA, 500VA	800Ω, 500Ω
SR72	0-300VA -400VA, 500VA	800Ω, 500Ω
SR74	0-300VA -400VA, 500VA	800Ω, 500Ω
SR76	0-250VA, 500VA	1200Ω, 500Ω
SY06	0-100VA, 150VA, 200VA, 250VA, 300-400VA, 500VA	1800Ω, 1700Ω, 1500Ω, 1200Ω, 800Ω, 500Ω
SY08	0-100VA, 150VA, 200VA, 250VA, 300-400VA, 500VA	1800Ω, 1700Ω, 1500Ω, 1200Ω, 800Ω, 500Ω

All models listed below have the following range: 0-100VA, 150VA, 200VA, 250VA, 300-400VA, 500VA. Resistance: 1800Ω, 1700Ω, 1200Ω, 800Ω, 500Ω.

SY10 SY12 SY14 SY16
SS50 SK06 SP06 SP08
SF24 SQ02 SQ04 S24
S24R S26 S36 SR30
SR32 SR34 SR36 S90
S92 S96 SQ12 SQ14
SQ60 SS10 SS12 SS14
SS14L SS18 SS24 SS28
SS30 SS32 SS40 SS42
SS46 SS20 SS22 SS26
SS60 SS66 SS84 SS86
SS88 SS92 SS94 SS96
SS98 SS100 SS102
SW06 SW16 SW26
SW38 SW30 SW36

SCALE/WINDOW DIMENSIONS

MODEL	L	W	D	MODEL	L	W	D	MODEL	L	W	D
SR40	12.8	18.0	4.6	S36	18.0	34.2	3.0	SS46	25.0	44.0	1.0
SR44	12.6	17.8	4.2	SR30	15.0	35.0	7.0	SS20	25.0	44.0	5.5
SR70	11.4	17.1	5.0	SR32	15.0	35.0	10.0	SS22	25.0	44.0	3.0
SR72	11.5	17.0	5.0	SR34	15.0	35.0	8.0	SS26	28.0	50.0	4.0
SR74	11.5	17.2	5.0	SR36	15.0	35.0	10.0	SS60	24.0	42.6	3.0
SR76	12.8	20.8	4.0	S90	20.6	45.0	7.0	SS66	24.0	42.4	4.5
SY06	8.2	23.2	2.0	S92	20.6	45.0	7.0	SS84	18.0	48.0	1.2
SY08	7.9	23.7	3.0	S96	19.0	45.8	3.2	SS86	18.0	48.0	2.0
SY10	8.0	23.0	1.2	SQ12	30 Dia.		3.8	SS88	19.0	44.0	5,5
SY12	9.5	23.0	2.5	SQ14	36 Dia.		4.6	SS92	35.0	59.8	5.0
SY14	7.8	23.5	3.0	SQ60	40 Dia.		5.3	SS94	35.0	59.8	1.5
SY16	16.0	52.0	1.2	SS10	18.5	36.3	3.0	SS96	18.0	48.0	1.7
SS50	9.5	23.7	3.0	SS12	21.0	36.0	8.0	SS98	46.0	60.0	5.0
SK06	16.9	34.3	2.8	SS14	21.5	36.5	5.0	SS100	39.2	64.2	3.0
SP06	15.0	35.0	4.0	SS14L	21.5	36.5	5.0	SS102	32.0	76.2	—
SP08	15.0	33.0	3.0	SS18	21.5	36.5	5.0	SW06	23.0	28.0	3.0
SF24	18.9	35.2	2.5	SS24	30.0	50.0	4.0	SW16	16.0	52-52	1.2
SQ02	25 Dia.		2.3	SS28	28.0	50.0	4.0	SW26	29.0	93.8	1.8
SQ04	24.0	21.0	2.3	SS30	30.0	36.4	3.0	SW38	32.0	112.0	3.0
S24	31.0	14.0	2.0	SS32	31.0	62.0	1.2	SW30	36.0	45.0	16.2, 16.3, 17.3
S24R	13.7	34.9	6.8	SS40	30.4	35.5	3.0				
S26	15.0	30.0	7.5	SS42	14.0	34.0	3.5	SW36	30.5	100.0	2.5

SEE OUR OTHER CATALOG PAGES IN EEM SECTIONS 1300/2100/2450/4750/5600/6000

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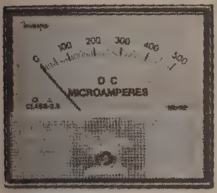
SHOGYO
INTERNATIONAL CORPORATION

METERS

PANEL METERS


0
100
200
300
400
500
DC
MICROAMPERES
CLASS-2.5

SL104

0
1
2
3
4
5
DC
AMPERES
CLASS-2.5

SS90

0
.2
.4
.6
.8
1
DC
MILLIAMPERES
CLASS-2.5

SS104

0
.2
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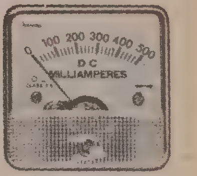
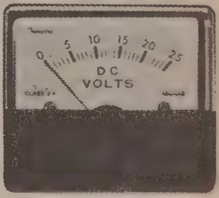
1
DC
MILLIAMPERES
CLASS-2.5

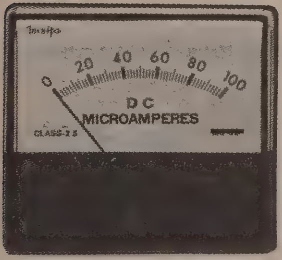
SS130


0
100
200
300
400
500
DC
MILLIAMPERES

SS76


0
5
10
15
20
25
DC
VOLTS

SU76


0
20
40
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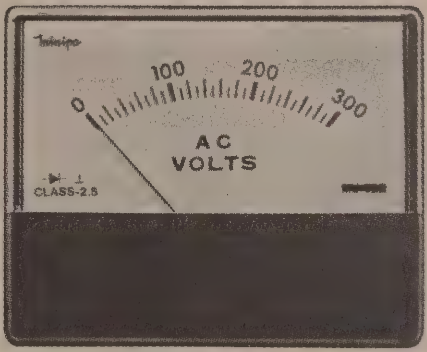
80
100
DC
MICROAMPERES
CLASS-2.5

SU104


0
100
200
300
AC
VOLTS
CLASS-2.5

SU104E

0
.2
.4
.6
.8
1
DC
MILLIAMPERES
CLASS-2.5

SU90

0
20
40
60
80
100
DC
MICROAMPERES
CLASS-2.5

SU130

DIMENSIONS

	L(mm)	W(mm)	D(mm)	MOUNTING CENTERS L(mm)	MOUNTING CENTERS W(mm)
SS76	44	44	32	32	32
SS90	51	51	32	38	38
SS104	60	60	34	48	48
SL104	61	70	36	48	48
SS130	80	80	36	64	64
SU76	45	50	34	32	32
SU90	52	58	43	38	38
SU104	60	65	37	48	48
SU104E	66	80	37	48	64
SU130	82	100	37	64	80
SU130E	100	120	39	80	100

RANGE AVAILABLE FROM STOCK

FUNCTION	RANGE	INTERNAL RESISTANCE*	SCALE DIVISION SS-76	SS-90	SS-104	SL-104	SS-130	SU-76	SU-90	SU-104	SU-104E	SU-130	SU-130E
DC Microammeter	0-50uA DC	3500Ω	25	25	50	50	50	25	25	50	50	50	50
	0-100uA DC	3500Ω	25	25	50	50	50	25	25	50	50	50	50
	0-200uA DC	1450Ω	20	20	40	40	40	20	20	40	40	40	40
	0-500uA DC	430Ω	25	25	50	50	50	50	50	50	50	50	50
DC Galvanometer.	25-0-25uA DC	3500Ω	25	25	50	50	50	25	25	50	50	50	50
	50-0-50uA DC	3500Ω	25	25	50	50	50	25	25	50	50	50	50
	100-0-100uA DC	1450Ω	20	20	40	40	40	20	20	40	40	40	40
	250-0-250uA DC	430Ω	25	25	50	50	50	25	25	50	50	50	50
DC Milliammeter	0-1mA DC	200Ω	25	25	50	50	50	25	25	50	50	50	50
	0-3mA DC	65Ω	30	30	30	30	30	30	30	30	30	30	30
	0-5mA DC	8Ω	25	25	50	50	50	25	25	50	50	50	50
	0-10mA DC	3Ω	25	25	50	50	50	25	25	50	50	50	50
	0-20mA DC	2Ω	20	20	40	40	40	20	20	40	40	40	40
	0-50mA DC	1.5Ω	25	25	50	50	50	25	25	50	50	50	50
	0-100mA DC	0.8Ω	25	25	50	50	50	25	25	50	50	50	50
	0-200mA DC	0.4Ω	20	20	40	40	40	20	20	40	40	40	40
	0-500mA DC	0.2Ω	25	25	50	50	50	25	25	50	50	50	50
DC Ammeter	0-1A DC	0.1Ω	25	25	50	50	50	25	25	50	50	50	50
	0-3A DC	0.03Ω	30	30	30	30	30	30	30	30	30	30	30
	0-5A DC	0.02Ω	25	25	50	50	50	25	25	50	50	50	50
	0-10A DC	0.01Ω	25	25	50	50	50	25	25	50	50	50	50
DC Voltmeter	0-3V DC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
	0-5V DC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-10V DC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-15V DC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-30V DC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
	0-50V DC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-100V DC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-150V DC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
	0-300V DC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
AC Voltmeter†	0-10V AC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-15V AC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
	0-30V AC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
	0-50V AC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-100V AC	1000Ω/V	25	25	50	50	50	25	25	50	50	50	50
	0-150V AC	1000Ω/V	30	30	30	30	30	30	30	30	30	30	30
S-meter	0-1mA DC		Special S-meter scale F. S.= 1mA DC										
VU-meter†	1.228V AC(OVU)		Special VU-meter scale, OVU (1000 Hz) = 1.228V AC										

* Resistance tolerance: ±10%   † Rectifier type

Items shown represent a small portion of the full production line. Consult Shogyo for full line catalog.

SEE OUR OTHER CATALOG PAGES IN EEM SECTIONS 1300/2100/2450/4750/5600/6000

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PANEL METERS

If it's a meter — stock or special — analog, digital, Ana-Led® or meter relay, Simpson makes it

STANDARD ANALOG PANEL METERS Industry's Widest Source

Century Series, modern styling in 1½, 2½, 3½ and 4½" sizes, wide choice of ranges. **Wide-Vue®,** popular style, in 1½, 2½, 3½, 4½ and 8" sizes, many stock ranges to select from. **Edgewise meters** save precious panel space, available in barrel and stackable models with vertical or horizontal scales, in all standard ranges plus specials. Other panel meter types also available include **Bold-Vue®,** Designer series, round and rectangular, metal cased. 250° long scale meters provide double the length of standard scales. The famous Simpson self-shielded meter movement provides calibration that is not affected by stray magnetic fields or magnetic mounting. A wide variety of stock DC, AC, RF, DB, wattmeters percent load, elapsed time, frequency, and segmental ranges are available through world wide electronics distributors.

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Highly reliable 3½ digit instruments utilize state-of-the-art LSI circuitry and provide 0.1% of reading accuracy. Designed to fit 1.682" x 3.622" cutouts. Adapters are available for other popular domestic and IEC/DIN cutout sizes. Automatic zero and polarity indication. Choice of 120/240 V AC, 50-400 Hz or 5 V DC operation. Input/output edge connector included.

New 4½ digit DPM, Model 2840.
16 ranges **$199.05**
Low Cost Series 2865 DPM has 0.43" LED readout. 9 stock DC ranges. from **$101.25**
Deluxe Series 2850 DPM. Choice of 0.43" LED or 0.55" planar gas discharge display. BCD output.
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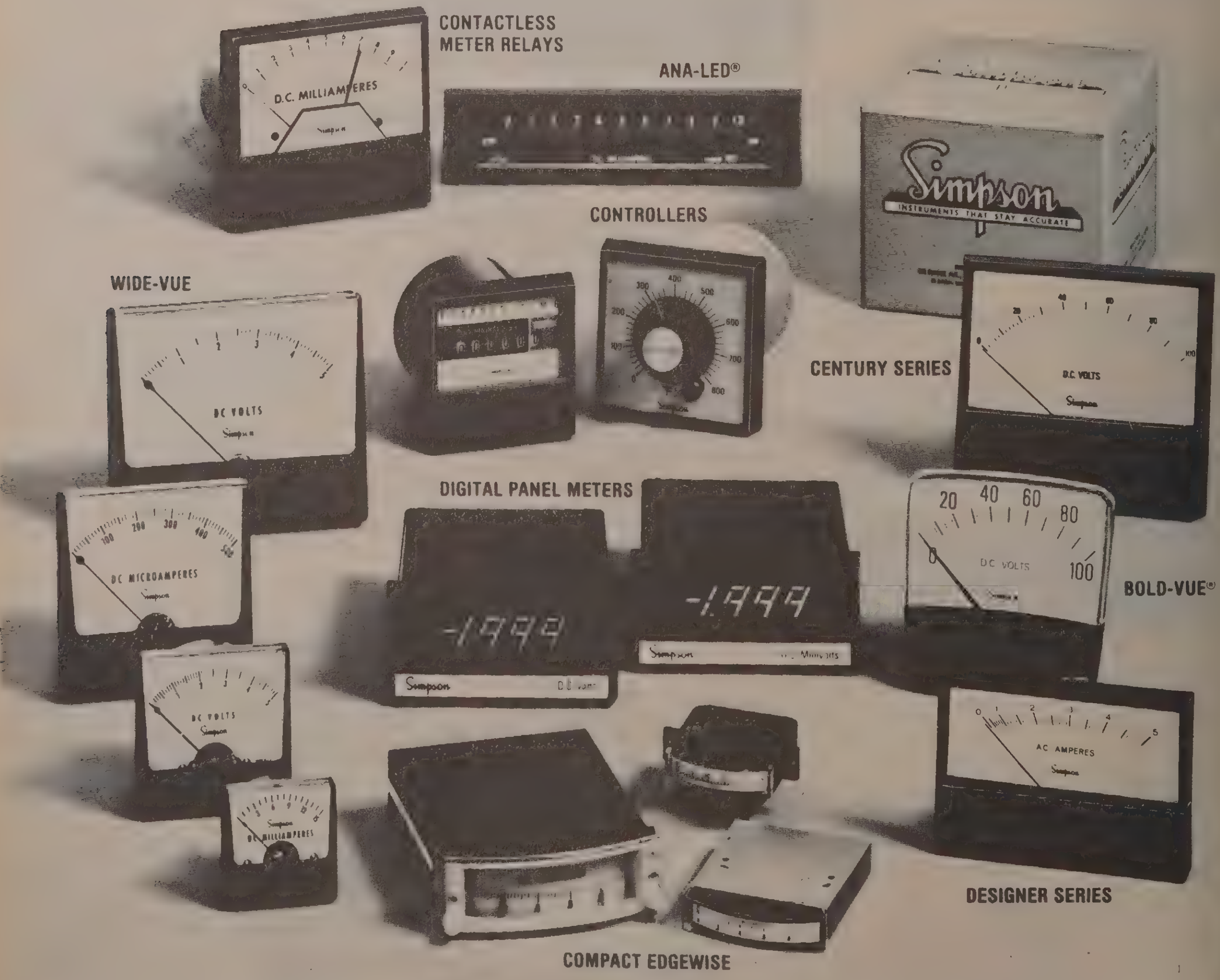
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PM-45X & PM-45XU 4½ DIGIT PANEL METERS
HIGH ACCURACY LCD METERS WITH 10μV RESOLUTION, TRUE DIFFERENTIAL INPUTS, ULTRA LOW POWER 25mW AT 5VDC, AND STANDARD MUX BCD OR OPTIONAL PARALLEL BCD OUTPUTS
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TEMPERATURE SPECIFICATIONS
HUMIDITY SPECIFICATIONS
TYPICAL APPLICATION CIRCUITS & CONNECTION INSTRUCTIONS
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DUAL VOLTS AMPS ISOLATED HIGH SIDE SENSING
RATIOMETRIC OHMMETER
10-50mA CURRENT LOOP RECEIVER - SIGNAL POWERED
CURRENT METER NON ISOLATED LOW SIDE SENSING
DUAL VOLTS AMPS NON ISOLATED LOW SIDE SENSING
DUAL VOLTS AMPS NON ISOLATED HIGH SIDE SENSING
4 TO 20mA CURRENT LOOP RECEIVER
SINGLE ENDED METER 200mV RANGE
DIFFERENTIAL METER 200mV RANGE 2V RANGE
DIFFERENTIAL METER WITH EXCITATION VOLTAGE DRIFT COMPENSATION
SINGLE ENDED METER 2V RANGE
SINGLE ENDED METER 2V RANGES WITH VOLTAGE DIVIDER
EXTRA HIGH CMRR DIFFERENTIAL INPUT METER
PM-45X/PM-45XU Page 4
PM-45X/PM-45XU Page 5
PIN DESCRIPTION
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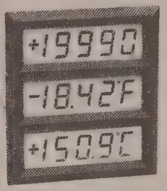
2-WIRE PROCESS DPM's

POWERED DIRECTLY FROM THE SIGNAL CURRENT LOOP

CM-35X $75 $64 (100's)



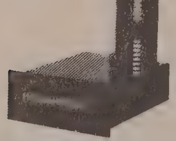
Powered by 4 to 20mA signal loop power • No external power source required • Translates 4 to 20mA input into 0 to 1999 digital display • May be user scaled to any required engineering unit • Programmable extra digit for use as trailing "0" or as °C or °F descriptor • 48″ LCD display • Bipolar • 50 PPM TC • Programmable decimals • Safe for hazardous areas • Available in stackable cases as shown

CM-35XHC $79 $67 (100's)

Identical features to the CM-35X but configured for operation from 10 to 50mA signal loop current

ANALOG METERS

AM-20 $49 $41 (100's)



Rugged Versatile Solid State Analog DPM • Accuracy ±2% of Full Scale • 10 Meg Ω Input Impedance • User Programmable for Bargraph Display • Moving Dot Display • Moving Proportional Brightness 3 to 4 Dot (slinky) Display • 0-4V FS to 0-1200V FS Input • 4/20mA Input • Offset Capability • Bipolar Center Zero Null Meter • Unipolar Center Zero with expanding Bar or intersecting Bars • Selectable LED Scale Points • Flashing Overrange • Overrange Alarm Output • 5V DC Pwr Bar Mode • 4V to 24V DC Pwr Dot Mode

AM-20S $65 $56 (100's)

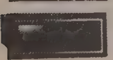
Solid State Dual or Single Set Point Controller • Set Point Accuracy ±1% • 20 Selectable Set Points • Two Opto-Isolated Relay or Alarm Drivers • Max Off Voltage 30V • Max on current 200mA • 5V DC Pwr Bar Mode • 4V to 24V DC Pwr Dot Mode

Texmate's Popular Low Profile 1″ x 2½″ DPM Cases

For Twin Mounting or multiple arrays order your DPMs in cases to suit your panel layout.

End Mount Case
Two End Mount Cases enable simple Twin mounting in a single cutout

Center Mount Case
Any number of center mount cases may be fitted between two end mount cases for multiple mounting arrays

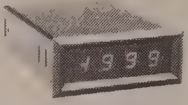


Full Bezel Case
has complimentary styling to multiple mounting cases

Slim Line Case
Standard Texmate case with attractive matte finish
(Shipped with all orders unless otherwise specified)

DIGITAL PANEL METERS

PM-35U $39 $29 (100's)

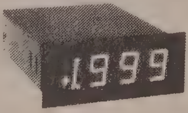


Lowest prices quality 3½ digit DPM available • Bright 3″ LEDS • Differential Inputs • Bipolar • Auto Zero • Ratiometric • OHMs/Amps • Programmable Decimals • 200mV 2V 20V 200V 1200V rgs • Edge connector or direct solder tab connections • TC 100 ppm typ 200 max • 4V DC Pwr

PM-35A $49 $37 (100's)

Popular, general purpose 3½ digit instrument More than 50.000 units have been installed throughout the world in thousands of different applications, attesting to the meter's reliability • Differential Inputs • Programmable Current & Ohmmeter Capability • Ratiometric • 200mV 2V 20V 200V 1200V inputs • Scaling in Engineering Units with Offsets • Lamp Test • Low TC 50 ppm Typ • Auto Zero • Bipolar • Programmable Decimals • 5V DC Pwr

PM-35AR $74 $63 (100's)



World's Smallest Size Lowest Priced Autoranging DPM Has all the features of the PM-35A except Ratiometric ohms measurement • Autoranges between 200mV-2V 2V-20V, 20V-200V, 200V-1200V • 1000 meg Ω input impedance on 200mV-2V range, 10 meg Ω on others • Auto Switching Decimals • Programmable to Display Engineering Units • 5V DC Pwr

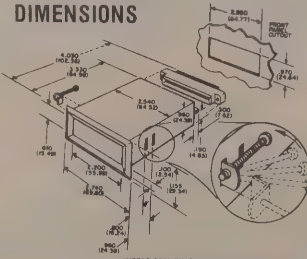
PM-45 $79 $67 (100's)

Popular economical 4½ Digit DPM • Single ended Input • MUX BCD Available • Sample & Hold • Leading Zero Blanking • 0.015% Rdg Accuracy • 0001 volt resolution • Ratiometric • Bright .3″ LEDs • 5V DC Pwr

PM-3.5 $59 $50 (100's)

Very fast update rate available • 3½ digit • Single ended Input • MUX BCD Available • Sample & Hold • Leading Zero Blanking • Bright 3″ LEDs • 5V DC Pwr

Low Profile Case DIMENSIONS



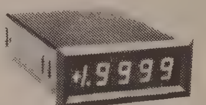
INSERT DPM THROUGH CUTOUT HOLE FROM FRONT OF PANEL ATTACH MOUNTING BRACKETS AND SCREWS AS SHOWN, USING SECOND SLOT WHEN PANEL THICKNESS IS GREATER THAN ¼ INCH. TIGHTEN SCREWS AGAINST REAR OF PANEL

DIGITAL PANEL METERS

PM-35D $59 $50 (100's)

Super Bright .56″ LEDs • 20mA Drive Per Segment • HI/Rel Design for Long MTF • Accuracy ± (.05% reading +1 digit) • Sample Hold Feature • Ideal Replacement for Low Drive capability single chip DPMs
The PM-35D is a full feature 3½ Digit Instrumentation DPM • Full Differential Inputs • Bipolar • Auto Zero • Ratiometric • 4/20mA • Ohmmeter/Ammeter • Programmable Decimals • Scaling in Engineering Units with offsets • Low TC • Lamp Test • Sample Hold • ±12V DC @ 5mA Power Output from Internal DC to DC Convertor • 5V DC pwr

PM-45D $100 $86 (100's)



Ultra Stable, Super Accurate Top of the Line 4½ Digit Instrument • Accuracy ± (.01% reading + 1 digit) • Differential Input • 10 Micro Volt Resolution • 200K Hz Quartz Crystal Clock for 120dB 50/60 Hz Normal Mode Noise Rejection • 80 dB Common Mode Rejection at DC.
The PM-45D represents the ultimate in miniature Hi Rel DPM Design featuring very bright 4″ LEDs • 4/20mA Inputs • Ohmmeter/Ammeter Ratiometric • Programmable Decimals • Scaling in Engineering units with Offset • +7 to −3V Common Mode Voltage • Sample and Hold • Usable at 0 to 100mV to display 0 to 20 000 Counts • Internal Altenuator for 2V, 20V, 200V, 1200V Rgs • Lamp, Test • Overrange Output • Busy Output • Clock Output • 5V DC Pwr

SECOND SOURCE DPM'S

SHORT DEPTH CASES TO FIT DATEL AND IMC PANEL CUTOUTS

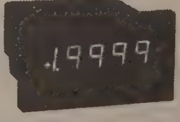
DM-3100L $49 $42 (100's)

Low cost short depth DPM • (05% Rdg + 1 Digit) accuracy • Differential input • 56″ LED display • Autozero • 200mV to 1200V FS • Auto Polarity • 5VDC Pwr • Ratiometric • Current • Ohms • Programmable decimals

DM-3100X $65 $56 (100's)

Identical features as DM-3100L but with low power 0 5″ LCD display • Battery Pwr or 5/9VDC Pwr

DM-4100L $85 $72 (100's)



Low cost general purpose 4½ digit DPM • (.01% Rdg + 1 Digit) accuracy • 100 microvolt resolution • 56″ LED display • Autozero • 2V to 1200V FS • Auto polarity • 5VDC Pwr • Sample/hold • Ratiometric • Ohms • Programmable decimals • MUX BCD output available

ENERGY MISER LOW POWER DIGITAL PANEL METERS

Incorporating TEXMATE's propriety Hi-Rel Hi-Contrast 0 48″ LCD Displays

PM-45X $150 $129 (100's)

Smallest 4½ digit .48″ LCD DPM available • Super stable temperature compensated reference • (0.01% Rdg + 1 Digit) accuracy • True differential & single ended inputs • 100KHz quartz crystal controlled clock for 120dB 50/60Hz NMR • 80dB CMR • 200mV to 1200VFS • 4/20mA • Ohms • Current • Ratiometric • Programmable decimals • Scaling in engineering units with offset capability • Overrange/underrange output • Busy Output • Clock output • Run/Hold • MUX BCD output • Ultra low power requirements 3~5mA at +4 5V to +5 5VDC (25mW)

PM-45XBCD $180 $153 (100's)

The worlds smallest 4½ Digit DPM with a buffered Tri-State parallel BCD output is created by adding an internally mounted PCB to the standard PM-45X Data outputs include polarity • overrange and underrange • Data Ready • Controls include Run/Hold • Clear and Output Select • Interconnection is by a standard 26 pin PCB to ribbon cable connector

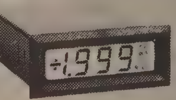
PM-45XU $97 $87 (100's)

Low cost utility version of the PM-45X Has all the same low power features of the PM-45X except uses a standard TC reference and has derated specifications • Accuracy (0 015% Rdg +2 Digits)

PM-45XUBCD $127 $108 (100's)

All the same features as the PM-45XU but with an internally mounted buffered Tri-state parallel BCD output

PM-35X $65 $52 (100's)

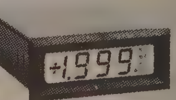


Versatile 3½ digit low pwr LCD meter • Wide operating voltage range capability 3 5V to 50VDC @ 4/15mA • Differential inputs • Programmable current & Ohmmeter capability • Ratiometric • 200mV 2V 20V 200V 1200V inputs • Scaling in Engineering units with offset • Lamp test • Auto zero • Bipolar • Programmable decimals • 8 selectable Function Descriptors

PM-35XAR $81 $69 (100's)

Autoranging LCD DPM • Has all the features of the PM-35X except Ratiometric Ohms • Autoranges between 200mV-2V, 2V-20V, 20V-200V 200V-1200V • 1000megΩ input impedance on 200mV-2V range 10megΩ on others • Decimals and Descriptors can be programmed to Auto Switch • 3 5V to 50V DC pwr

PM-35XAC $69 $54 (100's)



The World's smallest 115/230V AC Line Operated DPM, Fully Isolated with internal transformer.
PM-35XAC has all the features of the PM-35X but with AC pwr • can also operate from DC Voltages of 9V DC to 50V DC

PM-35XACAR $85 $73 (100's)

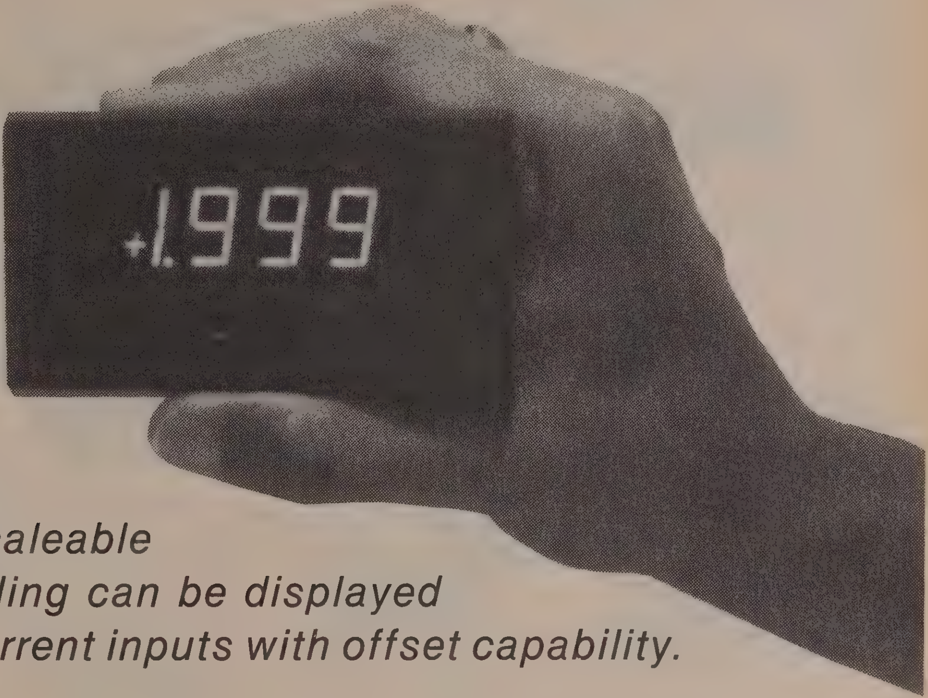
Auto ranging version of PM-35XAC has all the features of the PM-35XAR but operates from 115/230VAC power

ASK ABOUT OUR NEW RUGGEDIZED INDUSTRIAL DPM

Water Proof

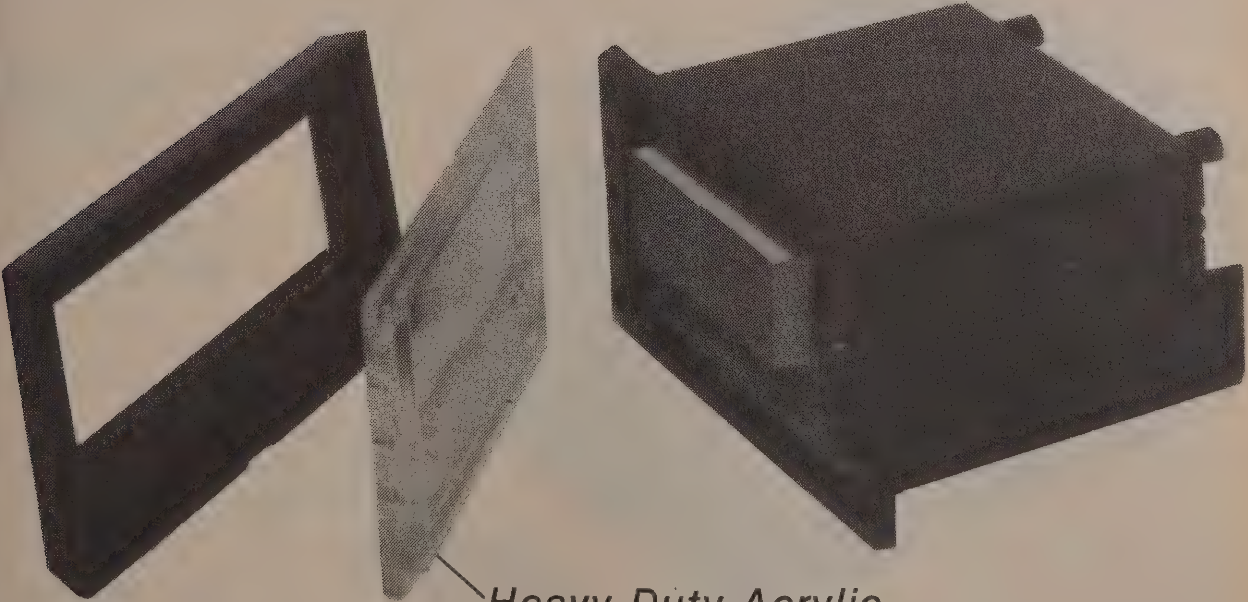
Dust Proof

Easy To Use



Infinitely Field Scaleable
Any required reading can be displayed
from voltage or current inputs with offset capability.

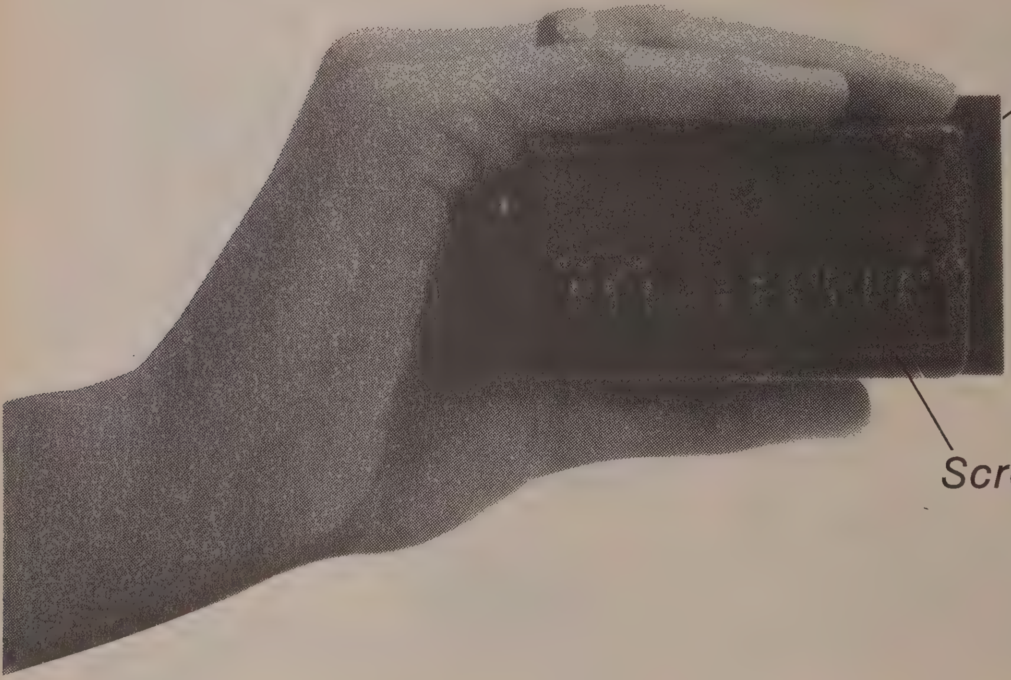
THE NEW ID-SERIES

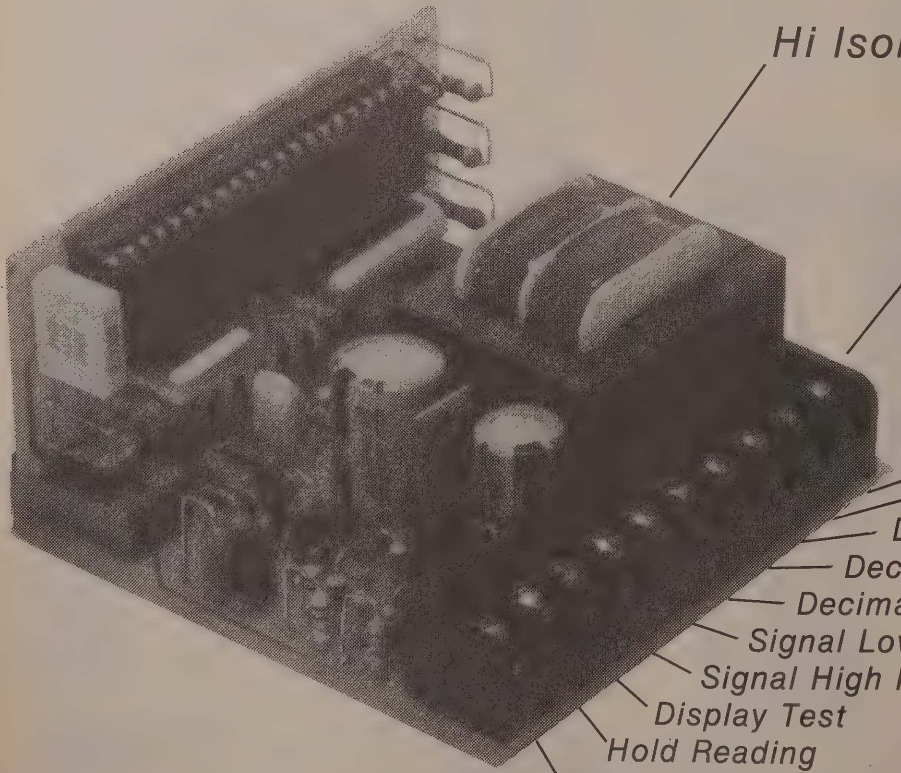


Heavy Duty Acrylic
Lens with Gasket

CALL US TODAY (619) 481-7177

ASK WHAT'S BEHIND OUR NEW INDUSTRIAL DPM


Heavy Duty Mounting
Screw Terminals

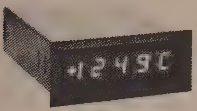

Hi Isolation Transformer
Protected Inputs
AC Power
AC Power
Decimal 1.XXX
Decimal 1XX.X
Decimal 1X.XX
Signal Low Input
Signal High Input
Display Test
Hold Reading
Display Blanking

CALL US TODAY (619) 481-7177

Ask about our new ruggedized, dust and waterproof Industrial Panel Meter line. For complete data sheets and application notes on these and other Texmate measurement and control products, call (619) 481-7177.

TEMPERATURE METERS

TM-150/150F $55 $47 (100's)
TM-150R/150RF $59 $50 (100's)



Low cost direct reading temperature meters 0.3″LED • 5V⎓DC pwr • TM-150 and TM-150F are configured for voltage and current sensing and are factory prescaled to display °C and °F with popular IC transducers such as NSC LM 135, LM 235, LM 335 or Analog Devices AD590 sensors • TM-150R and TM-150RF are configured for resistance sensing with a precision 1μA to 10mA current source and are factory prescaled to display °C and °F with platinum 100 ohm RTD sensors • Two programmable decimal positions • Auto polarity

TM-150X $75 $64 (100's)
TM-150XR $79 $67 (100's)
TM-150XAC $79 $67 (100's)
TM-150XACR $83 $71 (100's)

Low cost low power direct reading temperature meter • High contrast .48″ LCD display • Operates with most popular RTD and voltage or current output transducers/probes • The TM-150X 5VDC Pwr and TM-150XAC 115VAC Pwr are configured for voltage and current sensing and are factory prescaled to display °C with NSC LM135, LM235, LM335 or Analog Devices AD590 sensors • The TM-150XR 5VDC Pwr and TM-150XACR 115VAC Pwr are configured for resistance sensing with a precision 1μA to 10mA current source and are factory prescaled to display °C with Platinum 100 ohm RTD sensors • Programmable °C and °F descriptors and two programmable decimal positions • Measurements from −185° to +600°C & Accuracies to 0.1°C are possible depending on sensor/probe selected • Auto polarity

TM-150XF $75 $64 (100's)
TM-150XRF $79 $67 (100's)
TM-150XACF $79 $67 (100's)
TM-150XACRF $83 $71 (100's)

Identical features to the TM-150X, TM-150XR, TM-150XAC & TM-150XACR but factory prescaled to display °F • Any of the TM-150 Series may be user modified and calibrated to display either °C or °F, or user modified to enable switch selection of °C or °F display

RV-C8 $49 $41 (100's)

Thermistor Linearizer to suit interchangeable curve-8 NTC Thermistors manufactured by Sierracin-Western Thermistor, Tel. (714) 433-4484 • Output is adjustable from 1mV/°C to 10mV/°C • The RV-C8 is mounted in its own Slim Line DPM case • Calibration requires only two precision resistances • 5V DC Pwr

TEMPERATURE PROBES

For user convenience, Texmate offers a broad line of temperature transducers, probes, and accessories that can be ordered with your meter Included is an all Teflon probe designed especially for the semiconductor industry. to measure hydrofluoric etchant baths

EVENT COUNTERS

PC-45X $59 $50 (100's)

A versatile event counter/totalizer featuring 19999 counts with overrange indication, or 9999 counts with cascade output • contact closure, AC or logic signal inputs • High contrast .48″ LCD • 4~6VDC Power with outputs for user supplied Ni-Cad battery backup • Capable of Signal Powered Operation • Internal Debouncing Circuit • Controls include count reset, count inhibit and display hold • 4 user programmable decimal points • Overload indication

PC-45XAC $65 $52 (100's)

All the same features as the PC-45X but designed to be operated from 110VAC or 220VAC mains power • The Internally mounted transformer provides a 1.8mA output to trickle charge a user supplied 7.2V standard Ni-Cad back-up battery (Eveready CH 22 or eqv.)

PC-45 $49 $37 (100's)

A versatile event counter/totalizer featuring 19999 counts with overrange indication, or 9999 counts with cascade output • contact closure, AC or logic signal inputs • High brightness .4″ LED display • +5VDC powered • outputs for user supplied Ni-Cad battery backup • Internal debouncing circuit • controls include count reset, count inhibit and display hold • 4 user programmable decimal points • overload indication

REMOTE DISPLAYS .48″ LCD

RD-45XMUX4 $49 $42 (100's)

Accepts standard 4-wire BCD Data inputs with 2μ second minimum spacing between Digit scan/digit drive outputs • Positive or negative logic • Polarity sign and 5 selectable decimal positions • Overrange indication • 26 pin Ribbon cable/Edge connector input • +3V to +6V operation at 2~3mA

RD-45XMUX4I $49 $42 (100's)

All the same features as the RD-45MUX4 but designed to operate with Intersil A/D converters where the Digit scan outputs overlap and a STROBE signal identifies the data for each Digit

RD-45XMUX7 $54 $46 (100's)

Accepts multiplexed 7 segment inputs • Common Anode or Common Cathode • Negative or Positive Logic • Requires 2μs minimum spacing between Digit scan/Digit Drive outputs • Polarity sign • Overrange indication • 5 decimals • +3V to +6V DC operation at 2~3 mA

REMOTE DISPLAYS .4″ LED

RD-45MUX4 $40 $34 (100's)
RD-45MUX4I $40 $34 (100's)
RD-45MUX7 $45 $39 (100's)

The RD-45MUX4, RD-45MUX4I and RD-45MUX7 have corresponding features to the RD-45XMUX4, RD-45XMUX4I and RD-45XMUX7 but feature high brightness .4″ LED displays instead of LCD • 26 Pin Ribbon cable/Edge connector input • Low Ripple +4V to +4.4V DC Pwr at 200mA typ

REGULATED POWER SUPPLIES LOW COST +5VDC OUTPUT

PS-505 $17 $14 (100's)
PS-510 $19 $16 (100's)

The PS-505 with a 500mA output and the PS-510 with a 1 Amp lamp output are general purpose low ripple regulated power supplies suited for +5VDC powered DPM's • Both units provide user selectability for 110VAC or 220VAC operation

AC POWERED DPM'S

RP-35U $49 $42 (100's)

World's lowest priced 115/230VAC line operated DPM • 3½ Digits • .56″ Standard Red LEDs • True Differential Inputs • 200mV to 1200V FS • Ratiometric • Ohms • Current • Bipolar • Auto Zero • Programmable Decimals • TC 100ppm typ

RP-35A $59 $50 (100's)

Extremely versatile full feature 3½ digit 115/230VAC line operated DPM • Differential Inputs • Customer Programmable Current and Ohmmeter Capability • Ratiometric • 4/20mA • Scaling in Engineering Units with Offset • DC Outputs Available • Display Test • Low TC 60 ppm Typ • Auto Zero • Bipolar • Programmable Decimals

RP-35AR $85 $73 (100's)

World's lowest cost autoranging AC PWR DPM • Has all the features of the RP-35A except Ratiometric ohms measurement • Auto Ranges between any two Ranges from 200mV-2V to 200V-1200V • Auto Switching Selectable Decimals

RP-35AA $71 $61 (100's)

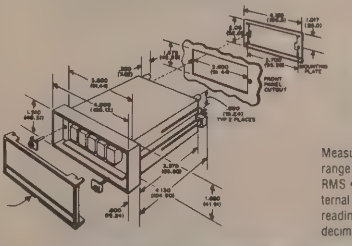
High display drive capability DPM • MUX .56″ LED display • 200mV to 1200V FS • High CMV • Scaling in engineering units with offset • 60PPM TC • Bipolar • Ratiometric • Ohms • 4/20mA • Display test • Autozero • 115/230VAC Pwr

RP-35UU $65 $56 (100's)

Utility version of RP-35AA • Same High Brightness Display but uses single sided PCB • Selectable but non-switchable decimal points

THE REPLACER (RP-) SERIES OF AC POWERED DPM's UTILIZE A CASE DESIGNED TO FIT MOST OTHER DPM MANUFACTURERS CUT-OUTS INCLUDING DIN/NEMA STANDARDS.

RP- CASE DIMENSIONS



AC POWERED DPM'S

RP-3500D $97 $87 (100's)
RP-4500D $125 $108 (100's)

RP-3500D 3½ digit and RP-4500D 4½ digit are top of the line 115/230VAC Pwr instrumentation DPMs • High normal mode noise rejection at 50/60 Hz of 120dB with internal 200K Hz quartz clock • Scaling in engineering units with offset • 4/20mA • Ratiometric • Ideal for load cell measurements • 20Ω to 20MΩ ohmmeter capability • 10 microvolt resolution on RP-4500D

RP-3500DBCD $127 $108 (100's)
RP-4500DBCD $160 $137 (100's)

All the same features as RP-3500D and RP-4500D but with buffered Tri-state parallel BCD output **Note**: Parallel BCD output board is also available for field retrofit of previously purchased RP-3500D/4500D meters

RP-3500 $79 $67 (100's)
RP-4500 $95 $81 (100's)

RP-3500 3½ digit and RP-4500 4½ digit are low cost 115/230VAC line operated DPMs • Single-ended inputs • MUX BCD • Remote control sample/hold feature • Display blanking • Leading zero blanking • Autorange outputs • Display test • Autozero • Bipolar • Flashing overload • 2V FS to 1200V

RP-3500BCD $109 $93 (100's)
RP-4500BCD $130 $111 (100's)

All the same features as RP-3500 and RP-4500 but with buffered Tri-state parallel BCD output. **Note**: Parallel BCD output board is also available for field retrofit of previously purchased RP-3500/4500 meters

RP-3500AC $122 $104 (100's)

Measures AC input signals with autozero • Frequency range of 40Hz to 1KHz • Average reading calibrated in RMS • 200mV to 200V FS (higher voltages require external divider) • ±(1.0% Rdg + 1 Digit) accuracy • 2.5 readings/seconds • .56″ LED display • Programmable decimals • 60 PPM TC • 115/230VAC Pwr

TEXMATE INC

348 SOUTH CEDROS AVENUE, P.O. BOX 2000
SOLANA BEACH, CA 92075 TWX-910-322-1738

Telephone (619) 481-7177

AUSTRALIA: SYDNEY (02) 792-9222; MELBOURNE (03) 329-8873 • **CANADA**: TORONTO (416) 661-3193; MONTREAL (514) 337-0425; EDMONTON (403) 432-7746; OTTAWA (613) 238-7077 • **FRANCE**: PARIS (1) 575-53-53 • **GERMANY**: QUICKBORN 041 06/612-1; HANOVER 05 11/88 6086; DUSSELDORF 02 11/66 61 45; DARMSTADD 0 61 51/2 64 46; STUTTGART 07 11/73 63 57; MUNICH 089-47 3023 • **NEW ZEALAND**: AUCKLAND 546-745/543-214 • **SPAIN**: BARCELONA (93) 692-35-19 • **SWEDEN**: STOCKHOLM 08-710 06 20 • **TAIWAN**: TAIPEI 592-3509/591-9651 • **UNITED KINGDOM**: WALSALL (0922) 27266

TRIPLETT

PANEL

Custom tooled . . . custom specifications or standard off-the-shelf . . . Triplett can supply your panel instruments or requirements.

Even though Triplett offers a wide selection of different styles, sizes and types of standard panel instruments, a large proportion of our customers require custom designed instruments. Many have a specific requirement for custom packaging to enhance the appearance or function of their product.

Triplett's versatile GL-GL/B Series provides a flexibility that may enable you to save considerable tooling expense by utilizing a standard back with a custom designed front panel. This flexibility can save you up to 50% on tooling costs.

If your requirements do not demand special packaging, but do demand custom instrument movements, Triplett engineering can also design to your accuracy, tracking, resistance or damping requirements.

Panel Instrument parameters and standard case styles are shown below to assist you in determining your instrument requirements.

METER SPECIFICATIONS

Instruments can be DC or AC, Taut-Band (Suspension) or Pivot and Jewel and designed to your accuracy, tracking, resistance, sensitivity or damping requirements. They can be zero left or right, up-scale zero, zero center (null meter) or with a suppressed zero.

DC Instruments are the d'Arsonval type with linear scales, extra light moving coil, rugged construction, Bar-Ring Magnet and one piece diecast frames.

AC Instruments are either the moving iron vane type with viscous damping and light moving parts or the rectifier type.

Coil Support System—Both the taut band and pivot and jewel systems are available. All pivot and jewel movements have selected spring back jewel bearings with highly polished and specially treated pivots.

Resistance—Instruments can normally be designed to meet your internal resistance requirements. For best results, current instruments should be low resistance and voltmeters should be high resistance.

Accuracy—Instruments can be designed to within ½% (standard ±2%) with mirror scales and knife-edge pointers.

RANGES

DC Ammeters—From 5μA to 50A with internal construction and up to 5,000A using an external shunt.

DC Voltmeters—from 5mV to 1000V with internal construction and up to 5,000V using an external multiplier box.

AC (Iron Vane Type) Ammeters—from 5mA to 50A with internal construction and up to 1,000A using external current transformer.

AC (Iron Vane Type) Voltmeters—from 1.5V to 600V with internal construction and up to 1,000V using external multiplier box.

AC (Rectifier Type) Ammeters—from 0.5mA to 10mA.

AC (Rectifier Type) Voltmeters—from 1V to 1000V with internal construction and up to 5,000V using external multiplier box.

RF Thermocouple Ammeters—from 2mA to 10A.

Watt Meters, VU Meters, db Meters (power level indicators) and Pyrometers are also available in many sizes and styles.

SCALES

Dials can be custom designed to conform with the overall appearance of the end product. Company logos, different ink colors and custom dials reading in such units as pH, roentgens, mm, Hg, rpm, %, heartrate and inches can be designed.

Pointers are also available in many styles.

Mirror Scales can be added for greater reading accuracy.

Divisions—For standard ranges, each division is in multiples or decimal multiples of 1, 2 or 5 of the units measured, determined by size, readability accuracy, etc.

If the standard case designs do not fulfill your design requirements contact the factory for custom machining or molding.

INFORMATION FOR ORDERING

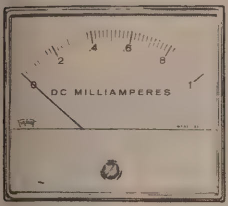
What custom panel instrument specifications do you need to make your product more reliable, more accurate, more rugged and—in the long run—less expensive? For quick, dependable delivery of small quantities of Triplett's "designed-for-you" panel instruments, contact your Triplett Sales/Service/Modification Center. For prototypes or production quantities, contact your Triplett representative. He'll put you in touch with our Instrument Designers/Engineers who'll help you analyze the problem and suggest the optimum cost/result solution.

INSTRUMENTS

TEL: (419) 358-5015 TWX 810-490-2400
TRIPLETT CORPORATION, BLUFFTON, OHIO 45817

STANDARD CASE STYLES

G SERIES: Models 120-G, 220-G, 320-G, 420-G, 520-G.

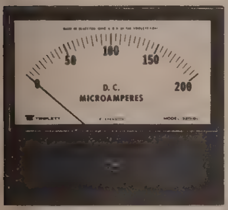


Sizes available: 1½"; 2½", 3½", 4½", 5½".

Case and Composition: Thermoplastic front and back, four stud mounting.

Options Available: Half-Bezel for behind panel mounting, illumination kit, and shallow barrel.

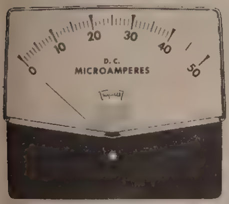
GL SERIES: Models 220-GL, 320-GL, 420-GL, 520-GL, 820-GL.



Sizes available: 2½", 3½", 4½", 5½", 8".

Case and composition: Glass window, flat black thermosetting plastic case, two stud mounting except 820-GL and 220-GL with four stud mounting, contains contoured base with sealed meter movement permitting utilization of lower part of front for mounting controls, switches, etc.

M SERIES: Model 820-M.

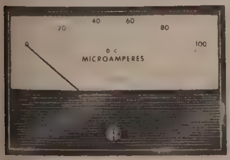


Sizes available: 8½".

Case and Composition: Thermoplastic front and back.

Options available: A thermosetting plastic accessory case 3¾" d (with handle) is available allowing instrument to be utilized in special test equipment requirements. Contact factory for additional data.

R SERIES: Models 320-R, 420-R.



Sizes available: 3½", 4½".

Case and composition: Thermoplastic front and thermosetting plastic back with flat scale arc.

RUGGEDIZED SERIES: Models 127-HR, 221-HR, 321-HR.

Models 221-HR and 321-HR meet MIL-M-10304-D.

Sizes available: 1½", 2½", 3½".

Case and composition: Thermoplastic front and steel back.

GL/B SERIES: Models 320-GL/B, 420-GL/B, 520-GL/B.

.2
.4
.6
.8
1
D.C.
MILLIAMPERES

Sizes available: 3½", 4½", 5½".

Case and composition: Glass window, flat black thermosetting plastic case, integral bezel provides behind the panel mounting, minimum panel space requirement permits fuller utilization of panel area.

EDGEWISE SERIES: Models .5-E, 120, 220-E, 320-E, 320-EG, 420-E.

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.2
.4
.6
.8
1
D.C. MILLIAMPERES

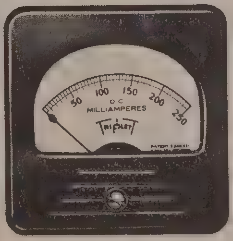
Sizes available: ½", 1½", 2½", 3½", 4½".

Case and composition: .5-E thermoplastic front, steel back; all others thermoplastic front (320-EG sealed glass window), thermo-setting plastic back. 320-EG constructed to withstand rough environmental and high vibration industrial applications.*

Options available: Bezels available for 320-E, 420-E. Models 320-E, 320-EG and 420-E can be mounted from front or rear of panel. Also available for vertical mounting.

*Includes steel mounting brackets.

PHENOLIC SERIES:

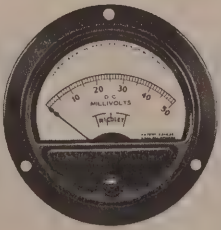


Models: 227-T, 327-T.

Sizes available: 2½", 3½".

Case and composition: Glass window, thermosetting plastic case, four stud mounting.

Options available: Illumination available for certain models—contact factory.



Models: 221-T, 321-T.

Sizes available: 2½", 3½".

Case and composition: Glass window, thermosetting plastic case, three stud mounting.

Options available: Illumination available for certain models—contact factory.

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D C
MICROAMPERES
Triplett

Models: 420, 626, 726.

Sizes available: 4½", 6½", 7½".

Case and composition: Glass window, thermosetting plastic case, four stud mounting.

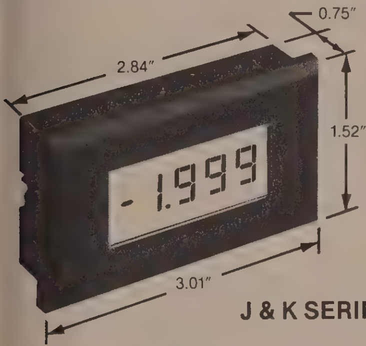
Options available: Illumination available for certain models—contact factory.

EEM PRODUCT SELECTION GUIDES

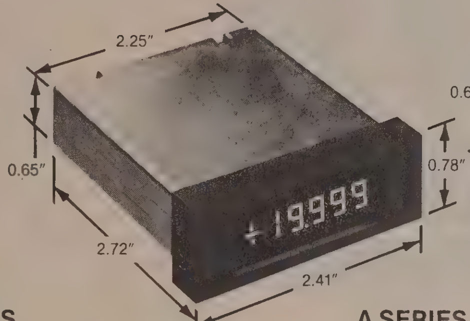
There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

velonex

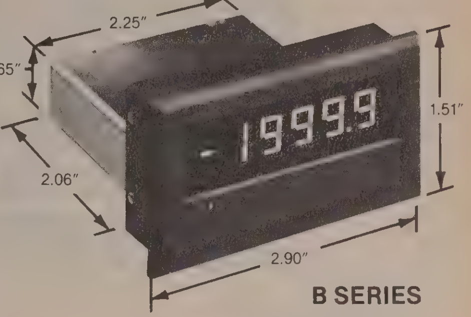
IMPAC™ DIGITAL PANEL METERS



J & K SERIES



A SERIES



B SERIES

IMPAC miniature LCD and LED meters feature high reliability, compact size (smallest available), automatic zero, and quick, easy installation. The miniature LCD series features extremely low power consumption (max. 50mW) and large (½″) display. The IMPAC LED series offers high resolution measurement (from 10μV) in thirty-two models—3, 3½, 4, and 4½ digits, all with BCD outputs as a standard feature. For militarized and severe environmental applications, ruggedized and extended temperature versions of the LED models are available. Most models are immediately available from stock; Velonex can also design models for your OEM specifications.

FEATURES

All Velonex DPM's

☐ Bipolar—auto polarity ☐ Automatic zero set each conversion ☐ Overrange indication ☐ Shielded construction ☐ Proven reliability ☐ Fully burned in & tested ☐ 100VAC, 115VAC, 230 VAC, 50 to 400 Hz and 28VDC input power adapters available

Ruggedized Models

☐ Available for wide temperature, humidity, mechanical and thermal shock and vibration environments

SPECIFICATIONS

Series	31ZA & 31ZB 3 digit LED	36ZA & 36ZB 3½ digit LED	37J & 37K 3½ digit LCD	41ZA & 41ZB 4 digit LED	46ZA & 46ZB 4½ digit LED	Range
Analog Input Full Scale Ranges (including 100% overrange)	±99.9mV	±199.9mV	±199.9mV	±99.99mV	±199.99mV	—1
	±999.9mV	±1.999V	±1.999V	±999.9mV	±1.999V	—2
	±9.99V	±19.99V	±19.99V	±9.999V	±19.999V	—3
	±99.9V	±199.9V	±199.9V	±99.99V	±199.99V	—4
Accuracy	±0.1% rdg ±0.1% FS	±0.1% rdg ±0.05% FS	±0.05% rdg 0.05% FS	±0.05% rdg ±0.02% FS	±0.05% rdg ±0.01% FS	
Sample Rate	2.5/second	2.5/second	2.5/second	2.5/second	2.5/second	
Input Impedance	37 Series 1000 Megohms on —1 and —2 range; 10 Megohms on —3 range; and 9 Megohms on —4 range Others 1000 Megohms on —1 range and —2 range, 1 Megohm on —3 and —4 ranges					
Noise Rejection						
Common Mode Rejection (typ.) 1kΩ imbalance	86 dB	86 dB	80 dB	86 dB	86 dB	
Normal Mode Rejection	40 dB at 60 Hz	40 dB at 60 Hz	50 dB at 50, 60 and 400 Hz	40 dB at 60 Hz	40 dB at 60 Hz	
BCD Output	STD	STD	No	STD	STD	
Digital Display	7 segment digit, polarity, and decimal point Height: "A" series 0.2 inches, "B" series 0.33 inches, "J" and "K" series 0.5 inches					
Power Requirements						
Voltage	+4.8 to +6.0 VDC (+7.0 VDC maximum without damage)					
Current @ 5VDC (typ.)	80 mA	80 mA	*	90 mA	90 mA	
	Current requirements shown are with all digit segments, + sign and decimal lit. Current requirement in "Display Blank" mode 30 mA * 37J 4 mA maximum @ 9V (battery powered) incl. "LO BAT" indicator * 37K 10 mA maximum @ 5V (logic powered) 150 mA with backlight option "W"					
Temperature Coefficient	100 ppm/°C					
Temperature Range	Wide temperature range options available on both LCD and LED					

OTHER VELONEX PRODUCTS

Digital Panel Event Counters
Miniature LED Event Counters for up or down counting from zero or preset values. Matches IMPAC DPM packaging.

"Process Control" DPM's
Underrange and Overrange alarm signals. A series and B series sizes. BCD outputs standard. Ranges: 4 to 20 mA, 1 to 5 mA, 10 to 50 mA and 1 to 5V.

Transient Generators
Surge transient generators to meet waveforms required for testing to IEEE Std 472-1974, FCC Part 68.302, and other IEEE, NEMA, SAE, and MIL specifications.

High Power Pulse Generators
Up to 180kW, 30kV, 750A. Rise times as low as 7 ns and pulse widths up to 10 mS are available. Burst, programming, GPIB (IEEE-488) interface, and other features are also available.

Miniature DC-DC Converters
Outputs available to 20kV designed to withstand aerospace and other rugged environments.

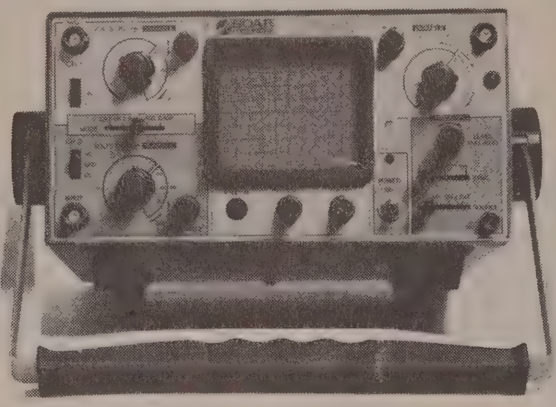
For complete information
and applications assistance
contact:
VELONEX
Department E
560 Robert Avenue
Santa Clara, California 95050
(408) 727-7370
TWX 910-338-0114

velonex

High Power Performance . . . WHERE IT COUNTS!

15MHz DUAL TRACE PORTABLE OSCILLOSCOPE

NORTH AMERICAN SOAR corporation



MODEL 3015

Accessories supplied:
Detachable 3 conductor AC cord

Optional Accessory: CC-3015 carrying case with shoulder strap.

Price $699.00 each

FEATURES

- WIDE BANDWIDTH DC TO 15MHz and HIGH SENSITIVITY of 2mV/DIV.
- AUTOMATIC RECHARGING: The internal battery is safely and automatically recharged while AC line power is supplied whether the oscilloscope is turned On or Off. When the internal battery reaches full level, the charger automatically goes to trickle-charge preventing over charge. A BATTERY CHARGE indicator changes from red to green when the battery is ready for use.
- INTERNAL GRATICULE and FRONT PANEL TRACE ROTATION CONTROL.
- POWER SUPPLY: The built-in switching regulator assures high stability of sensitivity and intensity regardless of line voltage fluctuation between 90V–130V or 180V–260V. Rechargable Ni-Cad battery provided runs scope for approx. 2 hours. Also, any DC power (11～30V; 7.2VA) can be used as EXTERNAL DC SUPPLY.
- STABLE TRIGGERING: Simple one-knob-operation for stable triggering. ×5 Magnifier expands sweep up to 0.1μs/DIV.
- SMALL SIZE and LIGHT WEIGHT but with all the features of a standard bench unit including full mode and trigger source selections.
- X-Y MODE: When SWEEP TIME/DIV is turned to CH-2 position, X-Y measurement can be made with high sensitivity 2mV/DIV. CH-1 becomes Y and CH-2 becomes X.
- AUTO FREE RUN: Auto free running is available for easy zero level reference when no signal is applied to vertical inputs.
- ADD/SUB: Pulling the CH-2 POSITION knob inverts polarity of CH-2 signal: So, added or subtracted signals are easily observed.

SPECIFICATIONS

VERTICAL DEFLECTION

Deflection Factor	2mV to 10V/DIV, 12 ranges in 1-2-5 step with fine control
Bandwidth	DC : DC to 15MHz (−3dB) AC : 10Hz to 15MHz (−3dB)
Risetime	24nsec
Overshoot	Less than 3%
Input Impedance	1MΩ shunted by 20pF±3pF
Operating Modes	CH-1, CH-2, DUAL, ADD and CHOP
Chop Frequency	100kHz approx.
Channel Separation	Better than 60dB at 1kHz
CH-2 Polarity	CH-2 can be inverted

TIME BASE

Type	Automatic and triggered. In automatic mode, sweep is obtained without input signal
Sweep Time	0.5μsec to 0.5sec/DIV, 19 ranges and X-Y in 1-2-5 step with fine control
Magnifier	x5 at all ranges
Linearity	Better than 3%

HORIZONTAL DEFLECTION

Deflection Factor	2mV to 10V/DIV, 12 ranges in 1-2-5 step with fine control
Frequency Response	DC to 1MHz
Input Impedance	1MΩ shunted by 20pF±3pF
Maximum Input Voltage	300V DC + AC peak or 600 Vp-p
X-Y Operation	X-Y mode is selected by SWEEP TIME/DIV switch CH-1 : Y axis CH-2 : X axis

TRIGGERING

Sensitivity	INT: 1 DIV or more EXT: 1 Vp-p
Source	INT, CH-1, CH-2, or EXT
Slope	Positive and Negative, continuously variable level control: Pull for AUTO
Range	20Hz to 15MHz
TV Sync	Vertical and Horizontal Sync separator circuitry allows any portion of complex TV video waveform to be synchronized and expanded for viewing. TV-H(Line) and TV-V(Frame) sync are switched automatically by SWEEP TIME/DIV switch TV-V: 0.5sec/DIV to 0.1msec/DIV TV-H 50μsec/DIV to 0.5μsec/DIV

OTHER SPECIFICATIONS

CRT	95mm Rect (approx. 1.5kV)
Calibration Voltage	0.5Vp-p±5%, 1kHz Square Wave
Power Requirements	AC : 90-130V or 180-260V, 48-440Hz DC : 11-30V; 7.2VA Battery: Ni-Cad Battery (up to 2 hour operation) Charging Time: 6 hour (Scope not operated) 16 hour (While Scope operated)
Weight	10 lb. (12¼ lb.) 4.5 kgs (5.5 kgs including battery)
Size	4⅜" × 8¾" × 11¾" [113(H) × 223(W) × 298(D)mm]

ACCESSORIES

Supplied	A pair of hook-on probes and cables Rechargable Battery (Built-in)
Option	Carrying case with shoulder belt (option)

NORTH AMERICAN SOAR corporation 1126 CORNELL AVENUE | CHERRY HILL, N.J. 08002 | TEL. (609) 488-1060

OSCILLOSCOPES

Manufacturer	EEM Page No.	Model/ Series	Band-width (MHz)	Rise-time (ns)	Vertical Sensitivity (mV/div)	Sweep Rate (µS/div)	No. of Traces	No. of Chan-nels	Lab	Field	De-layed Sweep	Auto.	Trigger Exter-nal	Z-Axis Input	X-Y Display Mode	Stor-age	IEEE 488 Interface
B & K Precision	3•1363	1590A	100	3.5	1	2 ns	8	4	●		●	●	●	●	●		
	3•1364	1580	100	3.5	1	2 ns	2	2	●		●	●	●	●	●		
	3•1363	1570A	80	5	1	5 ns	4	4	●		●	●	●	●	●		
	3•1364	1560	60	5.8	1	5 ns	3	3	●		●	●	●	●	●		
	3•1364	1540	40	8.8	1	10 ns	2	2	●		●	●	●	●	●		
	3•1362	1535	35		2	20		2				●					
	3•1362	1479B	30		5	40 ns		2									
	3•1362	1522	20		1	20 ns		2				●					
	3•1362	1477	15		10	0.1		2									
	3•1362	1420	15		10	100 ns		2									
	3•1362	1476A	10		1	50 ns		2				●					
	3•1362	1466A	10		1	50 ns		1									
	3•1362	1405	5		10	Recurrent		1									
Iwatsu Instruments	3•1368	SS-5321	250	1.4	5	1 ns	3	3	●	●	●	●	●		●		
	3•1366	SS-5711	100	3.5	5	20 ns	8	4	●	●	●	●	●	●	●		
	3•1367	TS-8123	100		1				●		●			●	●	A+D	GPIB
	3•1366	SS-5710	60	5.8	5	50	8	4	●	●	●	●	●	●	●		
	3•1368	SS-3510	50		10	0.1	2	2	●	●		●	●	●	●		
	3•1368	SS-5705	40		5	0.1	6	3	●	●		●	●	●	●		
	3•1368	SS-5706	30		5	0.1	3	3	●	●		●	●	●	●		
	3•1368	SS-5702	20		5	0.1	2	2	●	●		●	●		●		
	3•1367	SS-5802	10	35	5	0.5	3		●	●	●	●	●	●	●	Digital	GPIB
Kikusui International	3•1370	6100	100	3.5			5	5	●	●		●			●		
	3•1370	5100	100				8	3		●	●	●					
	3•1371	5060	60	5.8			2	2	●	●		●	●				
	3•1371	5040/41	40	8.8					●	●	Opt.	●					
	3•1371	5020/ST/21	20	17.5				2	●		Opt.	●				●	
	3•1371	DSS 6520/ 21/22	20	17.5			4	2	●		Opt.	●	●			●	
North American Soar	3•1372	MS-6110	100	3.5	5	0.5	4	4	●		●	●	●	●	●		
	3•1372	MS-6050	50	7	5	0.2	2	2	●	●	●	●	●	●	●		
	3•1373	MS-6050D	50	7	5	0.2	2	2	●	●		●	Delay	●	●		
	3•1372	MS-6035	35	10	5	0.1	2	2	●		●	●	●	●	●		
	3•1373	MS-6022/3	20	17.5	5	0.2	2	2	●			●	●	●	●		
	3•1374	MS-3015	15	24	2	0.5	2	2	●	●		●	●		●		
	3•1374	MS-3020	15	24	5	0.5	3	3	●			●	●		●	●	
Tektronix	3•1377	2235/36	100		2	5 ns	2	2	●			●		●	●		
	3•1376	2213/15	60		2	5 ns	2	2		●	●		●	●	●		

B+K PRECISION DYNASCAN CORPORATION / OSCILLOSCOPES

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

B&K-PRECISION offers one of the industry's broadest lines of oscilloscopes with thirteen models ranging from a 5 MHz single-trace unit to an 8-trace 100 MHz lab scope. No matter what your application — design, service, production or hobbyist — B&K-PRECISION has an oscilloscope to meet your requirements.

All of the oscilloscopes shown in this comparison chart are conservatively rated and designed for many years of high-demand operation. All are modern high-performance instruments with such plus extras as expanded range power supplies, to maintain published specifications under varying line voltage conditions. B&K-PRECISION has grown to become one of the industry's leading suppliers of oscilloscopes by developing a reputation for quality, value and reliability. The full line of B&K-PRECISION's oscilloscopes is supported by a complete line of accessories, probes and carrying cases.

Model No.	Bandwidth (MHz)	Deflection Factor/ Division	No. of Channels	Accelerating Potential	Sweep Rate Max.	Delayed Sweep/Dual Time Base	Delay Line	V-Mode Alternate Trigger	Video Sync
1590A	100	1 mV/div to 100 MHz	4	20 kV	2 ns/div	YES	YES	YES	YES
1580	100	1 mV/div to 50 MHz 5 mV/div to 100 MHz	2	16 kV	2 ns/div	YES	YES	YES	YES
1570A	80	1 mV/div to 80 MHz	4	12 kV	5 ns/div	YES	YES	YES	YES
1560	60	1 mV/div to 20 MHz 5 mV/div to 60 MHz	3	16 kV	5 ns/div	YES	YES	YES	YES
1540	40	1 mV/div to 15 MHz 5 mV/div to 40 MHz	2	12 kV	10 ns/div	YES	YES	YES	YES
1535*	35	2 mV/div to 35 MHz	2	6 kV	20 ns/div	NO	YES	YES	YES
1479B*	30	5 mV/div to 30 MHz	2	6 kV	40 ns/div	NO	YES	NO	YES
1522*	20	1 mV/div to 10 MHz 2 mV/div to 20 MHz	2	6 kV	20 ns/div	NO	NO	YES	YES
1477*	15	10 mV/div to 15 MHz	2	2 kV	0.1 μs	NO	NO	NO	YES
1420*	15	10 mV/div to 15 MHz	2	1.0 kV	100 ns/div	NO	NO	NO	YES
1476A*	10	1 mV/div to 7 MHz 2 mV/div to 10 MHz	2	2 kV	50 ns/div	NO	NO	YES	YES
1466A*	10	1 mV/div to 7 MHz 2 mV/div to 10 MHz	1	2 kV	50 ns/div	NO	NO	NO	YES
1405*	5	10 mV/div to 5 MHz	1	1.3 kV	Recurrent	NO	NO	NO	NO

* See your local B&K-PRECISION distributor for complete specifications or write for a catalog.

B+K PRECISION DYNASCAN CORPORATION

B+K PRECISION DYNASCAN CORPORATION / QUAD-INPUT OSCILLSCOPES

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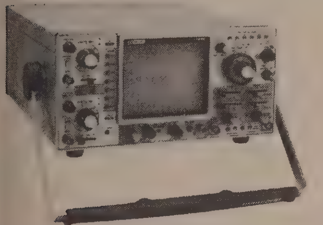
NEW 100 MHz QUAD-INPUT DUAL INDEPENDENT TIME BASE SCOPE



Model 1590A / $1995

FEATURES

• 1 mV sensitivity to full bandwidth • 500 µV/div cascade sensitivity to 70 MHz • 23 calibrated sweeps • Rectangular CRT with internal graticule and scale illumination • 20 kV accelerating voltage • V mode — displays four signals unrelated in frequency • Alternate timebase operation • Signal delay line • 20 MHz bandwidth limiter • Lighted pushbutton function switching • Voltage and current probe calibrators • Video sync separators • Channel 1 output.

SPECIFICATIONS

VERTICAL AMPLIFIERS (CH 1 and CH 2)
Deflection Factor: 1 mV/div to 5 V/div with vernier adjustment. LED UNCAL reminder.
Cascade: (CH 1 and CH 2): 500 µV/div.
Accuracy: ±2% (+10° to +35°C).
Response: (X1 or X5 vertical gain)
DC: DC to 100 MHz (−3 dB), DC to 120 MHz (−6 dB), DC to 70 MHz (cascaded).
AC: 5 Hz to 100 MHz (−3 dB), 5 Hz to 120 MHz (−6 dB), 7 Hz to 70 MHz (cascaded).
Rise Time: 3.5 ns or less.
Bandwidth Limiting. Approx. 20 MHz by bandwidth limit switch.
Input Impedance: 1 MΩ ±1%/22 pF.
CH 2 Polarity: Normal or inverted.
Max. Input Voltage: 1 MΩ Mode: 250 V (DC + AC peak) or 500 VAC p-p. 50Ω Mode: 5 V rms or DC.
(CH 3 and CH 4)
Deflection Factor: 1:1 — 0.1 V/div ±2%, 10:1 — 1 V/div ±2%.
Response: DC to 100 MHz (−3 dB), DC to 120 MHz (−6 dB).
Rise Time: 3.5 ns or less. Input Impedance: 1 Megohm ±1%/22 pF. Input Coupling: DC only.
Max. Input Displayed: 1:1 DC Component — ±0.5 V. AC Component — 1 V p-p. 10:1 DC Component — ±5 V. AC Component — ±10 V p-p.
Max Input Voltage: 50 V (DC + AC peak)
(CH 1 thru CH 4)
Operating Modes: CH 1 — CH 1, single trace. CH 2 — CH 2, single trace. DUAL — CH 1 and CH 2, dual trace. ADD — algebraic sum of CH 1 + CH 2, single trace (CH 1 — CH 2 with CH 2 inverted). QUAD — CH 1 thru CH 4, four trace.
Chop Frequency: Approx. 250 kHz, switchable.

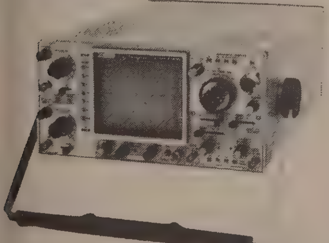
SWEEP SYSTEM
Modes: A — A sweep. ALT — A sweep (intensified for duration of B sweep) and B sweep alternating. A-INT-B — Duration of B sweep is displayed as an intensified portion of the A sweep. B DLY'D — Delayed B sweep. DUAL — Dual Sweep, A and B sweeps independent. X-Y — X-Y display mode.
A Sweep: 20 ns/div to 0.5 s/div in 1-2-5 seq., 23 steps. Vernier control. LED UNCAL reminder.
B Sweep: 20 ns/div to 50 ms/div in 1-2-5 sequence, 20 steps.
Accuracy: ±2% (+10° to +35°C).
Sweep Magnification: 10X, ±5% (+10° to +35°C).
Linearity: ±3%; 10X, ±5%.
Holdoff: Contin. adjust. for A sweep (NORM to >5 times normal.)
Delay Time: 0.2 to 10 times A SWEEP TIME/DIV setting, continuously adjustable.

TRIGGERING
A TRIGGER: Modes: AUTO (free run), NORM, SINGLE/RESET, FIX.
Source: V. MODE, CH 1, CH 2, (EXT) CH 3, EXT) CH 3 1/10, line trigger.
Coupling: AC — 20 Hz to 100 MHz. LF Rej — 30 kHz to 100 MHz. HF Rej — 20 Hz to 30 kHz. DC — DC to 100 MHz. VIDEO — Trigger signal is routed through sync separator.
Level: ±90°; selects triggering at any point on the pos. and neg. slope of waveform. Slope: Can trigger on the pos. or neg. going slope on the trigger waveform. LED Indicator: Sweep A TRIG'D.
B TRIGGER: Modes: Starts after delay. Triggerable after delay.
Source: CH 1, CH 2, (EXT) CH 4, (EXT) CH 4 1/10.
Coupling: AC — 20 Hz to 100 MHz. LF Rej — 30 kHz to 100 MHz. HF Rej — 20 Hz to 30 MHz. DC — DC to 100 MHz.
Level: ±90°; selects triggering at any point on the pos. and neg. slope of waveform.
Slope: Can trigger on the pos. or neg. going slope on the trigger waveform.
LED Indicator: Sweep B TRIG'D.
Trigger Sensitivity (A and B):

COUPLING	BANDWIDTH	INT	EXT
DC	DC—20 MHz	0.5 div	50 mV
	DC—50 MHz	1.0 div	100 mV
	DC—100 MHz	1.5 div	150 mV
AC	Same as DC exc. lower limit is 20 Hz		
HF Rej	Same as AC exc. atten. above 30 kHz		
LF Rej	Same as AC exc. atten. below 30 kHz.		
VIDEO	FRAME	0.5 div	50 mV
	LINE	0.5 div	50 mV
AUTO	Same as AC exc. lower limit is 30 Hz		
FIX	40 Hz-20 MHz	1.0 div	100 mV
	40 Hz-80 MHz	1.5 div	150 mV

HORIZONTAL AMPLIFIER
(Input through Channel 2 input)
Frequency Response: DC: DC to 5 MHz (−3 dB). DC to 6 MHz (−6 dB). AC: 5 Hz to 5 MHz (−3 dB). 5 Hz to 6 MHz (−6 dB).
X-Y Operation: CH 2 becomes X axis, CH 1 is Y axis. X-Y Phase Difference: 3° or less at 100 kHz.
Z-AXIS INPUT
(Intensity Modulation)
Input Signal: TTL level, intensity increasing with more positive levels. Usable Freq. Range: DC to 10 MHz. Input Impedance: Approx. 10 kΩ. Max. Input Voltage: 50 V (DC + AC peak)
CRT
Type: Rectangular with internal graticule. Accelerating Voltage: 20 kV. Display Area: 8 x 10 division (1 div = 1 cm).
OTHER SPECIFICATIONS
Calibration Output: Positive Square Wave: 1 kHz ±3%.
Voltage: 0.3 V p-p ±1% (+10° to +35°C). 0.3 V p-p ±2% (0° to +50°C).
Current: 10 mA p-p ±2% (+10° to +35°C). 10 mA p-p ±4% (0° to +50°C).
Gate Outputs: Pos. gate (pulse) output.
Environment: Operating: +10° to +35°C, 85% max. rel. humidity for full specs. 0° to +50°C, 90% max. rel. humidity, full operating range. Altitude: Up to 5000 meters (16,000 ft.).
Trace Rotation: Electrical, externally adj.
Beam Finder: Pushbutton shrinks and intensifies display.
Power: 90-132 VAC; 180-264 VAC 50/60 Hz, approx. 56 W.
Dimension (H x W x D): 13.8 x 28.4 x 40 cm (5¼ x 11¼ x 15¾″) Weight: 7.4 kg (16¼ lbs.)
ACCESSORIES SUPPLIED
Two 10:1 Probes, Spare Fuses, Instruction Manual, Schematic Diagram and Parts List.
OPTIONAL ACCESSORIES
Demodulator Probe — PR-32, Deluxe 10:1/direct Probe—PR-37, 10:1/direct Probe — PR-40, Front Panel Cover — LC-100, Probe Pouch — LC-150.

NEW 80 MHz, QUAD-INPUT DUAL TIME BASE SCOPE



Model 1570A / $1395

FEATURES

• Channel 1 output • 1 mV/div sensitivity to full bandwidth • 500 µV/div cascade sensitivity to 40 MHz • 22 calibrated sweeps • Rectangular CRT with internal graticule and scale illumination • 12 kV accelerating voltage • V mode — displays four signals unrelated in frequency • Alternate timebase operation • Signal delay line • 20 MHz bandwidth limiter • Lighted pushbutton function switching • Video sync separators.

SPECIFICATIONS

VERTICAL AMPLIFIERS (CH 1 and CH 2)
Deflection Factor: 1 mV/div to 5 V/div with vernier adjustment.
Cascade: CH 1 to CH 2): 500 µV/div.
Accuracy: ±2% (+10° to +35°C).
Response: (X1 or X5 vertical gain)
DC: DC to 80 MHz (−3 dB). DC to 40 MHz (cascaded). AC: 5 Hz to 80 MHz (−3 dB). 7 Hz to 40 MHz (cascaded).
Rise Time: 5 ns or less.
Bandwidth Limiting: Approx. 20 MHz by bandwidth limit switch.
Input Impedance: 1 Megohm ±1%/22 pF.
CH 2 Polarity: Normal to inverted.
Max. Input Voltage: 250 V (DC + AC peak) or 500 VAC p-p.
(CH 3 and CH 4)
Deflection Factor: 0.1 V/div ±2%.
Response: DC to 80 MHz (−3 dB).
Rise Time: 5 ns or less. Input Impedance: 1 Megohm ±1%/22 pF. Input Coupling: DC only.
Max. Input Displayed. DC Component — ±0.5 V. AC Component — 1 V p-p.
Max. Input Voltage: 50 V (DC + AC peak).
(CH 1 thru CH 4)
Operating Modes: CH 1 — CH 1, single trace. CH 2 — CH 2, single trace. DUAL — CH 1 and CH 2, dual trace. ADD — Algebraic sum of CH 1 + CH 2, single trace (CH 1 — CH 2 with CH 2 inverted). QUAD — CH 1 thru CH 4, four trace.
Chop Frequency: Approx. 250 kHz.
SWEEP SYSTEM
Modes: A — A sweep. ALT — A sweep (intensified for duration of B sweep) and B sweep alternating. A-INT-B — Duration of B sweep is displayed as an intensified portion of the A sweep. B DLY'D — Delayed B sweep. X-Y — X-Y display mode.
A Sweep: 50 ns/div to 0.5 s/div in 1-2-5 seq., 22 steps. Vernier control.
B Sweep: 50 ns/div to 50 ms/div in 1-2-5 seq., 19 steps.
Accuracy: ±2% (+10° to +35°C).
Sweep Magnification: 10X, ±5% (+10° to +35°C).
Linearity: ±3%; 10X, ±5%.
Holdoff: Continu. adj. for A sweep (NORM to > 5 times normal).
Delay Time: 0.2 to 10 times A SWEEP TIME/DIV setting, contin. adj.
TRIGGERING
A TRIGGER: Modes: AUTO (free run), NORM, SINGLE, RESET.
Source: V. MODE, CH 1, CH 2, (EXT) CH 3, Line Trigger.
Coupling: AC — 20 Hz to 80 MHz. LF Rej — 30 kHz to 80 MHz. HF Rej — 20 Hz to 30 MHz. DC — DC to 80 MHz. VIDEO — Trigger signal is routed through sync separator.
Level: ±90°, selects triggering at any point on the pos. and neg. slope of the waveform. Slope: Can trigger on the pos. or neg. going slope on the trigger waveform. LED Indicator: Sweep A TRIG'D.
B TRIGGER: Modes: Starts after delay. Triggerable after delay.
Source: CH 1, CH 2, (EXT) CH 4.
Coupling: AC only — 20 Hz to 80 MHz.
Level: +90°; selects triggering at any point on the pos. and neg. slope of the waveform.
Slope: Can trigger on the pos. or neg. going slope on the trigger waveform.
LED Indicator: Sweep B TRIG'D.
Trigger Sensitivity (A and B):

COUPLING	BANDWIDTH	INT	EXT
DC	DC—20 MHz	0.5 div.	50 mV
	DC—80 MHz	1.5 div.	150 mV
AC	Same as DC exc. lower limit is 20 Hz.		
HF rej	Same as AC exc. atten. above 30 kHz.		
LF rej	Same as AC exc. atten. below 30 kHz.		
VIDEO	FRAME	0.5 div.	50 mV
	LINE	0.5 div.	50 mV
AUTO	Same as AC exc. lower limit is 30 Hz.		

HORIZONTAL AMPLIFIER (Input through channel 2 input)
Frequency Response: DC: DC to 5 MHz (−3 dB). DC to 6 MHz (−6 dB). AC: 5 Hz to 5 MHz (−3 dB). 5 Hz to 6 MHz (−6 dB).
X-Y Operation: CH 2 becomes X axis, CH 1 is Y axis. X-Y Phase Difference: 3° or less at 100 kHz.
Z-AXIS INPUT: (Intensity Modulation)
Input Signal: TTL level, intensity increasing with more positive levels. Usable Freq. Range: DC to 10 MHz. Input Impedance: Approx. 10 kΩ. Max. Input Voltage: 50 V (DC + AC peak).
CRT
Type: Rectangular with internal graticule. Accelerating Voltage: 12 kV. Display Area: 8 x 10 division (1 div = 1 cm).
OTHER SPECIFICATIONS
Calibration Output: Positive Square Wave: 1 kHz ±3%.
Voltage: 0.3 V p-p ±1% (+10° to +35°C). 0.3 V p-p ±2% (0° to +50°C).
Environment: Operating: +10° to +30°C, 85% max. relative humidity for full specifications. 0° to +50°C, 90% max. rel. humidity, full operating range. Altitude: Operating: up to 5000 meters (16,000 ft).
Trace Rotation: Electrical, externally adjustable.
Power: 90-132 VAC; 180-264 VAC 50/60 Hz, approx. 56 W.
Dimensions (H x W x D): 13.8 x 28.4 x 40 cm (5¼ x 11¼ x 15¾″).
Weight: 7.4 kg (16¼ lbs.)
ACCESSORIES SUPPLIED
Two 10:1 Probes, spare fuses, instruction manual, schematic diagram and parts list.
OPTIONAL ACCESSORIES
Demodulator Probe — PR-32, Deluxe 10:1/direct Probe — PR-37, 10:1/direct Probe — PR-40, Front Panel Cover — LC-100, Probe Pouch — LC-150.

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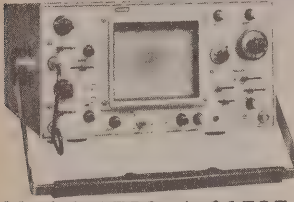
NEW 100 MHz, DUAL TRACE, DUAL TIME BASE OSCILLOSCOPE



Model 1580 / $1595

FEATURES

• 1 mV/div sensitivity • 23 calibrated sweeps • Rectangular CRT with internal illuminated graticule and Video Sync Separators • 20 MHz Limiter • X-Y Operation • Z axis Input • 16 kV Accelerating Voltage • X10 Sweep Magnification • Delayed Sweep/Dual Time Base • Single Sweep • V Mode — display two signals unrelated in frequency • Sum and Difference Capability • CH 1 Output • Includes Probes.

SPECIFICATIONS

VERTICAL AMPLIFIERS (CH 1 and CH 2)
Deflection Factor: Standard: 5 mV/div to 5 V/div in 10 steps. 1-2-5 seq.
X5 Gain: 1 mV/div to 1 V/div.
Accuracy: ±3% (+10° to +35°C). ±5% (0° to +55°C).
Response: (−3 dB) X1 Gain: DC: DC to 100 MHz, AC: 5 Hz to 100 MHz, X5 Gain: DC: DC to 50 MHz, AC: 5 Hz to 50 MHz.
Rise Time: 3.5 ns or less.
Bandwidth Limiting: Approx. 20 MHz by bandwidth limit switch.
Input Impedance: 1 MΩ ±2% 22 pF.
Max. Input Voltage: 500 V p-p or 250 V (DC + AC peak).
Operating Modes: CH 1 — Single Trace, CH 2 — Single Trace, ADD — CH 1 + CH 2, Single Trace, ALT — Dual Trace, alternating sweep, CHOP — Dual Trace, chopped sweep.
Signal Delay Time: Approx. 10 ns on the CRT screen.

SWEEP SYSTEM
Modes: A, ALT, B DLY'D, X-Y.
Sweep Time: A — 20 ns/div to 0.5 s/div in 23 ranges, in 1-2-5 seq, with Vernier. B — 20 ns/div to 50 ms/div in 20 ranges, 1-2-5 seq.
Accuracy: ±3% (+10° to +35°C), ±6% (0° to +50°C).
Sweep Magnification: X10, ±5% (+10° to +35°C).
Linearity: ±3%, ±5%, X10 MAG.
Holdoff: Cont. var., (NORM to >5X).
Delay Time: Cont. adjustable (200 ns to 0.5 s). Available delay time is 0.2 to 10 times the A sweep setting.

TRIGGERING
Modes: AUTO, NORM, SINGLE.
Source: V MODE, CH 1, CH 2, EXT, LINE.
Coupling: AC, HF rej, LF rej, DC, VIDEO.
Automatic: Sweep without an input.
Normal: No sweep obtained without input signal.
Single: Single sweep operation.
Slope: Can trigger on pos. or neg. going slope on the trigger waveform.
Video Sync: Vertical and horizontal sync separators.
Sensitivity: DC: DC-50 MHz, 1 div int. or 100 mV p-p ext., DC-100 MHz, 1.5 div int. or 210 mV p-p ext. AC: Same as DC but with incr. min. level for below 20 Hz. AC HF rej — incr. min. level <20 Hz and >30 kHz. AC LF rej — incr. min. level <30 kHz. VIDEO — FRAME/LINE: 0.5 div int. or 50 mV p-p ext.

EXTERNAL TRIGGER INPUT
Max. Input Voltage: 250 V (DC + AC peak).
Input Impedance: 1 MΩ approx. 40 pF.

HORIZONTAL AMPLIFIER (Input thru CH 2)
Response: DC — DC to 5 MHz, −3 dB. AC — 5 Hz to 5 MHz, −3 dB.
Accuracy: Same as vertical amp (CH 2).
X-Y Operation: Mode selectable with HORIZ DISPLAY switch. CH 1 = Y axis, CH 2 = X axis. X-Y Phase Difference: 3° or less at 100 kHz.

Z AXIS INPUT (Intensity Modulation)
Sensitivity: TTL Compatible. Freq. Range: DC to 5 MHz. Input Impedance: Approx. 10 KΩ. Max. Input Voltage: 50 V (DC + AC peak).

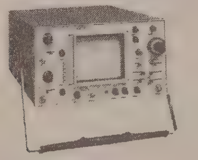
CRT
Type: Rectangular with int. graticule. Accel. Voltage: 16 kV. Display Area: 8 x 10 div (1 div = 1 cm).

OTHER SPECIFICATIONS
Probe Adjust Voltage: 1 V, ±2%, square wave, approx. 1 kHz, ±3%. Trace Rotation: Electr., adjustable. Environ.: 0°C to +50°C, 90% max RH-full operation. Power: 9 V to 264 VAC, 45 Hz to 400 Hz, approx. 50 W. Dim. (W x H x D): 304 x 160 x 401 mm (11.97 x 6.3 x 15.8″), 346 x 173 x 461 mm (13.6 x 6.8 x 18.1″). Weight: 19.36 lbs. (8.8 kg).

ACCESSORIES SUPPLIED
Two 10:1 Probes, spare fuses, instruction manual; schematic diagram.

OPTIONAL ACCESSORIES
Probe Pouch LC-150, Demodulator Probe — PR-32, 10:1 Probe — PR-45, 10:1/Direct Probe — PR-40. Deluxe 10:1/Direct Probe — PR-37.

NEW 60 MHz TRIPLE TRACE SCOPE



Model 1560 / $1150

FEATURES

• 1 mV/div sensitivity • 22 calibrated sweeps • Signal delay line • Rectangular CRT with internal graticule and scale illumination • Video sync separators • X-Y operation • Z axis input • 16 kV accelerating voltage • X10 sweep magnification • Delayed sweep/dual time base • Single sweep • Auto focus • V mode — displays two signals unrelated in frequency • Sum and difference capability • Channel 1 output • Includes probes.

SPECIFICATIONS

VERTICAL AMPLIFIERS (CH 1 and CH 2)
Deflection Factor: 1 mV/div to 5 V/div, ±3% in 12 step, 1-2-5 seq. with Vernier.
Response: (−3 dB) 1 mV/div., 2 mV/div. DC: DC to 20 MHz. AC: 5 Hz to 20 MHz, 5 mV/div. to 5 V/div. DC: DC to 60 MHz. AC: 5 Hz to 60 MHz.
Rise Time: 5.8 ns or less (60 MHz).
Input Impedance: 1 MΩ ±2%/27 pF.
Max Input Voltage: 500 V p-p or 250 V (DC + AC peak).

CH 3
Deflection Factor: 0.1 V/div and 1 V/div ±3%.
Response: DC: DC to 60 MHz, −3 dB. AC: 5 Hz to 60 MHz, −3 dB.
Rise Time: 5.8 ns or less.
Input Impedance: 1 MΩ ±2%/27 pF.
Max Input Voltage: 50 V (DC + AC peak).
Operating Modes: CH 1 — Single Trace. CH 2 — Single Trace. ADD — CH 1 + CH 2 Single Trace. Dual — CH 1 and CH 2. dual trace. TRIPLE — CH 1, CH 2, CH 3, triple trace. ALT — Dual or triple trace, alternating sweep. CHOP — Dual or triple trace, chopped sweep.
Signal Delay Time: Approx. 20 ns on the CRT screen.

SWEEP SYSTEM
Mode: NORM, AUTO, FIX, SINGLE.
Sweep Time: A — 0.05 µs/div to 0.5 s/div, ±3% in 22 ranges, in 1-2-5 seq. with Vernier. B — 0.05 µs/div to 50 ms/div in 19 ranges, in 1-2-5 seq.
Sweep Magnification: X10 ±5%. Extends max sweep rate to 5 ns/div.
Linearity: ±3%.
Holdoff: Cont. var. (NORM to >10X).
Delay Time: Cont. adj. 500 ns to 0.5 s). 0.2 to 10 times the A sweep setting.

TRIGGERING
Source: V MODE. CH 1. CH 2. CH 3/EXT. LINE.
Coupling: AC, HF rej, DC, VIDEO Frame, VIDEO Line.
Automatic: Sweep without an input.
Normal: No sweep without an adequate trigger signal.
Fix: Trigger threshold autom. set at center of trigger signal.
Single: Single sweep operation.
Slope: Can trigger on pos. or neg. going slope on the trigger waveform.
Video Sync: Vert. and horiz. sync sep.
Sensitivity: DC — DC-60 MHz, 1 div. int. or 0.1 V p-p ext. AC — 20 Hz — 60 MHz, 1 div. int. or 0.1 V p-p ext. AC HF rej — Incr. min. level below 20 Hz and above 30 kHz. VIDEO — FRAME or LINE: 1 div. int. or 0.1 V p-p-ext. AUTO — 30 Hz — 60 MHz: 1 div. int. or 0.1 V p-p ext. FIX — 40 Hz — 60 MHz: 1 div. int. or 0.1 V p-p ext.

EXTERNAL TRIGGER INPUT
Max Input Voltage: 50 V (DC + AC peak).
Input Impedance: 1 MΩ ±2%/28 pF.

HORIZONTAL AMPLIFIER (Input thru CH 2, X10 MAG not included)
Response: DC: DC to 2 MHz, −3 dB. AC: 5 Hz to 2 MHz, −3 dB.
X-Y Operation: Mode selectable with HORIZ DISPLAY switch. CH 1 = Y axis, CH 2 = X axis. X-Y Phase Difference: 3° or less at 100 kHz.

Z-AXIS INPUT (Intensity Modulation)
Sensitivity: TTL Compatible. Frequency Range: DC to 5 MHz. Input Impedance: Approx. 10 kΩ. Max Input Voltage: 50 V (DC + AC peak).

GATE OUTPUT
Output Voltage: TTL Compatible; Approx. 220Ω.

SWEEP OUTPUT
Output Voltage: 1 V p-p/Approx. 1 kΩ.

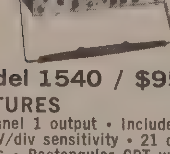
CRT
Type: Rectangular, with internal graticule. Acceleration Voltage: 16 kV. Display Area: 8 x 10 div. (1 div. = 1 cm).

OTHER SPECIFICATIONS
Probe Adjust Voltage: 0.5 V, ±6%, sq. wave, approx. 1 kHz. Trace Rotation: Electrical, adjust. Environmental: 0°C to +50°C, 90% max. RH — full operation. Power: 100/120/220/240 V AC ±10%, 50/60 Hz, approx. 65 W. Dim.: (W x H x D): 304 x 160 x 401 mm (11.97 x 6.3 x 15.8″). 346 x 173 x 461 mm (13.6 x 6.8 x 18.1″). Weight: 24.2 lbs. (11 kg).

ACCESSORIES SUPPLIED
Two 10:1 Probes, spare fuses, instruction manual; schematic diagram.

OPTIONAL ACCESSORIES
Probe Pouch — LC-150, Demodulator Probe — PR-32, 10:1 Probe — PR-45, 10:1/Direct Probe — PR-40, Deluxe 10:1/Direct Probe — PR-37.

NEW 40 MHz DUAL TRACE SCOPE



Model 1540 / $950.00

FEATURES

• Channel 1 output • Includes probes • 1 mV/div sensitivity • 21 calibrated sweeps • Rectangular CRT with internal graticule and scale illumination • Video sync separators • Signal delay line • 12 kV accelerating voltage • X-Y operation • Z axis input • X10 sweep magnification • Delayed sweep/dual time base • Single sweep • Auto focus • V mode — displays two signals unrelated in frequency • Sum and difference capability.

SPECIFICATIONS

VERTICAL AMPLIFIERS (CH 1 and CH 2)
Deflection Factor: 1 mV/div. to 5 V/div., ±3% in 12 steps, 1-2-5 seq. with Vernier. Response: (−3 dB) 5 mV/div. to 5 V/div., DC: DC to 40 MHz. AC: 5 Hz to 40 MHz. 1 mV/div., 2 mV/div., DC: DC to 15 MHz. AC: 5 Hz to 15 MHz.
Rise Time: 8.8 ns or less (40 MHz).
Input Impedance: 1 MΩ ±2%, approx. 20 pF.
Max Input Voltage: 500 V p-p or 250 V (DC + AC peak).
Operating Modes: Same as 1560 except dual-trace only.
Signal Delay Time: Approx. 20 ns on the CRT screen.

SWEEP SYSTEM
Mode: NORM, AUTO, FIX, SINGLE.
Sweep Time: A 0.1 µs/div. to 0.5 s/div., ±3% in 21 ranges, in 1-2-5 seq. with Vernier. B — 0.1 µs/div. to 50 ms/div., in 18 ranges.
Sweep Magnification: X10, ±5%. Extends max. sweep rate to 10 ns/div.
Linearity: ±3%.
Holdoff: Cont. var. (NORM to >10X).
Delay Time: Cont. adjustable (500 ns to 0.5 s), 0.2 to 10 times the A sweep.

TRIGGERING
Source: V MODE — Trigger sel. by vertical MODE switch. CH 1, CH 2, EXT, LINE.
Coupling: AC, HF rej: DC, VIDEO Frame, VIDEO Line.
Automatic: Sweep without an input.
Normal: No sweep without adequate trigger signal.
Fix: Trigger threshold autom. set.
Single: Single sweep operation.
Slope: Can trigger on the pos. or neg. going slope on the trigger waveform.
Video Sync: Vertical and horizontal sync separators.
Sensitivity: DC — DC-40 MHz, 1 div. All other specs same as 1560 except 40 MHz max.

EXTERNAL TRIGGER INPUT
Max. Input: 50 V (DC + AC peak).
Input Impedance: 1 MΩ, approx. 27 pF.

HORIZONTAL AMPLIFIER (Input thru CH 2, X10 MAG not included)
Freq. Resp.: DC — to 2 MHz, −3 dB. AC — 5 Hz to 2 MHz, −3 dB.
X-Y Operation: Same as 1560.

Z-AXIS INPUT (Intensity Modulation)
Sensitivity TTL Compatible. Freq. Range: DC to 3.5 MHz. Input Impedance: Approx. 10 kΩ. Max Input Voltage: 50 V (DC + AC peak).

GATE OUTPUT
Output Voltage: TTL Compatible/Approx. 220Ω.

SWEEP OUTPUT
Output Voltage: 1 V p-p./Approx. 1 kΩ.

CRT
Type: Rect., with internal graticule. Acceleration Voltage: 12 kV. Display Area: 8 x 10 div. (1 div. = 1 cm).

OTHER SPECIFICATIONS
Same as Model 1560.

ACCESSORIES SUPPLIED
Two 10:1/Direct probes, spare fuses, manual, schematic; diagram.

OPTIONAL ACCESSORIES
Probe Pouch — LC-150, Demodulator Probe — PR-32, 10:1 Probe — PR-45, 10:1/Direct Probe — PR-40, Deluxe 10:1/Direct Probe — PR-37.

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VOLUMES 1A, 1B & 2

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LOCAL SOURCE?
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LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
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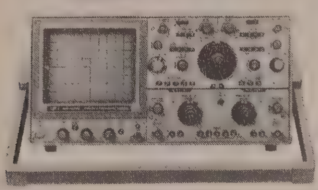
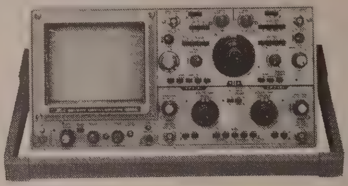


4-input, 8-trace portable oscilloscope DC ~ 60 MHz

SS-5710



Reliability resulting from superb basic characteristics DC ~ 100 MHz

SS-5711

FEATURES

- Typical frequency of from DC to 70 MHz −3 dB, thereby having a 10MHz margin over the specified frequency response
- Highly precise and stable deflection factor and sweep rate for a wide range of temperatures
- Superb linearity
- Reliable time difference between channels
- Built-in TV sync separator

Also Available:
MODEL SS-5710C (4 channels with universal counter)
MODEL SS-5710D (4 channels with DMM and counter)

FEATURES

- Typical frequency of from DC to 120 MHz, −3 dB, thereby having a 20MHz margin over the specified frequency response
- Highly precise and stable deflection factor and sweep rate
- Superb linearity
- Reliable time difference between channels
- Jitterless circuitry for stable triggering

Also Available:
MODEL SS-5711C (4 channels with universal counter)
MODEL SS-5711D (4 channels with DMM and counter)

SPECIFICATIONS

			SS-5710	SS-5711
Vertical Deflection System		Mode	CH1, CH2, QUAD, ALT, CHOP (approx. 300 kHz), ADD	CH1, CH2, QUAD, ALT, CHOP (approx. 500 kHz), ADD
		Rise Time	Approx. 5.8 ns	Approx. 3.5 ns
		Signal Delay Time	20 ns min. (on CRT display)	40 ns min. (on CRT display)
		Max. Input Voltage	400V (DC + AC peak)	250 V (DC + AC peak)
	CH1 and CH2	Deflection Factor	• 5 mV/div ~ 10V/div, ±2% • 1 mV/div, 2 mV/div, ±4% • 1 mV/div ~ 25 V/div variable	• 5mV/div ~ 5 V/div, ±2% • 1 mV/div, 2mV/div, ±4% • 1 mV/div ~ 12.5 V variable
		Frequency Response	• DC ~ 60 MHz, −3 dB (x1 GAIN) • DC ~ 20 MHz, −3 dB (x5 GAIN)	• DC ~ 100 MHz, −3 dB (x1 GAIN) • DC ~ 50 MHz, −3 dB (x5 GAIN) • DC ~ 20 MHz, −3 dB (LIMITTER ON)
		Input Coupling	AC-GND-DC	AC-GND-DC
		Input RC (direct)	1 MΩ ± 2% // 32pF ±2 pF	1 MΩ ± 1.5% // 25 pF ±2 pF
		Polarity Inversion	CH2 only	CH2 only
	CH3 CH4	Deflection Factor	0.1 V/div, 1 V/div, ±4%	0.1 V/div, 1 V/div, ±4%
		Frequency Response	DC ~ 50 MHz, −3, dB	DC ~ 100 MHz, −3 dB
		Input Coupling	AC-DC	AC-DC
Triggering	A Trigger	Source (CH3 for EXT input)	INT (NORM, CH1, CH2) EXT (EXT, EXT ÷ 10) LINE	INT (NORM; CH1, CH2) EXT (EXT, EXT ÷ 10) LINE
		Slope	POS. OR NEG.	POS. OR NEG.
		Coupling	DC, AC, LF REJ, HF REJ, TV-V, TV-H, FIX	DC, AC, LF REJ, HF REJ, TV-V, TV-H, FIX
		Sensitivity (Common to B Trigger)	INT and EXT: 0.3 div	INT and EXT: 0.3 div
	B Trigger	Source (CH4 for EXT input)	INT (CH1, CH2) EXT (EXT, EXT ÷ 10)	INT (CH1, CH2) EXT (EXT, EXT ÷ 10)
		Coupling	DC, AC, HF REJ, TV-H	DC, AC, LF REJ, HF REJ, FIX, TV-H
		Slope	POS. OR NEG.	POS. OR NEG.
Horizontal Defletion		Display Mode	A, A INTEN, ALT, B (DLY'D), X-Y	A, A INTEN, ALT, B (DLY'D), X-Y
	A Sweep	Sweep Mode	AUTO, NORM SINGLE	AUTO, NORM, SINGLE
		Sweep Rate	• 50 ns/div ~ 0.5 s/div, ±3% • 50 ns/div ~ 1.25 s/div variable	• 20 ns/div ~ 0.5 s/div, ±2% • 20 ns/div ~ 1.25 s/div variable
	B Sweep	Sweep Mode	RUNS AFTER DELAY, TRIG'D DELAY	RUNS AFTER DELAY, TRIG'D DELAY
		Sweep Rate	50 ns/div ~ 50 ms/div, ±3%	20 ns/div ~ 50 ms/div, ±2%
		Delay Time Jitter	1/20000 max.	1/20000 max.
		Magnification	10 times	10 times
XY Operation		Deflection Factor	Same as CH1	Same as CH1
		Frequency Response	DC ~ 2 MHz, −3 dB	DC ~ 2 MHz, −3 dB
		Input RC	1 MΩ ± 2% // 32 pF ±2 pF	1 MΩ ±1.5% // 25 pF ±2 pF
		XY Phase Difference	3° max. to 50 kHz	3° max. to 100 kHz
Signal-out	Calibrator	Output Waveform	Square-wave	Square-wave
		Frequency	Approx. 1 kHz	1 kHz, ±1%
		Output Voltage	0.3 V, ±1%	0.6 V, ±1%
		Output Current	10 mA, ±2%	10 mA, ±1%
	Gate-out	Output Voltage		Approx. 5 Vp-p for A & B gates
		Polarity		Positive going
		Output Resistance		Approx. 2.7 kΩ for A & B gates
CRT		CRT	6-inch rectangular with parallax-free internal scale	6-inch rectangular with parallax-free internal scale
		Display Area	8 div x 10 div (1 div = 10 mm)	8 div x 10 div (1 div = 10 mm)
		Accelerating Voltage	Approx. 15 kV	Approx. 20 kV
Z Axis Input		Sensitivity	0.5 Vp-p	0.5 Vp-p
		Bandwidth	DC ~ 3 MHz	DC ~ 5 MHz
		Input Resistance	5 kΩ, ±10%	5 kΩ, ±10%
Power Supply		Line Voltage	AC 100/115/220/230/240 V, ±10%	AC 100/115/220/230/240 V, ±10%
		Line Frequency	50 Hz ~ 440 Hz	50 Hz ~ 440 Hz
		Power Consumption	Approx. 50 W (at AC 100 V supply)	Approx. 62 W (at AC 100 V supply)
		Dimension (approx.)	$12\frac{5}{8}$" W x $6\frac{5}{16}$" H x $15\frac{3}{4}$" L	$12\frac{5}{8}$" W x $6\frac{5}{16}$" H x $15\frac{3}{4}$" L
		Weight (approx.)	8 kgs (17.7 lbs)	9.5 kgs (21 lbs)
		Operating Temperature	−10°C (14°F) ~ +50°C (122°F)	−10°C (14°F) ~ +50° C (122°F)

Accuracy at temperatures between +10° C (50° F) to +35° C (95° F).

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IWATSU INSTRUMENTS INC.

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TS-8123

SUPER-HIGH-SPEED STORAGESCOPE

IWATSU offers the 100 MHz oscilloscope with a super-high writing speed of 2500 divisions per microsecond (1 div = 12 mm).

In addition, a digitizing speed of 1000 div / µs, which is equivalent to the conversion speed of a 40-ps (25-GHz) clock can be obtained when waveforms are converted from analog to digital format after analog storage.

Converted digital data are sent via the standard GP-IB interface, to a computer for digital signal processing.

The TS-8123 uses a large, 7-inch cathode ray tube (CRT) developed by IWATSU, which displays bright, sharp traces and further broadens the scope of measurements.

FEATURES

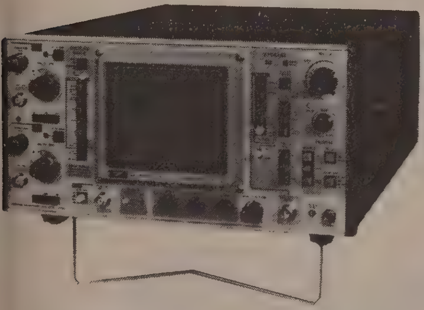
- 2500 div/µs super-high writing speed
- Stored waveforms can be digitized
  1) Ultra high speed: equivalent to 25 GHz clock
  2) 8-bit (1/256 resolution is independent of input frequency even with 100 MHz signals)
  3) Easy operation by simply pressing the Write & Read switch
- Stored waveform can be monitored on an external monitor screen and recorded on a VTR or printed. A composite video signal output is provided
- Measuring conditions can be displayed. Pressing the Scale Factor switch displays the measuring conditions
- Waveform comparison is possible. The stored waveform can be digitized and compared with another digitized or real-time waveform

SPECIFICATIONS

CRT	7-inch rectangular Display Area: 8 x 10 div (1 div = 12mm), parallax-free internal graticule. Accelerating Voltage: 20 KV approx.
Analog Storage	Fastest Writing Speed: 2,500 div/µS. Readout Time: 30 seconds or more
Digital Storage	Fastest Writing Speed: 1,000 div/µS. Resolution: Y-axis: 8 bits; X-axis: 512 words. Amount of Storage: A-B (up to 2 data items)
Z-Axis Input	0.5 Vp-p for noticeable intensity modulation
Signal Delay	Delay line provided
Sweep Magnification	x 10
Calibrator	Output Waveform: Square wave, 1 KHz ± 1% Output Voltage: 60mV, 0.6V, ± 1% Output Current: 10 mA ± 1%
Signal Outputs	Gate Out: A gate and B gate, 1V approx. Sawtooth Out: A only, 250 mV/div. Video Out: Composite video signal D/A Out: D/A conversion signal of digitized waveform X-axis: 5V, Y-axis: 4V, Z-axis: 5V
Power Supply	100/117/217/234 VAC, 50/60 Hz, 160W (approx.)
Weight	23 Kg (51 lbs.) approx. Including the plug-in units
Dimensions	8¾" W x 12⅜" H x 20½" L (approx.)

SS-5802

DIGITAL STORAGESCOPE



The SS-5802 is a unique measuring instrument combining the functions performed conventionally by two separate instruments; a transient recorder and an oscilloscope. It digitizes analog input signals and stores and displays them; it also works as a 3-trace oscilloscope with a bandwidth of 10 MHz.

Real-time and stored waveforms can be displayed simultaneously for comparison. Another powerful feature is the provision of a GP-IB interface which allows connection of a controller so that operations can be coordinated with customer's program flow. The SS-5802 can also be used to monitor the progress of low-speed writing (WATCH mode).

FEATURES

- Built-in GP-IB (General-Purpose Interface Bus) interface
- High-brightness CRT
- 3-channel 10 MHz oscilloscope function
- 8-bit x 2048 word/channel, 1 µs/word digital storage
- Both real-time and digital storage waveforms can be displayed on the CRT simultaneously
- WATCH mode allows monitoring of on-going low-speed input signals at low writing speed clock rate
- PEN recorder output

SPECIFICATIONS

CRT	6-inch rectangular, 8 x 10 div (1 div = 10mm), parallax-free internal graticule, 10 kV accelerating voltage
Vertical Deflection System Display Modes Deflection Factor Frequency Response Rise Time Input Coupling Input RC Max Input Voltage	 CH1, CH2, ALT, CHOP, ADD, X-Y, TRI 5 mV/div ~ 10 V/div ±3%, 1 mV/div, 2 mV/div ±5% (at x 5 GAIN), 1 mV/div ~ 25V/div (continuously variable), 0.1 V/div (CH3) DC ~ 10 MHz, -3 dB 35 ns AC, GND, DC 1MΩ ±2%, 34 pF ±2 pF 250 V (DC + AC peak)
Triggering Sources Coupling Sensitivity	 CH1, CH2, CH3 AC, DC, HF REJ 0.5 div
Horizontal Deflection System Sweep Modes Sweep Rate Fastest Sweep Rate Sweep Magnification	 AUTO, NORM 0.5 µs/div ~ 0.2 s/div ±4%, 0.5 µs/div ~ 0.5 s/div (continuously variable) 50 ns/div x 10
A/D Converter	1 µs/word, 8 bit (0.4%) at full scale
Memory Length	8 bit x 2048 word (at CH1 and CH2) 8 bit x 4096 word (at CH1)
Writing Modes	SINGLE, REPEAT, WATCH, PEN
Delay Range	0 div, 2.5 div, 7.5 div
Analog Outputs	X Out, Y Out
X-Y Operation	CH1-X, CH2-Y
Z-Axis Input	3 Vp-p, DC ~ 1 MHz
Calibrator	1kHz square wave, 0.3 V output
Power Supply	100/117/217/234 V AC, 50 ~ 400 Hz, 74 W, (approx.)
Weight	11 kg (24.3 lbs) approx.
Dimensions	12⅝" W x 6⅜" H x 18⅝" L approx.

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IWATSU INSTRUMENTS INC.

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SS-5705/SS-5706

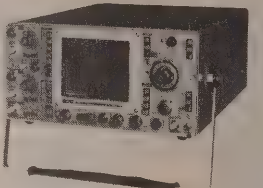
PORTABLE OSCILLOSCOPE

FEATURES

- SS-5705: DC-40MHz/SS-5706: DC-30MHz
  3-input, 6-trace (05) /3-trace (06)
  12KV accelerating voltage
- Versatile trigger capability with TV-SYNC
- Jitter-free circuitry and variable Hold-off
- High accuracy for V and H (±2%)
- Accurate calibrator (Amplitude ±1% and Frequency ±1%)

SPECIFICATIONS

CRT	6-inch rectangular
Display area	8 X 10 div (1div=10mm), parallax-free internal graticule
Accelerating voltage	12KV approx.
Vertical deflection System	
Modes	CH1, CH2, ADD, DUAL, TRI
Deflection factor	5mV/div to 10v/div, ±2%
X 5 MAG	CH1 and CH2 (SS-5705), CH1 only (SS-5706)
Frequency response	DC-40MHz, -3dB (SS-5705), DC-30MHz (SS-5706)
Max. input voltage	400V (DC+AC peak)
CH3	0.1V/div, ±3%, AC and DC coupling
Triggering	
Source	CH1, CH2, CH3, (EXT), LINE
Coupling	AC, DC, HF REJ, TV-SYNC, FIX (SS-5705 only)
Horizontal Deflection System	
Sweep mode	A, A INTEN, ALT (SS-5705 only), B, X-Y
Sweep rate	0.1uS/div to 0.5S/div, ±2% (A sweep) 0.1uS/div to 50mS/div, ±3% (B sweep)
Magnification	X 5
Z-axis input	3Vp-p, DC-3MHz (SS-5705), 5Vp-p, DC-1MHz (SS-5706)
Calibrator	1KHz, ±1% and 0.3V, ±1%
Weight	7.2kg (15.9lbs) approx.
Dimensions	11 1" (W) × 6" (H) × 15.9" (L)



SS-5321

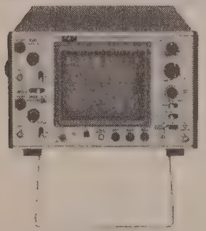
PORTABLE OSCILLOSCOPE

FEATURES

- Three input channels, triple-trace display
- Large 6-inch (8 x 10 cm) quadrupole-lens dome-mesh CRT with auto-focus circuit
- Fastest sweep rate of 1 ns/div plus Alternate Sweep mode
- Enhance facility
- Variable trigger holdoff time
- Four trigger select modes; CH1, CH2, CH3 and NORM

SPECIFICATIONS

CRT	6-inch rectangular
Display area	8 X 10 div (1div=10mm), parallax-free internal graticule
Accelerating voltage	20 kV approx.
Vertical Deflection System	
Modes	CH1, CH2, ALT, CHOP, ADD, TRIPLE
Deflection factor	5mV/div ~ 5V/div, ±2%
Frequency Response	DC ~ 250 MHz, -3dB
Rise Time	1.4 ns approx.
Input RC	1 MΩ ± 2%, 16 pF ±2 pF
Max. Input Voltage	500 V (DC + AC peak)
Triggering	
Sources	Internal, External (CH3), Line
Coupling	AC, HF REJ, DC
Sensitivity	INT: 0.3 div max. EXT (CH3): 0.2 div
Horizontal Deflection System	
Display Modes	A, A INTEN, ALT, B (DLY'D)
Sweep Rates	A: 10 ns/div ~ 0.5 s/div, ±2% B: 10 ns/div ~ 50 ms/div, ±2%
Delay Time Jitter	1/20,000 max.
Sweep Magnification	x 10
X-Y Operation	CH1-X, CH2-Y
Weight	11 kg (24.3 lbs) approx.
Dimensions	12¼" x 6" x 15¾" approx.



SS-5702

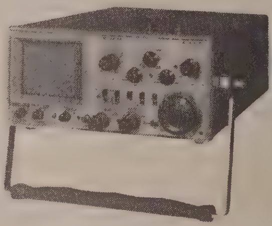
OSCILLOSCOPE

FEATURES

- Compact and lightweight; low power consumption
- 6-inch rectangular parallax-free CRT with internal graticule
- 1 mV/div ~ 10 V/div deflection factor
  0.1 μs/div ~ 0.2 s/div sweep rate
- Variable sweep length and 2-channel X-Y operation facilities
- TV-V trigger mode

SPECIFICATIONS

CRT	6-inch rectangular
Display area	8 X 10 div (1div=10mm), parallax-free internal graticule
Accelerating voltage	2KV approx.
Vertical Deflection System	
Modes	CH1, CH2, DUAL, ADD
Deflection Factor	5mV/div ~ 10v/div, ±4%
Frequency Response	DC ~ 20 MHz, −3dB
Input Coupling	AC, GND, DC
Max. Input Voltage	250 V (DC + AC peak)
Polarity Inversion	CH2 only
Triggering	
Sources	INT (CH1, CH2), EXT
Coupling	AC (INT), DC (EXT), TV-V
Sensitivity	INT: 0.5 div, EXT: 0.5V
Horizontal Deflection System	
Sweep Modes	AUTO, NORM
Sweep Rate	0.5 μs/div ~ 0.2, s/div ±4%
Sweep Magnification	×5
X-Y Operation	X. MODE (CH1, CH2, EXT) V. MODE (CH1, CH2, DUAL, ADD)
Ext. Intensity Modulation	3 Vp-p, DC ~ 1 MHz
Calibrator	1KHz square wave, 0.3 Vp-p ±3%
Weight	6.5kg (14.4 lbs) approx.
Dimensions	10" X 6⅜" X 16" approx.



SS-3510

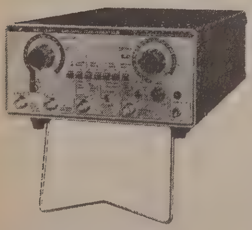
MINI OSCILLOSCOPE

FEATURES

- Bright, sharp display with 3.5-inch rectangular internal-graticule CRT and high 12 kV accelerating voltage
- Compact but powerful, versatile and reliable; comparable to much larger oscilloscope
- Switching regulator used in power supply circuit
- Full range of optional accessories including DC-AC inverter for use with battery

SPECIFICATIONS

CRT	3.5-inch rectangular
Display area	8 X 10 div (1div=6.35 mm), parallax-free internal graticule
Accelerating voltage	12 kV approx.
Vertical Deflection System	
Modes	CH1, CH2, ALT, CHOP, ADD, X-Y
Deflection Factor	10 mV/div ~ 5 v/div, ±3%, 2 mV/div, 5 mV/div (x 5 GAIN)
Frequency Response	DC ~ 50 MHz, -3 dB
Input RC	1 MΩ ± 3%, 36 pF ±2 pF
Max. Input Voltage	250 V (DC + AC peak)
Triggering	
Sources	Internal (CH1, CH2), External (EXT)
Coupling	AC, LF REJ, HF REJ (TV-V), DC (EXT only)
Sensitivity	INT: 0.5 div
Horizontal Deflection System	
Display Modes	A, A INT BY B, B
Sweep Rates	A: 0.1 μs/div ~ 0.2 s/div, B: 0.1 μs/div ~ 0.5 ms/div
Sweep Magnification	x 10
X-Y Operation	CH1-Y, CH2-X
Z-Axis Input	5 Vp-p, DC ~ 1 MHz
Calibrator	1 KHz square wave, 0.6 V output
Weight	4 kg (8.8 lbs) approx.
Dimensions	8¼" x 4" x 11⅞" approx.



SC-340

SCOPE CALIBRATOR

FEATURES

- Calibration and adjustments of oscilloscopes are possible: Vertical gain and phase (1 kHz⊓⊔, 100 V max. out), Sweep rate (10 ns/div, 20 ns/div, 0.1 ms/div ~ 2 s/div),
  Square wave response,
  Rise time (output with 300 ps rise time),
  Triggering confirmation
- Can be used as a general purpose signal generator
- Easy operation

SPECIFICATIONS

Voltage Calibrator	
Output	Square wave, 0.12 mV ~ 100 V ±0.5%
Rise Time	5 μs or less
Flatness	±0.5% or less
Impedance	50 Ω (at 0.2V or less)
Time Calibrator	
Normal	Differentiating wave, 0.1 Vp-p or more (into 50Ω), 0.1 μs ~ 2s ±0.05%
Fast	Sine wave (10 ns), square wave (20 ns) 0.2 Vp-p or more (50 Ω termination), 10 ns or 20 ns ±0.05%
Sine Wave Generator	Sine wave, 1 kHz ±20%, 50/60 Hz line frequency
Waveform Calibrator	
Output	Square wave from 0.5 Hz ~ 1 MHz, 1.3 V max. or more
Rise Time	5 ns or less
High Speed Rise Calibrator	
Output	Waveform of tunnel diode, 0.1 V or more (into 50 Ω)
Repetition	10 kHz ~ 200 kHz
Rise Time	300 ps or less
Weight	3.5 kg (7.8 lbs) approx.
Dimensions	8⅜" x 4" x 13⅞" approx.

SC-7501

MULTILOGGER

FEATURES

- 12 channels (Optionally 30 channels)
- Independent measuring condition for each channel
- Powerful data processing and limit detection
- Self-contained thermal printer
- GPIB interface, Battery operation and D/A output (Option)
- Easy to use keyboard input and battery backed up set conditions

SPECIFICATIONS

DC Voltage Measurement	CH1 to CH12
Measuring range	20mV, 200mV, 2V, 20V, 200V, 270V
Resolution	1uV max.
AC Voltage Measurement	CH1 to CH6
Measuring range	200mV, 2V, 20V, 200V, 270V
Frequency	45Hz to 100KHz
Resolution	10uV max.
Resistance Measurement	CH1 to CH6
Measuring range	20Ω, 200Ω, 2KΩ, 20KΩ, 200KΩ, 2MΩ, 20MΩ
Resolution	1mΩ MAX
Temperature Measurement	CH7 to CH12
Thermocouple type	R, K (CA), T (CC), J(IC), E(CRC)
Measuring range	-200°C to +1600°C
Internal Clock	Counts up to 23H59M59S
Data Processing	X_σ, dB, △%, *. ÷, △
Printer	Thermal type, 0.5s/line printing speed
Display	19999 (A/D converter full scale), 99999 (processor full scale)
A/D Converter	Dual slope integration
Limit Detection	High and Low limit is available
Weight	5.5kg (12.2lbs)
Dimensions	8.3" (W) X 3.9" (H) X 13.8" (L)

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MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1•B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

KIK Scopes

Eight reasons why KIK–Scopes are your best buy:

1. Satisfaction guaranteed or your money back: What could be more assuring. Just order a KIK-scope and try it for 30 days. If it isn't everything we say it is . . . if it won't match or outperform any comparable scope, just return it. We'll refund your purchase price.

2. Two-year warranty: As a reflection of the confidence we have in the quality components and workmanship of KIK-scopes, Kikusui offers a two-year limited warranty as opposed to the one-year warranty offered by most scope manufacturers. This virtually guarantees you two full years of cost-free operation. **Three year warranty available on several models if registered with the factory.**

3. Quick and easy maintenance: Although many manufacturers claim modularity for their scopes, a quick check of the internal construction will show that they are semi-modular at best. However, virtually every KIK-scope is completely modular. Components are mounted on boards that can be easily removed. In the event of trouble, simply return the faulty board to Kikusui and a replacement will be sent immediately. This not only reduces the cost of maintenance, but also assures minimum down time.

4. Nation-wide service is available through your local Honeywell service center in most major cities. Contact your local service rep for warranty service, maintenance, routine calibration and service. Or consult the factory for prompt assistance.

5. Outstanding reliability: Kikusui designs and builds scopes to work . . . accurately and dependably under a wide range of conditions and environments. In fact, our service records indicate that the failure rate of KIK-scopes is approximately one-tenth that of the industry average. A comforting statistic for potential customers.

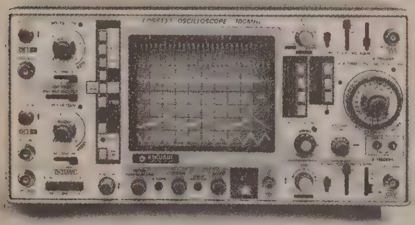
6. Features and performance plus: If you'll check the specifications of KIK-scopes, you'll find that almost every model has a counterpart from a major scope manufacturer. That is, your KIK-scope will do everything that theirs will do . . . and, most often, a lot more. We designed them that way to offer you features and performance, plus.

7. More performance for your dollar: Although KIK-scopes offer performance, features and reliability that are unmatched by any other scopes, they are priced very competitively. In fact, in most cases you'll find them to be 10% to 15% less than the scopes of other major manufacturers.

8. 30 years of experience: Our parent company, Kikusui Electronics is one of Japan's leading manufacturers of electronic test equipment. They manufacture diode curve tracers*, RC oscillators, function generators*, calibrators*, analog voltmeters, digital multimeters, frequency counters, level meters, attentuators, wow and flutter meters, distortion meters, voltage testers*, W/I/R testers*, lab type and digital programmable power supplies.

* Not stocked in the U.S.

MODEL #6100

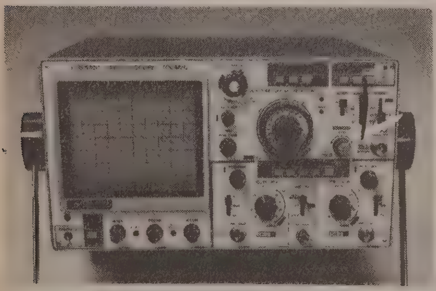


100 MHZ, 5 channel oscilloscope designed for laboratory and field service applications (19 lbs.). Key features include: ALTERNATE-TIME BASE, AUTOMATIC TRIGGERING with LEVEL LOCK™, AUTOMATIC FOCUS CONTROL, ALTERNATE TRIGGER, TV SYNC, VERTICAL SIGNAL AND SWEEP GATE OUT.

$1,950.00**

THREE YEAR WARRANTY STANDARD IF REGISTERED WITH FACTORY.

MODEL #5100



100 MHz, 3 channel scope. For field service. Displays eight traces. All channel in any combination. Features alternate time base, automatic triggering with Level Lock(TM), patented Auto Focus, TV sync and HF trigger modes, CH. 1 vertical, sweep + gate outputs.

THREE YEAR WARRANTY STANDARD IF REGISTERED WITH FACTORY.

#5100 $1,495.00**

** Prices effective March 31st, 1984.
Subject to change without notice.
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Kikusui
INTERNATIONAL CORP.

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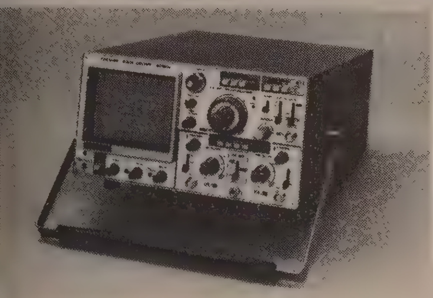
Phones: CA, Alaska, Hawaii (213) 515-6432
TWX: 910-346-7648

LEASING AVAILABLE

KIK Scopes

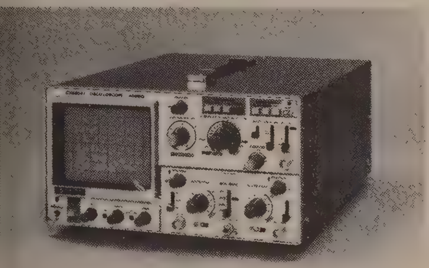
ODEL #5060



15.4 lbs. 60 MHZ, field service instrument offering TRIGGER VIEW, ALTERNATE TIME BASE, AUTOMATIC TRIGGERING with LEVEL LOCK™, AUTOMATIC FOCUS, ALTERNATE TRIGGER, TV SYNC, TWO VERTICAL CHANNELS, ADD MODE, CH 2 INVERT.

THREE YEAR WARRANTY STANDARD IF REGISTERED WITH FACTORY. **$1,150****

ODEL #5040, #5041



These 40 MHZ scopes offer a choice of delayed sweep or single time base operation in a lightweight field service or production instrument. Key features are: AUTOMATIC TRIGGERING with LEVEL LOCK™, AUTOMATIC FOCUS, TV SYNC, DUAL CHANNEL.

#5040 $745.00**
#5041 $895.00**

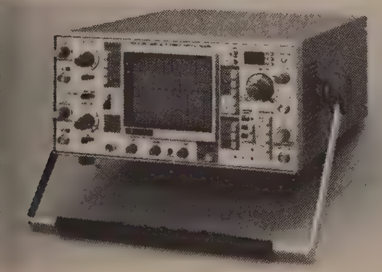
ODEL #5020, #5020ST, #5021

These 20 MHZ scopes offer more performance for your dollar, including a delay sweep version (#5021). Key features include: AUTOMATIC TRIGGERING with our LEVEL LOCK™, AUTOMATIC FOCUS, TV SYNC, DUAL CHANNEL. Ideal for production applications or bench servicing.

NEW Storage Model (#5020ST) includes all the features of the 5020 and AUTOMATIC ERASE, MANUAL ERASE, ENHANCE, HOLD and an exclusive REMOTE ERASE with TTL levels.

#5020 $ 595.00** **#5021 $645.00****
#5020ST $1,695.00**

ODEL #DSS 6520, #DSS 6521



Digital storage scopes with a 2 MHZ clock rate (500 NS sample interval) and a 20 MHZ real time bandwidth. Key features include 8 BIT BY 1K WORD MEMORY, PEN PLOT, DC OFFSET AND A VIEW TIME CONTROL. Operational modes are REAL — REAL AND STORAGE, AUTO ERASE, ROLL, and PRETRIGGER. The DSS 6520, in addition offers voltage and time measurements between cursors.

#DSS 6520 $3,495.00**
#DSS 6521 $2,370.00**

** Prices effective March 31st, 1984.
Subject to change without notice.
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LEASING AVAILABLE

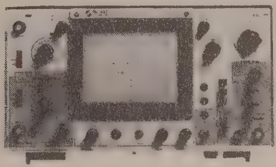
NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

50 MHz DUAL TRACE

MODEL MS-6050

WITH SIGNAL AND TRIGGER DELAY



$950.

FEATURES

- 6″ metal backed mesh CRT with 15 kV PDA
- 50 MHz dual trace with both sig. and var. trig. delay
- 1 mV/Div sensitivity thru 10 MHz, 5 mV/Div thru 50 MHz
- 70 MHz~−6 dB, triggerable~80 MHz
- Has TV sync, X-Y or X-Y-Z and single sweep
- Comes with two hook-on probes and spare fuses

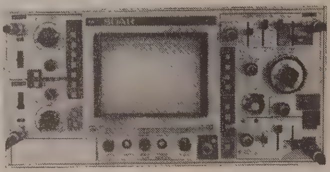
SPECIFICATIONS

CRT ..... 6″ Flat-Face Metal-Back PDA (15 kV drive) Internal Grat.
Vertical .... Operating Modes: CH1, CH2, dual, add, chop (200 kHz) CH2, invert
Freq. & Deflect ..... DC or AC 10 Hz to 50 MHz (−3 dB) (to 70 MHz−6 dB) 5 mV to 5V/Div on 12 ranges; 1 mV to 1V/Div (5x gain) DC thru 10 MHz
Rise Time ... <7 ns (<35 ns with 5x); Overshoot <3%; Input Z, 1 MΩ/20 pF ±3 pF
Delay Line ...... 120 ns (Effective delay 50 ns in display)
Max. Input V ... 600V p-p or 300V (DC + AC p-p); Channel Sep. >70 dB @ 1 kHz
Horizontal Sweep Mode .. Normal, Auto, Single, Delay
Time Base ...... 0.2 µs to 0.5s/Div, 20 ranges with x5 Mag, Linearity <3%
Delay Trig. .... Intend Switch for Setting Delay time, Delay Switch Starts Sweep at Delay Time Selected, Delay time 100 ms to 1 µs in 5 steps + fine.
Trigger Modes ... Int. CH1, CH2, Line, Ext. Plus TV-V/H, HF-REJ; Auto Free Run + (−) Slope, X-Y or X-Y-Z
Sensitivity .... Int <0.3 Div DC~10 MHz, <0.2V p-p DC~50 MHz <1.5 Div with 5x gain. (Triggerable~80 MHz) Ext. <50 mV p-p DC~10 MHz <0.2V p-p DC~50 MHz
Other ... Single Sweep of Trigger Signal can be displayed
Int. Mode .... TTL Level (3V p-p) DC~1 MHz, Max. 50V
Power .... 120 or 240 ±10% 50/60 Hz Switch Select.
Size/Weight ... 6⅜″ x 11½″ x 16¾″ (HWD), 21¼ Lbs.

Supplied with two hook-on probes, spare fuse, 3 cond. AC cord.

100 MHz QUAD TRACE OSCILLOSCOPE

MODEL MS-6110



$1695.

FEATURES

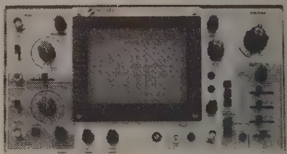
- 6″ CRT, 20 kV acceleration, P-31 Phosphor Quad Trace or Two Channel plus 2 Trigger View, with Verticle Delay Line, Beam Finder.
- High sensitivity 500 µV/Div (5 MHz) and accuracy ±2% for voltage and time axis.
- Alternate Trigger, TV sync Separator, 20 MHz Bandwidth Limiter, Variable Hold-Off.
- Supplied with two 10:1 probes, spare fuse, dust cover and screw driver.

SPECIFICATIONS

Bandwidth/Rise Time . DC or 10 Hz to 100 MHz, Rise Time ≤3.5 ns, (70 ns at 10 x mag)
Deflection . 5 mV to 5V/Div in 10 steps (1-2-5) Plus uncal variable between steps. x 10 mag extends min deflection to 0.5 mV/Div. Accuracy ±2% max input 250V (DC + peak AC) or 500 Vp-p AC
Display Modes .... CH 1, CH 2, (CH 2 Invert) Alternate, Chop (250 kHz rate) Add
Input Z .. 1 M ohm ±2% parallel with 30 pF Simultaneously display CH 1, CH 2 and external Trig. signal (deflect factor 200 mV/Div)
Horizontal Deflection . Time Base A: 20 ns to 0.5s/Div in 23 steps (1-2-5) plus variable uncal. Time Base B: 20 ns to 50 ms/Div in 20 steps (1-2-5) 10 x mag extends sweep to 2 ns/Div. Accuracy ±2% or less
Horizontal Display Modes . A only, A intensify, Alternate, B Delayed. Calibrated sweep delay from 0.5 and 10 x time Base A setting. Delay jitter better than 1:20,000
"A" Trigger Modes .... Auto, Normal, Single, TV-V, TV-H, Source Internal (CH 1, 2) Line, Ext: 10; Slope + or −. Sensitivity DC to 10 MHz Internal 0.3 Div., External 50 mV, 10 to 100 MHz. 1.5 Div., 150 mV; Coupling DC or 30 Hz to full bandwidth, HF and LF Rej.; Input Z and max voltage same as vert.
"B" Trigger Modes .. Auto, Normal, (CH 1, 2) External; Slope + or −; Coupling AC only 30 Hz to full bandwidth; X-Y operation. Accuracy Y: ±2%, X: ±4% BW DC to ≥2 MHz. Phase error ≤3°
Calibrator : 0.5V ±1%, 1 kHz ±5% sq. wave
Power .... 120/240V 50 Hz to 400 Hz ≤60W
Size/Weight . 12¼″ x 7⅛″ x 16¼″, 20.5 Lbs.
MTBF .... 20,000 hours nominal

35 MHz DUAL TRACE

MODEL MS-6035



$799.

FEATURES

The MS-6035 is of advanced design using a high brightness rectangular 6″ short neck PDA Tube with internal graticle and Trace rotator. Included are all the features most wanted by professional engineers and techs. Alternate trigger capability, trigger hold-off, delayed trigger, single sweep and variable hold-off for accurate pulse train display (Min. to Max.: 10 times). Built-in HF & LF Filters, TV (Video) sync separator, X-Y Operation plus Z axis input are standard. Two 10:1 hook-on probes, spare fuse supplied.

SPECIFICATIONS

VERTICAL

Freq. & Deflect. .. CH1 & CH2, DC or 10 Hz to 35 MHz (−3 dB) 5 mV to 10V/Div, 11 steps, 1 mV-2V/Div to 5 MHz with x5 mag.
Operating Modes ... CH1, CH2, Dual, Add, CH2 invert
Rise Time ... <10 ns; input R/C, 1 MΩ 20 pF
Max. Input ... 600V p-p or 300V p-p (DC + AC peak)
Channel Isolation .... >60 dB at 1 kHz, overshoot <3%

HORIZONTAL

Sweep Mode ... Auto., Trig., Single and Delay Sweep
Time Base ... 0.1 µs - 0.5s/Div, 21 ranges plus x5 mag.
Delayed Sweep ... delay time 100 ms −1 µs in 5 steps plus fine, delay jitter <1/5000

TRIGGERING

Sensitivity .. Int. 0.3 div/DC −5 MHz, 1.0 div/DC −35 MHz, 1.5 div/DC −5 MHz (x5); Ext: 50 mV p-p DC −5 MHz 0.2V p-p DC −35 MHz
Source ... Int. (CH1, CH2, ALT) Line. Ext. 1/10 Ext. +TV (Line, Frame)
Coupling .... DC, AC 20 Hz −35 MHz; HF
X-Y Oper. .... CH1 is X axis, CH2 is Y Axis, Horiz, Freq. DC-2 MHz
Intens. Mod. ... TTL (3V p-p) Positive Brighter DC −1 MHz, Max. input Z axis 50V
Calibration ... 0.5V p-p ±5%, 1 kHz sq. wave
Power . 100, 120, 220, 240V, 50/60 Hz, ~34W
Size/Weight ... 6⅜″ x 11½″ x 13¾″ (HWD), 17¾ Lbs.

WARRANTY: One Year Parts and Labor

ALL PRICES SHOWN SUBJECT TO CHANGE WITHOUT NOTICE. PRICES SHOWN ARE FOR QUANTITIES OF 1 TO 3 PIECES OF A TYPE, DISCOUNTS AVAILABLE FOR HIGHER QUANTITIES.

SEE OUR PAGES IN SECTION 2975

SOAR corporation

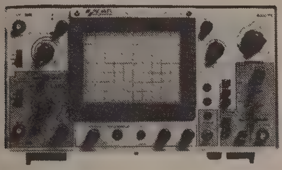
NORTH AMERICAN SOAR CORPORATION

1126 CORNELL AVENUE / CHERRY HILL, NEW JERSEY 08002 / PHONE: 609-488-1060
PROFESSIONAL ELECTRONIC INSTRUMENTS

50 MHz DUAL TRACE

MODEL MS-6050D

WITH TRIGGER DELAY



$875.

FEATURES

- 6″ metal backed mesh CRT with 15 kV PDA
- 50 MHz dual trace with variable trigger delay
- 1 mV/Div sensitivity thru 10 MHz/Div thru 50 MHz
- ~7 nsec risetime plus extremely bright trace ideal for working on logic (pulse) circuits, etc.
- Comes with two hook-on probes and spare fuses

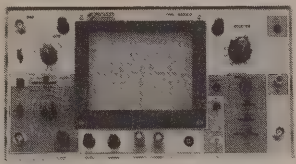
SPECIFICATIONS

CRT .... 6″ Flat-Face Metal-Back PDA (15 kV drive) Internal Grat.
Vertical .... Operating Modes: CH1, CH2, dual, add, chop (200 kHz) CH2, invert
Freq. & Deflect. ..... DC to 50 MHz (−3 dB); 5 mV to 5V/Div on 12 ranges; 1 mV to 1V/Div (5x gain) DC thru 10 MHz
Rise Time ... ~7 ns (<35 ns with 5x); Overshoot <3%; Input Z, 1 MΩ/20 pF ±3 pF
Max. Input V ... 600V p-p or 300V (DC + AC p-p); Channel Sep. >70 dB @ 1 kHz
Horizontal Sweep Mode .. Normal, Auto, Single, Delay
Time Base ..... 0.2 µs to 0.5s/Div, 20 ranges with x5 Mag, Linearity <3%
Delay Trig. .... Intend Switch for Setting Delay Time, Delay Switch Starts Sweep at Delay Time Selected, Delay Time 100 ms to 1 µs in 5 steps + fine.
Trigger Modes ... Int. CH1, CH2 Line, EXT. Plus TV-V/H, HF-REJ; Auto Free Run; + (−) Slope, X-Y or X-Y-Z
Sensitivity ... Int. <0.3 Div DC~10 MHz, <1 Div DC~50 MHz, <1.5 Div with 5x gain. (Triggerable~70 MHz) Ext. <50 mV p-p DC~10 MHz, <0.2V p-p DC~50 MHz
Other ... Single Sweep of Trigger Signal can be displayed
Int. Mode .... TTL Level (3V p-p) DC~1 MHz, Max. 50V
Power .... 120 or 240 ±10% 50/60 Hz Sw. Select.
Size/Weight ... 6⅜″ x 11½″ x 16¾″ (HWD), 21¼ Lbs.
Supplied with two hook-on probes, spare fuse, 3 cond. AC cord.

20 MHz DUAL TRACE OSCILLOSCOPE

MODEL MS-6022

(WITH BUILT-IN COMPONENT TESTER)



$599.

FEATURES

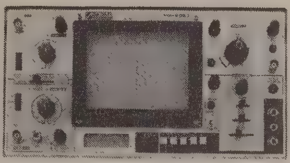
- Model MS-6022 has a special built-in circuit that allows testing single or multiple components in or out of circuit. This quick tracer technique displays unique component signature patterns on the scope CRT screen that indicates the components relative condition. Ideal for trouble-shooting in cold (no power) circuits.
- Large flat-face 6″ CRT with internal graticule, front panel trace rotator, 2 kV acceleration.
- CH2 invert, X-Y operation, Z axis intensity modulation, TV-V, H (Video) sync separator.
- Fully shielded switching regulator power supply for accuracy, high frequency filter in the trigger circuit.
- Smooth rolloff exceeding 20 MHz, triggers beyond 30 MHz.
- Comes complete with two 10:1 hook-on probes and spare fuses.

SPECIFICATIONS

Vertical Frequency & Deflection .. AC 10 Hz/DC to 20 MHz, 5 mV to 20V/div on 12 ranges. 1-2-5 step (−3 dB) [~28 MHz −6 dB]
Risetime .... ≤17.5 nsec.
Overshoot .... <3%
Modes .... CH1, CH2, DUAL, ADD, X-Y
Input Impedance .... 1 MΩ/20 pF ±3 pF
Max. Input .. 600V p-p or 300 VDC + peak AC
Chop Frequency .... 200 kHz
Channel Separation .... >60 dB at 1 kHz
Time Base ... Auto or triggered, in Auto Mode Trace is on without input signal.
Sweep Time ... 0.2 µsec to 0.5 sec/div on 20 ranges in 1-2-5 step, x5 Mag.
Linearity ....<3%
Triggering ..... Sensitivity Int. 1 div or more, Ext. 1V p-p or more, Source, Int., CH2, Line, Ext. Pos/Neg, pull for Auto range 20 Hz to >20 MHz; Sync AC, HF Rej, TV
Calibration .... 0.5V p-p ±5%, 1 kHz square wave
Power .... 120V/240V ±10%, 50/60 Hz
Size/Weight .... 6¼″ x 11½″ x 14″, 17 Lbs.

20 MHz DUAL TRACE with DMM

MODEL MS-6023



$699.

Model MS-6023 contains all the same oscilloscope specifications, features and size as the MS-6022 but includes a 3½ digit Multimeter. It is two instruments in one as they can operate independently or simultaneously in the same circuit. DMM has 3½ digit LCD readout and allows measuring AC/DC Volts from 1 mV thru 1000 Volts, AC/DC current from 1 µA thru 1 Amp. Resistance from 1Ω to 20 MΩ. Full overload protection all functions and ranges. Basic DCV accuracy ±0.5% ±2 digit.

NOTE:

All SOAR oscilloscopes are furnished with an instruction manual that contains a full schematic diagram, parts layout, parts list by generic part numbers and description, plus maintenance and calibration data.

WARRANTY: One Year Parts and Labor
ALL PRICES SHOWN SUBJECT TO CHANGE WITHOUT NOTICE. PRICES SHOWN ARE FOR QUANTITIES OF 1 TO 3 PIECES OF A TYPE, DISCOUNTS AVAILABLE FOR HIGHER QUANTITIES.
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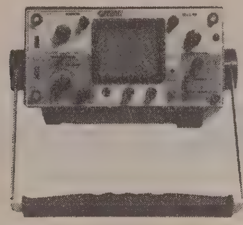
PROFESSIONAL ELECTRONIC INSTRUMENTS

15 MHz DUAL TRACE PORTABLE

MODEL MS-3015



$699.

FEATURES

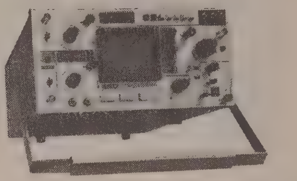
- 15 MHz dual trace with 2 mV/Div sensitivity
- Complete with built-in rechargeable battery, runs on external DC 11V to 30V (car or boat) AC 120/240 48-440 Hz
- Rect. 3½″ CRT with int. graticle and ext. trace rotate
- Full vert. input and trigger mode selection plus CH2 invert, X-Y, add, sub, auto-free run
- Comes with two 10:1 hook-on probes and spare fuse.

SPECIFICATIONS

Vert. Deflect. . . . 2 mV-10V/Div, 12 ranges in 1-2-5 step + fine
Bandwidth . DC or AC 10 Hz to 15 MHz (−3 dB)
Risetime . . . . 24 nsec overshoot <3%
Input Z . . . . 1 MΩ shunted by 20 pF ±3 pF
Modes . . . CH1, CH2, dual, add and chop (100 kHz Rate)
Channel Sep. . . . 60 dB at 1 kHz; CH2 can be inverted
Time Base . . . Auto. and trig.—in auto mode, sweep obtained without input signal
Sweep Time . . . . . 0.5 µsec to 0.5 sec/Div, 19 ranges in 1-2-5 step + fine and x5 mag.
Horiz. Deflect. . . . . DC to 1 MHz, input Z 1 MΩ shunted by 20 pF ±3 pF
Max. Input . . 600V p-p or 300V (DC + AC p-p)
X-Y Operation . . . . . Selected by Sweep Time/Div Switch CH1:Y, CH2:X axis
Trig. Sens. . . . INT: 1 Div or more, EXT: 1V p-p
Source . . . . INT, CH1, CH2 or EXT
Slope . . . Pos. and Neg. continuously variable, pull for Auto-Free Run
Range . . . . 20 Hz to 15 MHz
TV Sync . . . . TV-H (Line) TV-V (Frame) sync auto select by Sweep Time. Div switch TV-V: 0.5 sec/Div to 0.1 msec/Div TV-H 50 µsec/Div to 0.5 µsec/Div
Calib. V . . . . . 0.5V p-p ±5%, 1 kHz Sq. Wave
Power . . AC: 90-130V or 180-260V, 48-440 Hz DC: 11-30V, 7.2 VA Battery: Ni-Cad battery plus recharger built-in
Size/Weight . . . 4⅜″ x 8¾″ x 11¾″, 12¼ Lb.
CC3015 carrying case $65.00

15 MHz TRIPLE TRACE DIGITAL STORAGE OSCILLOSCOPE

MODEL MS-3020



$1995.

FEATURES

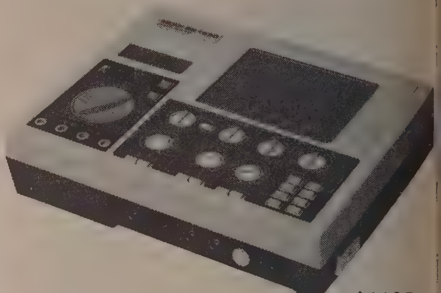
- Complete test system in one case — includes DMM with separate inputs, component test for resistors, caps, diodes, etc. in or out of circuit.
- Scope has trigger delay and single sweep with storage signal output X-Y + sync via rear BNC's.
- Small size shipped with two 10:1/1:1 scope probes, two DMM probes, spare fuse.

SPECIFICATIONS

Modes . . . . CH1, CH2, Dual, Add, Triple
Sensitivity . . . 5 mV to 20V/Div in 1-2-5 seq. 12 ranges for CH1, CH2; CH3 is 0.5V & 10V/Div in 2 steps no fine.
Bandwidth . . . . . DC or 10 Hz AC to ≥15 MHz Rise Time <24 nsec. overshoot <3% CH3 <10%.
Polarity Invert . . . . CH2 only, CH3 by slope
Chop Freq. . . . . 200 kHz.
Ch. Separation . . . >60 dB at 1 kHz, Max input 600V p-p.
Horizontal Modes . Auto, Norm, Delayed, Single
Sweep Time . . . . . 0.5 µsec to 0.5 sec/Div, 19 ranges, 1-2-5 seq. accuracy ±3%, 5X Mag., Lin <3%.
Delay Time . . . 100 msec to 1 µsec in 5 steps, Jitter 1:5k
Trigger Source . . . Int. CH2, Ext 1/1, Ext 1/20 Sensitivity >1 Div (20 Hz to 15 MHz), Ext 1V p-p Ext 1:20 (20V p-p or more), X-Y operation DC to 1 MHz (−3 dB)
Digital Storage . . . Memory 1024 words, speed 0.1 msec to 0.5 sec/Div in 12 ranges (1 µs to 5 ms/word)
AD Converter . . . Resolution 8 Bits (256), speed .1 µsec max, scale over Y Axis 8 Bit (256), Bandwidth DC or 10 Hz AC to 200 kHz.
Sweep Mode . . Auto, Triggered, Delayed, Single
DMM Section . . . AC/DC Volts, 1 mV to 1000V; AC/DC A, 1 µA to 1A; Ω, 1Ω to 20 MΩ.
Size & Weight . . . 10″ W x 5⅛″ H x 12¼″ D, ~13⅓ Lbs.
Power . . . 100/120/220/240V 50/60 Hz, 19w

DUAL TRACE LCD DIGITAL STORAGE OSCILLOSCOPE

MODEL 1000



$1195.

FEATURES

- Small size and weight can fit in a brief case for all on site analysis.
- Battery portable operation with memory so data can be remotely analyzed.
- Ideal for field service, design engineering, plant maintenance.

SPECIFICATIONS

Oscilloscope Section
General Display . . . LCD 128 x 160 Dot Matrix, 20480 Pixels (Dots) 0.55 sq. mm, 6″ x 7½″, 8 x 10 Div. with positive or negative display select and contrast adj.
Verticle . . . . CHA and CHB sensitivity 10 mV/Div~5V/Div in 1-2-5 sequence 9 steps. Freq. response DC or 10 Hz AC couple 20 mV~20 kHz, 50 mV~50 kHz, 0.1V~100 kHz, 0.2V~200 kHz, 0.5V~500 kHz
Horizontal . . . . Trigger Source Int (CHA/CHB) Ext, Coupling Int (AC or DC) Ext DC. Sensitivity 0.5 Div (Int) Sampling Freq. 8 MHz~10 Hz 18 steps. Display Mode . . Single, Normal, Auto., Trace Shift ±100, 75, 50, 25 (%)
Memory . . . . . . 1k Byte with battery back-up.
DMM Section . . . DCV . . . 0.1 mV to 1000V, 5 ranges ±0.5%; ACV . . . 1 mV to 750V, 4 ranges ±0.75%, 40~500 Hz.
DC/AC A . . . 0.1 µA to 10A, 5 ranges 0.75% and ±1%
Resistance . . . . . . 0.1Ω to 20 MΩ on 6 ranges ±0.5% Diode Test, Continuity Check
Size & Weight . . . . 10″ W x 7⅜″ D x 2⅞″ H, 3½ Lbs.
AC Adaptor . . . . Optional MQ-62, $12.00

WARRANTY: One Year Parts and Labor

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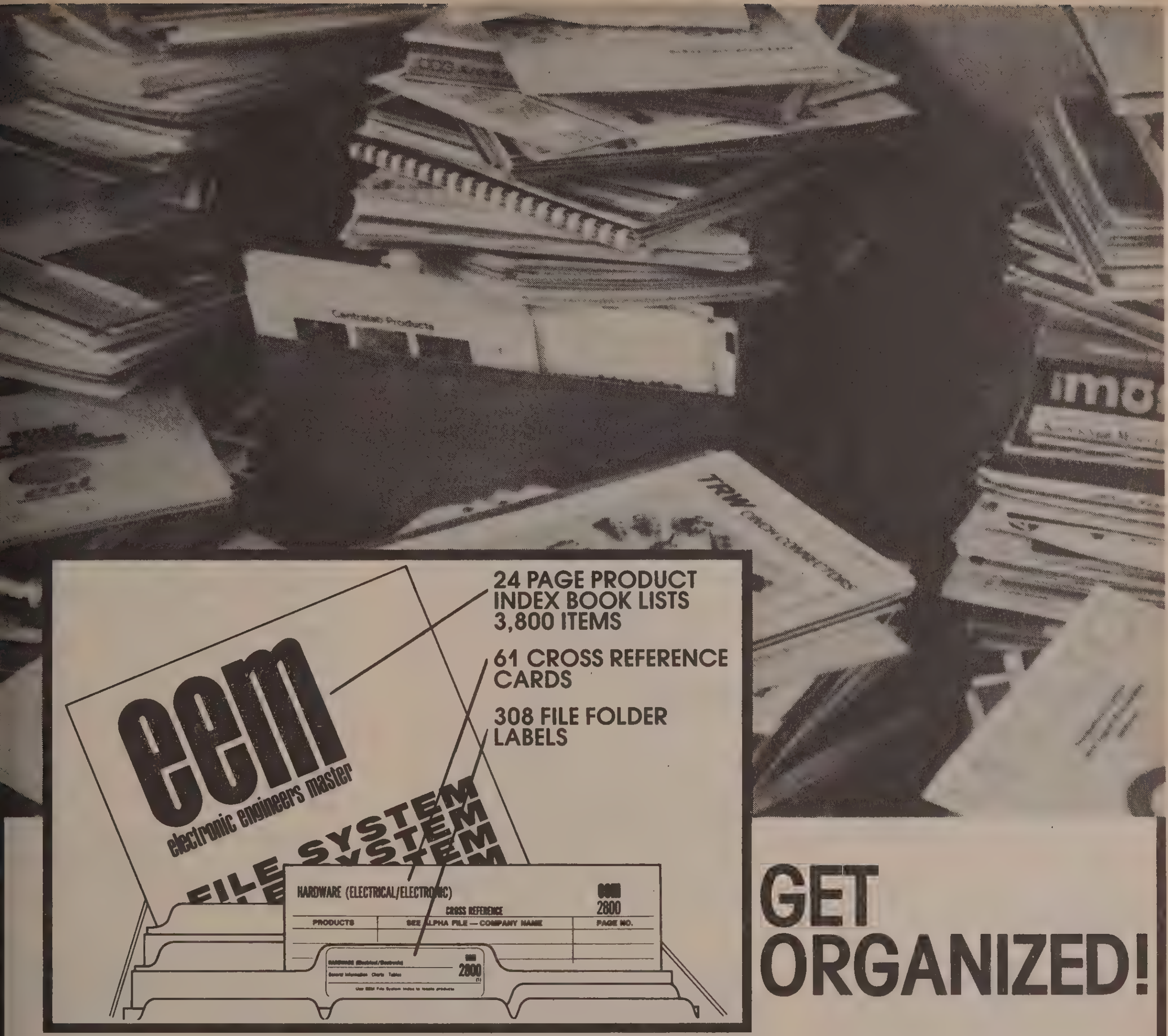
24 PAGE PRODUCT INDEX BOOK LISTS 3,800 ITEMS
61 CROSS REFERENCE CARDS
308 FILE FOLDER LABELS
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electronic engineers master
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HARDWARE (ELECTRICAL/ELECTRONIC)
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GET ORGANIZED!

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The EEM File System was invented over twenty-five years ago to help people who specify, buy, or work with electronic products and equipment. It is upgraded on a constant basis to reflect the current state of the art. It's easy to use and easy to customize to your particular needs.

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The EEM File System is shipped in one neat package. The package contains everything you need to set up your very own filing system. Best of all, it's easy to get and very affordable. Send a check or money order for $25.00 and EEM will pay the postage and sales tax. If you must use a purchase order, please add $5.00 for postage and handling. An invoice will accompany your System.

Don't waste any more time. Get organized now!

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645 stewart ave., garden city, ny 11530

TEK 2200 MULTI-PURPOSE OSCILLOSCOPES

THE PERFORMANCE/ PRICE STANDARD IN PORTABLE SCOPES.

The 2200 Series ushered in an innovative design concept that substantially lowered the cost of a Tek-quality scope.

Now Tek has improved its 2213/2215 scopes with brighter displays. Greater accuracy. And more sensitive triggering. At no increase in price.

There are over 25 specification and feature enhancements such as a 10 MHz bandwidth limit switch, improved CMRR and sweep accuracy. Plus TV line, true P-P auto and single sweep triggering.

Like other members of the Tek 2000 family, the 2200 Series offers the industry's first three-year warranty on all labor and parts, including the CRT. A variety of maintenance contracts, economically extending this coverage even further, are also available.

2213A

The 2213A is a 60 MHz, dual trace oscilloscope offering unprecedented value in both initial and life cycle costs. With single time base delay, the 2213A provides intensified and delayed sweep at a low cost. An ideal choice for general purpose applications, the 2213A is also well-suited for use in education. The 2213A works anywhere in the world, thanks to a high-efficiency power supply that has eliminated the need for line switches, and even made a cooling fan unnecessary.

60 MHz bandwidth.
5 ns/div sweep speed.
2 mV/div sensitivity.
Dual trace.
Delayed sweep.
CMRR of 10:1 at 25 MHz.
Horizontal operating modes: A, A intensified after delay, delayed.
Delay times: <1.0 μs, 20 μs, and 0.4 ms with 50:1 multiplier.
X-axis bandwidth: 2 MHz; phase difference is 3° from dc to 100 kHz.
Z-axis input.
Trigger sensitivity from 0.3 division at 5 MHz to 1.0 divisions at 60 MHz.
Triggering features include TV field, TV Line, P-P Auto, Single Sweep, alternate channel, and position independent triggering.
5.8 kg (12.8 lbs).
3 year warranty.

2215A

Like the 2213A, the 2215A provides excellent performance in a small, lightweight package of just 6.1 kilograms (13.5 lbs). In addition to all the features of the 2213A, the 2215A adds dual time base performance with alternate sweep switching. From design to testing, if you need an accurate scope with a broad range of features at a surprisingly affordable price, look into the 2215A.

60 MHz bandwidth.
5 ns/div sweep speed.
2 mV/div sensitivity.
Dual trace.
Delayed sweep.
CMRR of 10:1 at 25 MHz.
Horizontal operating modes: A, alternate (A intensified by B and B), B.
Delay jitter is 20,000:1 (0.005%) of maximum available delay time.
X-axis bandwidth: 2 MHz; phase difference is 3° from dc to 100 kHz.
Z-axis input.
Trigger sensitivity from 0.3 division at 5 MHz to 1.0 divisions at 60 MHz.
Triggering features include TV field, TV Line, P-P Auto, Single Sweep, alternate channel, and position independent triggering.
Trigger after delay.
Calibrated delay time dial.
Alternate time base.
6.1 kg (13.5 lbs).
3 year warranty.

2235

The 2235 offers the highest value combination of measurement quality and affordability at 100 MHz. Features like rugged design, light weight,

2213A
2215A

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TTA-455

THE PERFORMANCE/
PRICE STANDARD

easily learned front panel, plus 2% vertical and horizontal accuracy make the 2235 an ideal service scope. For both service and design applications the 2235 offers a low-noise, low-drift, high sensitivity vertical system that improves display quality and makes your measurements easier and more accurate.

In production and test applications, features like the beam finder and separate A and B intensity controls, peak-to-peak auto triggering, and vertical mode triggering make the 2235 easy to use.

100 MHz bandwidth.
2 channels plus trigger view.
5 ns/div sweep speed.
2 mV/div sensitivity.
2% vertical and horizontal accuracy.
CMRR of 10:1 at 50 MHz.
20 MHz bandwidth limit on vertical channels and triggering system.
Input R and C: 1 MΩ, 20 pF.
Horizontal operating modes:
A, alternate (A intensified by B and B), B.
Delay jitter is 20,000:1.
Full sensitivity X-Y measurements with X-axis bandwidth of 3 MHz, ±3% accuracy.
Chop rate: 500 kHz.
Differential time measurement accuracy: ±1%.
Z-axis input useable to 20 MHz.
Trigger sensitivity from 0.3 division at 10 MHz to 1.5 divisions at 100 MHz.
Triggering features include P-P auto, TV line, TV field, Normal, Single Sweep and bandwidth-limited modes.
6.1 kg (13.5 lbs).
3 year warrant.

2236

The 2236 100 MHz measurement system with integrated counter/timer/DMM

The first scope to make counter/timer/DMM-type measurements through the scope system, the 2236 makes possible consolidated set-ups and combinations of measurements that have never been possible before. Gated counter measurements, for example, can be made via the B trigger with automatic, digital readout of results. You also get direct digital readout of frequency, period and Δ-Time measurements with accuracies to 0.001%. The fluorescent display also provides user prompts to further simplify operation. Its productivity advantages extend from routine service to complex design tasks.

All 2235 features, plus:
Direct frequency and period measurements from 0.2 Hz to 100 MHz.
Direct width measurements from 5 ns to 5 seconds.
Direct totalizing to 2^{23}—1 events.
Triggered and non-triggered delay time and Δ-Time measurements.
Frequency and time measurements are auto-ranged and auto-averaged for best resolution.
100 MHz counter time base yields time resolution to 10 ps and frequency resolution to 10 μHz with averaging.
±5000 count DMM measures voltage through Ch 1 input: dc to 0.3%, ac true rms 1.0%, 0.4999 V to 49.99 V (499.9 V with 10X probe) full scale.
Floating, auto-ranged voltage measurements through side inputs: dc to 0.1%, ac true rms to 1.0%, 0.4999 V to 499.9 V full scale (349.9 V in RMSV).
Floating, auto-ranged resistance measurements: 0.01 Ω to 1.99 GΩ with automatic diode detection.
Audible continuity test.
Temperature measurements with optional P6602 probe.
7.4 kg (16.3 lbs).
3 year warranty.

To learn more, contact your local Tek Sales Engineer. Or call the Tek National Marketing Center, toll free.

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COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

OSCILLOSCOPE PROBES AND ACCESSORIES

TEST PROBES, INC. TPI
P.O. Box 2113, La Jolla, CA 92038 Tel. (619) 459-4197

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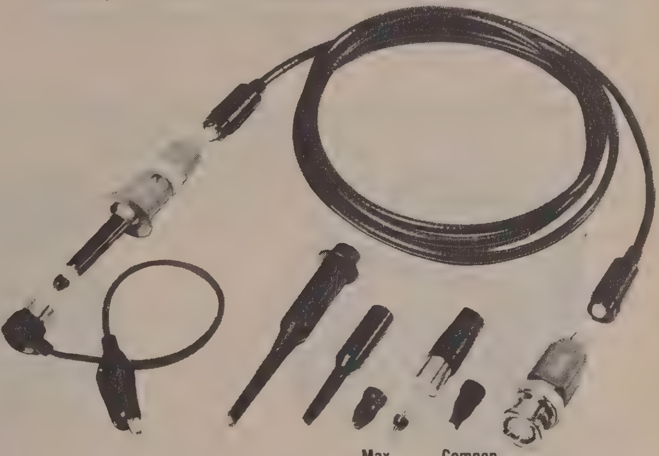
Modular Oscilloscope Probes



- ☐ *Use with any scope*
- ☐ *Inexpensive repair – cable, BNC and probe head screw together in seconds*
- ☐ *Save to $50 per probe*
- ☐ *X1, X10, X100 attenuation and switchable X1-X10*
- ☐ *Bandwidths to 300 MHz*
- ☐ *Optional actuator pin for scopes with readout*
- ☐ *Pencil slim heads*
- ☐ *Slender, flexible cable*
- ☐ *Pictured accessories included*

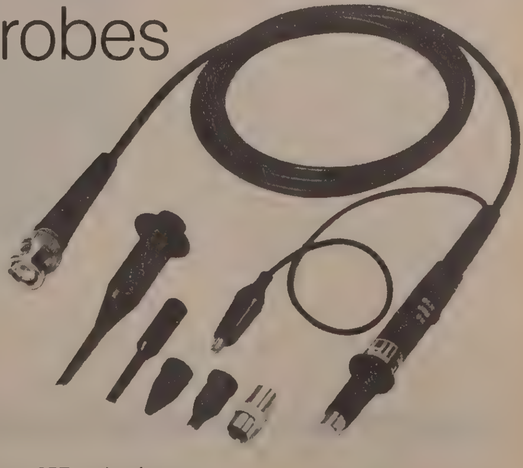
The only line of modular, repairable probes other than Tektronix. Wide compensation ranges allow TPI probes to adapt to HP, Philips, Tektronix, Hitachi, Kikusui, B&K and all other makes. Risetimes of 1.2 and 1.4 nanosec. with less than 3% overshoot assure precise signal transfer. Repair requires no soldering so it can be done on site. Cable, tip, head, and BNC all screw together for more secure attachment than snap-on. For very fast signals an optional probe tip accessory gives essentially zero-length ground lead. Models with READOUT have an Activator Pin in the BNC connector to automatically indicate X10 deflection factor on scopes with knob skirt or CRT readout feature.

OPTIONAL ACCESSORY
Probe-tip Ground, Spring loaded

Part No. 121598 .... $5.00

Model	Atten.	Cable Length	Input Impedance R	Input Impedance C	BW	Max. Input V DC + Peak AC	Compensation Range	Readout	Price
M12X1	X1	1.2m	1MΩ	45pf	30MHz	600V			$36.00
M20X1		2.0m		75pf					42.00
M30X1		3.0m		105pf					48.00
M12X10	X10	1.2m	10MΩ	16pf	250MHz	600V	10-60pf	NO	59.00
M20X10		2.0m		25pf	250MHz				65.00
M30X10		3.0m		28pf	150MHz				71.00
M12X10AP	X10	1.2m	10MΩ	16pf	250MHz	600V	10-60pf	YES	65.00
M20X10AP		2.0m		25pf	250MHz				71.00
M30X10AP		3.0m		28pf	150MHz				77.00
M15X10HF	X10	1.5m	10MΩ	16pf	300MHz	600V	10-60pf	NO	75.00
M20X10HF		2.0m		23pf					81.00
M30X10HF		3.0m		25pf					87.00
M12X10HFAP	X10	1.2m	10MΩ	16pf	300MHz	600V	10-60pf	YES	81.00
M20X10HFAP		2.0m		23pf					87.00
M30X10HFAP		3.0m		25pf					93.00
			X1 X10	X1 X10	X1 X10				
M12SW	X1-X10 SWITCHABLE	1.2m	SAME AS SCOPE 10MΩ	40 18	10 250	600V	10-60pf	NO	69.00
M20SW		2.0m		70 19	5 100				75.00
M30SW		3.0m		70 20	5 100				81.00
M15X100	X100	1.5m	100MΩ	6.5pf	250MHz	1200V	15-50pf	NO	89.00
M20X100		2.0m		7.5pf					95.00
M30X100		3.0m		7.5pf					101.00
M12DM	RF Detector Probe—New Item. Contact factory for specifications								69.00
M20DM									75.00
M30DM									81.00

Monolithic Oscilloscope Probes



- ☐ *Least expensive quality probes*
- ☐ *For all scopes to 100 MHz*
- ☐ *10-60 p.f. compensation range*
- ☐ *Slender, very flexible cable*
- ☐ *Break resistant center conductor*
- ☐ *Sharp, heavy duty tip*
- ☐ *Pictured accessories included*

odel	Atten.	Cable Length	Input Impedance[1] R	Input Impedance[1] C	Input Impedance[1] BW	Max. Input V	Compensation Range	Readout[2]	Price
P20	X1	1.5m	10MΩ	47pf	100MHz	600V	10-60pf	NO	$27.00
100	X10	1.5m	10MΩ	15.7pf	100MHz	600V	10-60pf	NO	36.00
P100		3.0m		16pf				NO	52.00
100AP		1.5m		15.7pf				YES	49.00
			X1 X10	X1 X10	X1 X10				
P100	X1-X10 SWITCHABLE	1.5m	1 10	Same as Scope 6.5	10 100	600V	10-60pf	NO	41.00
SP100		2.0m	1 10	7.5					47.00
SP100		3.0m	1 10	8.5					57.00

With oscilloscopes having 1 Mohm 30 pf inputs

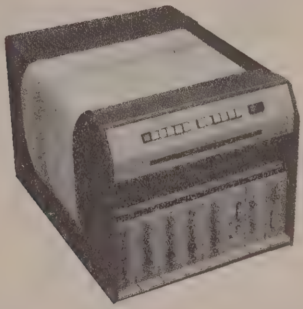
2. Automatic scale factor for scopes with knob skirt or CRT readout feature

Gould... Innovation and Quality in Instrumentation.

The Complete Line of Recording Systems.

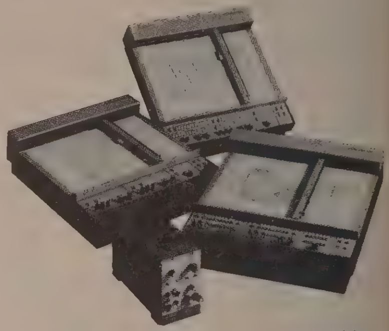
Gould offers a complete line of instruments and systems for test and measurement applications that require the highest precision, sensitivity and accuracy.

The product line includes computer-based data acquisition systems, high speed waveform recorders, and general purpose oscillographs with plug-in amplifiers. In addition, Gould also offers a complete line of X-Y recorders, digital plotters, electrostatic recorders and tape recorders.

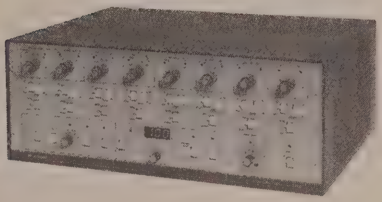


Gould ES 1000B. Electrostatic analog recorder automatically makes preprogrammed chart notations. To 16 channels, 40 μs transient response.

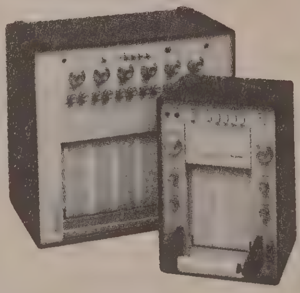
DASA 9000. Gould's new data acquisition system is an IBM PC® based system. It gives you the power of a computer with the simplicity of an instrument.



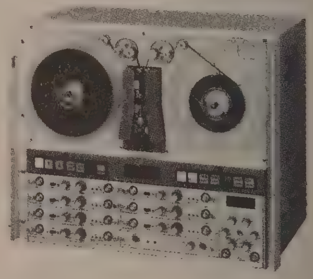
Gould X-Y recorders. Fast, sensitive response for comparing two analog variables. Digital plotters for computer-generated graphics.



The Gould 4300 brings affordable digital storage power to a broad range of waveform recorder applications. It can drive any IEEE 488 compatible output device.

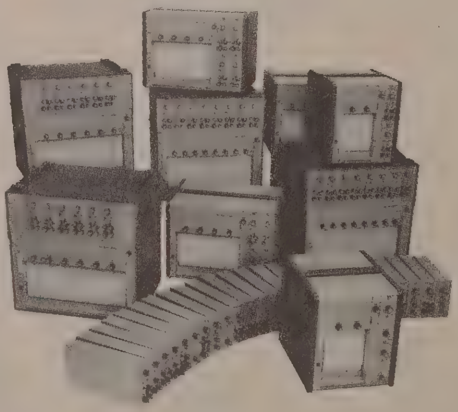


Accuracy, dependability and economy are made portable in Gould's 220 two-channel and 260 six-channel recorders.



Gould portable tape recorders feature plug-in 7 instrument-function calibrator plus rugged, compact, modular construction.

The Gould 2000S direct-writing recorders are a truly superior line of measurement instruments, with frequency response to 160 Hz and 99.65% linearity. 40, 50 and 100 mm channels. Thermal or pressurized fluid. Full line of more than 30 signal conditioners for maximum measurement flexibility. Chart edge annotation and stack to stack charts are available in some versions.



With service locations throughout the world, Gould provides you with a level of service that matches the high quality and precision of your Gould instrument.

For more information on products and service, contact Gould Inc., Recording Systems Division, 3631 Perkins Avenue, Cleveland, Ohio 44114 (216) 361-3315.

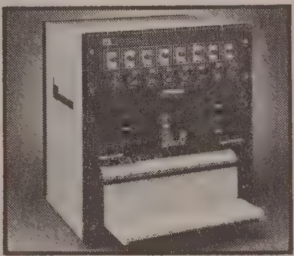
GOULD
Electronics

graphic recorders-3000

Manufacturer	EEM Page No.	No. of Channels	Oscillographic	Strip Chart	X-Y Plotter	Event Multi-event	Computer Data	Transient	Thermal	Other Types
Astro-Med	3•1382	1-8		●		●		●	●	Battery operated field recorder; Digital recorder
Chessell Corp.	3•1383	1-6		●		●	●	●		
Gould	3•1384	1-16	●	●	●	●	●	●	●	Magnetic Tape
Linseis, Inc.	3•1385	1-12		●	●	●	●		●	Linear Array Penless
Omega Engineering	3•1386	Ask Mfr.		●			●		●	Laboratory Recorders
Primeline	3•1387	1-25		●	●	●		●		Oscilloscope Camera
Soltec Corp.	3•1388	1-16	●	●		●		●	●	Portable light-beam
	3•1389		●	●	●	●		●	●	Oscillograph

There's an Astro-Med OEM recorder for every medical, scientific and industrial application.

WORLD-CLASS 8-CHANNEL RECORDER



The ZF-8000, offered with 8 or 6 channels, features a full range of computer interfaces. Point writing, Z-fold charts, and more than 743 precise speeds. Prints date, time and chart speed. Plug-in signal conditioners. Ideal for aerospace, medical, scientific and industrial uses.

1-CHANNEL PHYSIOLOGICAL/LAB RECORDER

WORLD'S ONLY TRUE FIELD RECORDER

THE INTELLIGENT 4-CHANNEL RECORDER

The Z-1000 1-channel physiological / lab recorder. Superb point writing. Battery/AC power with more than 40 chart speeds. Convenient Z-fold chart presentation. Use it for a wide variety of physiological recording applications.

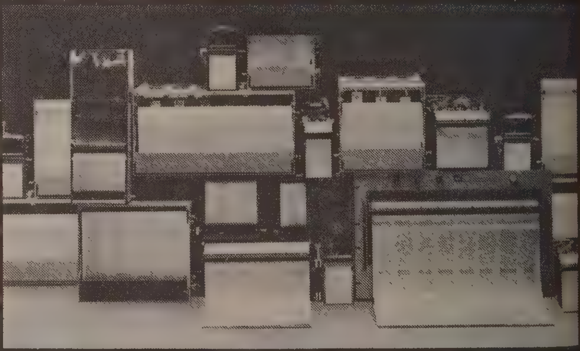
The Dash II 2-channel field recorder. Reliable under the most brutal conditions. Battery/line power. Supplied complete with compact, sturdy carrying case. Acknowledged by industry as the standard for field testing.

The versatile Dash IV 4-channel recorder. Small and lightweight, but packed with advanced technology. Automatic date, time, and chart speed printing. More than 40 microprocessor-controlled chart speeds. Plug it in and put it to work anywhere.

All Astro-Med recorders feature position feedback galvanometers with more than 99% accuracy, DC to 125 Hz response, and reliable low-cost thermal writing. All Astro-Med recorders are produced at our plant in West Warwick, R.I., U.S.A.

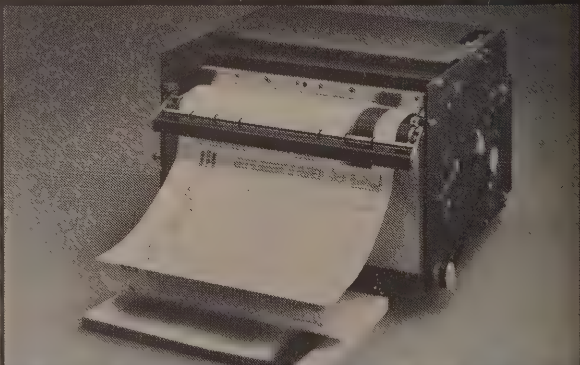
OEM recorders

Astro-Med is the world leader in the design, manufacturer and sales of OEM graphic recorders. We have a model to meet your every need: 1 through 8 channels. Configurations to meet all requirements. A wide range of electronically-selected chart speeds; fast snap-in or cartridge chart loading. Knife edge or point writing. Roll type or Z-fold chart handling. Thermal printers and event markers are standard options.



Astro-Graph ™ digital recorder

The Astro-Graph—the world's first high speed, high resolution direct writing digital recorder that produces waveforms, line printing and graphics in a single instrument with no moving parts. Under control of the operator, copyrighted softwear permits these three data formats to be recorded separately, or in any combination or sequence. An obvious low-cost replacement for electrostatic recorders and photographic oscillographs.



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Telephone (401) 828-4000 TWX No. 710-382-6409

THE *Super* SERVO RECORDERS

Engineering Excellence—continuous-trace recording in compact, modular construction . . . many field-retrofittable options.

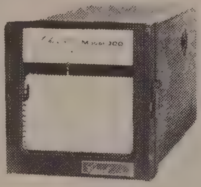
Custom Design— unique recorders for special applications . . . oil drilling, energy management, traffic census, and many more.

Flexibility—built to the user's specifications . . . over 4,000 dedicated input conditioning modules available.

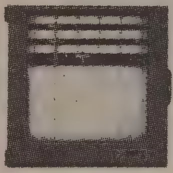
Reliability— over 100,000 product installations world-wide . . . Chessell's reputation of excellence is second to none.

4 in. INDUSTRIAL RECORDERS

MODEL 300—single channel, single speed, with choice of 3 writing systems: capillary pen, disposable cartridge or electric writing . . . roll or Z-fold charts . . . choice of chart speed . . . linearized plug-in signal conditioners for mA, A, mV, V, T/C's, RTD's, etc. . . . Panel cutout: 5½″ square. Power req: 115/230V, 50 or 60Hz, 8VA.


Model 300 Single Pen

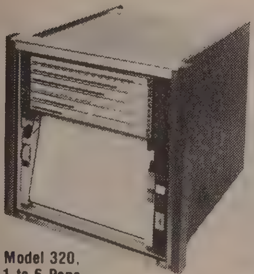
MODEL 301 – similar to Model 300 but available with up to 3 over-lapping pens, also more versatile & expandable. Additional channels or options easily added by the user. Typical options: chart annotation (time, date, chart speed and range), alarms, event marker, 10-speed chart drive.


Model 301
with 1, 2 or 3 Pens

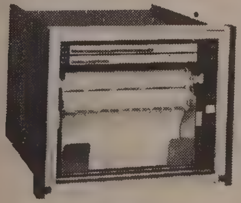
MODEL 306 — six channel, six color multipoint recorder with alphanumeric printing of scale data, chart speed, day number and time. Accepts up to three independent, linearized signal conditioners assignable to any channel. Records on standard linear chart. Continuous analog printing of alarm set points.

Model 306
Multipoint Recorder

10 in. INDUSTRIAL RECORDERS


Model 320,
1 to 6 Pens

MODEL 320—multi-channel unit with up to 6 overlapping traces . . . color-coordinated moving ribbon indicators give high readability . . . swing-out chassis gives instant access to plug-in modules, pen servos, chart drive, test & calibration sockets.
Input Modules: each channel requires a dedicated single range unit or multi-range module.
Writing System: capillary ink or disposable cartridge
Charts: roll or Z-fold
Chart Drive: 10-speed, high or low ranges
Panel Cutout:approx. 14½″ W x 15″H
Typical Options: alarms, event markers, retransmission signal, remote control.

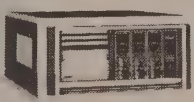

Model 321,
1 or 2 Pens

MODEL 321—similar to the Model 320 in low profile case (cut out 14½″ W x 12″ H) and accepts either one or two pens. (Specifications same as for Model 320.)

EUROTHERM
INTERNATIONAL
GROUP

LABORATORY RECORDERS

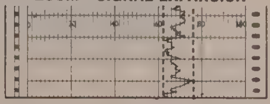
100mm Precision Recorders . . . better than 0.01% resolution

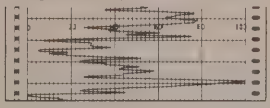

Model 3003
with 100 mm chart,
1 to 3 pens

MODEL 3003—a unique "zoom" facility expands and normalizes any signal to provide a frame-filled calibrated presentation . . . lets the signal fill the chart, giving a 10 meter effective chart width in a 100 mm (4 in.) recorder with 1, 2 or 3 channels. (Each channel requires a plug-in signal conditioning module.)

Much more than a recorder, Model 3003 is a precise, absolute, diagnostic **measuring** instrument for the laboratory. Multi-range signal conditioning modules give digitally selectable span from 1mV to 99.9V, in 4500 steps, and zero offset up to 100 times the span, in either direction.

"ZOOM" SIGNAL EXPANSION

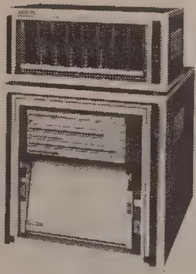

Original trace: span 10 mV, no offset


Expanded trace: span 1.37 mV, 6.2 mV offset

The 3101 multi-range module provides normalizing without calculations. It can expand a small field of interest to a full scale presentation.

Signal conditioning: Choice of multi-range 'scale expander' module, Type 3101, or single-range module, Type 3102.
Writing system: Choice of capillary ink, disposable cartridge or electric-etch systems.
Chart: Ruled width, 100mm. Choice of roll or Z-fold format (interchangeable cassettes). Z-fold not available with electric-etch.

Chart speed: 10-speed electronic drive, from 60 cm/min to 10 cm/hr (other drives available).


Model 3026
with 250 mm chart,
1 to 6 pens

Special ultra-high resolution recording systems, and multi-channel signal conditioners can be assembled to meet critical requirements.

250mm Precision Recorder . . . better than 0.005% resolution

MODEL 3026—the same signal conditioning modules used in the Model 3003 are also used in this 250 mm (10 in.) recorder—available with up to 6 overlapping traces.
Signal Conditioning: same as Model 3003
Writing System: capillary ink or disposable cartridge
Chart: Ruled width, 250mm. Choice of roll or Z-fold format (interchangeable cassettes). Extra-long roll-feed cassette, available with one or two channel versions only, gives large, 250x250 mm viewing area.
Chart speed: 10-speed electronic drive, from 60 cm/min to 10 cm/hr (other drives available).
Typical Options: (refer to the Model 320 in the adjacent column.)

Chessell

CHESSELL CORPORATION / Penns Trail
Newtown, PA 18940 / Phone: (215) 968-0660

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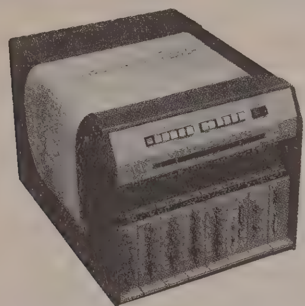
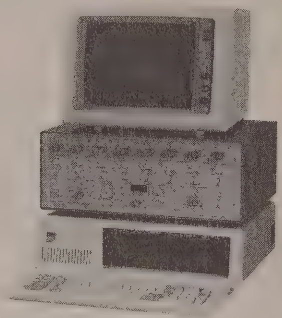
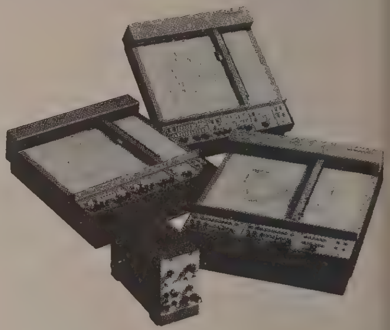


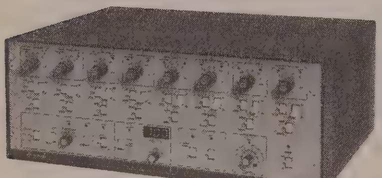
Gould ES 1000B. Electrostatic analog recorder automatically makes preprogrammed chart notations. To 16 channels, 40 μs transient response.



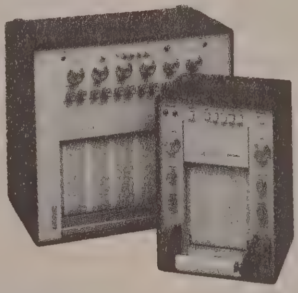
DASA 9000. Gould's new data acquisition system is an IBM PC® based system. It gives you the power of a computer with the simplicity of an instrument.



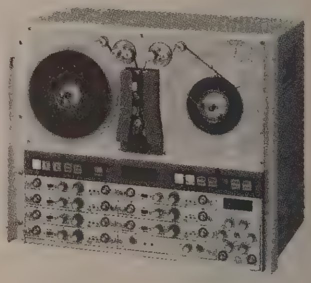
Gould X-Y recorders. Fast, sensitive response for comparing two analog variables. Digital plotters for computer-generated graphics.



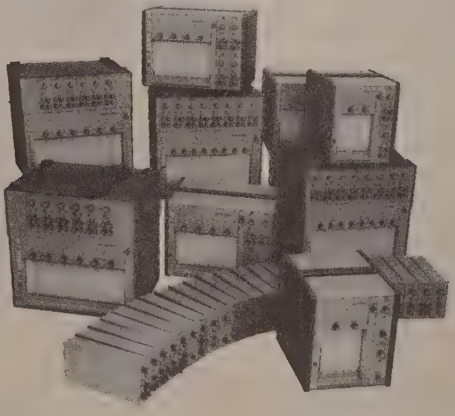
The Gould 4300 brings affordable digital storage power to a broad range of waveform recorder applications. It can drive any IEEE 488 compatible output device.



Accuracy, dependability and economy are made portable in Gould's 220 two-channel and 260 six-channel recorders.



Gould portable tape recorders feature plug-in 7 instrument-function calibrator plus rugged, compact, modular construction.



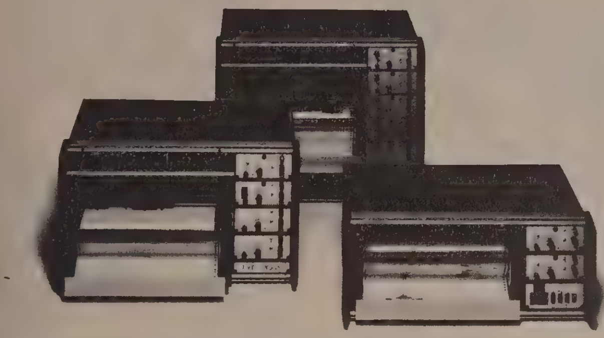
The Gould 2000S direct-writing recorders are a truly superior line of measurement instruments, with frequency response to 160 Hz and 99.65% linearity. 40, 50 and 100 mm channels. Thermal or pressurized fluid. Full line of more than 30 signal conditioners for maximum measurement flexibility. Chart edge annotation and stack to stack charts are available in some versions.

With service locations throughout the world, Gould provides you with a level of service that matches the high quality and precision of your Gould instrument.

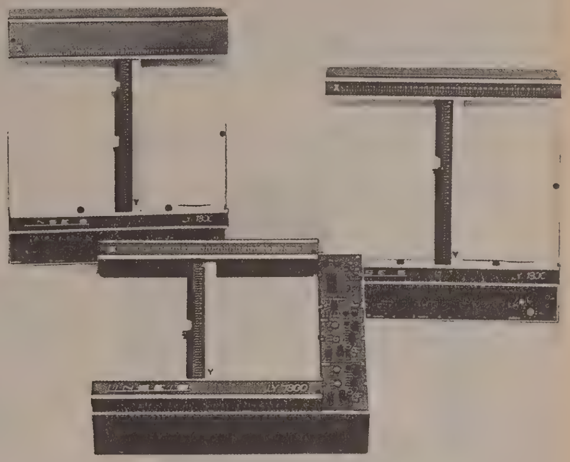
For more information on products and service, contact Gould Inc., Recording Systems Division, 3631 Perkins Avenue, Cleveland, Ohio 44114 (216) 361-3315.

GOULD
Electronics

The Recorder Company Presents:

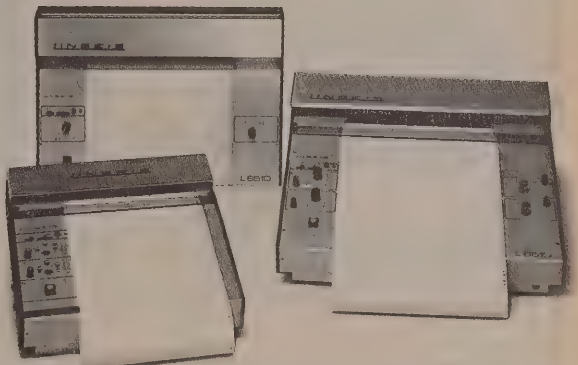


L 2005 1 – 6 Channel Rackmountable Recorders
Microprocessor-controlled data synchronization of the time delay between channels available, 42 different input modules, RS-232 Interface optional

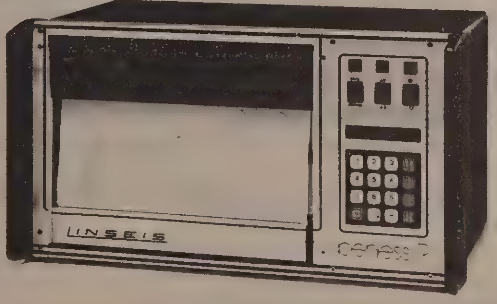


XY Recorders
Two sizes 8 ½ x 11" and 11 x 17", XY and XYY models, optional paper take-up mechanism for continuous paper feed

1 – 6 Channel Flat-bed Recorders
Retrofittable due to modular construction, input modules for voltage, current, resistance, and temperature measurements



Compact Flat-bed Recorders
Our economical recorder line, 120, 200 or 250 mm chart widths, voltage and temperature inputs



Linear Array Penless Recorder
Microprocessor-controlled linear array print head, printing without moving parts, 4 analog channels, automatic parameter documentation on chart, no dead band, no overshoot

LINSEIS
LP 12

12 Channel Multiplexing Point-printing Recorder
12 independently programmable input channels, voltage, current, and temperature measurements

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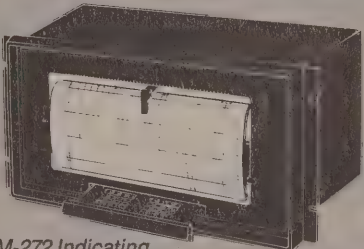
RECORDING INSTRUMENTS

For Temperature, Pressure and Strain



OM-272 Indicating, Programmable Data Logger

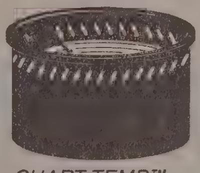
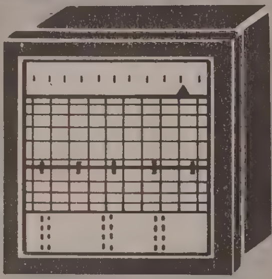
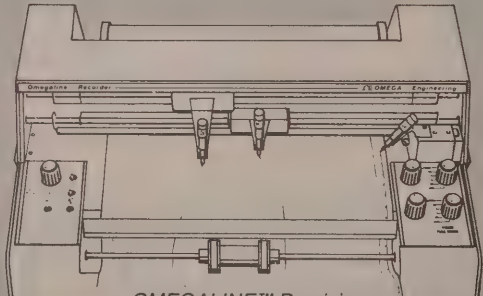


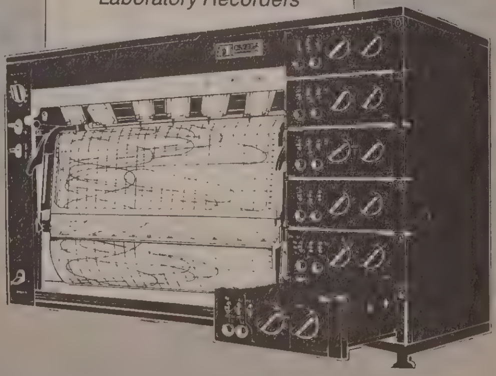
CHART TEMP™ Self Contained Multi-Day Recorder



180A Series Precision Temperature Process Recorders


Omegaline Recorder
OMEGA Engineering

OMEGALINE™ Precision Laboratory Recorders



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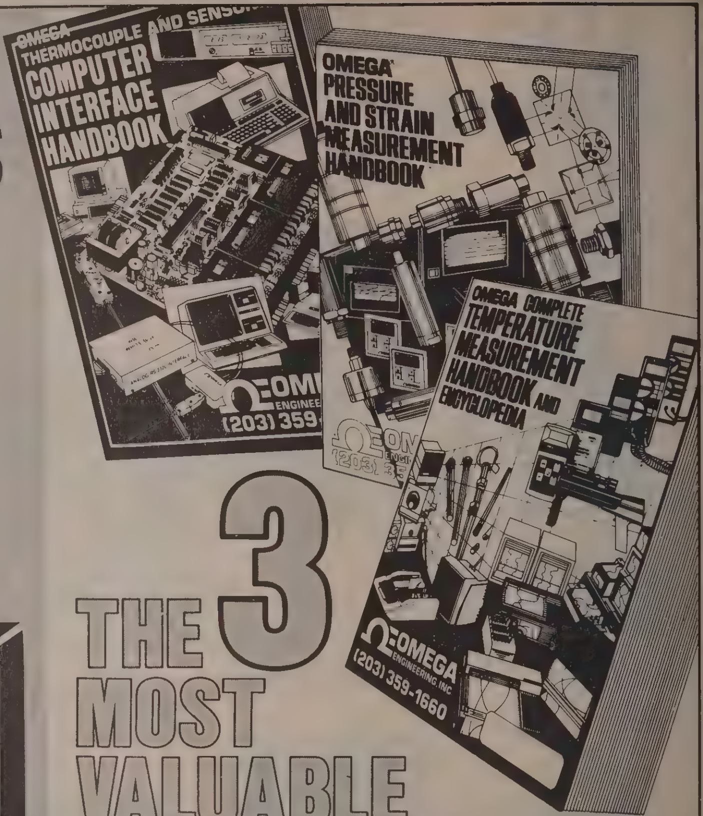
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RECORDERS

ECONOMY 1,2 & 3 PEN FLATBED

R-0X series feature 24 inputs per channel (pen), 1mV to 200V full scale; quartz digital chart drive system from 1cm/hr to 60cm/min; CMRR 140dB AC/160dB DC; remote controlled event marker, pen lift, chart start/stop and chart drive; 0-1V monitor output per channel; 100% zero suppression; disposable pens and 250mm chart width.

X-Y WITH TIME SWEEP

RW-21T (8½x11″) DIN A4 & RW-201T (11x17″) DIN A3 models include built-in time sweep with 12 speeds from 0.1 to 500sec/cm, inputs with 18 ranges from 0.5mV/cm, a vernier and ±100% zero adjust. CMRR 140dB AC/160dB DC. Pen speed is greater than 1200mm/sec! Electrostatic chart hold with two LED lights on platen assist in paper alignment. Optional roll chart adapter.

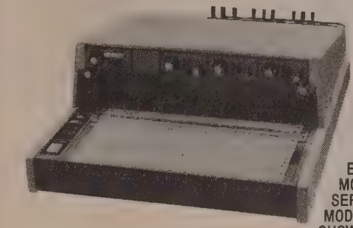
RACKMOUNT/FLATBED 1-10 PEN MODULAR/EXPANDABLE

R-300 series: up to 8 pens f.s. for 19″ rack or desk use. R-50 flatbed series: up to 10 pens f.s. All pens overlap/write 250mm f.s. Standard: Z-fold or roll charts; disposable pens; 24 chart speeds, 2cm/hr to 120cm/min; 32 DC voltages from 0.5mV to 50V f.s.; 10mV internal cal and 1600mm/sec pen speed. Plug-in module choices: DC voltage/current, linearized thermocouple/RTD, strain, AC voltage and auto zero/attenuator. Options include upper/lower limits, GP-IB and pen gap compensation.

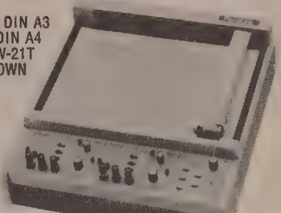
PROCESS 1 & 2 PEN, 6-POINT, MODEL 8800 SERIES (Not Shown)

Available in 144x144mm panel mount configuration. Features include basic 10mV sensitivity, modular construction, disposable pens, full scale accuracy of ±0.5%, light weight and low cost. Options include high/low alarms and 52 different plug-in input cards to record voltage, current and temperature.

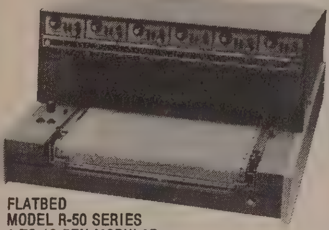
STRIP CHART & X-Y RECORDERS



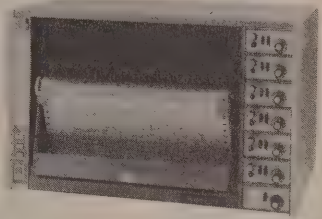
ECONOMY
MODEL R-0X
SERIES
MODEL R-03
SHOWN



X-Y DIN A3
AND DIN A4
MODEL RW-21T
SHOWN



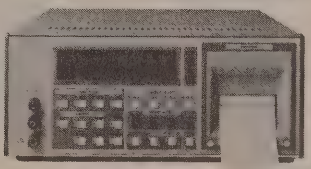
FLATBED
MODEL R-50 SERIES
1 TO 10 PEN MODULAR
MODEL R-56 SHOWN



RACKMOUNT/TABLE-TOP
1-8 PEN R-300 SERIES
MODEL R-306 SHOWN

25 CHANNEL DATA LOGGER

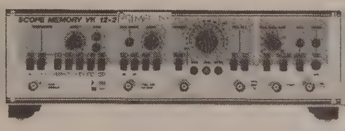
Multi-logging meter is compact, intelligent and portable. A 1-channel base unit with plug-in 3, 12 or 24 channel scanners provides up to 25 channels of voltage, resistance, linearized thermocouple and RTD inputs. An LED readout and tape printer are standard. Optional GP-IB and RS-232.



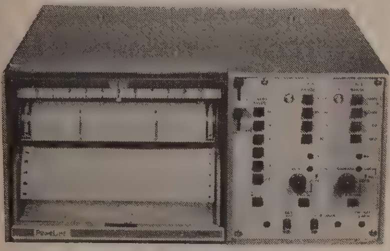
MODEL AD-5312 SHOWN

DIGITAL STORAGE/ SCOPE MEMORY

MODEL VK12-2 SHOWN



VK12-2 is a single channel, analog signal recorder with a 2MHz sampling rate. 2K bytes of memory stores analog data samples with 8 bit resolution. D/A converter reconstructs the stored digital data to an analog signal for output and display on all oscilloscopes and strip chart recorders. Manual memory scroll for expansion/compression of display. Ganged units simultaneously store data from common trigger. BCD is standard, GP-IB optional.



2 PEN AC/DC PORTABLE

MODEL 6723
SHOWN

- AC/DC or internal battery
- Lightweight, 13 lbs
- 120mm chart width
- Long life disposable pens

Compact 2-pen features multiple power input modes: 115V, 50-400Hz, internal D-cell battery operation using internally rechargeable Ni-Cad or disposable batteries, external 12VDC or 28VDC. 8-calibrated ranges, 10mV to 100V with internal calibrator. 12 chart speeds. Weight: 13 lbs with batteries. Also available as Model 4201 and 4202 single and 2-pen AC only versions.

MODEL 7000 SHOWN

LOW COST OSCILLOSCOPE CAMERA

Model 7000 camera is designed for use with any oscilloscope and most logic analyzers. Can be hand held or mounted directly to oscilloscope/ analyzer CRT bezel. Direct bezel mount features both left and right swing away. Controls include f3.5 to f32 and 1 second to 1/125th second with bulb. Uses standard Polaroid® color/B&W eight exposure film packs.

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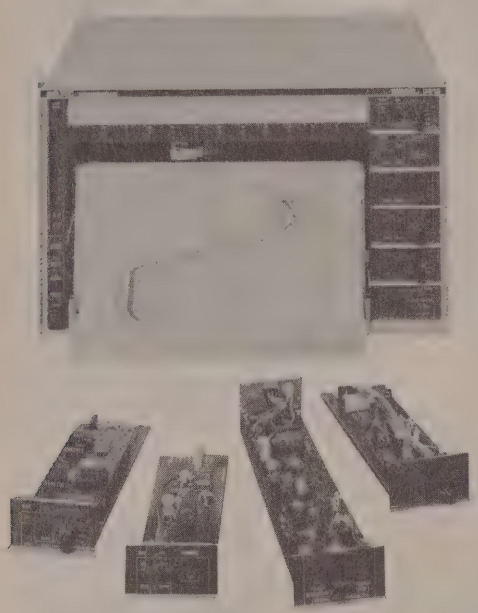
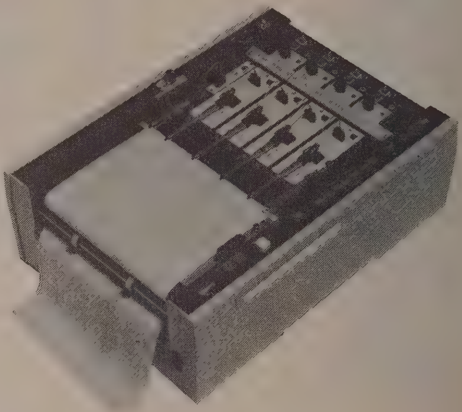


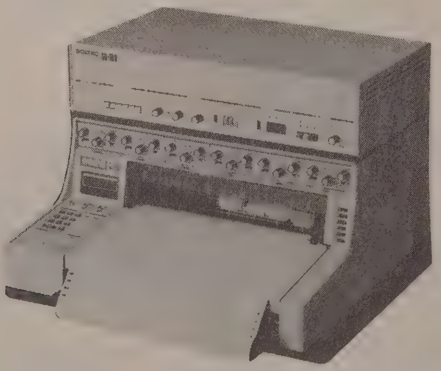
SOLTEC'S 3310 SERIES RECORDERS

Have set the industry standard; featuring truly modular construction, with one to eight pen recording capability and a wide variety of plug-in signal conditioners which provide for measurement of voltage, current, resistance and temperature. Many conventional "extras" are standard equipment with these recorders.



SOLTEC'S 8K20 SERIES OSCILLOGRAPHS

High performance, multi-channel (2-16), Thermal writing recorders. Black traces of unparalleled clarity. Standard features include internal clock, LED Display and Printer.



SOLTEC'S 1280 SERIES RECORDERS

1-6 channels of conventional or transient/waveform recording on the same chart. Wide selection of plug-in amplifiers including DC-5 KHz transient module.

SOLTEC'S SU-100 TRANSIENT OPTION

This recorder also features an optional transient storage input capability. This option features storage on as many as 6 channels, 32K words of storage memory, 12 bit resolution, pre and post trigger delay functions, sampling speeds as high as 5 microseconds and oscilloscope monitor outputs.

SOLTEC'S 5M SERIES/PORTABLE LIGHT-BEAM OSCILLOGRAPHS

Offer 1-6 channel capability for many industrial, scientific and medical applications. Available in Direct, Attenuated and Buffer Amplifier configurations. Frequency measure to 2 KHz. AC or battery powered.

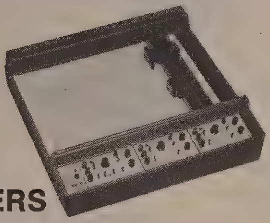
THE SOLTEC PRODUCT LINE — KNOWN FOR QUALITY . . .

The demand for reliable, high-quality TEST and MEASUREMENT equipment exceeds the supply. At SOLTEC we're working overtime to keep your trust and provide an expanding line of quality products that meet your changing needs. Look to SOLTEC for,

- STRIP CHART RECORDERS
- OSCILLOGRAPHIC RECORDERS
- TEMPERATURE RECORDING EQUIPMENT
- DIGITAL WAVEFORM/ TRANSIENT RECORDERS
- X-Y RECORDERS
- THERMAL WRITING RECORDERS
- MICROPROCESSOR CONTROLLED RECORDERS
- LABORATORY RECORDERS

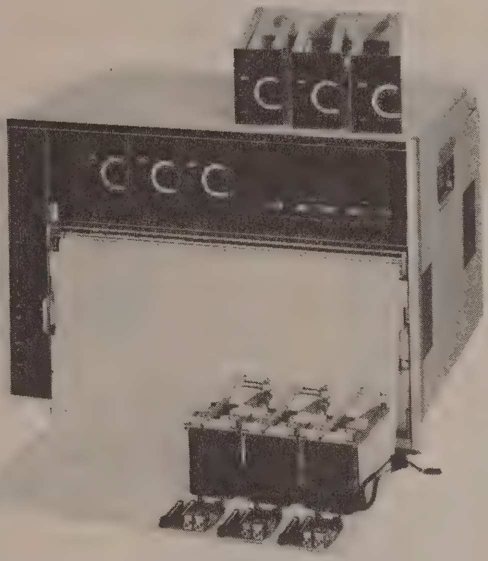
RECORDERS OSCILLOGRAPHS DIGITAL INSTRUMENTATION

SOLTEC RECORDERS



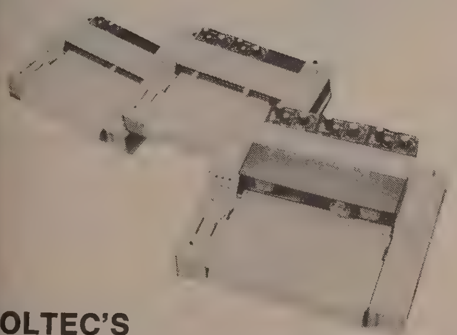
HIGH SPEED X-Y RECORDERS

The 6400 Series of X-Y recorders comes in four versions — two DIN A4 X-Y, one DIN A3 X-Y, and one DIN A3 X-Y-Y, and offers writing speeds of up to 1500 mm/s (X-axis) and 2000 mm/s (Y-axis). Available inputs range from 0.05 mV/cm to 20 V/cm. The models feature a built-in time base, electronic limiter, and remote control functions.



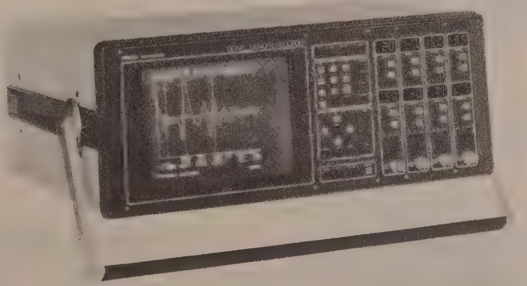
SOLTEC'S 3410 SERIES OSCILLOGRAPHS

Easily programmable via front panel and/or IEEE-488 interface. Clean, crisp, non-smear thermal traces. Innovative modular design makes it easy to change configurations and add options in-the-field. DC-145 Hz response. Available in 4, 6 and 8 channel versions with 50 or 100 mm writing widths and a wide variety of plug-in signal conditioners.



SOLTEC'S 1240 SERIES RECORDERS

1, 2 and 3 pen models available. Sensitivity to 1 mV full scale. Disposable fibre-tip pens write the full 250 mm chart width.



SMR TRANSIENT/WAVEFORM RECORDER

Modular expansion from 2 to 16 channels with 16K — 64K words of memory per channel. 1, 2 or 10 MHz versions with 8, 10, or 12 bit resolution. Up to four waveforms and their parameters may be viewed simultaneously in Y-t or X-Y format on the high resolution 9″ video monitor.

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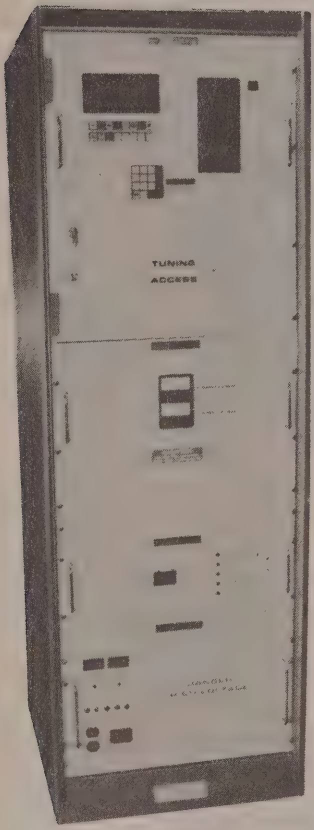


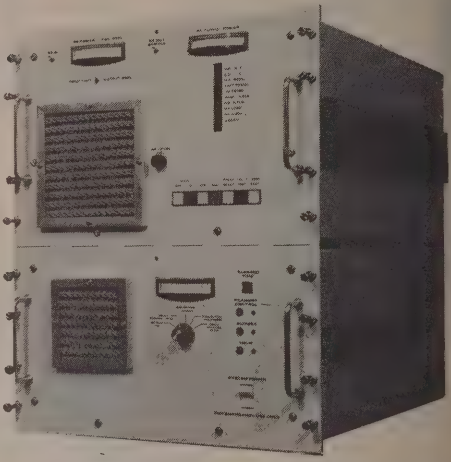
"COMPUTER COMPATIBLE" KLYSTRON AMPLIFIER SERIES 10000

Producing Klystron and TWT amplifiers for commercial satellite earth stations, MCL's engineers have provided solutions to most communication systems' problems. For many years, our engineers have been known as some of the finest microwave problem solvers in the industry.

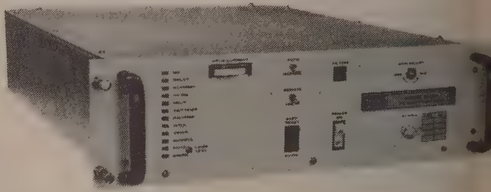
Two excellent solutions incorporated into our equipment are: CMOS logic-controlled fault isolation circuitry which shuts down all high-voltage functions within 8 ms should key components fail, and our unique arc detector with photo-diode sensing coupled with a PIN-diode switch which removes RF drive.

Other features include forward/backward fiberoptic inputs which survey the entire waveguide including the Klystron window, plug-in PC boards, color-coded LED status indicators displayed on panel fronts to make trouble-shooting easier and quicker, and regulated beam power supply.

With C-Band units having from 75 W to 3,350 W outputs and system gains up to 85 dB; and 6 Ku-Band frequency models with from 50 W to 2,000 W and up to 75 dB system gain, MCL's HPA series amplifiers provide the best answer for your communications systems.



TWT AMPLIFIER 200-700 WATTS



TWTA 75-125 WATTS

INSTRUMENTATION KLYSTRON CW AMPLIFIER SYSTEMS

An exclusive MCL achievement in design and development of self-contained, rack-mounted Klystron cavity amplifier-power supply systems that eliminates clutter and contributes to work area efficiency.

Suggested applications include biological research, factory test-source. This series includes many individual systems, each embodying highly desirable features such as high power capability, broad frequency range. (Any of these systems can be custom modified.) Each system is engineered conservatively and quality built, affording users maximum reliability and economy.

- Rack-mounted; completely self-contained; front panel serviceable
- 1700 to 18,000 MHz coverage
- Individual front panel accessible tuning dials and dial vs frequency calibration charts (where applicable).
- Front panel metering of beam voltage and current, body current, filament voltage and current, forward and reflected power of input and output circuits.
- Elapsed time indicator.
- Fault and Control Panel — indicates equipment's operational status and fault status.

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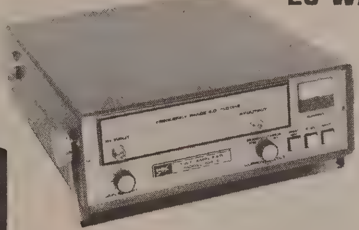
MICROWAVE AMPLIFIERS AND GENERATORS

TWT AMPLIFIERS

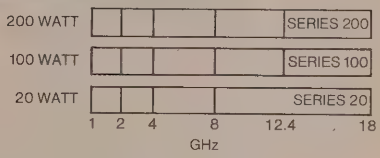
Three models cover your power requirements: 20, 100 and 200 watts. All provide stable microwave power to meet testing, measurement, and calibration requirements.

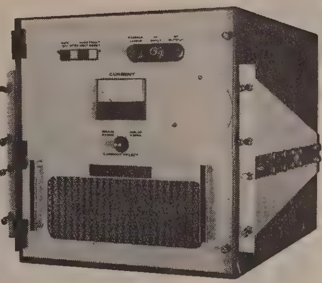
Modular construction and plug-in boards accommodate a wide variety of standard and special traveling wave tubes.

Solid state components and protective circuitry. Beam and helix current metering. Options include VSWR protection and power monitoring.



20 WATT SERIES





100/200 WATT SERIES

65 & 100 WATT SIGNAL GENERATORS

10 to 2500 MHz with six plug-in heads. Highest stability and reliability for laboratory calibration, testing and measurement.

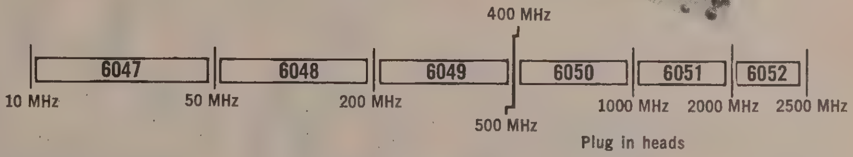
Frequency Stability: ±0.003%/10 minutes.

Power Stability: ±0.2db/hour.

Internal 1 KHz modulation, and external pulse and AM modulation. Single control tuning to 2% of actual frequency. Front panel power indication.

All solid state components (except osc. tube), regulated power supplies, and conservative design provide laboratory quality in a compact unit.

MODEL 15122/15222 SIGNAL GENERATOR

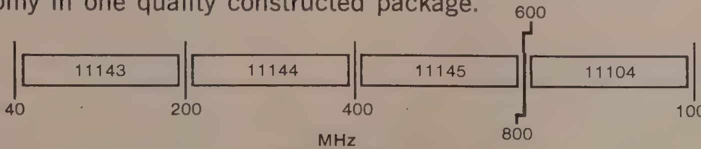


Plug in heads

1000 WATT RF CW POWER AMPLIFIER

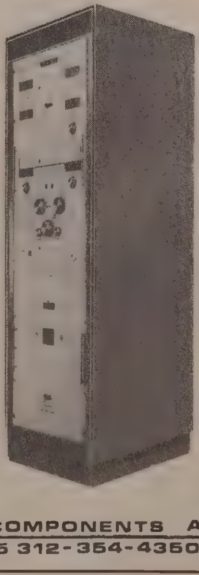
- Front Panel Dial Tuning of Each RF Cavity.
- Front Panel Dial Vs. Frequency Calibration Charts on Each Cavity.
- Front Panel Metering of Plate, Screen, Grid and Filament Circuits and Forward and Reflected Power of Input and Output Circuits.
- Elapsed Time Indicator.
- Minimum 13 dB Gain.

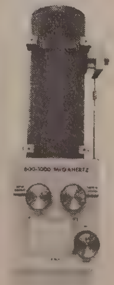
Model 10270 is the ultimate in RF power amplifier design . . . affording maximum utility in commercial, military and similar installations where space must be budgeted. Its modular cavity bandchange feature provides users with a high degree of flexibility, high power efficiency and extreme economy in one quality constructed package.



Plug in heads

10270 WITH PLUG-IN





MCL / INC DESIGNERS AND MANUFACTURERS OF RF COMPONENTS AND SYSTEMS
TEN NORTH BEACH LA GRANGE ILLINOIS 60525 312-354-4350 TWX 910-683-1899

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SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
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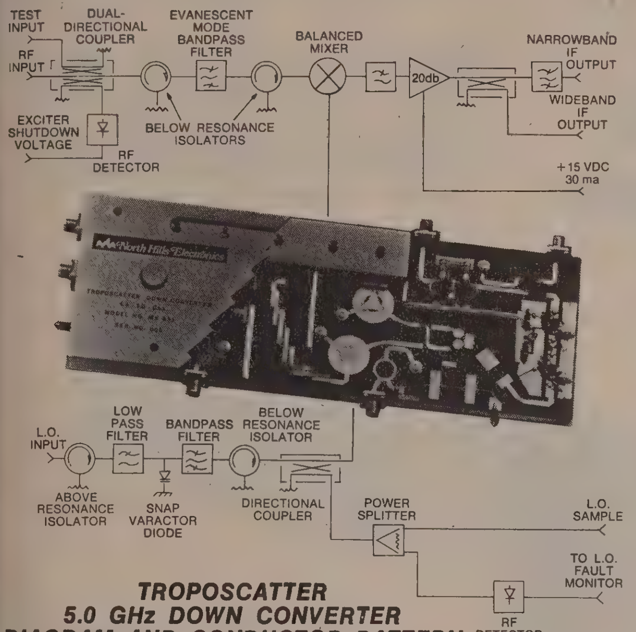
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

MICROWAVE INTEGRATED SUBASSEMBLIES

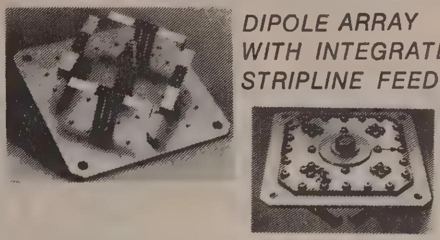
by

North Hills Electronics, INC.

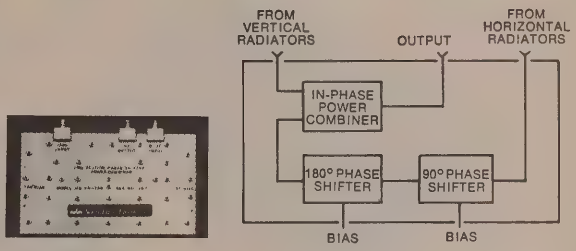
SPECIALISTS IN INTEGRATED MICROWAVE NETWORKS


TEST INPUT
DUAL-DIRECTIONAL COUPLER
EVANESCENT MODE BANDPASS FILTER
BALANCED MIXER
NARROWBAND IF OUTPUT
RF INPUT
20db
WIDEBAND IF OUTPUT
EXCITER SHUTDOWN VOLTAGE
BELOW RESONANCE ISOLATORS
RF DETECTOR
+15 VDC 30 ma
North Hills Electronics
L.O. INPUT
LOW PASS FILTER
BANDPASS FILTER
BELOW RESONANCE ISOLATOR
ABOVE RESONANCE ISOLATOR
SNAP VARACTOR DIODE
DIRECTIONAL COUPLER
POWER SPLITTER
L.O. SAMPLE
TO L.O. FAULT MONITOR
RF DETECTOR

TROPOSCATTER 5.0 GHz DOWN CONVERTER DIAGRAM AND CONDUCTOR PATTERN



DIPOLE ARRAY WITH INTEGRATED STRIPLINE FEED CIRCUITRY


FROM VERTICAL RADIATORS
OUTPUT
FROM HORIZONTAL RADIATORS
IN-PHASE POWER COMBINER
180° PHASE SHIFTER
90° PHASE SHIFTER
BIAS
BIAS

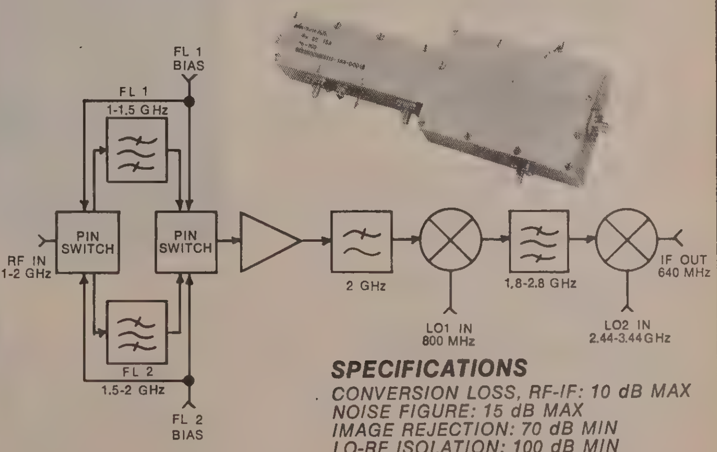
TWO SECTION PIN DIODE PHASE SHIFTER AND POWER COMBINER ASSEMBLY

North Hills Electronics, INC.
DUAL QUADRATURE DETECTOR

DUAL QUADRATURE PHASE DETECTOR

36-WAY RECEIVER MULTICOUPLER WITH PRESELECTION AND GAIN

2-4 GHz DOWN CONVERTER


FL 1 BIAS
FL 1
1-1.5 GHz
PIN SWITCH
PIN SWITCH
RF IN 1-2 GHz
2 GHz
1.8-2.8 GHz
IF OUT 640 MHz
LO1 IN 800 MHz
LO2 IN 2.44-3.44 GHz
FL 2
1.5-2 GHz
FL 2 BIAS

SPECIFICATIONS

CONVERSION LOSS, RF-IF: 10 dB MAX
NOISE FIGURE: 15 dB MAX
IMAGE REJECTION: 70 dB MIN
LO-RF ISOLATION: 100 dB MIN
RF INPUT VSWR: 1.9:1 MAX
IF OUTPUT AT 1 dB COMPRESSION: −20 dBm MIN

ADVANTAGES OF INTEGRATED MICROWAVE CONSTRUCTION

Integrated Microwave circuit techniques are the optimum approach when superior electrical performance, smaller size, and greater reliability are required in microwave and RF systems and subassemblies. Advantages realized include:

- Greater reliability
- Shorter MTTR
- Lower cost
- Smaller size
- Elimination of interconnecting cables resulting in:
  - lower losses
  - elimination of discontinuities
  - low amplitude and group delay ripple

North Hills Electronics, INC.

GLEN COVE, N.Y. 11542
Tel.: 516-671-5700
Telex: 64-0476

MILITARY

GROUND

HELIONETICS, INC.

Protected Environment Frequency Changer/Power Conditioner; 18 kVA

For protected, or quasi-military environments, such as closed vans, trailers or other mobile installations, Helionetics offers a wealth of proven field reliability with several series of designs. Virtually any standard operating voltage and frequency can be configured with ease using Helionetics modular construction.

Every series of power conditioners uses pulse width modulation circuitry developed and patented by our technical personnel. Full load efficiency of 92% is typically achieved.

MODEL 61322

INPUT
Voltage: 120/208 VAC; 3-Phase
Tolerance +10%, −15%
Transient: ±25% for 2 Sec.
Frequency: 47-63 Hz

OUTPUT
Voltage: 120/208 VAC; 3-Phase
Frequency: 60 Hz, ±0.1%
Distortion: 5% THD
Voltage Regulation: 0.5%
Power: 18 kVA
Power Factor: .8 Leading or Lagging; 14.5 kW

EFFICIENCY: 85% at Nominal Input and Full Output Power

OVERLOAD CAPABILITY: 150% for 3 Cycles, 120% Continuous

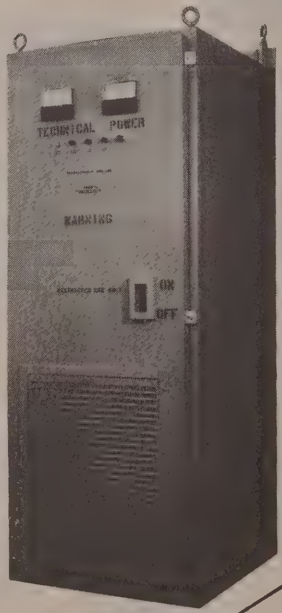
TEMP RANGE: 0°C to 50°C

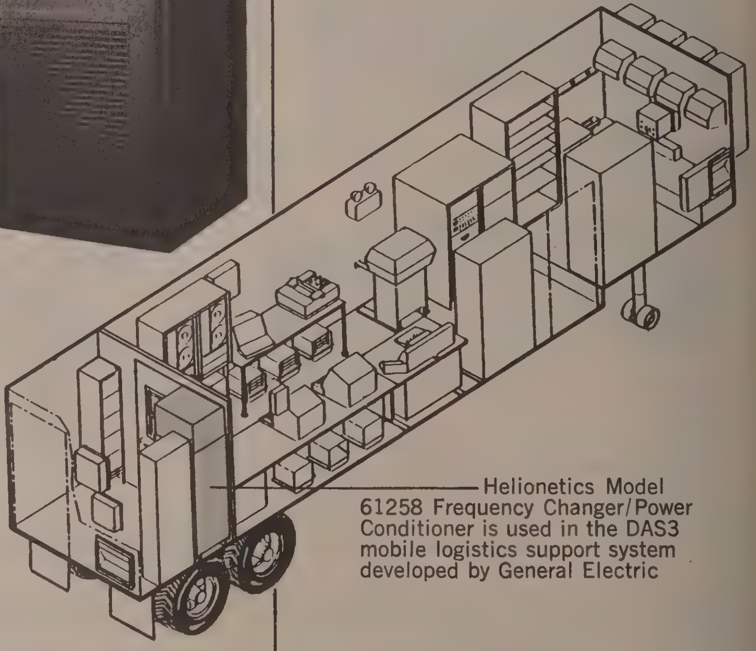
HUMIDITY: 10%-90% Non-Condensing

COOLING: Fan Cooled

SIZE: 24″W x 24″D x 60″H

WEIGHT: 700 lbs.





Helionetics Model 61258 Frequency Changer/Power Conditioner is used in the DAS3 mobile logistics support system developed by General Electric

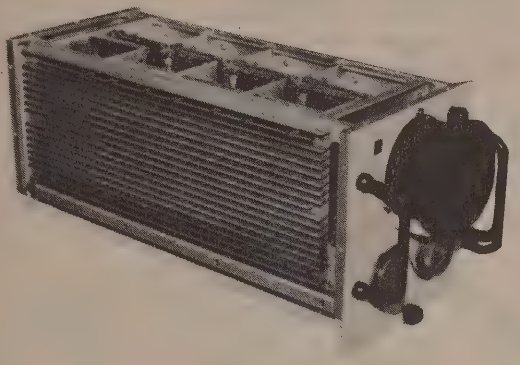
Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290
INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**
SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

AIRBORNE

HELIONETICS, INC.

21 Output Aircraft DC Power Supply



MODEL 61188: Designed for use on military aircraft for multi-output power supply applications.

- MEETS MIL-E-5400, CLASS-I
- QA: MIL-STD-9858A
- EMI: MIL-STD-461
- RELIABILITY: MIL-HDBK-217
- EFFICIENCY: 80%
- OVERVOLTAGE/CURRENT PROTECTION
- MODULAR CONSTRUCTION FOR EASE OF SERVICE

INPUT
Voltage: 200 VAC, 3-Phase
Frequency: 400 Hz per MIL-STD-704

21 OUTPUTS
7 Outputs: +28 VDC at 5 Amps
7 Outputs: +15 VDC at 3 Amps
7 Outputs: −15 VDC at 1 Amp
Voltage Regulation: ±0.59 VDC

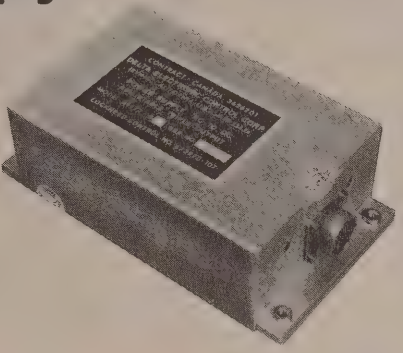
TEMP. RANGE: −54°C to +55°C

SIZE: 7.6″W x 8.5″H x 20.25″D

WEIGHT: 45 lbs.

ALTITUDE: 50,000 ft.

Surveillance Aircraft Multi-Output DC Power Supply



Model 6117: Designed for use on the CP-140, the Canadian version of the Lockheed P3-A, this unit supplies power to an onboard computer.

INPUT
Voltage: 115/200 VAC; 3-Phase
Frequency: 400 Hz

OUTPUTS
Output 1: +5 VDC at 3 Amps
Output 2: +23 VDC at 3.7 Amps
Output 3: −23 VDC at 3.7 Amps
Regulation: ±2%
Ripple: ±1% for 102 VAC Input or Higher
Impedance: 0.02 Ohms; 0-12 kHz
Power Density: 3 Watts per Cubic Inch

TEMP RANGE: −54°C to +85°C

SIZE: 4.03″W x 2.29″H x 7.15″D

WEIGHT: 3.75 lbs.

ALTITUDE: 30,000 ft.

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

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MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... 1A•1137, 1B•1035, 2•1014, 3•1014
ASCII Code .... 3•1103
Batteries, Product Selection Guide .... 3•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... 2•1003
Capacitors, Basic Formulas .... 1A•1093
Capacitors, Miniglossary .... 1A•1069
Capacitors, Product Selection Guide .... 1A•1003
Circuit Boards (Printed), Product Selection Guide .... 2•1089
Coils, Chokes, & Inductors, Product Selection Guide .... 1A•1219
Connectors, Miniglossary .... 2•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... 2•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... 1A•1309
Delay Lines, Product Selection Guide .... 1A•1445
Discrete Semiconductors, Product Selection Guide .... 1A•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... 1B•1021
EBCDIC Code .... 3•1153
Encapsulation, Miniglossary .... 2•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... 2•1801
Filters, Product Selection Guide .... 1A•1577
Instruments, Graphic Recording, Product Selection Guide .... 3•1381
Instruments, Panel Meters, Product Selection Guide .... 3•1321
Instruments, Test & Measuring, Product Selection Guide .... 3•1182
Interconnection Systems, Product Selection Guide .... 2•1873
Keyboards & Keypads, Product Selection Guide .... 1B•1759
Microwave Components, Product Selection Guide .... 1A•1685
Military Qualified Products Lists .... 1B•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... 1B•1121
Opto Semiconductors, Miniglossary .... 1B•1218
Oscilloscopes, Product Selection Guide .... 3•1361
Panel Hardware, Product Selection Guide .... 2•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... 1A•2017
Power Supplies, Miniglossary .... 3•1455
Power Supplies, AC, Product Selection Guide .... 3•1815
Power Supplies, DC, Product Selection Guide .... 3•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... 1B•1255
Relay Contact Forms .... 1B•1317
Relays, Electromechanical, Miniglossary .... 1•B1292
Relays, Product Selection Guide .... 1B•1289
Resistor Color Codes .... 1A•1791
Resistors, Product Selection Guide .... 1A•1789
Servo Components, Miniglossary .... 3•1935
Solenoids, Product Selection Guide .... 1B•1481
Switches, Product Selection Guide .... 1B•1499
Thyristors/High Power Diodes, Miniglossary .... 1A•1652
Transducers & Encoders, Product Selection Guide .... 1B•1827
Transformers, Product Selection Guide .... 1A•2115
Wire & Cable, Product Selection Guide .... 2•1935

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VOLUMES 1A, 1B & 2

A BATTERY SHOULD BE DESIGNED TO MATCH YOUR SPECIFICATIONS. NOT VICE VERSA.

Has this ever happened to you?

Your specs and their battery complement each other about as well as the proverbial square peg in a round hole.

And oddly enough, when that happens, you're the one that gets sent back to the drawing board. Not them.

After laboring months, or even years on specifications, you're forced to compromise for want of a power system.

Well, that won't happen if you bring your project to Saft first. We're a leading manufacturer of all types of high technology electro-chemical energy systems: Nicad®, Lithium, Gelyte, and Lead Acid just to name a few.

In fact, we're the ultimate power source. Unlike many of our competitors we give you choices. Not excuses, or whatever happens to be on the shelf.

Add to those choices our expertise and innovative design capabilities, and you'll discover we can solve many of your energy problems.

You'll find Saft batteries virtually everywhere: in computers, aviation, military, medical, home appliances, and even in aerospace.

Ours is the original equipment battery on the Boeing 757 and 767 jumbo jets, the most advanced aircraft in the sky today.

You'll find a Saft battery safeguarding the electronic memory in portable drug pumps, the latest medical breakthrough in the control of diabetes.

We're even considered a pioneer in rechargeable batteries used in video cassette recorders, stereos, photoflash equipment and mobile transceivers. Batteries that can be recharged up to 1,000 times.

If your project requires a high technology electro-chemical energy system, talk to a specialist at Saft first.

We'll give you a battery that's custom fit to your specifications. Not ours.

For more information, contact SAFT America Inc., 711 Industrial Blvd., Valdosta, GA 31601 or call (912) 247-2331.

SAFT

MORE POWER TO YOU.

This Guide provides a quick reference to most of the battery systems used in electronic applications. It should be used as a starting point to select the style of battery needed. The next step is to turn to the manufacturers' data pages in EEM and then contact the manufacturer or the nearest sales office listed in the EEM Yellow Pages.

ZINC-CARBON (Leclanché)

The most common zinc-carbon batteries are shown below along with the type numbers of only two manufacturers. Most types are available from other suppliers: Avex (**3**•1403), Bren-Tronics (**3**•1404), Power Group (**3**•1420), Tauber (**3**•1433) and Varta (**3**•1436).

Max. Service Hrs.	@ mA	V Nom.	ANSI	NEDA	Eve-ready Page 3•1434	Ray-O-Vac Page 3•1423
650	0.1	1.5	WO	—	201	—
22	20.0	1.5	N	—	E340E	RN
22	20.0	1.5	N	910F	904	716
*	20.0	1.5	AAA	24P	812	410
21	20.0	1.5	AAA	24F	912	400
*	25.0	1.5	AA	15P	815	710
54	20.0	1.5	AA	15C	HS15	WM40
54	20.0	1.5	AA	15F	915	7AA
72	20.0	1.5	AA	15	1015	15
*	25.0	1.5	AA	15D	1215	5AA
420	9.0	1.5	C	—	T35	—
2	325.0	1.5	C	14P	835	110
140	20.0	1.5	C	14C	HS35	WM15
140	20.0	1.5	C	14F	935	1C
185	18.0	1.5	C	14	1035	14
97	37.5	1.5	C	14D	1235	4C
1100	9.0	1.5	D	—	T50	—
*	150.0	1.5	D	13P	850	210
113	60.0	1.5	D	13C	HS50	WM10
360	20.0	1.5	D	13F	950	2D
440	18.0	1.5	D	13	1050	13
16.3	375.0	1.5	D	13C	HS150	WM30
15.8	375.0	1.5	D	13C	1150	3D
139	60.0	1.5	D	13D	1250	6D
75	300.0	1.5	—	700	711	—
1200	40.0	1.5	—	4	742	A4
32	1.14A	1.5	—	—	735	900
3000	20.0	1.5	6	905	HS6	WM50
37	20.0	3.0	—	704	750	—
87	20.0	4.5	—	—	703	—
225	20.0	4.5	—	—	781	—
90	120.0	4.5	—	903	714	—
550	20.0	4.5	—	3	736	—
17.5	60.0	6.0	—	2	724	—
40	187.0	6.0	—	908	509	941
47	187.0	6.0	—	917	510F	943
155	60.0	6.0	—	—	744	—
61	187.0	6.0	—	908D	1209	944
110	187.0	6.0	—	918	731	918
1200	40.0	6.0	—	902	706	—
2000	30.0	6.0	—	907	1461	641
270	20.0	7.5	—	9	717	—
29	937.0	7.5	—	903	715	903
2000	30.0	7.5	—	—	1562	—
40	12.0	9.0	—	1611	206	T1611
50	9.0	9.0	—	1604	216	1604
41	12.0	9.0	—	1604D	1222	D1604
61	12.0	9.0	—	1600	226	1600
90	12.0	9.0	—	1613	2709N	—
165	12.0	9.0	—	1602	246	1602
138	20.0	9.0	—	1605	266	1605
350	20.0	9.0	—	1603	276	1603
185	25.0	9.0	—	1612	2356N	—
1200	40.0	9.0	—	—	716	904
59	12.0	12.0	—	1810	228	—
500	20.0	12.0	—	—	732	926
500	20.0	12.0	—	923	2780N	—
2300	20.0	12.0	—	922	1463	922
750	*	12.0	—	—	1862	—
112	1.0	15.0	—	220	504	220
74	2.0	15.0	—	208	411	—
60	5.0	15.0	—	224	417	—
112	1.0	22.5	—	221	505	221
74	2.0	22.5	—	215	412	215
60	5.0	22.5	—	225	420	—
85	18.0	22.5	—	—	763	—
70	2.0	30.0	—	210	413	—
155	1.0	45.0	—	710	415	—
370	1.0	45.0	—	—	460	—
630	1.0	45.0	—	—	455	—
138	20.0	45.0	—	202	482	—
125	40.0	45.0	—	207	484	—
49	8.4	63.0	—	211	477	—
57	3.4	67.5	—	217	416	—
60	5.0	67.5	—	203	457	—
150	5.0	67.5	—	200	467	—
111	27.0	69.0	—	914D	646	914D
60	9.0	90.0	—	214	479	—
63	10.0	90.0	—	204	490	—
63	10.0	225	—	728	489	N150
74	2.0	240	—	729	491	1010
74	2.0	300	—	722	493	—
63	10.0	450	—	740	496	1013

*** Special discharge conditions, see mfrs. data**

ALKALINE-MANGANESE

This is a listing of the most popular styles of alkaline-manganese (non-rechargeable) batteries with the type numbers from three manufacturers. Other suppliers include: Avex (**3**•1403), Bren-Tronics (**3**•1404), Power Group (**3**•1420) and Tauber (**3**•1433).

Max. Serv. Hrs.*	* @ mA	V. Nom.	Size	NEDA	Eve-ready Page 3•1434	Ray-O-Vac Page 3•1423	Varta Page 3•1436
17	10	1.5	—	—	EPX825	RPX825	7201
90	9	1.5	N	910A	E90	810	7245
150	10	1.5	½ AA	—	E89	—	—
25	37.5	1.5	AAA	24A	E92	824	7239
107	20	1.5	AA	15A	E91	815	7244
160	37.5	1.5	C	14A	E93	814	7233
270	50	1.5	D	13A	E95	813	7232
270	50	1.5	D	13A	HS95	813	7232
17	10	3.0	—	—	EPX30	RPX30	—
35	20	3.0	1	1308A	532	RPX24	7253
7.5	18	4.5	—	—	538	RPX31	—
35	20	4.5	1	1306A	523	RPX21	7251
35	20	4.5	1	1307A	531	RPX19	7252
31	2.5	6.0	—	—	537	—	7250
30.5	18	6.0	—	—	539	—	—
59	375	6.0	G	930A	520	—	—
33	18	9.0	—	1604A	522	—	—

MERCURY

Mercury batteries are supplied in two versions. Those with a 100% mercuric oxide depolarizer deliver a nominal voltage of 1.35. When manganese dioxide is added, the output increases to a nominal 1.4 volts. Three manufacturers' types are shown in the table. Other suppliers include: Avex (**3**•1403), Power Group (**3**•1420) and Tauber (**3**•1433).

mAh (Ah)	V. Nom.	Cells	NEDA No.	Eveready 3•1434	Ray-O-Vac 3•1423	Varta 3•1436
16	1.35	1	—	E212E	R212	*
50	1.35	1	1155M	E325	RW57	*
65	1.35	1	1157M	E388	—	*
80	1.35	1	1116M	E400N	T400N	*
95	1.35	1	1156M	E323	RW58	7086
120	1.35	1	1154M	E343	RW56	*
150	1.35	1	1153M	E354	RW54	*
220	1.35	1	1152M	E313	RW52	7081
250	1.35	1	1123M	E625N	T625N	7102
500	1.35	1	1105M	E640N	T640N	*
800	1.35	1	1117M	E401N	T401N	*
1000	1.35	1	1109M	E1N	T1N	*
2200	1.35	1	—	E3	3LA	*
2400	1.35	1	—	E502	—	*
3400	1.35	1	1112M	E4	4LA	*
3800	1.35	1	1113M	E12N	T12N	*
(14)	1.35	1	1115M	E42N	T42N	*
250	2.70	2	1201MP	EPX14	RPX14	239
1000	2.70	2	1203M	E132N	T132N	*
1000	4.05	3	1314M	E133N	T133N	*
500	5.40	4	1410M	E164N	—	*
1000	5.40	4	1409M	E134N	T134N	*
1000	6.75	5	1505M	E135N	T135N	*
1000	8.10	6	—	E136N	T136N	*
45	1.40	1	—	E312	T312	*
80	1.40	1	—	E400	T400	*
85	1.40	1	—	E13	T13	*
105	1.40	1	—	E575E	—	7109
160	1.40	1	—	E41	T41	*
190	1.40	1	1127M	E675E	R675	7101
215	1.40	1	1127MD	E675	T675	*
350	1.40	1	1122M	E625	T625	7102
350	1.40	1	1104M	E630	—	*
500	1.40	1	1105M	E640	T640	*
800	1.40	1	1118M	E401	T401	*
1000	1.40	1	1100M	E1	T1	*
2400	1.40	1	—	E502E	—	*
2500	1.40	1	15M	E9	T9	*
3800	1.40	1	1101M	E12	T12	*
(14)	1.40	1	—	E42	T42	*
350	2.80	2	—	E152	—	*
1000	2.80	2	1200M	E132	T132	*
500	4.20	3	—	E163	T163	*
1000	4.20	3	1306M	E133	T133	*
2200	4.20	3	—	E233	T233	*
110	5.60	4	1407MP	EPX23	RPX23	434
500	5.60	4	—	EPX32	—	*
500	5.60	4	1404M	E164	T164	*
1000	5.60	4	1408M	E134	T134	*
180	7.00	5	1501M	E175	T175	*
350	7.00	5	—	E115	T115	*
500	7.00	5	1500M	E165	T165	*
1000	7.00	5	—	E135	T135	*
575	8.40	6	1604M	E146X	1604M	*
600	8.40	6	1611M	E126	T164	*
1000	8.40	6	1615M	E136	T136	*
215	9.80	7	1606M	E177	T177	*
750	12.60	9	1810M	E289	T289	*

*** Contact manufacturer for availability.**

SILVER OXIDE

Silver oxide cells exhibit similar performance to mercury cells, but at a higher (1.55) nominal voltage. In addition to the two manufacturers shown, these batteries are available from: Avex (**3**•1403), Power Group (**3**•1420), Tauber (**3**•1433) and Varta (**3**•1436).

mAh	V.	NEDA No.	Eveready 3•1434	Ray-O-Vac 3•1423
35	1.5	1134SO	384	RW37
38	1.5	—	S312	T312G
38	1.5	1135SO	392	RW47
60	1.5	1136SO	309	RW18
75	1.5	—	S13	T13G
75	1.5	1137SO	393	RW48
100	1.5	1132SO	301	RW14
120	1.5	—	S41	T41G
120	1.5	1133SO	386	RW24
165	1.5	1130SO	303	RW12
190	1.5	1107SO	S76	RS76
190	1.5	1131SO	357	RW22
210	1.5	1140SO	355	RW25
190	6.0	1406SOP	544	RPX25
*	1.5	1138SO	389	RW49
*	1.5	1139SO	344	RW36
*	1.5	1158SO	362	RW310
*	1.5	1159SO	390	RW49
*	1.5	1160SO	391	RW40
*	1.5	1161SO	394	RW33
*	1.5	1162SO	395	RW313
*	1.5	1163SO	396	RW411
*	1.5	1164SO	397	RW311
*	1.5	1165SO	399	RW413

*** Contact manufacturer for data.**

LITHIUM

Lithium batteries are available in many styles, in several chemical compositions and many configurations. A group of common types from three suppliers appears in the table. Other suppliers include: Avex (**3**•1403), Elpower (**3**•1408), Panasonic (**3**•1414), Tauber (**3**•1433), Eveready (**3**•1434) and Varta (**3**•1436).

V. Nom.	mAh	Diam. mm	Height mm	Catalyst Research 3•1407	Power Group 3•1420	Sanyo 3•1430
3.0	40	3.8	33.0	—	PCR333	CR333
3.0	20	4.2	26.0	—	BR425	—
3.0	40	4.2	35.9	—	BR435	—
3.0	30	7.9	7.2	—	PCR772	CR772
2.8	40	11.6	2.0	11620	—	—
3.0	160	11.6	10.8	—	PCR1/3N	CR1/3N
3.0	1000	12.0	60.0	—	PCR2N	CR2N
3.0	30	12.5	2.0	—	PCR1220	CR1220
6.0	160	13.0	25.2	—	P2CR1/3N	2CR1/3N
3.0	50	16.0	2.0	—	PCR1620	CR1620
3.0	750	16.8	22.5	—	BR1/2A	—
3.0	1200	16.8	33.4	—	BR2/3A	—
2.8	200	19.0	3.5	1935	—	—
3.0	50	20.0	1.6	—	BR2016	CR2016
3.0	90	20.0	2.5	—	BR2025	—
3.0	120	20.0	2.5	—	CR2025	CR2025
3.0	100	20.0	2.5	—	PCR2025H	CR2025H
3.0	170	20.0	3.2	—	PCR2032	CR2032
3.0	130	20.0	3.2	—	PCR2032H	CR2032H
3.0	90	23.0	1.6	—	PCR2316	CR2316
3.0	110	23.0	2.0	—	BR2320	—
3.0	150	23.0	2.5	—	BR2325	—
3.0	120	24.5	2.0	—	PCR2420	CR2420
3.0	200	24.5	3.0	—	PCR2430	CR2430
2.8	350	27.0	3.6	2736	—	—
2.8	700	34.0	4.0	3440	—	—

NICKEL-CADMIUM

Ni-cad batteries have become extremely popular and are available in a great many types and styles from many suppliers. Several are listed in the following tables along with representative batteries. Other suppliers include: Avex (**3**•1403), Bren-Tronics (**3**•1404), Motorola (**3**•1413), Power-Sonic (**3**•1422), Ray-O-Vac (**3**•1423), Tauber (**3**•1433) and Varta (**3**•1436).

1.2 Volt (Nominal) Cylindrical

Size	Eve-ready 3•1434	Saft 3•1425	Elpower 3•1409	Pwr. Grp. 3•1420	Panasonic 3•1417	Sanyo 3•1430
½ AAA	*	070SC	*	070SC	*	*
N	CF150	*	EPN150	PCF150	P15N	N150N
⅓ AA	*	110SC	*	100SC	P11AA	N100AA
⅓ A	*	150SC	EPN180	150SC	*	N160A
½ A	CF450	*	*	PCF450	*	N425A
AAA	*	180SC	EPN181	180SC	P18AAA	N180AAA
½ AA	*	250SC	*	250SCS	*	*
⅔ AA	*	450SC	*	450SC	P25AA	N250AA
AA	CH15	500SC	EPN500	500SC	P50AA/FT	N450AA
AA	CH500	VR0.5	EPN500F	PCH500	P50AA	N500AA
A	*	600SC	*	600SC	*	*
½ C	*	750SC	*	750SC	*	*
⅔ C	*	*	EPN1000	900SC	P60SC	N900C
SC	CH1.2	1.2SC	EPN1200	1200SC	P120SC	N1200SC
C	CH35	2.0SC	EPN1800	1800SC	P180C	N1800C
½ D	*	2.2SC	*	2000SC	*	*
⅔ D	*	*	*	2500SC	*	N2500D
D	CH4	4.0SC	EPN4000	4000SC	P400D	N4000D
F	*	7.0SC	*	7000SC	*	N6000F
M	*	*	*	10000SC	*	N10000M

1.2 Volt (Nominal) Button Cells

Size D x L (mm)	Eveready 3•1434	Saft 3•1424	Power Group 3•1420	Varta 3•1436
7.5 x 5.0	*	*	10B	*
11.5 x 5.4	B20	20B	20B	20DK
15.4 x 6.0	B50	50B	60B	50DK
25.2 x 6.9	B150	150B	150B	150DK
25.2 x 7.4	*	*	180VBH	*
25.2 x 8.9	B225	225B	250B	225DK
25.2 x 9.1	BH225	225BH	250BH	*
25.2 x 14.5	*	*	400B	*
34.4 x 5.3	*	*	250VBH	*
34.4 x 10.0	BH500	500BH	500BH	500DK
50.8 x 8.4	*	*	1000VBH	*
50.8 x 15.0	*	*	2000VBH	*

Multicell Types

Descrip.	V. Nom.	Evr.	Saft	Pan.	Pwr. Grp.	Ray.	San.	Var.
9V	7.2	X	X	X	X	X	X	X
9V	8.4	X	X	X	X	X	X	X
Stacks								
2	2.4	X	X	X	X	X	X	X
3	3.6	X	X	X	X	X	X	X
4	4.8	X	X	X	X	X	X	X
5	6.0	X	X	X	X	X	X	X
6	7.2	X	X	X	X	X	X	X
7	8.4	X	X	X	X	X	X	X
8	9.6	X	X	X	X	X	X	X
9	10.8	X	X	X	X	X	X	X
10	12.0	X	X	X	X	X	X	X

X = Available.

LEAD ACID

Sealed lead acid batteries are widely used in UPS systems. A few of the available types are shown in the tables. Three manufacturers are listed. Other suppliers include: Avex (**3**•1403), Panasonic (**3**•1414), Power Group (**3**•1420), Power-Sonic (**3**•1422), Sonnenschein (**3**•1431) and Tauber (**3**•1433).

6.0 Volt

Size (Nom.) L x W x H (mm)	Wt. (Kg)	20 hr. Ah	Elpower 3•1409	Saft 3•1424	Yuasa 3•1437
51 x 42 x 61	0.27	0.9	EP610-16	—	—
51 x 43 x 51	0.25	1.0	—	—	NP1-6
97 x 25 x 51	0.34	1.2	—	—	NP1.2-6
134 x 34 x 60	0.60	2.6	EP626-16	PB626	NP2.6-6
70 x 47 x 102	0.90	4.0	—	—	NP4-6
67 x 67 x 103	0.90	4.0	EP640-16	—	—
67 x 67 x 109	0.90	4.5	EP640-21	PB645L	—
151 x 34 x 101	1.14	5.0	EP650-16	—	—
91 x 58 x 101	1.18	5.5	EP655-16	—	—
151 x 34 x 96	1.25	6.0	—	—	NP6-6
137 x 71 x 127	*	6.0	—	PB660L	—
71 x 71 x 95	*	6.0	—	PB660	—
151 x 50 x 96	1.65	8.0	—	PB680	NP8-6
108 x 70 x 141	1.82	8.0	EP680-1	—	—
151 x 50 x 101	1.79	8.5	EP685-16	—	—
96 x 58 x 144	*	9.0	—	PB690	—
108 x 70 x 141	2.20	9.5	EP695-1	—	—
151 x 50 x 96	2.20	10.0	—	—	NP10-6
108 x 70 x 141	2.50	12.0	EP6120-1	—	—
213 x 70 x 140	3.67	16.0	EP6160-1	—	—
193 x 58 x 145	*	18.0	—	PB6180	—
159 x 85 x 165	4.09	20.0	EP6200-24	—	—
175 x 96 x 145	*	27.0	—	PB6270	—
159 x 85 x 165	4.86	30.0	EP6300-24	—	—
159 x 85 x 165	5.00	33.0	EP6330-24	—	—

12.0 Volt

97 x 48 x 51	0.59	1.2	—	—	NP1.2-12
178 x 34 x 59	0.90	1.9	—	—	NP1.9-12
134 x 67 x 60	1.10	2.6	—	PB1226	NP2.6-12
134 x 34 x 125	1.32	2.6	EP1226-6	—	—
111 x 76 x 93	1.70	3.5	EP1235-23	—	—
134 x 67 x 103	1.77	4.0	EP1240-16	—	—
151 x 64 x 101	2.22	5.0	EP1250-16	—	—
151 x 65 x 96	2.40	6.0	—	—	NP6-12
141 x 71 x 98	*	6.0	—	PB1260	—
149 x 86 x 163	*	6.0	—	PB1260TV	—
213 x 70 x 140	3.72	8.0	EP1280-1	—	—
117 x 96 x 144	*	9.0	—	PB1290	—
213 x 70 x 140	5.00	12.0	EP12120-1	—	—
193 x 117 x 145	*	18.0	—	PB12180	—
170 x 159 x 165	8.17	20.0	EP12200-4	—	—
166 x 175 x 125	7.70	24.0	—	—	NP24-12
289 x 117 x 145	*	27.0	—	PB12270	—
170 x 159 x 165	9.75	30.0	EP12300-24	—	—
159 x 172 x 173	10.0	33.0	EP12330-24	—	—
197 x 165 x 170	14.0	38.0	—	—	NP38-12

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

- **AC** alternating current
- **A/D** analog to digital
- **ADC** analog to digital converter
- **ADP** automatic data processing
- **AF** audio frequency
- **AFC** automatic frequency control
- **ALGOL** algorithmic language
- **AM** amplitude modulation
- **AND** a logical operator
- **AQL** acceptable quality level
- **ASCII** American national standard code for information interchange
- **AWG** American wire guage

B

- **BALUN** balanced to unbalanced
- **BASIC** beginners' all-purpose symbolic instruction code
- **BCD** binary-coded decimal
- **BNC** baby "N" connector
- **BUS** basic utility system

C

- **CAD** computer aided design
- **CAM** computer aided manufacture
- **CATV** cable television or community antenna television
- **CERMET** ceramic metal element
- **Comm.** communications
- **CMOS** complementary metal-oxide semiconductor
- **CPS** characters per second
- **CPU** central processing unit

D

- **D/A** digital to analog
- **DAC** digital to analog converter
- **DC** direct curent
- **DIL** dual in-line
- **DIP** dual in-line package
- **DPM** digital panel meter
- **DTL** diode transistor logic

E

- **EDP** electronic data processing
- **EBCDIC** extended binary coded decimal interchange code
- **EEPROM** electrically erasable PROM
- **EMC** electromagnetic compatibility
- **EMI** electromagnetic interference
- **EPROM** electrically programmable ROM
- **ESR** equivalent series resistance

F

- **FEP** fluorinated ethylene propylene Copolymar, 200° Teflon
- **FET** field-effect transistor
- **FM** frequency modulation
- **FORTRAN** formula translator

G

- **GaAsFET** gallium arsenide field effect transistor
- **GPIB** general purpose interface bus

H

- **HF** high frequency (3 to 30 MHz)
- **HIPOT** test, measurement and diagnostic equipment
- **HLL** high level language
- **HV** high voltage
- **Hz** Hertz

I

- **IC** integrated circuit
- **IF** intermediate frequency
- **IO** input/output (devices)
- **IR** insulation resistance (or) infrared

J

- **JFET** junction field effect transistor
- **JMOS** junction metal oxide semiconductor

K

- **kHz** kilohertz (10^3 hertz)
- **KSR** keyboard send receive

L

- **LC** inductance capacitance
- **LCD** liquid crystal display
- **LED** light-emitting diode
- **LF** low frequency (30 to 300 kHz)
- **LSI** large scale integration
- **LVDT** linear velocity displacement transformer

M

- **MATV** master antenna television
- **μF** microforad
- **MHz** megahertz
- **MOS** metal oxide semiconductor
- **MOSFET** metal oxide semiconductor field effect transistor
- **MOV** metal oxide varistor
- **MPU** microprocessor unit
- **MSI** medium scale integration

N

- **NBS** National Bureau of Standards
- **NIM** nuclear instrumentation module
- **NOR** not OR

O

- **OEM** original equipment manufacturer
- **OR** a logical operator

P

- **pF** picofarad
- **PC** printed circuit
- **PCB** printed circuit board
- **PIN** positive-intrinsic-negative (transistor)
- **PLA** programmable logic array
- **PPI** plan position indicator
- **PROM** programmable read only memory
- **PUT** programmable unijunction transistor

Q

- **QAM** quadrature amplitude modulation
- **Q (meter)** quality-factor meter

R

- **RAM** random access memory
- **RC** resistance-capacitance
- **RFI** radio frequency interference
- **RMS** root mean square
- **ROM** read only memory
- **RF** radio frequency
- **RFC** radio-frequency choke
- **RFI** radio-frequency interference
- **RTD** resistance-temperature detector
- **RTL** resistor transistor logic
- **RTV** room temperature vulcanizing
- **RW** read/write

S

- **SAS** silicon asymmetrical switch
- **SBC** single board (micro) computer
- **SBS** silicon bilateral switch
- **SCR** silicon-controlled rectifier
- **SIP** single in-line package
- **SSI** small scale integration
- **SSR** solid state relay
- **STL** Schottky transistor logic

T

- **TC** temperature coefficient
- **TCXO** temperature compensated crystal oscillator
- **TFE** tetrafluoride ethylene propylene Copolymer, 250° Teflon
- **TTL** transistor-transistor logic
- **TTY** teletypewriter

U

- **UHF** ultra high frequency (300 MHz to 3 GHz)
- **UL** Underwriters Laboratory
- **UPS** uninterruptible power supply

V

- **VAC** volts (of) alternating current
- **VAR** volt-ampere reactive
- **VCR** video cassette recorder
- **VDC** volts (of) direct current
- **VHF** very high frequency
- **VHSIC** very high speed integrated circuit
- **VLF** very low frequency (3 to 30 kHz)
- **VLSI** very large scale integration
- **VRM** voice recognition module
- **VTVM** vacuum tube volt meter
- **VU** volume unit
- **VSWR** voltage standing wave ratio

W

- **WPS** word processing software

Y

- **YIG** yttrium iron garnet

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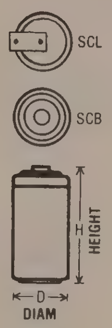	100SCL	1/3AA	.100	.23	.562	.670
	150SCL	1/3A	.150	.28	.615	.645
	180RCL	AAA	.180	.32	.402	1.760
	225SCL	1/3Af	.225	.38	.681	.716
	226SCL	1/2AA	.225	.38	.562	1.102
	450SCL	2/3Af	.450	.55	.681	1.138
	500SCL	AA	.500	.70	.554	1.980
	500SCB	AA	.500	.70	.554	1.967
	600SCL	A	.600	.86	.615	1.960
	750SCL	1/2C	.750	1.10	1.034	.965
	800SCL	Af	.800	1.05	.681	1.978
	1.0SCL	3/5C	1.0	1.40	1.038	1.190
	1.2SCL	Cs	1.2	1.60	.903	1.696
	2.0SCL	C	2.0	2.40	1.034	1.940
	2.0SCB	C	2.0	2.40	1.034	1.969
	2.2SCL	1/2D	2.2	2.80	1.299	1.488
	4.0SCL	D	4.0	4.60	1.295	2.358
	4.0SCB	D	4.0	4.60	1.295	2.406
	7.0SCL	F	7.0	7.40	1.301	3.566

Dimensions are maximum. Cells have plastic insulation and lugs (L) or raised positive button (B). Contact factory on Kraft paper insulation, lugs, buttons or other options not shown above.

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PB626	12/2.6	PB6180	6/18.0
PB645L	6/4.5	PB12180	12/18.0
PB660L	6/6.0	PB6270	6/27.0
PB660	6/6.0	PB12270	12/27.0
PB1260	12/6.0	PB2300	2/30.0
PB690	6/9.0		

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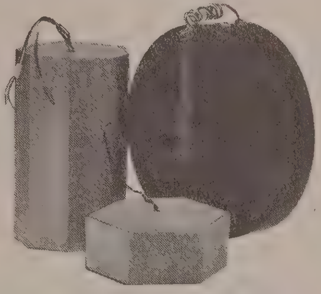

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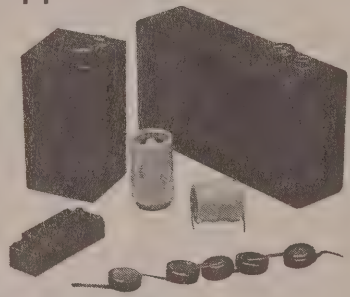

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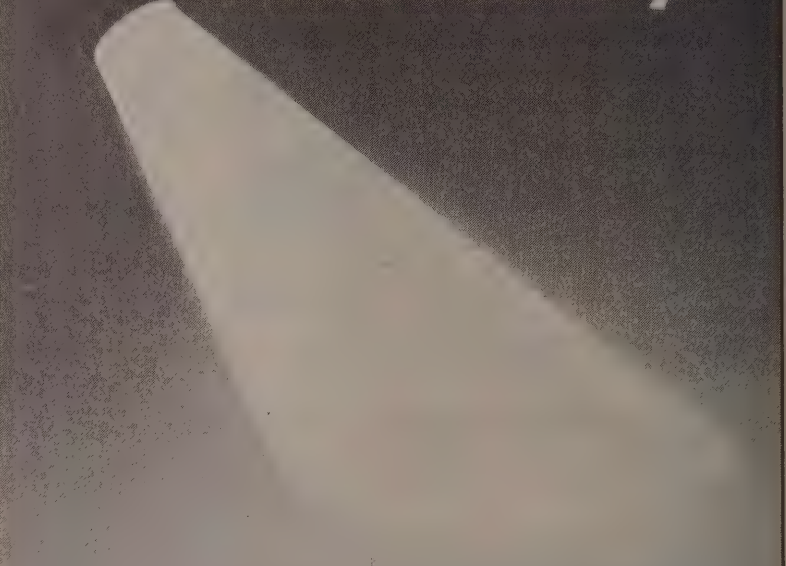

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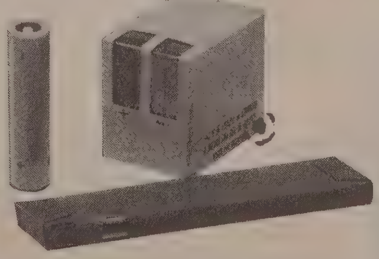

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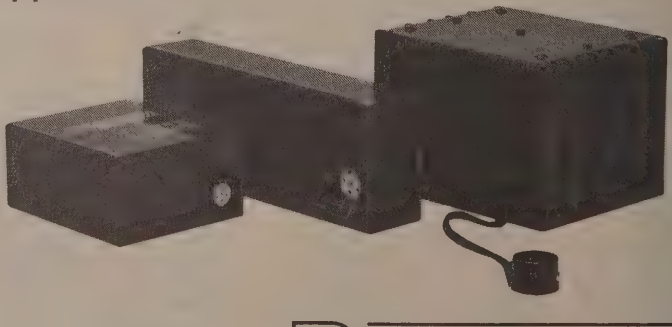

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MIL BATTERY TYPE NO.	NATIONAL STOCK NO.	BATTERY TYPE A = ALKALINE L = ZINC CARBON M = MERCURY	TERMINAL TYPE	TERMINAL VOLTAGE (VOLTS)	NOMINAL DIMENSIONS (INCHES)			
					Length	Width	Overall height	Weight oz.
BA-2	6135-00-120-1028	A	Wire lead	22.5	3.438	2.031	2.594	20
BA-8	6135-00-120-1027	A	Wire lead	22.5	6.563	4.000	3.000	72
BA-9	6135-00-120-1026	A	Flat spring	4.5	2.438	0.813	3.125	6
BA-15A	6135-00-120-1025	L	Stud & nut	1.5	2.625	1.313	4.500	14
BA-26	6135-00-120-1023	L	Spring clip	22.5, 45	8.125	4.375	7.938	220
BA-27	6135-00-120-1022	L	Stud & nut	-1.5, -3, -4.5	4.000	1.438	3.563	16
BA-28	6135-00-120-1021	A	Flat spring	4.5	1.969	0.656	2.678	5
BA-31	6135-00-120-1019	A	Stud & nut	4.5	2.438	0.813	3.156	6
BA-33	6135-00-120-1018	A	Stud & nut	45, 135	6.125	3.500	5.781	104
BA-34	6135-00-120-1017	A	Stud & nut. Wire lead tap	-1.5, -3, -4.5, -6, -7.5	4.063	0.875	3.313	10
BA-35	6135-00-120-1016	L	Stud & nut	1.5	2.625	2.625	4.500	24
BA-36	6135-00-120-1015	A	Stud & nut	22.5, 45	4.188	2.500	6.500	54
BA-37	6135-00-120-1014	L	Flat surface	1.5	--------	1.313 (dia)	6.125	11
BA-38	6135-00-120-1013	A	Flat surface	103.5	1.344	1.344	11.688	26
BA-39	6135-00-120-1012	A	5-hole socket	7.5, 150	6.438	3.750	7.500	140
BA-40	6135-00-120-1011	A	4-hole socket	1.5, 90	5.250	4.094	7.375	124
BA-41	6135-00-107-6662	A	5-hole socket	4.5, 25.5, 60	2.313	2.063	3.438	16
BA-44	6135-00-050-0916	L	Stud & nut	6	10.375	2.688	7.406	176
BA-48	6135-00-120-1007	A	4-hole socket	1.5, 90	9.938	2.188	4.813	88
BA-51	6135-00-120-1005	L	Snap fasteners	67.5	2.688	1.313	3.688	14
BA-53	6135-00-120-1004	A	Stud & nut	22.5, 45	3.000	1.875	5.219	26
BA-56	6135-00-120-1003	L	Snap fasteners	45	2.594	0.938	3.625	10
BA-59	6135-00-120-1032	A	5-hole socket	45	3.500	1.719	5.438	34
BA-63	6135-00-178-9506	L	5-hole socket	22.5, 45	2.938	2.250	4.063	28
BA-65	6135-00-120-1034	L	2-hole socket	1.5	2.625	2.625	4.000	24
BA-67	6135-00-120-1035	A	3-hole socket	3, 90	4.063	1.938	4.563	25
BA-203/U	6135-00-100-0420	L	2-hole socket	6	3.875	2.719	5.500	52
BA-205/U	6135-00-100-0423	L	Stud & nut	3	2.625	1.313	4.656	14
BA-208/U	6135-00-100-0426	A	Flat springs	3	1.375	0.688	2.500	4
BA-210/U	6135-00-100-0475	L	2-hole socket	6	2.625	2.625	4.000	24
BA-216/U	6135-00-100-0469	L	Spring clip	4.5	3.875	3.875	5.938	72
BA-222/U	6135-00-100-0465	L	Stud & nut	6	8.188	2.688	6.406	102
BA-223/U	6135-00-100-0464	A	5 pin connector	22.5, 45	4.062	2.562	5.312	58
BA-225/U	6135-00-100-0462	L	Spring clip	3	3.875	2.625	6.125	52
BA-226/U	6135-00-100-0463	L	2-hole socket	4.5	3.938	1.313	4.625	22
BA-228/U	6135-00-100-0460	A	Stud & nut	22.5, 45	2.938	1.250	4.406	16
BA-231/U	6135-00-100-0458	A	2-hole socket	1.5	--------	1.313 (dia)	4.063	8
BA-232/U	6135-00-100-0457	L	3-hole socket	22.5	1.563	1.313	2.938	5
BA-233/U	6135-00-100-0456	L	3-hole socket	33	2.000	1.313	2.937	6
BA-234/U	6135-00-100-0455	A	3-hole socket	45	2.000	1.313	3.813	9
BA-251/U	6135-00-179-0538	L	Wire lead	1.5, 3	1.656	0.844	2.656	4
BA-270/U	6135-00-194-9352	A	7-hole socket	1.5, 45, 90, -4.5	2.750	2.563	7.313	54
BA-272/U	6-135-00-100-0389	L	Flat surface	1.5	1.125	0.594	2.000	1.5
BA-279/U	6135-00-240-3200	A	8-hole socket	1.5, 67.5, 135.0, -6	8.313	2.313	8.313	136
BA-310/U	6135-00-274-4034	L	8-hole socket	6	2.625	2.625	4.500	29
BA-334/U	6135-00-221-4688	L	Flat surface	30	1.172	0.594	1.453	1
BA-358/U	6135-00-577-3340	A	9-hole socket	1.5, -6.0, 4.5.0, 67.5 135.0	8.625	4.438	2.688	96
BA-386/ PRC-25	6135-00-858-5712	A	5-hole socket	3.0, 15.0	9.438	3.563	2.063	72
BA-398/ PRC-25	6135-00-926-3503	A	5-hole socket	3.0, 15.0	12.000	11.000	1.250	54
BA-399/U	6135-00-926-0845	A	4-hole socket	15.0	3.125	1.312	1.937	6
BA-401/U	6135-00-164-8753	L	Flat surface	1.5	--------	1.313 (dia)	3.563	5
BA-402/U	6135-00-164-8780	L	8-hole socket	1.5	2.625	1.375	4.500	15
BA-403/U	6135-00-125-5255	L	8-hole socket	1.5	3.938	1.375	4.500	19
BA-404/U	6135-00-164-8779	L	8-hole socket	1.5	2.625	2.625	4.500	26
BA-405/U	6135-00-164-8778	L	8-hole socket	1.5	3.938	2.625	4.500	42
BA-406/U	6135-00-164-8777	L	8-hole socket	3.0, 1.5	2.625	1.375	3.188	9
BA-407/U	6135-00-164-8776	L	8-hole socket	3.0, 1.5	2.625	1.375	4.500	15
BA-408/U	6135-00-164-8775	L	8-hole socket	6.0, 4.5, 3, 1.5	2.625	2.625	3.188	18
BA-409/U	6135-00-164-8774	L	8-hole socket	6.0, 4.5, 3, 1.5	2.625	2.625	4.500	26

continued

MIL BATTERY TYPE NO.	NATIONAL STOCK NO.	BATTERY TYPE A = ALKALINE L = ZINC CARBON M = MERCURY	TERMINAL TYPE	TERMINAL VOLTAGE (VOLTS)	NOMINAL DIMENSIONS (INCHES)			
					Length	Width	Overall height	Weight oz.
BA-410/U	6135-00-164-8773	L	8-hole socket	6.0, 4.5, 3, 1.5	5.250	2.688	4.500	53
BA-411/U	6135-00-164-8766	L	8-hole socket	6.0, 4.5, 3, 1.5	5.375	3.875	6.000	102
BA-412/U	6135-00-164-8767	L	8-hole socket	6.0, 4.5, 3, 1.5	7.813	3.875	6.000	156
BA-413/U	6135-00-164-8754	A	8-hole socket	22.5	1.563	1.438	3.250	6
BA-414/U	6135-00-125-5256	A	8-hole socket	22.5, 45	2.938	1.438	3.250	11
BA-415/U	6135-00-164-8755	A	8-hole socket	22.5, 45, 67.5, 90	5.375	1.438	3.250	21
BA-416	6135-00-164-8768	A	8-hole socket	22.5, 45, 67.5, 90, 135	4.125	2.875	3.250	32
BA-417/U	6135-00-164-8756	L	8-hole socket	22.5	2.375	2.250	4.125	17
BA-418/U	6135-00-164-8757	A	8-hole socket	22.5, 45	4.188	2.313	4.125	33
BA-419/U	6135-00-125-5257	A	8-hole socket	22.5, 45, 67.5, 90	7.625	2.313	4.125	65
BA-420/U	6135-00-164-8758	A	8-hole socket	22.5, 45, 67.5, 90, 135	6.625	4.375	4.125	97
BA-421/U	6135-00-164-8759	A	8-hole socket	22.5	2.625	2.500	4.750	26
BA-422/U	6135-00-164-8760	A	8-hole socket	22.5, 45	4.156	2.563	5.583	51
BA-424/U	6135-00-164-8762	A	8-hole socket	22.5, 45, 67.5, 90, 135	7.625	4.188	5.625	159
BA-505/U	6135-00-926-0844	A	2-hole socket	6.0	--------	0.563 (dia)	5.250	1.4
BA-802/U	6135-00-100-0402	L	2-hole socket	1.5	2.593	1.375	4.250	15
BA-803/U	6135-00-100-0413	L	Stud & nut	6.0	2.625	2.625	4.188	24
BA-804/U	6135-00-178-9527	L	Binding post	7.5	7.250	4.062	6.375	120
BA-805/U	6135-00-266-9787	A	Snap fasteners	90.0	3.688	1.312	3.688	21
BA-806/U	6135-00-100-0385	A	6-hole socket	45.0	3.438	2.250	4.500	25
BA-809/U	6135-00-100-0392	L	Flat spring	3.0	5.594	1.438	3.250	24
BA-813/U	6135-00-100-0405	L	Binding post	7.5, 4.5	2.813	0.625	1.750	—
BA-815/U	6135-00-100-0411	L	Flexible lead	6.0	4.063	2.625	5.437	58
BA-818/U	6135-00-100-0415	L	Stud & nut	13.5	2.063	2.063	2.594	8
BA-833/U	6135-00-683-0536	L	6-hole socket	1.5	2.969	1.281	2.563	9
BA-1003/U	6135-00-542-6277	M	2-hole socket	6.7	3.906	1.406	5.063	40
BA-1006/U	6135-00-299-6918	M	Flat surface	1.3	--------	0.610 (dia)	0.233	.22
BA-1010/U	6135-00-010-5275	M	Flat surface	1.3	--------	1.462 (dia)	0.385	1.4
BA-1015A/U	6135-00-161-0746	M	Stud & nut	1.3	2.625	1.313	4.500	15
BA-1030/U	6135-00-125-5265	M	Flat surface	1.3	--------	1.313 (dia)	2.375	5.9
BA-1051/U	6135-00-262-6850	M	Snap fasteners	64.3	2.699	1.313	3.688	14
BA-1083/U	6135-00-557-0174	M	2 lug	10.7	2.656	2.656	5.563	56
BA-1085/U	6135-00-295-2613	M	3 wires	1.3, 13.0	--------	0.718 (dia)	9.562	3.8
BA-1086/U	6135-00-473-6278	M	Flat surface	12.1, 2.7, 5.4	--------	0.656 (dia)	5.813	4.5
BA-1087/U	6135-00-473-6279	M	Flat surface	4.0	--------	0.656 (dia)	5.844	5
BA-1092/U	6135-00-578-6901	M	Flat surface	9.4	--------	0.660 (dia)	1.938	1.5
BA-1093/U	6135-00-808-5093	M	Flat surface	8.0	--------	0.656 (dia)	3.900	2.9
BA-1094/U	6135-00-010-5255	M	Flat surface	5.4	--------	0.662 (dia)	1.635	2
BA-1096/U	6135-00-445-2787	M	Ribbon	1.3	0.680	0.290	0.680	1
BA-1098/U	6135-00-556-8318	M	Flat surface	4.0	--------	0.656 (dia)	1.950	1.5
BA-1101/U	6135-00-164-8772	M	3-hole socket	5.4, 2.7	1.063	1.063	2.906	2
BA-1102/U	6135-00-500-1173	M	Flat spring	1.3	--------	1.190 (dia)	0.655	1.5
BA-1105/U	6135-00-725-3941	M	2 tabs	1.35	--------	0.622 (dia)	1.953	1.6
BA-1106/U	6135-00-683-0812	M	Flat surface	4.2	--------	1.015 (dia)	1.969	3.5
BA-1111/U	6135-00-935-8769	M	Flat surface	12.1	--------	1.000 (dia)	5.813	10
BA-1232/U	6135-00-160-7161	M	3-hole socket	24.1	1.563	1.313	2.938	7
BA-1234/U	6135-00-160-7158	M	3-hole socket	48.2	2.000	1.313	3.813	14
BA-1277/U	6135-00-194-9354	M	2-hole socket	1.3	2.348	1.313	4.188	22
BA-1278/U	6135-00-194-9353	M	7-hole socket	46.9, 22.8, 5.4, 2.7	3.188	1.313	4.188	22
BA-1288/U	6135-00-266-9762	M	Flat surface	1.3	--------	1.200 (dia)	0.650	1.6
BA-1312/U	6135-00-269-5843	M	Flat surface	1.3	-------	0.622 (dia)	0.635	.6
BA-1313/U	6135-00-643-2235	M	4-hole socket	1.3, 139.4	2.672	2.031	7.500	72
BA-1322/U	6135-00-295-2172	M	8-hole socket	5.4, 2.7	2.625	2.625	3.188	23
BA-1328/U	6135-00-274-4035	M	Flat surface	1.3	-------	0.622 (dia)	1.953	1.6
BA-1330/U	6135-00-295-2614	M	Flat surface	1.3	-------	0.987 (dia)	0.650	1.2
BA-1363/U	6135-00-577-8309	M	Flat surface	12.1	--------	0.640 (dia)	2.281	1.6
BA-1371/U	6135-00-845-9232	M	Flat surface	5.4	--------	0.655 (dia)	2.620	2
BA-1373/U	6135-00-715-4001	M	Flat surface	2.7	--------	0.662	1.315	1
BA-1389/U	6135-00-961-3603	M	Flat surface	10.7	---------	0.655	5.200	4
BA-1391/U	6135-00-935-2532	M	Flat surface	1.3	--------	1.460 (dia)	0.520	1.8
BA-1400/U	6135-00-135-0194	M	Flat surface	6.5	--------	0.655 (dia)	2.187	1.6
BA-1549/U	6135-00-459-3326	M	6-hole socket	4, 30	5.380	5.680	2.040	74
BA-1574/U	6135-00-073-8939	M	Screw	5.4	--------	1.000 (dia)	2.580	2.5
BA-1588/U		M	Snap fasteners	15.4	3.56	1.239	2.25	14
BA-3036/U	6135-00-935-2589	A	Stud & nut	22.5, 45	4.188	2.500	6.500	53
BA-3044/U	6135-00-935-2577	A	Stud & nut	6	10.375	2.688	7.406	176
BA-3051/U	6135-00-935-2582	A	Snap fasteners	67.5	2.688	1.313	3.594	22
BA-3515/U	6135-00-411-3171	A	Connector plug	30.0	8.563	1.688	4.062	72
BA-3517/U	6135-00-450-3528	A	Connector plug	36.0	6.485	5.485	4.550	1.28
BA-4660/U		MAG	5-hole socket	36	9.438	3.563	2.063	60
BA-4840/U	6135-01-015-1223	MAG	6-hole socket	16.6, 16.6	3.420	6.000	11.610	160

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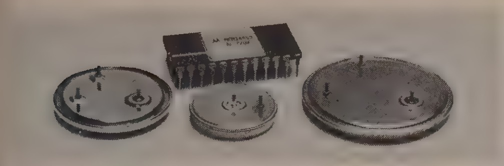
Lithiode™...Lithium-Iodine Batteries

The solid-state chemistry makes the difference

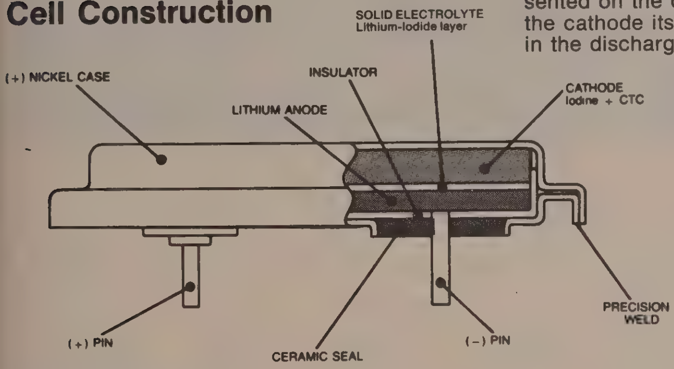


The only solid-state lithium battery for CMOS RAM backup.

A Lithiode™ cell is formed when a lithium anode is brought into contact with a cathode composed of iodine and an organic which forms a conductive charge transfer complex (CTC). An initial chemical reaction between these components forms the electrolyte: solid lithium-iodide.

As current is drawn from the cell, lithium is oxidized and iodine reduced, forming additional lithium-iodide. This lithium-iodide, which serves as both electrolyte and separator, accumulates as the cell is discharged, increasing the internal resistance. The result is an initial linear decline in voltage, represented on the discharge curves. Later, when the CTC loses most of its iodine, the cathode itself begins to rise in resistance. This results in the "knee" seen in the discharge curves.

Cell Construction



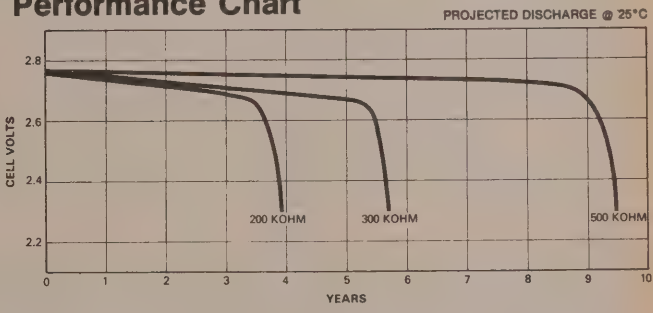
Performance Advantages

LONG LIFE	Over 10-year life capability based on 8 years of pacemaker battery test data
HERMETICALLY SEALED	Prevents battery leakage and improves battery life and reliability
BATTERY MOUNTING	Designed for standard circuit boards and wave soldering
TEMPERATURE RANGE	Will operate from −55°C to +125°C
OPERATING SAFETY	Completely safe under short circuit and voltage reversal conditions
HIGH ENERGY OUTPUT	Energy density is 0.6 watt-hr/cc and 0.12 watt-hr/gm

Battery Chart

Battery Model	Voltage	Capacity	Current Capability at 25°C	Physical Size		Weight
				Diameter	Height	
1935	2.8	200 mAhr	15 μamp	19mm	3.5mm	4.8gm
2736	2.8	350 mAhr	15 μamp	27mm	3.6mm	7.1gm
3440	2.8	700 mAhr	30 μamp	34mm	4.0mm	17.8gm

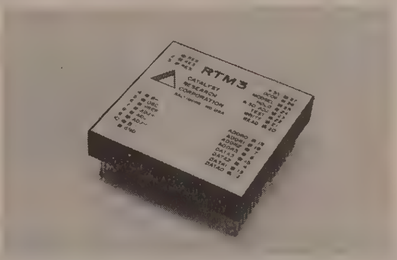
Performance Chart



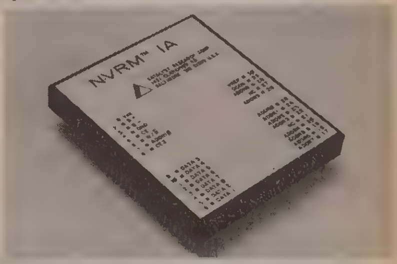
Lithiode™ Modules—Contain battery and switching circuitry for non-volatility

Save: memory, board space, design time, money. Over 10 years shelf and operational life, non-volatility.

DRM™/DRM2™—Data Retention Module
- Operational mode/data retention mode switch
- Logic level monitor
- Voltage monitor
- DCOK signal
- 13 used, 14 allocated, standard 24 pin dip pattern
- 2″ x 2″ x .4″/1″ x 1.5″ x .4″
- Available with or without battery



RTM3™—Real Time Clock/Calendar
- Microprocessor bus-oriented
- Clocks seconds, minutes, hours, day-of-week, date, month and year.
- 12 or 24 hour format
- Leap year identification
- ±30 second set
- 5V power supply
- 2″ x 2″ x .4″



NVRM1A™—Non-Volatile RAM Module
- 2K x 8 bits organization
- TTL compatible inputs and outputs
- 5V single power supply
- −30 C to +70 C operation
- DCOK signal
- 3.1″ x 2.6″ x .4″

Note: All specifications subject to change. Contact CR for verification.

Lithiode™ batteries and modules are ready for immediate shipment.
For application assistance, prices and additional information, call or write:

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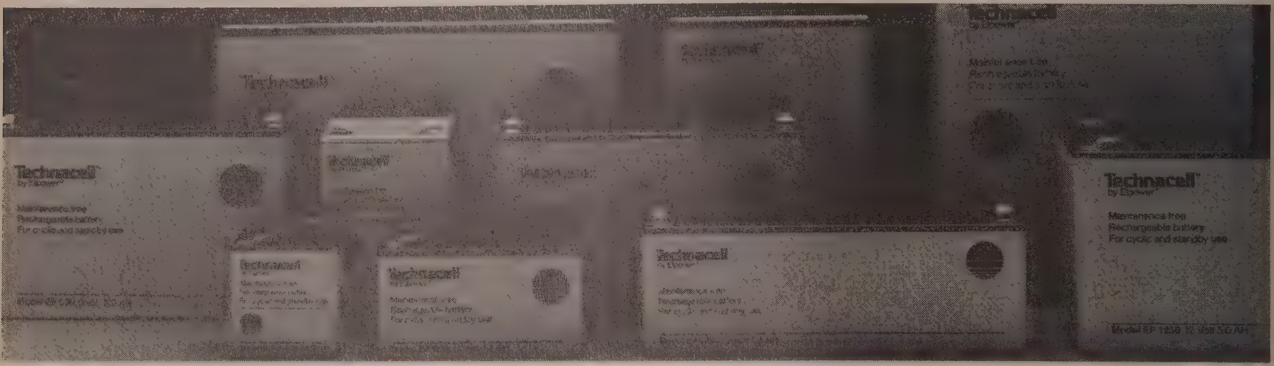
Technacell Sealed Lead Acid Batteries



Technacell maintenance free sealed lead acid batteries deliver consistant power in a range of 2 volts through 12 volts and at a rating of 0.9 AH through 38 AH.

Perfect for all cyclic and standby applications, the batteries are contained in a rugged polystyrene case and have from 100 to 1000 charging cycles.

Model Number	Nominal Voltage	Capacity @ 20 hr. (ampere-hours)	Current @ 20 hr. Rate (milli-amperes)	Weight		Dimensions							
				lb.	Kilo-grams	Length in.	mm	Width in.	mm	Height in.	mm	Height over Terminals in.	mm
EP285-26	2V	8.5A.H.	425	1.3	.590	2.08	52.83	1.97	50.04	3.70	93.98	3.90	99.06
EP450-26	4V	5.0A.H.	250	1.7	.771	2.52	64.01	2.08	52.83	3.70	93.98	3.90	99.06
EP485-26	4V	8.5A.H.	425	2.6	1.18	4.02	102.11	1.97	50.04	3.70	93.98	3.90	99.06
EP610-26	6V	0.9A.H.	45	0.6	0.27	2.00	50.8	1.65	41.9	2.08	52.83	2.28	57.91
EP626-26 (-36)	6V	2.6A.H.	130	1.4	0.64	5.28	134.1	1.33	33.7	2.39	60.71	2.59	65.79
EP640-16	6V	4.0A.H.	200	2.0	0.90	2.63	66.8	2.63	66.8	3.78	96.01	4.01	101.85
EP640-21	6V	4.0A.H.	200	2.0	0.90	2.63	66.8	2.63	66.8	3.78	96.01	4.28	108.70
EP650-26 (-36)	6V	5.0A.H.	250	2.5	1.14	5.96	151.4	1.33	33.7	3.72	94.49	3.92	99.57
EP680-1 (-5)	6V	8.0A.H.	400	4.0	1.82	4.26	108.2	2.75	69.9	5.54	140.72	5.54	140.72
EP682-26	6V	8.0A.H.	400	3.4	1.55	3.86	98.0	2.21	56.13	4.65	118.11	4.65	118.11
EP685-26 (-36)	6V	8.5A.H.	425	3.9	1.79	5.96	151.4	1.97	50.0	3.72	94.49	3.92	99.57
EP695-1 (-5)	6V	9.5A.H	475	4.9	2.20	4.26	108.2	2.75	69.9	5.54	140.72	5.54	140.72
EP6120-1 (-5)	6V	12.0A.H.	600	5.5	2.50	4.26	108.2	2.75	69.9	5.54	140.72	5.54	140.72
EP6160-1	6V	16.0A.H.	800	8.1	3.67	8.38	212.9	2.75	69.9	5.50	139.70	5.50	139.70
EP6200-34	6V	20.0A.H.	1000	9.0	4.09	6.25	158.8	3.35	85.1	6.50	165.10	6.70	170.18
EP6200-40	6V	20.0A.H.	1000	9.0	4.09	6.25	158.8	3.35	85.1	6.50	165.10	6.95	176.53
EP6300-34	6V	30.0A.H.	1500	10.7	4.86	6.25	158.8	3.35	85.1	6.50	165.10	6.70	170.18
EP6300-40	6V	30.0A.H.	1500	10.7	4.86	6.25	158.8	3.35	85.1	6.50	165.10	6.95	176.53
EP6330-34	6V	33.0A.H.	1650	11.0	5.0	6.25	158.8	3.35	85.1	6.50	165.10	6.70	170.18
EP6330-40	6V	33.0A.H.	1650	11.0	5.0	6.25	158.8	3.35	85.1	6.50	165.10	6.95	176.53
EP1212-26	12V	1.2A.H.	60	1.25	.57	3.83	97.28	1.86	47.24	2.00	50.80	2.20	55.88
EP1218-26 (-36)	12V	1.8A.H.	90	1.8	.82	7.02	178.31	1.33	33.78	2.38	60.45	2.58	65.53
EP1226-6	12V	2.6A.H.	130	2.9	1.32	5.28	134.1	1.33	33.8	4.93	125.22	4.93	125.22
EP1226-26	12V	2.6A.H.	130	2.9	1.32	5.28	134.1	2.52	57.1	2.36	59.94	2.56	65.02
EP1240-26	12V	4.0A.H.	200	3.9	1.77	5.12	134.1	2.63	66.8	3.78	96.01	4.05	102.87
EP1250-26	12V	5.0A.H.	250	4.9	2.22	5.96	151.4	2.52	64.0	3.72	94.49	3.92	99.57
EP1280-1	12V	8.0A.H.	400	8.2	3.72	8.38	212.9	2.75	69.9	5.50	139.70	5.50	139.70
EP1295-1	12V	9.5A.H.	475	10.0	4.55	8.38	212.9	2.75	69.9	5.50	139.70	5.50	139.70
EP12120-1	12V	12.0A.H.	600	11.0	5.0	8.38	212.9	2.75	69.9	5.50	139.70	5.50	139.70
EP12240-34	12V	24.0A.H.	1200	20.0	9.1	6.54	166.12	6.90	175.26	4.98	126.49	5.27	133.86
EP12240-40	12V	24.0A.H.	1200	20.0	9.1	6.54	166.12	6.90	175.26	4.98	126.49	5.51	139.95
EP12300-34	12V	30.0A.H.	1500	21.5	9.75	6.54	166.12	6.90	175.26	6.91	175.51	7.20	182.88
EP12300-40	12V	30.0A.H.	1500	21.5	9.75	6.54	166.12	6.90	175.26	6.91	175.51	7.34	186.44
EP12380-34	12V	38.0A.H.	1900	29.0	13.2	6.54	166.12	6.90	175.26	6.91	175.51	7.20	182.88
EP12380-40	12V	38.0A.H.	1900	29.0	13.2	6.54	166.12	6.90	175.26	6.91	175.51	7.34	186.44

Explanation of Terminal Types

-1 Solder-lug/quick disconnect tabs, terminals located on top of battery. Positive terminal (6.35 mm wide × 0.81 mm thick)(.250 in. wide × .032 in. thick). Negative terminal (4.75 mm wide × 0.51 mm thick)(.187 in. wide × .020 in. thick). Will accept Amp, Inc. Faston "250" and "187" series respectively or equals.

-5 Solder-lug/quick disconnect tabs, same dimensions as -1, terminals located on side of battery

-6 18 gauge wire leads, red positive, black negative (101.6 mm)(4 in. long)

-16 Solder-lug/quick disconnect tabs (4.75 mm wide × 0.81 mm thick)(.187 in. wide × .032 in. thick). Tabs parallel with the width of the battery.

-21 Coil spring terminals for pressure type electrical connections; with circuit breaker.

***-26** Solder-lug/quick disconnect tabs (.187 wide × .032 thick). Tabs parallel with width of battery.

***-34** Solder-lug/quick disconnect tabs (6.35 mm wide × 0.81 mm thick)(.250 in. wide × .032 in. thick).

***-36** Solder-lug/quick disconnect tabs, same dimensions as a -26. Tabs parallel with the length of the battery.

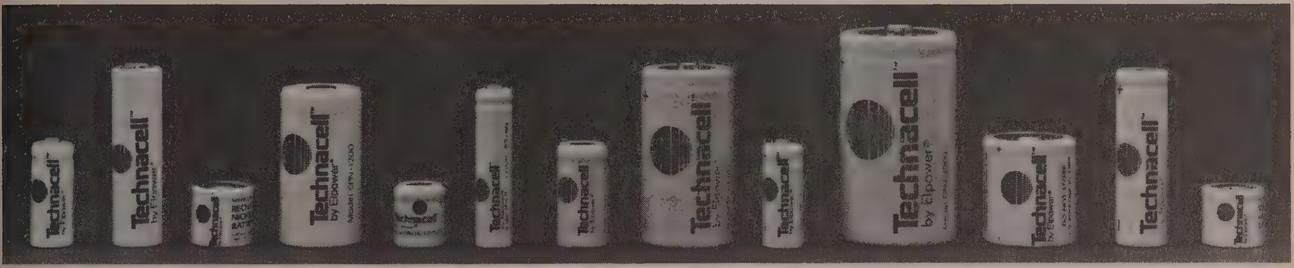
-40 Flat lead post drilled for a #10 screw and nut.

*Terminal imbedded in epoxy.

Operating Temperature Range:
Discharge: −40°C to 60°C (−40°F to 140°F)
Charge: −20°C to 50°C (−4°F to 122°F)
Capacity is rated at 20°C (68°F)

Depth of Discharge: Although battery design tolerates deep discharges, for maximum life a low voltage cut-off circuit is recommended for discharges below 1.66 volts per 2 volt cell

Technacell Nickel Cadmium Batteries



The Technacell nickel-cadmium rechargeable batteries are rated at 1.2 volts and are available in single cell capacities from 110 mAH to 4000 mAH in industry standard sizes.

These cells are capable of more than 750 charge-discharge cycles. More than eight years of life can be expected when subjected to constant trickle charge at room temperature. High temperature models are also available for ambient temperatures ranging to 65°C.

Model Number	Type	Nominal Voltage	Capacity @ 5 Hour Rate, mAH	Normal Charge Rate		*Maximum Charge Rate		Dimensions Height		Diameter		Weight	
				mA	Hours	mA	Hours	in.	mm.	in.	mm.	oz.	g.
EPN 150	N	1.2	150	15	15	38	6.0	1.139	28.9	.475	12.1	.40	11.3
EPN 180	1/3A$_f$	1.2	180	18	15	60	4.5	0.646	16.4	.675	17.2	.40	11.3
EPN 181	AAA	1.2	180	18	15	45	6.0	1.750	44.6	.415	10.5	.35	10.0
**EPN 250	2/3AA	1.2	250	25	15	80	4.5	1.181	30.0	.570	14.5	.40	12.0
EPN 450	2/3A$_f$	1.2	450	45	15	150	4.5	1.116	28.4	.675	17.2	.71	20.1
EPN 500	AA	1.2	500	50	15	150	4 5	1.969	50.0	.553	14.1	.80	22.7
**EPN 500F	AA	1.2	500	50	15	150	4.5	1.880	47.8	.553	14.1	.80	22.7
EPN 1000	2/3C	1.2	1,000	100	15	330	4.5	1.161	29.5	1.043	26.5	1.8	51.0
EPN 1200	C$_S$	1.2	1,200	120	15	300	6.0	1.679	42.7	.900	22.9	1.9	53.9
EPN 1800	C	1.2	1,800	180	15	180	15.0	1.970	50.0	1.025	26.0	2.7	75.0
EPN 4000	D	1.2	4,000	400	15	400	15.0	2.350	59.7	1.310	33.3	5.4	153.0

Temp. ranges: For charge 0°C (32°F) to 45°C (113°F)
For discharge and storage: −20°C (−4°F) to 45°C (113°F)

HIGH TEMPERATURE MODELS

**EPN H 110	1/3AA	1.2	110	11	15	11	15	.670	17.0	.570	14.5	.25	7 0
**EPN H 500	AA	1.2	500	50	15	50	15	1.880	50.0	.553	14.1	.80	22.7
EPN H 1800	C	1.2	1,800	180	15	180	15	1.970	50.0	1.025	26.0	2.7	75.0
EPN H 4000	D	1.2	4,000	400	15	400	15	2.350	59.7	1.310	33.3	5.4	153 0

For charge: 0°C (32°F) to 65°C (149°F)
For discharge and storage: −20°C (−4°F) to 65°C (149°F)
*For rates higher than this, contact Elpower factory
All batteries supplied with standard button top unless otherwise noted
**Supplied with flat top only

Battery Packs

The Technacell nickel-cadmium cells are available in a wide variety of custom pack configurations. Cells are welded together with nickel tabs to insure rugged, reliable performance. A wide variety of terminals, cases, and hardware are stocked for even the most unusual battery requirement.

ELPOWER CORPORATION

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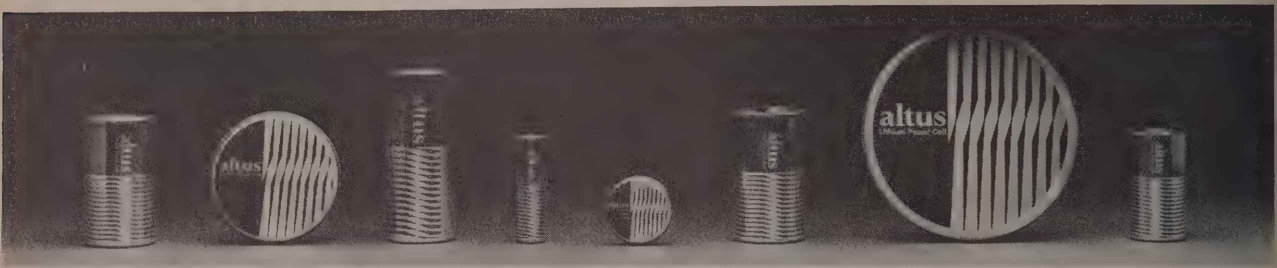
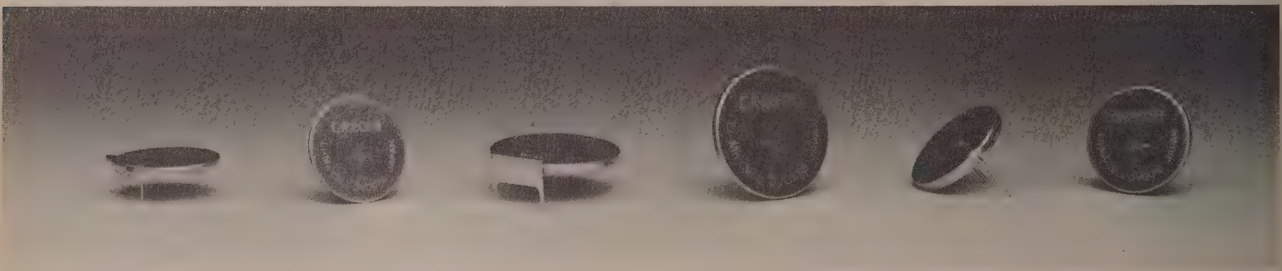
Lithium Thionyl Chloride Cells



High-energy-density lithium thionyl chloride cells enjoy a reputation for quality and safety unmatched by any other manufacturer. Lithium batteries have an open circuit voltage of 3.6 volts, 10+ year shelf life, and an operating temperature of −40 degrees C to 70 degrees C.

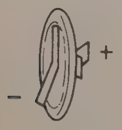
Model Number	Nominal Capacity	Approx. Weight (ounces)	Maximum Diameter (inches)	Maximum Height (inches)	Maximum Height Over Terminals (inches)
AL125	1.4 AH	0.67	1.27	0.41	0.41
AL250	5.5 AH	2.65	2.50	0.44	0.44
AL400	15.0 AH	8.29	4.02	0.48	0.48
AL2AA	2.0 AH	0.74	.59	2.07	2.07
AL6-C	6.0 AH	1.98	1.04	2.09	2.09
AL14-D	14.0 AH	4.06	1.37	2.43	2.41
AL18-F	18.0 AH	5.47	1.32	3.20	3.48

Lithium Manganese Dioxide Cells

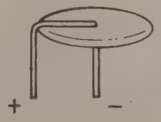


High-energy-density and long storage life characterize these cells. Ideal for memory protection. Each cell has a voltage of 3.0 volts and an operating temperature of −20 degrees C to 60 degrees C.

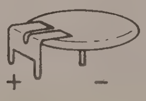
Model Number	Nominal Capacity	Approx. Weight (ounces)	Maximum Diameter (inches)	Maximum Height (inches)
CR2016	60 mAh	0.07	0.787	0.063
CR2032	170 mAh	0.11	0.787	0.126
CR2430	200 mAh	0.14	0.965	0.118



-T



-P



-F

Lithium cells (CR2016, CR2032, CR2430) are available with the terminations shown to the left. Please add suffix -T for solder tabs, -P for pins or -F for fixed tab, to part number when specifying.

Safety Note:
Lithium, an active component of these cells, will burn if exposed directly to water. Do not attempt to mutilate, incinerate, disassemble, attempt to charge, place batteries in water or heat above 100°C. Soldering directly to the cells will cause damage and possible release of hazardous materials.

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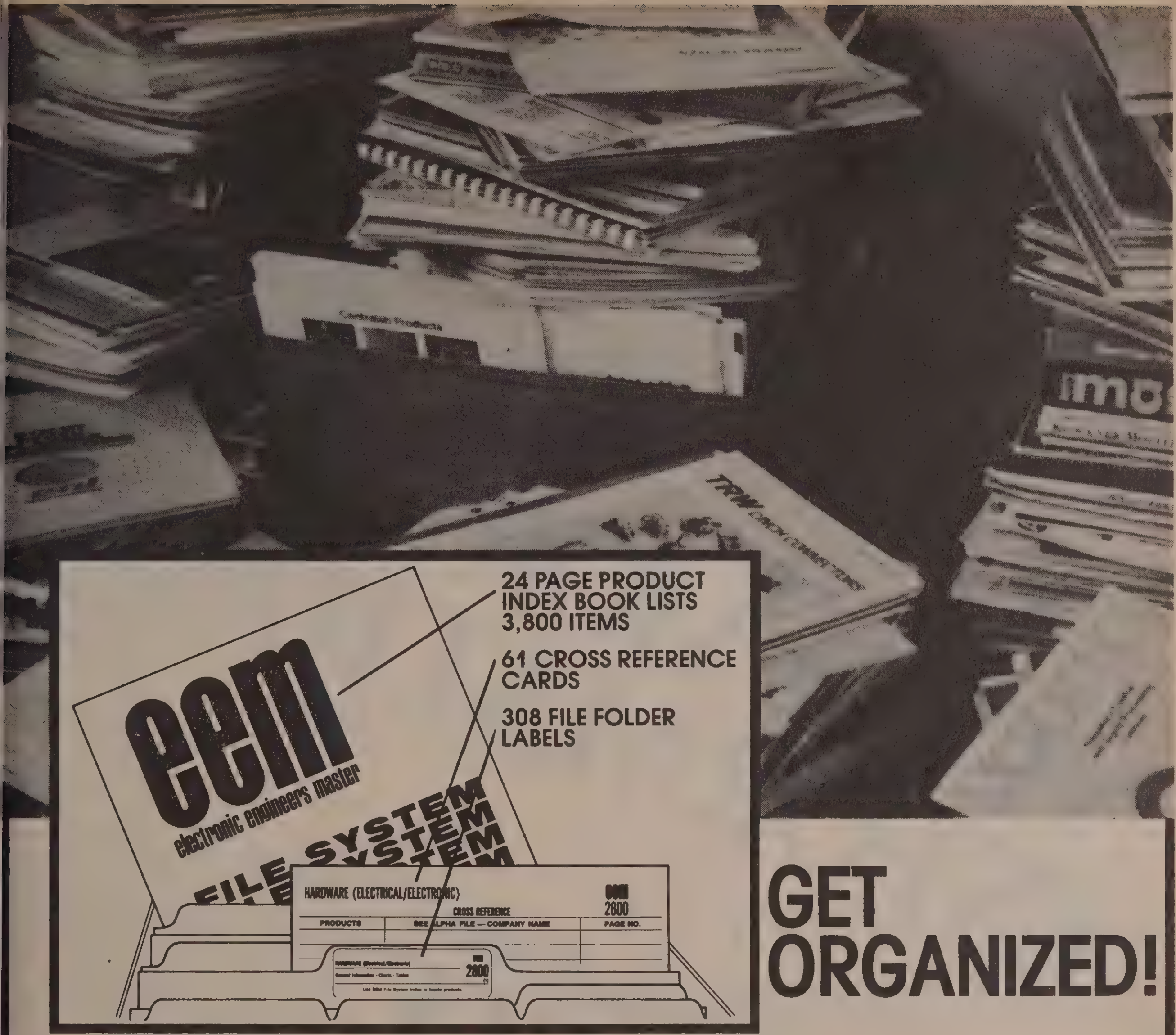
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SPECS?
DRAWINGS?
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QUOTES?

MOTOROLA INC.
Components Division
2553 N. Edgington • Franklin Park, Ill. 60131
312/451-1000 TWX: 910-255-4619 Telex: 4990104

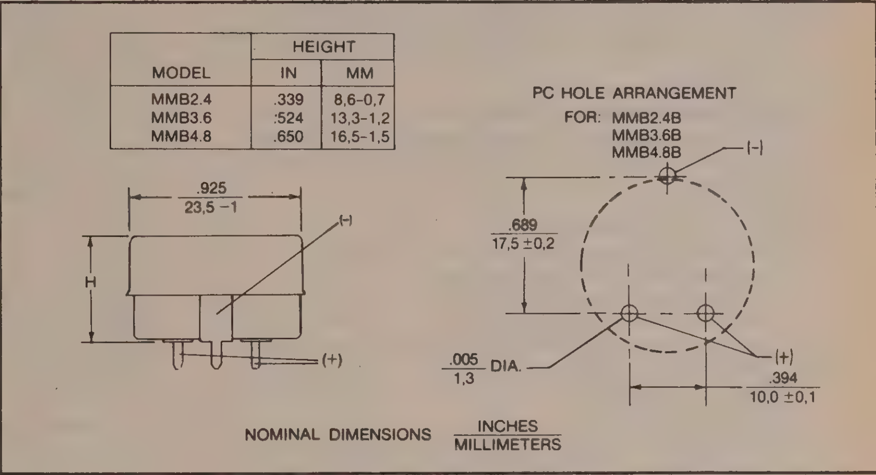
Memory Backup Batteries
2.4V, 3.6V, 4.8V

Rechargeable NiCd Memory Backup Batteries PC Board Mount

MMB3.6B
FRANKLIN PARK, ILLINOIS

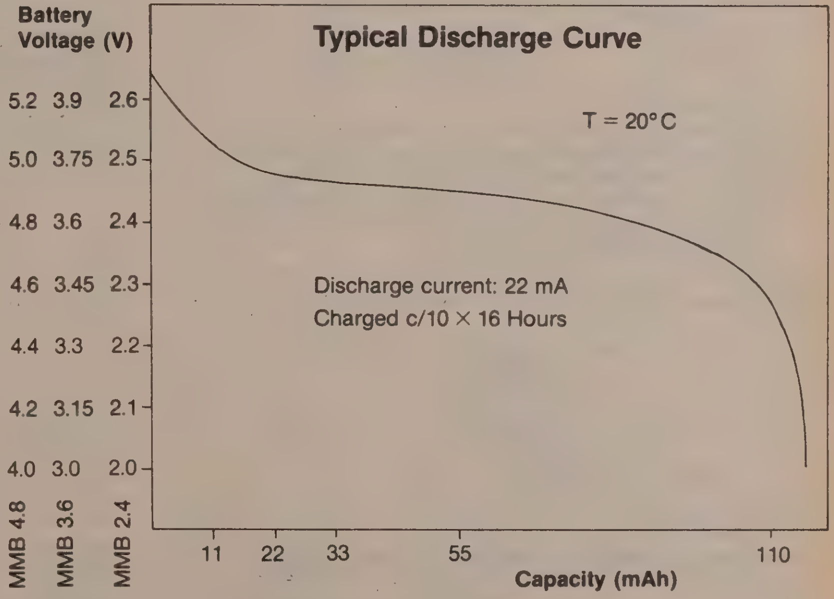
MMB series batteries feature a unique, patented electrode configuration that minimizes the "memory effect." NiCd MMB batteries are thus capable of maintaining a cycle of constant trickle charge when power is on, slow discharge when power is off, with a typical life expectancy in excess of 5 years.

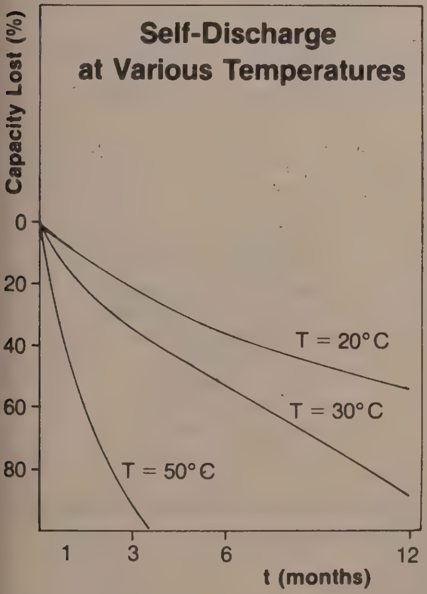
Easy PC board mount — can be wave soldered (5 sec. max) directly to the printed circuit board; no tie-down straps are needed. MMB batteries take up less than 1″ diameter board space and have low seated height (only .524″ for 3.6V models).



MODEL	HEIGHT IN	HEIGHT MM
MMB2.4	.339	8,6−0,7
MMB3.6	:524	13,3−1,2
MMB4.8	.650	16,5−1,5

NOMINAL DIMENSIONS INCHES / MILLIMETERS





Model Number	Nominal Voltage (V)	Nominal Capacity (mAh)	Discharge End Volts (V)	Maximum Discharge Current (mA)	Maximum Charge Current (mA)	Max. Continuous Trickle Charge* (mA)	Temperature Range (°C)
MM2.4B	2.4	110	1.8	165	11	1	Charge: 0 to +55
MM3.6B	3.6	110	2.7	165	11	1	Discharge: -20 to +55
MM4.8B	4.8	110	3.6	165	11	1	Storage: -30 to +55

Occasional overcharging at recommended charge rates will not adversely affect the battery's overall performance. Deep discharging or driving into reverse polarity, however, should be avoided.

*0.5 mA recommended.

MOTOROLA INC.
Components Division

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Panasonic.
Industrial Company

RECHARGEABLE SEALED LEAD-ACID BATTERIES

The LCR Series is a sealed lead-acid rechargeable battery system. The lead-calcium rechargeable (LCR) battery, will stand up to tough operating conditions such as overcharge and deep discharge. In field service, troubles due to abnormal, improper operation or misuse are reduced to a minimum.

Suggested Applications

- Power sources for various portable equipment.
- Power sources for power failure back-up and/or emergency use.

Major Features

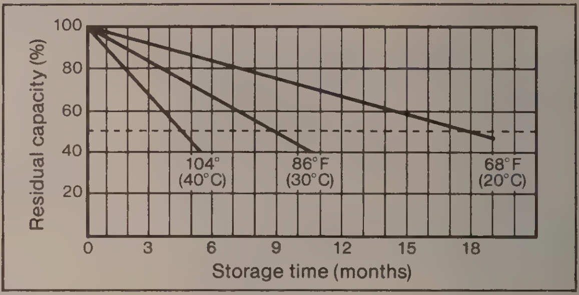
1. Exceptional deep discharge recovery.
2. Long service life; float or cyclic.
3. Gelled or starved electrolyte.
4. Maintenance-free operation.
5. Charge, discharge, or store in any position.
6. No corrosive gas generation.
7. Leakproof design.
8. No memory effect.
9. Approved as "dry cell" for airshipment by Department of Transportation and IATA.

• Temperature Range Summary

Discharge:	5° ~ 122°F (-15° ~ 50°C)
Charge:	32° ~ 104°F (0° ~ 40°C)
Storage:	5° ~ 104°F (-15° ~ 40°C)

• "Shelf Life"

Self-discharge rate is very much dependent on the storage temperature as shown in the graph. Lower temperatures allow the battery to be stored for longer periods. (Each ten degree drop results in a halving of self-discharge rate and doubles storage time.)



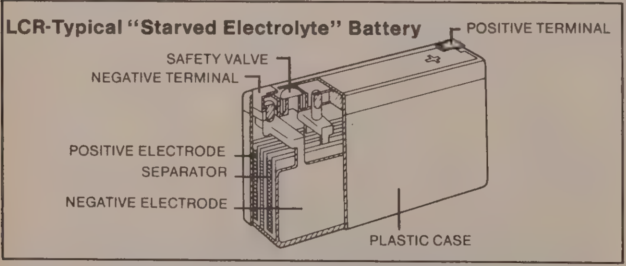
• Cycle Life

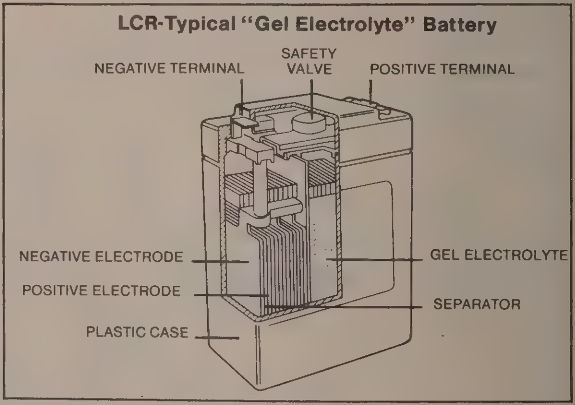
Cycle life is very much dependent on the depth of the discharge which the battery encounters during each cycle.

Discharge Depth	Resultant Cycle Life
100% discharge	200 ~ 250
60% discharge	600 ~ 700
30% discharge	1500 ~ 2000

• Standby Life

The expected float life at room temperature is estimated to be **more than 8 years** on the basis of accelerated tests.


LCR-Typical "Starved Electrolyte" Battery


LCR-Typical "Gel Electrolyte" Battery

• Charging method and battery application

	Cyclic operation	Trickle operation	Float operation
Constant Voltage (Note: all at 68°F, 20°C)	Regulation range of controlled voltage: 6 volt batteries: 7.3V to 7.5V 12 volt batteries: 14.6V to 15.0V Initial current: 0.4C or less	Regulation range of controlled voltage: 6 volt batteries: 6.8V to 6.9V 12 volt batteries: 13.6V to 13.8V Initial current: 0.4C or less	Regulation range of controlled voltage: 6 volt batteries: 6.8V to 6.9V 12 volt batteries: 13.6V to 13.8V Initial current: 0.4C or less

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RECHARGEABLE SEALED LEAD-ACID BATTERIES

Model Number	Nominal Voltage	Nominal Capacity		Dimension				Weight (Approx.)	Standard Terminals or Connectors	Type
		10 hour rate	20 hour rate	Length	Width	Height	Total Height (including terminals)			
	(V)	(Ah)	(Ah)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	lbs. (g)		
LCR-156P	6	1.5	1.6	2.60 (66)	1.30 (33)	3.35 (85)	3.35 (85)	0.84 (380)	FASTON Type 187	G
LCR-226P	6	2.2	2.4	2.60 (66)	1.30 (33)	4.11 (104.5)	4.11 (104.5)	1.15 (520)	"	G
LCR-306P	6	3.0	3.2	2.60 (66)	1.30 (33)	4.92 (125)	4.92 (125)	1.46 (660)	"	G
LCR-456P	6	4.5	4.8	3.70 (94)	1.30 (33)	4.92 (125)	4.92 (125)	2.03 (920)	"	G
LCR-606P	6	6.0	6.4	3.58 (91)	1.93 (49)	4.53 (115)	4.53 (115)	2.65 (1200)	FASTON Type 250	G
LCR-756P	6	7.5	8.0	4.53 (115)	1.93 (49)	4.53 (115)	4.53 (115)	3.31 (1500)	"	G
LCR-856P	6	8.5	9.2	4.53 (115)	1.93 (49)	4.53 (115)	4.53 (115)	3.53 (1600)	"	G
LCR-1512PF	12	1.5	1.6	2.60 (66)	2.64 (67)	3.35 (85)	3.35 (85)	1.68 (760)	FASTON Type 187	G
LCR-1512PS	12	1.5	1.6	5.24 (133)	1.34 (34)	3.39 (86)	3.39 (86)	1.70 (770)	"	G
LCR-2212PF	12	2.2	2.4	2.60 (66)	2.64 (67)	4.11 (104.5)	4.11 (104.5)	2.29 (1040)	"	G
LCR-2212PS	12	2.2	2.4	5.24 (133)	1.34 (34)	4.15 (105.5)	4.15 (105.5)	2.31 (1050)	"	G
LCR-3012PF	12	3.0	3.2	2.60 (66)	2.64 (67)	4.92 (125)	4.92 (125)	2.91 (1320)	"	G
LCR-3012PS	12	3.0	3.2	5.24 (133)	1.34 (34)	4.96 (126)	4.96 (126)	2.93 (1330)	"	G
LCR-4512PF	12	4.5	4.8	3.70 (94)	2.64 (67)	4.92 (125)	4.92 (125)	4.08 (1850)	"	G
LCR-4512PS	12	4.5	4.8	7.44 (189)	1.34 (34)	4.96 (126)	4.96 (126)	4.08 (1850)	"	G
LCR-6012PF	12	6.0	6.4	3.58 (91)	3.90 (99)	4.53 (115)	4.53 (115)	5.29 (2400)	FASTON Type 250	G
LCR-6012PS	12	6.0	6.4	7.20 (183)	1.97 (50)	4.57 (116)	4.57 (116)	5.29 (2400)	"	G
LCR-7512PF	12	7.5	8.0	4.53 (115)	3.90 (99)	4.53 (115)	4.53 (115)	6.61 (3000)	"	G
LCR-7512PS	12	7.5	8.0	9.09 (231)	1.97 (50)	4.57 (116)	4.57 (116)	6.61 (3000)	"	G
LCR-8512PF	12	8.5	9.2	4.53 (115)	3.90 (99)	4.53 (115)	4.53 (115)	7.05 (3200)	"	G
LCR-8512PS	12	8.5	9.2	9.09 (231)	1.97 (50)	4.57 (116)	4.57 (116)	7.05 (3200)	"	G
LCR-1812P	12	1.8	1.9	7.89 (200.5)	0.98 (24.8)	2.38 (60.5)	2.38 (60.5)	1.54 (700)	DC Plug	S
LCR-2012P	12	2.0	2.1	7.90 (200.7)	0.98 (24.8)	2.43 (61.8)	2.43 (61.8)	1.54 (700)	Pressure Contact	S
LCR-3012VBP	12	3.0	3.2	9.45 (240)	1.34 (34)	2.64 (67)	2.64 (67)	2.91 (1320)	DC Plug	G
LCR-6V1.2P	6	1.1	1.2	3.82 (97)	0.94 (24)	1.97 (50)	2.17 (56)	0.66 (300)	FASTON Type 187	S
LCR-6V3P	6	2.8	3.0	5.28 (134)	1.34 (34)	2.36 (60)	2.60 (66)	1.21 (550)	"	S
LCR-6V6.5P	6	6.0	6.5	5.95 (151)	1.36 (34.5)	3.70 (94)	3.94 (100)	2.65 (1200)	FASTON Type 187 or 250	S
LCR-6V8P	6	7.9	9.0	5.95 (151)	2.01 (51)	3.70 (94)	3.94 (100)	3.64 (1650)	"	S
LCR-6V10P	6	8.8	10.0	5.95 (151)	2.01 (51)	3.70 (94)	3.94 (100)	3.64 (1650)	"	S
LCR-12V1.9P	12	1.8	1.9	6.97 (177)	1.34 (34)	2.36 (60)	2.60 (66)	1.54 (700)	FASTON Type 187	S
LCR-12V3PF	12	2.8	3.0	5.84 (134)	2.72 (69)	2.36 (60)	2.60 (66)	2.43 (1100)	"	
LCR-12V6.5P	12	6.0	6.5	5.95 (151)	2.56 (65)	3.70 (94)	3.94 (100)	5.18 (2350)	FASTON Type 187 or 250	S
LCR-12V24P	12	22.0	24.0	6.89 (175)	6.50 (165)	4.92 (125)	4.92 (125)	19.2 (8.7kg)	M5 Bolt and Nut Type	S
LCR-12V40P	12	34.0	40.0	10.16 (258)	6.74 (171)	7.88 (200)	9.30 (236)	41.9 (19.0kg)	M6 Bolt and Nut Type	S
LCR-12V60P	12	50.0	60.0	11.97 (304)	6.74 (171)	7.88 (200)	9.30 (236)	52.9 (24.0kg)	"	S
LCR-12V80P	12	70.0	80.0	16.03 (407)	6.82 (173)	8.27 (210)	9.69 (246)	80.0 (36.0kg)	M8 Bolt and Nut Type	S
LCR-12V100P	12	86.0	100.0	19.77 (502)	7.09 (180)	8.27 (210)	10.04 (255)	100.0 (45.0kg)	"	S
LCR-12V120P	12	104.0	120.0	19.89 (505)	8.67 (220)	8.27 (210)	10.04 (255)	115.0 (52.0kg)	"	S
LCL-12V38P	12	34.0	38.0	7.76 (197)	6.50 (165)	6.89 (175)	6.89 (175)	31.3 (14.2kg)	M6 Bolt and Nut Type	S
LCL-12V65P	12	58.0	65.0	13.78 (350)	6.50 (165)	6.89 (175)	6.89 (175)	50.7 (23.0kg)	"	S

G: Gel Electrolyte

S: Starved Electrolyte

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RECHARGEABLE NICKEL CADMIUM BATTERIES

Applications

For Cyclic Use

- Consumer Applications
- Office Equipment
- Tools
- Instruments and Medical Equipment
- Photography
- Toys and Hobby

For Trickle or Float Charge Use

- Emergency Devices
- Memory Back up

General Characteristics

Panasonic offers a wide range of cells for varying applications and requirements:

- Standard
- Rapid Charge "R"
- High Temperature "H"
  Emergency Back Up
  Memory Back Up
- High Capacity "E"
- High Rate Discharge "P"

Discharge

The discharge characteristics of the Panasonic Ni-Cd cell are extremely flat when compared to those of dry cells.

Discharge voltage characteristics depend upon discharge current and temperature.

Life

The Panasonic Ni-Cd cell can be charged and discharged hundreds of times.

Under normal conditions, more than 500 cycles (charge/discharge) can be expected. The cell has reached its end of life when capacity falls below 80% of original rating.

Life is decreased by charge/discharge cycles beyond the specified temperature or current range or by extended storage under conditions which exceed specified temperature limits, or by cell reversal.

Effects of Temperature upon Performance

The standard Panasonic Ni-Cd cell has excellent discharge characteristics at normal temperatures. If the temperature during charge and discharge is high, capacity tends to decrease. When cells are trickle-charged at a high temperature, this tendency is accelerated. Therefore, it is recommended that special high temperature cells be used for applications in high temperature ambients.

Special Purpose Batteries

Rapid-Charge "R" type

The "R" type cell has a specially improved negative plate with increased gas absorption characteristics. It can be subjected to uncontrolled charging at the 1 C, rate and a Rapid charge in 1 to 1.5 hours is possible.

High-Temperature "H" type

By using a polypropylene separator, the "H" type cell can withstand a temperature of 65°C (149°F) during use. When charging is conducted at a low charging current of C/20 to C/30 in a high-temperature ambient, the "H" type cell has sharply improved capacity compared to a standard cell.

Panasonic "H" type cells for high-temperature use can be classified into two types according to application: the emergency back-up type and the memory back-up type.

(A) Emergency back-up ("H" type)
Emergency back-up normally uses DH, CH, SCH, or AAH, and a trickle or float charge of C/20 to C/30 is usually applied.

(B) Memory back-up ("H" type)
This application requires less capacity, and normally uses AAH, 1/3AAH. In addition to excellent high-temperature characteristics, the charge/discharge characteristics for small currents in the μA range are excellent.

High-Capacity "E" type

These extra capacity cells combine a high-capacity density positive plate with a high-capacity paste negative plate. These cells have 20 ~ 30% more capacity than equivalent standard cells.

High-Rate Discharge "P" type

Using plates with low internal resistance, edge-welded plates and terminals, the resulting cell has sharply reduced internal resistance and improved voltage characteristics during high rate discharge.

Charging Methods

Standard charge

Panasonic Ni-Cd cells are charged using constant current or semi-constant current chargers. The rate of charge is dependent on the size and type of cell. Standard cells, sub C and smaller, can be charged at rates from C/3 ~ C/4 to C/20.

Rapid-charge "R" type

The "R" type Panasonic Ni-Cd cell can be rapidly charged in 1 ~ 1.5 hours using recommended charging circuits and controls. The cell is normally charged at the 1C rate for 1 ~ 1.5 hours, at which time charging current is reduced to C/10 (or less) to complete the charge.

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RECHARGEABLE NICKEL CADMIUM BATTERIES

Temperature Conditions

Charge

Charging temperature ranges are:

- Standard charge: 0° ~ 45°C (32° ~ 113°F)
- C/3 quick charge: 10° ~ 45° (50° ~ 113°F)
- Trickle (float) charge: 0° ~ 65°C (32° ~ 149°F)
- "R" type Rapid charge (- ΔV method): 10° ~ 45°C (50° ~ 113°F)
- Temperature sensing system: 10° ~ 40°C (50° ~ 104°F)

Discharge

Discharge temperature ranges are -20° to +65°C (-4° to +140°F).

Storage

Panasonic cells can withstand very long storage time under typical conditions at a storage temperature range of -20° to +45°C (-4° ~ 113°F). If the cell must provide full capacity after storage, completely charge the cell before use. In addition, after prolonged storage, completely normal capacity can be returned within 1 ~ 3 charge/discharge cycles.

P.C. MOUNT (MEMORY) BATTERIES
"L" TYPE PACKS (STACKS)

Model (Former Model)	Terminals	Voltage (V)	Capacity (mAh)
P-01H-L2N2 (NR-⅓AAHL2-F1)	Tabs	2.4	110
P-01H-L2P2 (NR-⅓AAHL2-P1)	Pins	2.4	110
P-01H-L3N2 (NR-⅓AAHL3-F1)	Tabs	3.6	110
P-01H-L3P5 (NR-⅓AAHL3-P1)	Pins	3.6	110

P.C. MOUNT (MEMORY) BATTERIES
"F" TYPE (SIDE BY SIDE)

Model (Former Model)	Terminals	Voltage (V)	Capacity (mAh)
P-01H-F3P2 (NR-⅓AAHF3-P1)	Pins	3.6	110
P-01H-F3P9*	Pins	3.6	110

*Special Pin Location

STANDARD TYPE

Model	Former Model	Voltage (V)	Capacity (mAh)	Diameter (in.)	Height (in.)	Weight (oz.)	Internal Resistance mΩ
P-11AA	(NR-⅓AA)	1.2	110	0.55±0.02	0.65±0.02	0.24	60
P-15N	(NR-N)	1.2	150	0.45±0.02	1.16±0.02	0.29	40
P-18AAA	(NR-AAA)	1.2	180	0.39±0.02	1.74±0.02	0.35	30
P-25AA	(NR-⅔AA)	1.2	250	0.55±0.02	1.09±0.02	0.43	25
P-50AA/FT	(NR-AA)	1.2	500	0.55±0.02	1.88±0.02	0.78	18
P-50AA	(P-50AA)	1.2	500	0.55±0.02	1.95±0.02	0.78	18
P-60SC	(NR-⅔SC)	1.2	600	0.89±0.02	1.02±0.02	1.02	25
P-120SC	(NR-SC)	1.2	1200	0.89±0.02	1.67±0.02	1.8	13
P-180C	(NR-C)	1.2	1800	1.00±0.02	1.94±0.03	2.6	12
P-400D	(NR-D)	1.2	4000	1.27±0.03	2.36±0.04	4.7	8

HIGH CAPACITY TYPE (E)

Model	Former Model	Voltage (V)	Capacity (mAh)	Diameter (in.)	Height (in.)	Weight (oz.)	Internal Resistance mΩ
P-60AAE	(P-60AA)	1.2	600	0.55±0.02	1.88±0.02	0.78	18
P-150SCE	(P-150SC)	1.2	1500	0.89±0.02	1.67±0.02	1.8	13
P-220CE	(P-220C)	1.2	2200	1.00±0.02	1.94±0.03	2.65	12
P-440DE	(P-440D)	1.2	4400	1.27±0.03	2.36±0.04	4.9	8

HIGH RATE DISCHARGE TYPE (P)

Model	Former Model	Voltage (V)	Capacity (mAh)	Diameter (in.)	Height (in.)	Weight (oz.)	Internal Resistance mΩ
P-120SCP	—	1.2	1200	0.89±0.02	1.67±0.02	1.8	6

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RECHARGEABLE NICKEL CADMIUM BATTERIES
PRIMARY LITHIUM BATTERIES

RECHARGEABLE NICKEL CADMIUM BATTERIES

HIGH TEMPERATURE TYPE (H)

Model	Former Model	Voltage (V)	Capacity (mAh)	Diameter (in.)	Height (in.)	Weight (oz.)	Internal Resistance mΩ
P-11AAH	(NR-⅓AAH)	1.2	110	0.55±0.02	0.65±0.02	0.24	80
P-50AAH	(NR-AAH)	1.2	500	0.55±0.02	1.88±0.02	0.78	18
P-180CH	(NR-CH)	1.2	1800	1.00±0.02	1.94±0.03	2.65	12
P-400DH	(NR-DH)	1.2	4000	1.27±0.03	2.36±0.04	4.7	10

RAPID CHARGE TYPE (R)

Model	Former Model	Voltage (V)	Capacity (mAh)	Diameter (in.)	Height (in.)	Weight (oz.)	Internal Resistance mΩ
P-40AR	—	1.2	400	0.65±0.02	1.11±0.03	0.62	18
P-70AR	—	1.2	700	0.65±0.02	1.68±0.03	0.95	15
P-80AAR	—	1.2	800	0.55±0.02	2.54±0.02	1.0	15
P-120SCR	—	1.2	1200	0.89±0.02	1.67±0.02	1.8	13
P-180CR	—	1.2	1800	1.00±0.02	1.94±0.03	2.5	10

PRIMARY LITHIUM BATTERIES

Versatile, Long-Life Lithium Batteries

Since 1971, Panasonic has pioneered the development of Lithium Batteries as an extremely long life, leakproof, high-energy power source for a wide range of electronic applications.

From watches, cameras, radios and other consumer products to dependable computer memory back-up systems, Panasonic Lithiums have proven themselves as an ideal solution for today's most demanding electronic requirements.

Using a solid-state polycarbon monofluoride as the cathode, Panasonic Lithiums are **inherently** safe, remaining both chemically and thermally stable. Corrosive liquid or poisonous gas discharge is never a problem, even during long storage periods.

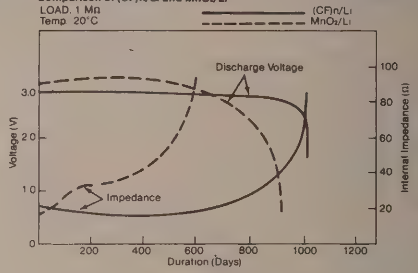
Features

- Inherently safer than MnO_2/Li systems
- High voltage (3V); high energy density
- Excellent storage properties
- Flat voltage characteristics
- Outstanding leak-resistant properties
- Minimum operating temperature -40°C
- 0.5% capacity deterioration per year
- Available in a wide choice of types; pin cell, coin cell and high capacity cylindrical cells

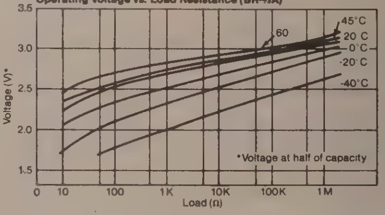
UL Recognized under the Component Program of Underwriters Laboratories, Inc. File #MH12210*

*with the exception of Type BR-C.

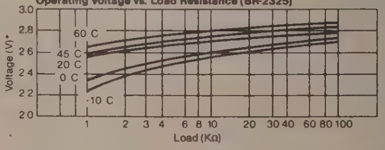
Comparison of (CF)n/Li and MnO_2/Li



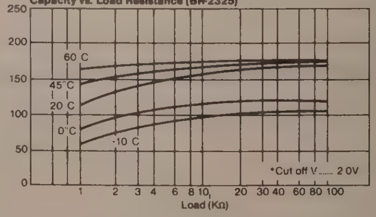
Operating Voltage vs. Load Resistance (BR-⅔A)



Operating Voltage vs. Load Resistance (BR-2325)



Capacity vs. Load Resistance (BR-2325)



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PRIMARY LITHIUM BATTERIES

PC MOUNTABLE CYLINDRICAL TYPE

Model	Former Model	Terminals	Voltage (V)	Capacity (mAh)
BR-CT2P	(BR-C-F1)	Tabs	3	5000
BR-CP3P	(BR-C-P1)	2 Pins	3	5000
BR-⅔AT2P	(BR-⅔A-F1)	Tabs	3	1200
BR-⅔AP3P	(BR-⅔A-P1)	2 Pins	3	1200
BR-⅔AE2P	(BR23AE2P)	3 Pins	3	1200
BR-½AT2P	(BR-½A-F1)	Tabs	3	600
BR-½AP2P	(BR-½A-P1)	2 Pins	3	600
BR-½AE2P	—	3 Pins	3	600
BR-⅔AAT2P	(BR-⅔AA-F1)	Tabs	3	600
BR-⅔AAE2P	—	3 Pins	3	600

PC MOUNTABLE COIN TYPE (HORIZONTAL MOUNT)

Model	Former Model	Terminals	Voltage (V)	Capacity (mAh)
BR-2325-1HB	—	2 Pins	3	160
BR-2325-1HE	—	2 Pins	3	160
BR-2325-1HG	—	3 Pins	3	160
BR-2032-1HB	—	2 Pins	3	180
BR-1225-1HB	—	2 Pins	3	38
BR-2325-2HA	—	2 Pins	6	160
BR-1225-2HA	—	2 Pins	6	38
BR-2325-HC	—	2 Pins	3	320

PC MOUNTABLE COIN TYPE (VERTICAL MOUNT)

Model	Former Model	Terminals	Voltage (V)	Capacity (mAh)
BR-2325-1VG	—	3 Pins	3	160
BR-2325-1VB	—	2 Pins	3	160
BR-1225-1VB	—	2 Pins	3	38
BR-2325-2VC	—	2 Pins	6	160

CYLINDRICAL TYPE

Model	Former Model	Terminals	Voltage (V)	Capacity (mAh)	Diameter (mm)	Height (mm)	Weight (gms)
BR-C	—	Flat Contacts	3	5000	26.0	50.0	47.0
BR-⅔A	—	Flat Contacts	3	1200	17.0	33.5	13.5
BR-½A	—	Flat Contacts	3	600	17.0	23.0	9.5
BR-⅔AA	—	Flat Contacts	3	600	14.5	33.5	9.5

COIN TYPE

Model	Former Model	Terminals	Voltage (V)	Capacity (mAh)	Diameter (mm)	Height (mm)	Weight (gms)
BR-2032	—	Flat Contacts	3	180	20.0	3.2	3.0
BR-2325	—	Flat Contacts	3	160	23.0	2.5	3.1
BR-2320	—	Flat Contacts	3	110	23.0	2.0	2.5
BR-2020	—	Flat Contacts	3	85	20.0	2.0	1.8
BR-2016	—	Flat Contacts	3	75	20.0	1.6	1.5
BR-1616	—	Flat Contacts	3	45	16.0	1.6	1.0
BR-1225	—	Flat Contacts	3	38	12.5	2.5	0.9

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Nickel — Cadmium

RECHARGEABLE

Sealed Cells and Batteries

CAPACITIES UP TO 2000 AMPERE HOURS ON REQUEST

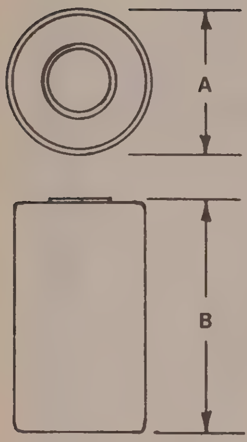

FIG. A

TYPICAL CYLINDRICAL CELLS (FIG. A) 1.2 VOLTS PER CELL

Type	Capacity mAH	Dimensions (in.) A	Dimensions (in.) B	WT. (oz.)
070SC	75	.375	.805	.14
80SC	70	0.497	0.593	0.2
100SC	100	0.571	0.669	.28
110SC	110	0.55	0.65	0.24
150SC	150	0.475	1.135	0.4
170SC	170	0.625	0.625	0.4
180SC	180	0.405	1.730	0.4
225SC	225	0.675	0.646	0.4
270SCS	270	0.560	1.168	0.5
450SC	450	0.675	1.120	0.7
500SC	500	0.554	1.920	1.0
600SCP	600	0.554	1.920	1.0
600SC	600	0.625	1.920	1.0
700SCP	700	.906	1.044	1.0
700SC	750	0.655	1.920	1.0
750SC	750	1.020	0.910	1.1
800SCP	800	.550	2.5	1.0
1000SC	1000	1.000	1.280	1.1
1200SC	1200	0.875	1.600	1.5
1550SCP	1550	0.875	1.600	1.5
1800SC	1800	1.000	1.840	2.5
2200SCP	2200	1.000	1.84	2.8
2000SC	2000	1.272	1.400	2.8
4000SC	4000	1.289	2.300	4.6
4000SCP	4400	1.289	2.300	4.6
7000SC	7000	1.290	3.490	7.6
10.000SCS	10.000	1.683	4.218	12.5

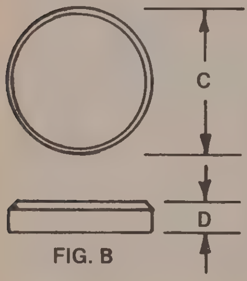

FIG. B

TYPICAL BUTTON CELLS (FIG. B) 1.2 VOLTS PER CELL

Type	Capacity mAH	Dimensions (in.) C	Dimensions (in.) D	Wt. (oz.)
10B	10	0.294	0.200	0.02
20B	20	0.449	0.201	0.04
60B	50	0.606	0.230	0.09
100DKO**	100		See Below	
170B	170	0.984	0.260	0.30
180VBH*	180	0.984	0.290	0.39
250B	225	0.984	0.339	0.41
250BH*	225	0.984	0.347	0.44
250VBH*	250	1.340	0.210	0.58
400B	400	0.992	0.571	0.66
450B	450	1.689	0.299	1.10
600BH*	600	1.340	0.374	0.90
1000VBH*	1000	2.000	0.330	2.24

*H denotes high rate discharge capability.

**The 90DKO is an oval cell 1.01" long x 0.555" wide x 0.24" thick with 100 mAH capacity. Wt. .17 oz.

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ALSO MARKETS:

Emergency lighting units.
Flashlight and lantern rechargeable batteries.
Custom and prototype design battery packs
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Battery chargers for all types of batteries.

Batteries - NICKEL CADMIUM - SILVER CADMIUM - SILVER ZINC - MERCURY - SEALED LEAD-ACID - LITHIUM.

All cylindrical and oval battery types feature a pressure safety device for security and reliability making them especially suited for cordless consumer and electronic products.

CUSTOM BATTERY PACKS

Cylindrical cells are incased in a rigid, high impact case. Case materials are highly dielectric to provide maximum cell insulation at minimum cost. The case is vented to each cell to provide cooling and long life. Packs are available to your specifications in any voltage.

FAST CHARGE CELLS

Special fast charge cells are available on special order either individually or in custom battery packs with thermistors for extra fast recharge capability.

Button cell batteries are constructed of sealed nickel cadmium button cells (see fig. B) to meet almost any application requirement. The compact size of button cells permits easy stacking to form multiple cell batteries of optimum power/volume ratio and space utilization. Completely sealed button cells are ideally suited for portable radios, flashlights, photoflash, alarms, and any low-drain, high capacity application.

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AND LITHIUM PACKS
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MOUNTING

INVESTIGATE direct current emergency power sources available in any regulated voltage or current, featuring automatic SCR solid state switchover to a self-contained battery. We have the answer to reliable economical D.C. power with automatic emergency back-up.

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NEW PANASONIC BATTERY SOURCE

PANASONIC LITHIUM BATTERIES

Type	Model No.	Nominal Voltage (V)	Nominal Capacity (MAh)	Standard Drain (mA)	Maximum Drain (mA)	Dimensions (MAX) (inches) Height	Dimensions (MAX) (inches) Diameter	Average Weight (oz.)
Cylinder	BR-C	3	5,000	150	300	1.969	1.024	1.66
	BR2/3AA	3	600	2	40	1.300	.554	1.50
	BR-2/3A	3	1,200	35	150	1.319	0.669	0.48
	BR-1/2A	3	750	5	70	0.906	0.669	0.34
Coin	BR2325	3	160	0.2	5	0.098	0.906	0.11
	BR2320	3	110	0.2	5	0.079	0.906	0.09
	BR2020	3	85	0.2	.10	0.075	0.783	0.09
	BR2016	3	60	0.1	2	0.063	0.787	0.05
	BR1225	3	35	0.1	2	0.098	0.492	0.03
	CR2025	3	110	0.2	5	0.098	0.787	0.09
	CR2016	3	50	0.2	5	0.063	0.787	0.06
Pin	BR435	3	40	1	3	1.413	0.165	0.03
	BR425	3	20	0.5	1.5	1.020	0.165	0.02

High Carbon • Mono-Fluoride • Safe System

- Non-toxic
- Non-combustible
- Non-corrosive
- Non-gassy
- No pressure buildup
- Up to 10 year service life
- Internal resistance low & constant

(UL recognized)

NEW

Soon to be available
RECHARGEABLE
Lithium Coin Type.

UNION CARBIDE "EVEREADY" LITHIUM BATTERIES

Type	Model No.	Nominal Voltage (V)	Nominal Capacity (MAh)	Standard Drain (mA)	Maximum Drain (mA)	Dimensions (MAX) (inches) Height	Dimensions (MAX) (inches) Diameter	Average Weight (oz.)
Buttons	801*	1.5	100			0.165	0.455	
	803*	1.5	160			0.220	0.455	
Coin	CR2032**	3	190			0.126	0.787	
Cylindrical	2L76**	3	160			0.425	0.456	
	L544**	6	160			0.990	0.505	
	L31***	3.6	1.0Ah			1.809	0.523	

*Lithium Iron
**Lithium/Manganese Dioxide
***Lithium/Thionyl Chloride

PANASONIC SEALED LEAD ACID BATTERIES

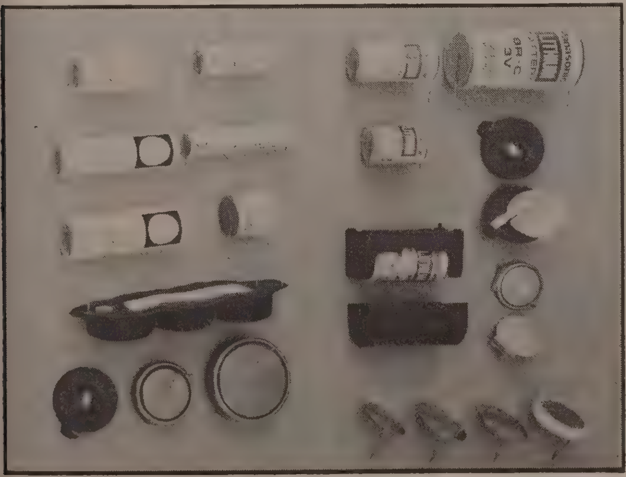
Model No.	Nominal Voltage (V)	Nominal Capacity (Ah)	Dimensions (MAX) (inches) Length	Dimensions (MAX) (inches) Width	Dimensions (MAX) (inches) Height	Average Weight (oz.)
LCR-156P	6	1.5	2.60	1.30	3.35	0.84
LCR-226P	6	2.2	2.60	1.30	4.11	1.15
LCR-306P	6	3.0	2.60	1.30	4.92	1.46
LCR-456P	6	4.5	3.70	1.30	4.92	2.03
LCR-606P	6	6.0	3.58	1.93	4.53	2.65
LCR-756P	6	7.5	4.53	1.93	4.53	3.31
LCR-856P	6	8.5	4.53	1.93	4.53	3.53
LCR-1512PF*	12	1.5	2.60	2.64	3.35	1.68
LCR-2212PF*	12	2.2	2.60	2.64	4.11	2.29
LCR-3012PF*	12	3.0	2.60	2.64	4.92	2.91
LCR-4512PF*	12	4.5	3.70	2.64	4.92	4.08
LCR-6012PF*	12	6.0	3.58	3.90	4.53	5.29
LCR-7512PF*	12	7.5	4.53	3.90	4.53	6.61
LCR-8512PF*	12	8.5	4.53	3.90	4.53	7.05
LCR-1812P	12	1.8	7.89	0.98	2.38	1.54
LCS-2012P	12	2.0	7.90	0.98	2.43	1.54
LCR-3012VBP	12	3.0	9.45	1.34	2.64	2.91
LCR6V1.2P	6	1.1	3.82	0.94	2.17	0.66
LCR6V3P	6	2.8	5.28	1.34	2.36	1.21
LCR6V6.5P	6	6.0	5.95	1.36	3.94	2.65
LCR6V8P	6	7.9	5.95	2.01	3.94	3.64
LCR6V10P	6	8.8	5.95	2.01	3.94	3.64
LCR12V1.9P	12	1.8	6.97	1.34	2.36	1.54
LCR12V3PF	12	2.8	5.84	2.72	2.60	2.43
LCR12V6.5P	12	6.0	5.95	2.56	3.94	5.18
LCR12V24P	12	22.0	6.89	6.50	4.92	19.2
LCR12V40P	12	34.0	10.16	6.74	9.30	41.9
LCR12V60P	12	50.0	11.97	6.74	9.30	52.9
LCR12V80P	12	70.0	16.03	6.82	9.69	80.0
LCR12V100P	12	86.0	19.77	7.09	10.04	100 0
LCR12V120P	12	104.0	19.89	8.67	10.04	115.0

*F=Fast on terminals

Batteries are available for video camera and other portable equipment including, but not limited to VHS, ENG and VTR.

Can be left in a discharged condition for months without damage

- No memory effect
- LCR design
- Available with snap on terminals
- New high rate discharge capability
- Longer service life under trickle charge conditions



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Shown are just a few of the infinite variety of pin and lug mounts we supply. We will weld 0.032″ diameter PC board, pins to batteries of any configuration or voltage, for all types of cells or battery packs. Double pin polarized models are available.
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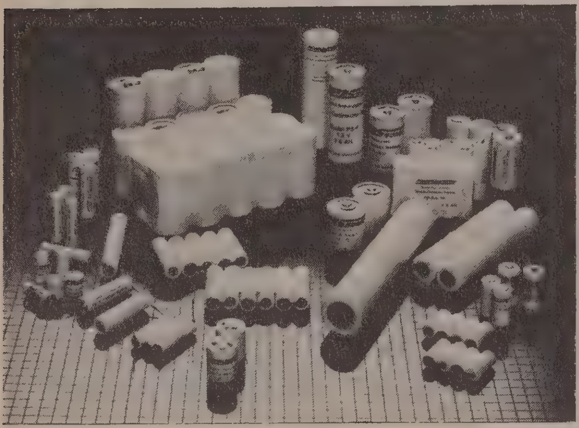

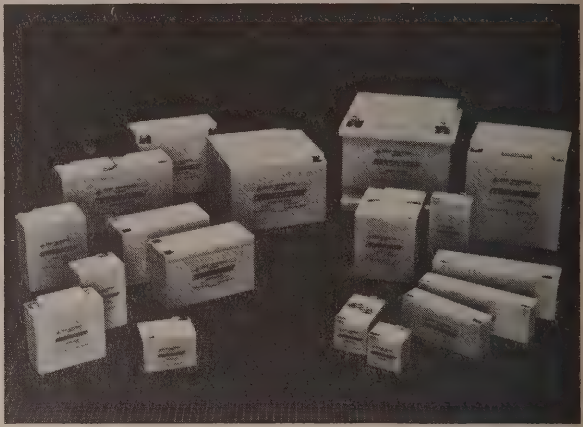

SEALED LEAD-ACID BATTERIES

Model	Nominal Voltage V	Nominal Capacity @ 20hr rate A.H.	Current @ 20hr rate mA	DIMENSIONS								Weight	
				Length		Width		Height		Ht. Over Terminal			
				in.	mm.	in.	mm.	in.	mm.	in.	mm.	lbs.	kg.
PS-412	4	1.2	60	2.64	67	0.94	24	2.09	53	2.24	57	0.5	0.2
PS-426	4	2.6	130	3.54	90	1.34	34	2.36	60	2.52	64	1.0	0.5
PS-490	4	9.0	450	4.02	102	1.73	44	3.70	94	3.86	98	2.4	1.1
PS-610	6	1.0	50	2.00	51	1.65	42	2.00	51	2.20	56	0.6	0.3
PS-612	6	1.2	60	3.94	100	0.94	24	2.09	53	2.24	57	0.6	0.3
PS-618	6	1.8	90	2.95	75	2.00	51	2.09	53	2.28	58	0.9	0.4
PS-626	6	2.6	130	5.28	134	1.34	34	2.35	60	2.56	65	1.3	0.6
PS-640	6	4.0	200	2.76	70	1.89	48	4.02	102	4.02	102	1.8	0.8
PS-660	6	6.0	300	5.98	152	1.34	34	3.78	96	4.13	105	2.6	1.2
PS-665	6	6.5	325	3.86	98	2.20	56	4.05	103	4.05	103	3.0	1.4
PS-682	6	8.0	400	3.86	98	2.20	56	4.65	118	4.65	118	3.3	1.5
PS-685	6	8.5	425	5.95	151	1.97	50	3.78	96	4.05	103	3.7	1.7
PS-6100	6	10.0	500	5.95	151	2.00	51	3.70	94	3.86	98	4.6	2.1
PS-6200	6	20.0	1000	6.18	157	3.27	83	4.92	125	4.92	125	8.2	3.7
PS-826	8	2.6	130	7.00	178	1.34	34	2.36	60	2.52	64	1.9	0.9
PS-1212	12	1.2	60	3.94	100	1.65	42	2.09	53	2.20	56	1.3	0.6
PS-1219	12	1.9	95	7.01	178	1.34	34	2.36	60	2.56	65	1.9	0.9
PS-1226	12	2.6	130	7.68	195	1.85	47	2.76	70	2.95	75	2.9	1.3
PS-1245	12	5.0	250	5.96	152	2.56	65	3.78	96	3.89	99	5.1	2.3
PS-1265	12	6.5	325	5.95	151	2.56	65	3.70	94	3.86	98	5.7	2.6
PS-1282S	12	8.0	400	4.40	112	3.86	98	4.65	118	4.65	118	6.7	3.0
PS-12150	12	15.0	750	7.13	181	2.99	76	6.57	167	6.57	167	12.8	5.8
PS-12200	12	20.0	1000	6.89	175	6.54	166	4.92	125	4.92	125	17.6	8.0
PS-12240	12	24.0	1200	6.52	166	4.92	125	6.89	175	6.89	175	19.8	9.0
PS-12280	12	28.0	1400	7.75	197	5.19	132	6.12	155	7.31	186	21.0	9.5
PS-12400	12	40.0	2000	7.64	194	6.85	174	6.85	174	6.85	174	28.7	13.0

TOLERANCES: Length and Width: ±0.04 in. (1mm) — Height: ±0.08 in. (2mm)

SEALED NICKEL-CADMIUM BATTERIES

Model No.	Nominal Voltage (V)	Capacity 5 hr. rate (mAh)	Std. Charge		Quick Charge		Diameter (Max.)		Height (Max.)		Weight	
			(mA)	(hrs.)	(mA)	(hrs.)	inches	mm.	inches	mm.	oz.	g
PS-1/3AA	1.2	110	11	15	28	6	0.571	14.5	0.669	17.0	0.25	7
PS-N	1.2	150	15	15	38	6	0.473	12.0	1.142	29.0	0.30	9
PS-AAA	1.2	180	18	15	45	6	0.413	10.5	1.752	44.5	0.35	10
PS-2/3AA	1.2	250	25	15	75	4.5	0.571	14.5	1.181	30.0	0.42	12
PS-AA	1.2	500	50	15	150	4.5	0.571	14.5	1.988	50.5	0.74	22
PS-1/2SC	1.2	600	60	15	150	6	0.906	23.0	1.043	26.5	0.99	28
PS-SC	1.2	1200	120	15	300	6	0.906	23.0	1.693	43.0	1.69	48
PS-C	1.2	1800	180	15	–	–	1.024	26.0	1.969	50.0	2.65	75
PS-1/2D	1.2	2200	220	15	–	–	1.300	33.0	1.476	37.5	3.03	86
PS-D	1.2	4000	400	15	–	–	1.339	34.0	2.402	61.5	5.47	155
PS-F	1.2	7000	700	15	–	–	1.339	34.0	3.583	91.5	8.82	250

A

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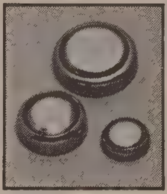

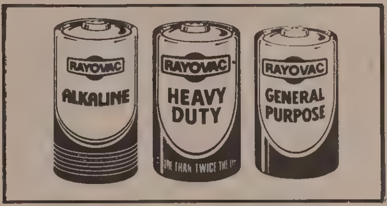
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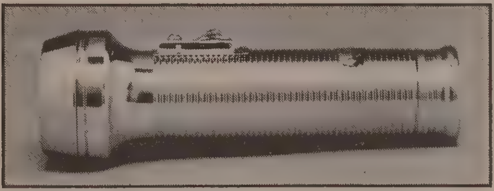

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NICAD® SEALED RECHARGEABLE NICKEL-CADMIUM BATTERIES

GENERAL PARAMETERS

The unique features of the SAFT NICAD® system lend themselves to a wide range of product applications:

Portable Power for:

- Tools
- Instruments
- Medical Equipment
- Photography
- Portable Comm.
- Toys

Standby Power for

- Memory Preservation
- Emergency Lighting
- Logic Systems
- Alarms
- Controls
- Electronic Equipment

Sealed rechargeable SAFT NICAD brand nickel-cadmium cells and batteries offer distinct advantages not obtainable from primary or other secondary systems.

FEATURES

Long Life

Parameters of the application, such as charge rates, temperature, and discharge rates affect the total, standby or cycle, life of the NICAD cell. A life of 300 to 1000 cycles of discharge, or 5 or more years of standby power is common. Shallow discharges, lower operating temperatures, and a reduction of the overcharge, time and rates, will extend the life of NICAD cells.

Overcharge Capability

SAFT NICAD cells can be overcharged continuously at the recommended rates without loss of life or performance.

High-Rate Discharge Capability

SAFT NICAD cells are especially suited to continuous high-rate discharge or high current pulsing. This feature is due to the low internal resistance and flat discharge voltage of the NICAD cell.

High-Rate Charge Capability

SAFT cylindrical NICAD cells can be continuously charged, under most conditions, at rates up to and including 0.33C (4-hour recharge) without loss of performance. Higher charge rates (from 1 hour to 15 minutes) can be achieved with the use of temperature cutoff and voltage regulated charging methods.

Operate In Any Position

Due to their sealed construction, NICAD cells can be operated in any position, without damage to the cells or the equipment in which they are installed.

Operating Temperatures

SAFT NICAD cells are designed to operate over the following temperature ranges:

	Polytemp™	Button Cells	Standard Cells
Charge*	+15°C to +70°C	+10°C to +50°C	+ 5°C to +50°C
Discharge	-40°C to +70°C	-40°C to +50°C	-40°C to +50°C
Storage	-40°C to +70°C	-40°C to +50°C	-40°C to +50°C

*For charging at other than recommended continuous rates or at lower temperatures, contact factory.

Long Storage Life

SAFT NICAD cells can be stored indefinitely without significant irreversible degradation in their performance. After extended storage, a few charge/discharge cycles may be needed to restore full capacity.

Charge Retention

The charge retention shown is based on storage at 20°C. The self-discharge rate is a function of temperature and internal resistance. Storage at higher temperatures will reduce charge retention during storage. Cells should be charged prior to use to restore full capacity.

	Percent Charge Retained		
Cell Type	1 Month	3 Months	5 Months
Cylindrical	75%	50%	15%
Button	65%	40%	5%

Safety Vents

The safety vent on cylindrical cells may be of either hermetic or resealable design. Both are designed to release excess pressure as a safety measure to prevent cell rupture. Regardless of the vent employed, repeated venting of a cell will release gas and lower the electrolyte level in the cell causing it to dry out, degrade in performance, and ultimately fail to deliver power at a functional level. Whether hermetic or resealable, the vents prime purpose is to provide a pressure relief to prevent accidental cell rupture due to abuse or misuse.

Your SAFT representative should be contacted as to the correct vent for your application.

Internal Impedance and Resistance

The internal impedance as well as the internal resistance of a NICAD cell is low. As the cell discharges, impedance increases. The impedance increases approximately 20% for a semi-discharged cell, and approximately 50% for a discharged cell.

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NICAD® SEALED
RECHARGEABLE
NICKEL-CADMIUM
BATTERIES

NICAD® STANDARD CELLS

Standard cells, due to their wide operating temperature range (-40° C to +50° C) and excellent cycle life (300 to 1000 cycles) are ideal for a majority of applications. Standard cells are the most economical of the NICAD designs and with 34 models ranging in capacity from .070 Ah to 10.0 Ah, they are also the most versatile.

Cell Type		Max. Bare Cell Dim.				Capacity, Ah Rated @ 20° C*		Charge Rates @ 20° C				Bare Cell Weight		Int. Resist.	Vent Type
		Height		Diameter				Continuous		Maximum					
Model	Size	In.	MM	In.	MM	1C	0.2C*	Amps	Hrs	Amps	Hrs	Oz	Grams	mΩ	H Hermetic R Resealable
.070SC	1/2AAA	0.825	20.96	0.380	9.65	0.060	0.070	0.007	16	0.023	4.0	0.14	4.0	220.0	H
110SC	1/3AA	0.660	16.76	0.540	13.72	0.100	0.110	0.011	16	0.037	4.0	0.23	6.5	80.0	H
.150SC	1/3A	0.635	16.13	0.593	15.06	0.140	0.150	0.015	16	0.030	8.0	0.28	7.9	100.0	H
.180SC	AAA	1.750	44.45	0.380	9.65	0.160	0.180	0.018	16	0.036	8.0	0.32	9.0	120.0	H
.225SC	1/3A_f	0.665	16.89	0.652	16.56	0.200	0.225	0.023	16	0.045	8.0	0.38	10.8	30.0	H
.250SC	1/2AA	1.192	30.28	0.540	13.72	0.225	0.250	0.025	16	0.080	4.0	0.38	10.8	60.0	H
450SC	2/3A_f	1.100	27.94	0.652	16.56	0.405	0.450	0.045	16	0.150	4.0	0.55	15.6	48.0	H
VR0.45	2/3A_f	1.106	28.09	0.671	17.04	0.405	0.450	0.045	16	0.180	3.5	0.74	21.0	24.0	R
500SC	AA	1.967	49.96	0.540	13.72	0.450	0.500	0.050	16	0.165	4.0	0.70	19.9	28.0	H
VR0.5	AA	1.976	50.20	0.563	14.30	0.450	0.500	0.050	16	0.200	3.5	0.85	24.1	26.0	R
VR0.5	AAL	1.937	49.20	0.563	14.30	0.450	0.500	0.050	16	0.200	3.5	0.85	24.1	26.0	R
.600SC	A	1.920	48.77	0.593	15.06	0.530	0.600	0.600	16	0.120	8.0	0.86	24.0	26.0	H
.750SC	1/2C	0.925	23.50	1.012	25.70	0.660	0.750	0.075	16	0.150	8.0	1.10	31.0	23.0	H
800SC	A_f	1.940	49.28	0.652	16.56	0.720	0.800	0.080	16	0.265	4.0	1.05	29.8	22.0	H
VR0.8	A_f	1.929	49.00	0.648	16.46	0.720	0.800	0.080	16	0.320	3.5	1.16	32.9	16.9	R
1.0SC	3/5C	1.150	29.21	1.012	25.70	0.880	1.000	0.100	16	0.200	4.0	1.40	39.7	20.0	H
1.2SC	C_S	1.652	41.96	0.876	22.25	1.060	1.200	0.120	16	0.240	8.0	1.60	45.4	15.0	H
1.2SC	C_SL	1.575	40.01	0.876	22.25	1.060	1.200	0.120	16	0.240	8.0	1.60	45.4	15.0	H
VR1.2	C_S	1.657	42.10	0.880	22.35	1.080	1.200	0.120	16	0.480	3.5	1.80	51.1	8.5	R
2.0SC	C	1.865	47.37	1.012	25.70	1.800	2.000	0.200	16	0.400	8.0	2.40	68.0	17.0	H
VR2	C	1.957	49.70	1.006	25.55	1.800	2.000	0.200	16	0.600	4.0	2.72	77.0	8.5	R
VR2	CL	1.878	47.70	1.006	25.55	1.800	2.000	0.200	16	0.600	4.0	2.72	77.0	8.5	R
2.2SC	1/2D	1.448	36.78	1.275	32.39	2.000	2.200	0.220	16	0.440	8.0	2.80	80.0	10.0	H
VR2.5	2/3D	1.713	43.51	1.281	32.54	2.300	2.500	0.250	16	0.500	8.0	3.70	105.0	6.0	R
4.0SC	D	2.318	58.88	1.275	32.39	3.500	4.000	0.400	16	0.800	8.0	4.60	130.0	9.0	H
VR4	D	2.382	60.50	1.281	32.55	3.500	4.000	0.400	16	0.800	8.0	5.31	150.0	5.0	R
VR4	DL	2.311	58.50	1.281	32.55	3.500	4.000	0.400	16	0.800	8.0	5.31	150.0	5.0	R
VRD4	D	2.382	60.50	1.281	32.55	3.500	4.000	0.400	16	NA	NA	4.95	140.0	5.0	R
VRD4	DL	2.303	58.50	1.281	32.55	3.500	4.000	0.400	16	NA	NA	4.95	140.0	5.0	R
7.0SC	F	2.382	89.30	1.275	32.39	6.300	7.000	0.700	16	1.400	8.0	7.40	210.0	7.0	H
VR7	F	2.303	91.30	1.281	32.55	6.300	7.000	0.700	16	1.400	8.0	8.46	240.0	4.4	R
VR7	FL	3.516	89.30	1.281	32.55	6.300	7.000	0.700	16	1.400	8.0	8.46	240.0	4.4	R
VRD7	F	3.594	91.30	1.281	32.55	6.300	7.000	0.700	16	NA	NA	8.10	230.0	5.5	R
VR10	SF	3.512	89.20	1.628	41.35	9.000	10.000	1.000	16	NA	NA	14.10	400.0	3.3	R

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NICAD® SEALED RECHARGEABLE NICKEL-CADMIUM BATTERIES

POLYTEMP™ BRAND HIGH TEMPERATURE CELLS

Polytemp's long life at high temperatures makes it an ideal backup power source for many applications including:

- Computers and computer peripherals
- Emergency lighting and alarms
- Telephone and telegraph equipment
- Stationary and portable electronic instruments
- Process control equipment

Polytemp performance is the result of a combination of electrode design innovations with a polypropylene separator material. Polypropylene is much more resistant to deterioration than the nylon separator used in standard designs.

The following table illustrates the relative effect of continuous overcharge at the 0.1C rate (where C = ampere-hour rated capacity of the cell), on capacity over time (or life). This difference in life increases substantially as the continuous cell temperature is increased above 25° C.

Percent of 25° C Life

Cell Temp, °C	Standard	Polytemp
25	100	100
35	40	75
45	20	60
55	10	45
65	1	30

Cell Type		Max. Bare Cell Dim.				Capacity, Ah Rated @ 20° C*		Charge Rates @ 20° C				Bare Cell Weight		Int. Resist.	Vent Type
		Height		Diameter				Continuous		Maximum					H Hermetic R - Resealable
Model	Size	In.	MM	In.	MM	1C	0.2C*	Amps	Hrs	Amps	Hrs	Oz	Grams	mΩ	
.070PT	1/2AAA	0 825	20.96	0.380	9.65	0.060	0.070	0.004	24+	0.007	16	0.14	4.0	220.0	H
110PT	1/3AA	0.660	16.76	0.540	13.72	0.100	0.110	0.007	24+	0 011	16	0.23	6.6	80.0	H
150PT	1/3A	0 635	16.13	0.593	15.06	0.135	0.150	0.010	24+	0.015	16	0.28	7.9	100.0	H
180PT	AAA	1.750	44.45	0 380	9.65	0.160	0.180	0.012	24+	0.018	16	0.32	9.0	120.0	H
250PT	1/2AA	1.192	30.28	0.540	13.72	0.225	0.250	0.017	24+	0.025	16	0.38	10.8	60.0	H
450PT	2/3A_f	1.100	27.94	0.652	16.56	0.405	0.450	0.030	24+	0.045	16	0.55	15.6	48.0	H
500PT	AA	1.967	49.96	0.540	13.72	0.450	0.500	0.033	24+	0.050	16	0.70	19.9	28.0	H
VT0.5	AA	1.976	50.20	0.563	14.30	0.450	0.500	0.036	24+	0 050	16	0.85	24.1	32.5	R
.600PT	A	1 920	48 77	0.593	15.06	0.540	0.600	0.040	24+	0.060	16	0.86	24.4	26.0	H
750PT	1/2C	0 925	23.50	1 012	25.70	0.675	0.750	0.050	24+	0.075	16	1.10	31.2	23.0	H
800PT	A_f	1.940	49.28	0.652	16.56	0.720	0.800	0.053	24+	0.080	16	1.05	29.8	22.0	H
1.0PT	3/5C	1 150	29.21	1.012	25.70	0.900	1.000	0.067	24+	0.100	16	1.40	39.7	20.0	H
1.2PT	C_S	1.652	41.96	0.876	22.25	1.080	1.200	0.080	24+	0.120	16	1.60	45.4	15.0	H
VT1 2	C_S	1 657	42 10	0.880	22.35	1.080	1.200	0.086	24+	0.120	16	1.80	51.1	12.1	R
2 0PT	C	1.865	47 37	1.012	25.70	1.600	1.800	0.120	24+	0.180	16	2.40	68.1	17.0	H
VT2	C	1 957	49.70	1.006	25 55	1.800	2.000	0.143	24+	0.200	16	2.70	77.0	11.2	R
2 2PT	1/2D	1.448	36 78	1.275	32.39	2 000	2.200	0.146	24+	0.220	16	2.80	79.5	10.0	H
4 0PT	D	2 318	58.88	1 275	32.39	3.500	4.000	0.267	24+	0.400	16	4.60	130.5	9.0	H
VT4	D	2 382	60.50	1.281	32.55	3.500	4.000	0.279	24+	0.400	16	5.30	150.4	7.0	R
VT4	DL	2.303	58.50	1.281	32.55	3.500	4.000	0.279	24+	0.400	16	5.30	150.4	7.0	R
7.0PT	F	3 508	89.10	1.275	32.39	6.300	7.000	0.467	24+	0.700	16	7.40	210.0	7.0	H
VT7	F	3 594	91 30	1.281	32.55	6 300	7.000	0.500	24+	0.700	16	8.50	241.0	5.5	R

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NICAD® SEALED RECHARGEABLE NICKEL-CADMIUM BATTERIES

QUICK CHARGE CELLS

Quick charge cells are specifically designed for applications where a full charge must be accomplished in 3.5 to 4.0 hours. Quick charge cells do not require special charge controls and may be charged up to 72 hours at the maximum rates without significant loss of life.

Cell Type		Max. Bare Cell Dim.				Capacity, Ah Rated @ 20° C*		Charge Rates @ 20° C				Bare Cell Weight		Int. Resist.	Vent Type
		Height		Diameter				Continuous		Maximum					
Model	Size	In.	MM	In.	MM	1C	0.2C*	Amps	Hrs	Amps	Hrs	Oz	Grams	mΩ	H Hermetic R Resealable
.070SC	1/2AAA	0.825	20.96	0.380	9.65	0.060	0.070	0.007	16	0.023	4.0	0.14	4.0	220.0	H
.110SC	1/3AA	0.660	16.76	0.540	13.72	0.100	0.110	0.011	16	0.037	4.0	0.23	6.5	80.0	H
.250SC	1/2AA	1.192	30.28	0.540	13.72	0.225	0.250	0.025	16	0.080	4.0	0.38	10.8	60.0	H
.450SC	2/3A$_f$	1.100	27.94	0.652	16.56	0.405	0.450	0.045	16	0.150	4.0	0.55	15.6	48.0	H
VR0.45	2/3A$_f$	1.106	28.10	0.671	17.05	0.405	0.450	0.045	16	0.180	3.5	0.74	21.0	24.0	R
.500SC	AA	1.967	49.96	0.540	13.72	0.450	0.500	0.050	16	0.165	4.0	0.70	19.0	28.0	H
VR0.5	AA	1.976	50.20	0.563	14.30	0.450	0.500	0.050	16	0.200	3.5	0.85	24.1	26.0	R
VR0.5	AAL	1.937	49.20	0.563	14.30	0.450	0.500	0.050	16	0.200	3.5	0.85	24.1	26.0	R
800SC	A$_f$	1.940	49.28	0.652	16.56	0.720	0.800	0.080	16	0.265	4.0	1.05	29.8	22.0	H
VR0.8	A$_f$	1.929	49.00	0.648	16.46	0.720	0.800	0.080	16	0.320	3.5	1.16	32.9	16.9	R
VR1.2	C$_S$	1.657	42.10	0.880	22.35	1.080	1.200	0.120	16	0.480	3.5	1.80	51.1	8.5	R
VR2	C	1.957	49.70	1.006	25.55	1.800	2.000	0.200	16	0.600	4.0	2.72	77.0	8.5	R
VR2	CL	1.878	47.70	1.006	25.55	1.800	2.000	0.200	16	0.600	4.0	2.72	77.0	8.5	R

BUTTON CELLS

The SAFT VB type button cell is a sintered/sintered construction (ref. Figure 2). This construction facilitates discharge rates up to 10C, continuous charge rates of up to 0.05C, minimum cycle life of 300 (100% depth of discharge) cycles and continuous charge failure rates of less than 5 cells per 1000 cells after 5 years of continuous charge.

As a complement to the VB cell, SAFT offers a series of button cells of the same dimensions and capacities which are designed to withstand severe operating conditions. These VBE cells offer improved temperature and voltage performance coupled with higher reliability. (Contact your SAFT representative regarding VBE cells.)

Cell Type	Max. Bare Cell Dim.				Capacity, Ah Rated @ 20° C*		Charge Rates @ 20° C				Avg Bare Cell Weight		Int. Resist.
	Height		Diameter				Continuous		Maximum				
Model	In.	MM	In.	MM	C/1	C/5*	Amps	Hrs	Amps	Hrs	Oz	Grams	mΩ
VB4/VBE4	0.233	5.92	0.610	15.50	0.036	0.040	0.002	36+	0.004	14-16	0.12	3.5	293.0
VB10/VBE10	0.205	5.21	0.898	22.81	0.090	0.100	0.005	36+	0.010	14-16	0.25	7.0	63.0
VB22/VBE22	0.303	7.70	0.980	24.89	0.200	0.220	0.011	36+	0.022	14-16	0.42	12.0	36.0
VB30/VBE30	0.214	5.44	1.358	34.49	0.270	0.300	0.015	36+	0.030	14-16	0.63	18.0	28.0
VB60/VBE60	0.382	9.70	1.358	34.49	0.540	0.600	0.030	36+	0.060	14-16	1.09	31.0	23.0

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NICAD® SEALED RECHARGEABLE NICKEL-CADMIUM BATTERIES

FAST CHARGE CELLS

Fast charge NICAD® cells can be 100% charged in 1.0 to 1.5 hours. This can be accomplished without the need for complicated circuitry. A simple temperature cutoff circuit is all that is required. (Ref. Charging Parameters, page 4.)

Cell Type		Max. Bare Cell Dim.				Capacity, Ah Rated @ 20° C*		Charge Rates @ 20° C				Bare Cell Weight		Int. Resist.	Vent Type H = Hermetic R = Resealable
		Height		Diameter				Continuous		Maximum					
Model	Size	In.	MM	In.	MM	1C	0.2C*	Amps	Hrs	Amps	Hrs	Oz	Grams	mΩ	
VR0.45	$2/3A_f$	1.106	28.10	0.671	17.05	0.360	0.405	0.045	16	0.450	1 - 1.5	0.74	21.00	24.0	R
VR0.5	AA	1.976	50.20	0.563	14.30	0.360	0.405	0.045	16	0.500	1 - 1.5	0.85	24.10	26.0	R
VR0.5	AAL	1.937	49.20	0.563	14.30	0.360	0.405	0.045	16	0.500	1 - 1.5	0.85	24.10	26.0	R
VR0.8	A_f	1.929	49.00	0.648	16.46	0.640	0.720	0.080	16	0.800	1 - 1.5	1.16	32.90	16.9	R
VR1.2	C_S	1.657	42.10	0.880	22.35	0.960	0.120	0.200	16	1.200	1 - 1.5	1.80	51.08	8.5	R
VR2	C	1.957	49.70	1.006	25.55	1.600	1.800	0.200	16	2.000	1 - 1.5	2.72	77.00	8.5	R
VR2	CL	1.878	47.70	1.006	25.55	1.600	1.800	0.200	16	2.000	1 - 1.5	2.72	77.00	8.5	R
VR2.5	2/3D	1.713	43.51	1.281	32.55	2.000	2.250	0.250	16	2.500	1 - 1.5	3.70	105.00	6.0	R
VR4	D	2.382	60.50	1.281	32.55	3.200	3.600	0.400	16	4.000	1 - 1.5	5.31	150.00	5.0	R
VR4	DL	2.303	58.50	1.281	32.55	3.200	3.600	0.400	16	4.000	1 - 1.5	5.31	150.00	5.0	R
VR7	F	3.594	91.30	1.281	32.55	5.600	6.300	0.700	16	7.000	1 - 1.5	8.46	240.00	4.4	R
VR7	FL	3.516	89.30	1.281	32.55	5.600	6.300	0.730	16	7.000	1 - 1.5	8.46	240.00	4.4	R
VR10	SF	3.512	89.20	1.628	41.35	8.000	9.000	1.000	16	10.000	1 - 1.5	14.10	400.00	3.3	R

SPECIAL LOW RESISTANCE CELLS

Low resistance cells are of a special design to provide excellent high-rate characteristics during both charge and discharge. These cells can be charged to 100% of capacity in as little as 15 minutes. They also exhibit excellent voltage retention during very high-rate discharging.

Cell Type		Max. Bare Cell Dim.				Capacity, Ah Rated @ 20° C*		Charge Rates @ 20° C				Bare Cell Weight		Int. Resist.	Vent Type H - Hermetic R - Resealable
		Height		Diameter				Continuous		Maximum					
Model	Size	In.	MM	In.	MM	1C	0.2C*	Amps	Hrs	Amps	Min	Oz	Grams	mΩ	
VY1.15	C_S	1.657	42.10	0.880	22.35	1.040	1.150	1.000	1.5	4.000	15	1.80	51.00	7.0	R

With the largest sealed NICAD® cell line in the industry, you should be able to find a SAFT cell design to fit any application you may have. But if you can't, pick up the phone and call your nearest SAFT representative. We are constantly expanding and improving our product line to meet your needs for the future.

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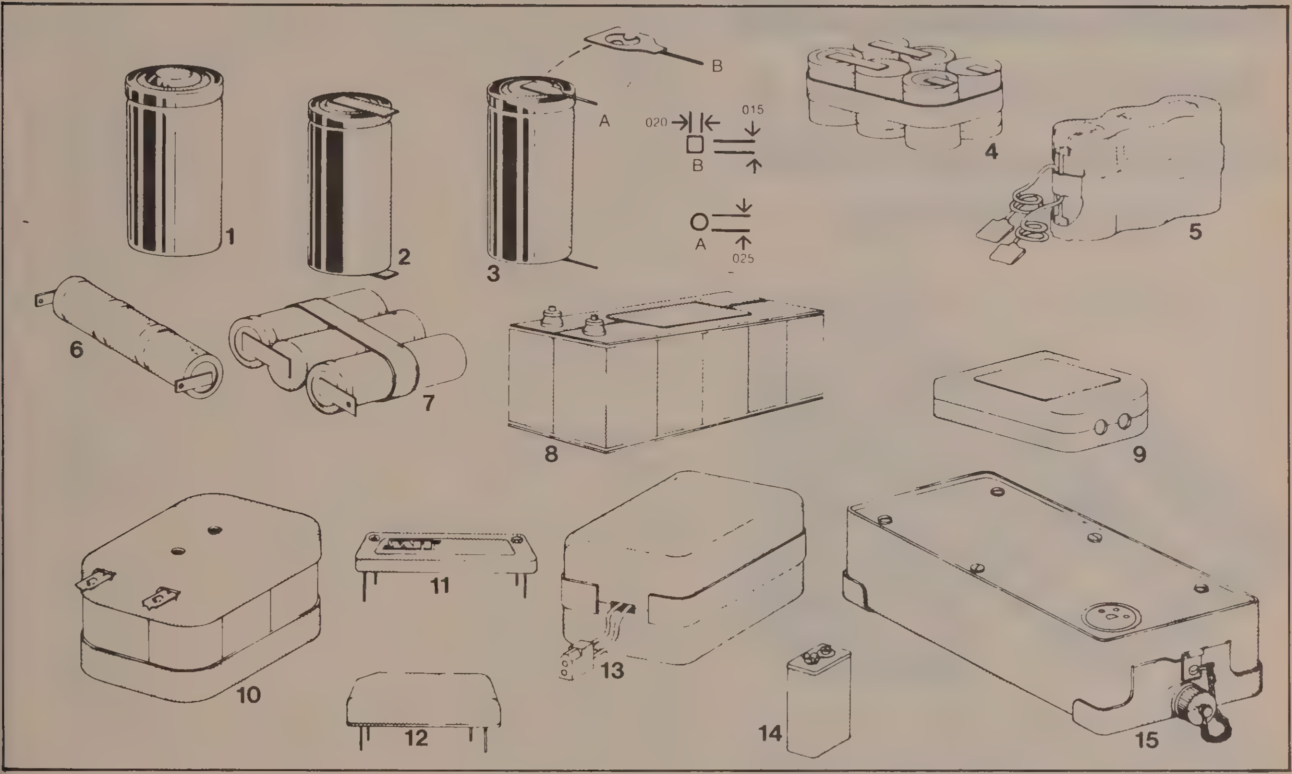
NICAD® SEALED, RECHARGEABLE NICKEL-CADMIUM BATTERIES

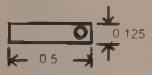
SAFT BATTERY ASSEMBLIES



1. Single cell button contact
2. Single cell standard lugs
3. Single cell P.C. mount lugs
   A. Circular
   B. Rectangular
4. Standard taped and lugged
5. Heat shrink overwrap
6. Cylindrical stack
7. Combination pack (4 and 6)
8. Modpack
9. Custom designed injection molded case
10. Redhead
11. Memoguard™
12. DataProtector™
13. Custom designed vacuum formed case
14. Consumer package transistor battery
15. Custom designed military spec. - PRC 77

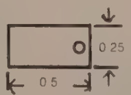
STANDARD LUGS

Style A



Cells using this style: 1/3AAA, 1/3AA, 1/3A, AAA, 1/3A_f, 1/2AA 2/3A_f, AA, A, A_f

Style B



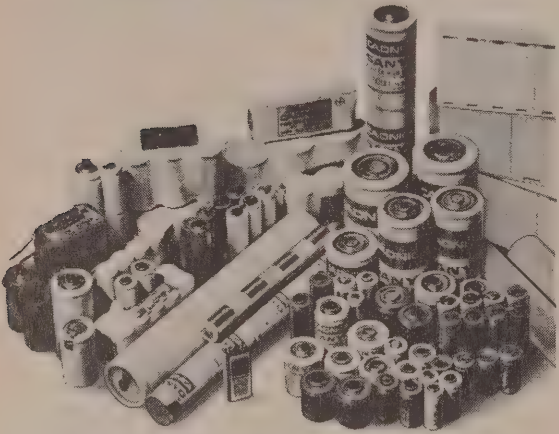
Cells using this style: 1/2C, 3/5C, C_S, C, 1/2D, 2/3D, D, F, SF

STANDARD WIRE

18 AWG and 20 AWG, medium wall vinyl UL1007 90° C

SANYO CADNICA

RECHARGEABLE NICKEL-CADMIUM BATTERIES



From one of the world's largest manufacturers of quality batteries . . . high-performance sealed nickel-cadmium batteries in a wide range of sizes and rechargeable battery assemblies. Call Sanyo . . . for speedy shipment from inventory . . . or for a power source designed to meet your special need.

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1200 W. Artesia Blvd., Compton, Cal. 90220 Dept. G
(213) 537-5830

STANDARD-CHARGE CELLS (15-hour charge)

Model No.	Size	Nominal Voltage (V)	Nominal Capacity (5-H Rate) (mAH)	Outside Dimensions (mm) Dia. (D)	Outside Dimensions (mm) Height (H)	Weight (gr.)
N-50AAA	⅓ AAA size	1.2	50	11.0 $^{+0}_{-0.5}$	16.0 $^{+0}_{-1}$	4
N-75P	—	1.2	75	13.0 $^{+0}_{-0.5}$	14.5 $^{+0}_{-1}$	6
N-100AA	⅓ AA size	1.2	100	14.5 $^{+0}_{-0.5}$	17.0 $^{+0}_{-1}$	8
N-150N	N size	1.2	150	12.0 $^{+0}_{-0.5}$	29.0 $^{+0}_{-1}$	9
N-160A	⅓ A size	1.2	160	17.0 $^{+0}_{-1}$	17.0 $^{+0}_{-1}$	11
N-180AAA	AAA size	1.2	180	10.5 $^{+0}_{-0.5}$	44.5 $^{+0}_{-1}$	10
N-250AA	⅔ AA size	1.2	250	14.5 $^{+0}_{-0.5}$	30.0 $^{+0}_{-1}$	14
N-425A	½ A size	1.2	425	17.0 $^{+0}_{-1}$	28.0 $^{+0}_{-1}$	19
N-475AA	AA size	1.2	475	14.0 $^{+0}_{-0.5}$	50.0 $^{+0}_{-1}$	23
N-500AA	AA size	1.2	500	14.2 $^{+0}_{-0.5}$	50.0 $^{+0}_{-1}$	24
N-600SC	⅔ SC size	1.2	600	23.0 $^{+0}_{-1}$	26.0 $^{+0}_{-1}$	29
N-900C	⅔ C size	1.2	900	26.0 $^{+0}_{-1}$	30.0 $^{+0}_{-1}$	44
N-1200SC	SC size	1.2	1200	23.0 $^{+0}_{-1}$	43.0 $^{+0}_{-1}$	52
N-1800C	C size	1.2	1800	26.0 $^{+0}_{-1}$	50.0 $^{+0}_{-2}$	80
N-2500D	⅔ D size	1.2	2500	34.0 $^{+0}_{-2}$	44.0 $^{+0}_{-2}$	115
N-4000D	D size	1.2	4000	34.0 $^{+0}_{-2}$	61.0 $^{+0}_{-2}$	160
N-6000F	F size	1.2	6000	34.0 $^{+0}_{-2}$	91.0 $^{+0}_{-2}$	230
N-10000M	M size	1.2	10000	43.0 $^{+0}_{-2}$	91.0 $^{+0}_{-2}$	400
6N-75P	6F22 size	7.2	75	26.5 × 15.5 × 49.0		40

QUICK-CHARGE CELLS (3-5 hour charge)

N-250AAF	⅔ AA size	1.2	250	14.5 $^{+0}_{-0.5}$	30.0 $^{+0}_{-1}$	14
N-475AAF	AA size	1.2	475	14.0 $^{+0}_{-0.5}$	50.0 $^{+0}_{-1}$	23
N-500AAF	AA size	1.2	500	14.2 $^{+0}_{-0.5}$	50.0 $^{+0}_{-1}$	24
N-600SCF	⅔ SC size	1.2	550	23.0 $^{+0}_{-1}$	26.0 $^{+0}_{-1}$	29
N-1200SCF	SC size	1.2	1100	23.0 $^{+0}_{-1}$	43.0 $^{+0}_{-1}$	52

HIGH-TEMPERATURE CELLS*(15-hour charge)

N-500AAH	AA size	1.2	500	14.2 $^{+0}_{-0.5}$	50.0 $^{+0}_{-1}$	24
N-1200SCH	SC size	1.2	1200	23.0 $^{+0}_{-1}$	43.0 $^{+0}_{-2}$	52
N-1800CH	C size	1.2	1800	26.0 $^{+0}_{-1}$	50.0 $^{+0}_{-2}$	70
N-4000DH	D size	1.2	4000	34.0 $^{+0}_{-1}$	61.0 $^{+0}_{-2}$	160
N-6000FH	F size	1.2	6000	34.0 $^{+0}_{-2}$	91.0 $^{+0}_{-2}$	230

TEMPERATURE CUT-OFF FAST-CHARGE CELLS (1-hour charge)

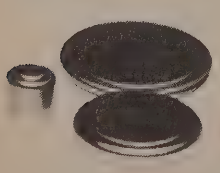
N-425AR	½ A size	1.2	400	17.0 $^{+0}_{-1}$	28.0 $^{+0}_{-1}$	19
N-700AR	A size	1.2	700	17.0 $^{+0}_{-1}$	43.0 $^{+0}_{-1}$	30
N-800AR	A size	1.2	800	17.0 $^{+0}_{-1}$	50.0 $^{+0}_{-2}$	36
N-1200SCR	SC size	1.2	1100	23.0 $^{+0}_{-1}$	43.0 $^{+0}_{-2}$	52
N-1500SCR	SC size	1.2	1500	23.0 $^{+0}_{-1}$	50.0 $^{+0}_{-2}$	61
N-1800CR	C size	1.2	1650	26.0 $^{+0}_{-1}$	50.0 $^{+0}_{-2}$	80
N-4000DR	D size	1.2	3500	34.0 $^{+0}_{-2}$	61.0 $^{+0}_{-2}$	160

MEMORY BACK-UP CELLS**

N-50AAAS	N/A	1.2	45	11.0 $^{+0}_{-0.5}$	16.0 $^{+0}_{-1.0}$	4
N-50SB2	N/A	2.4	45	11.0 $^{+0}_{-1}$	37.5 $^{+0}_{-2}$	9
N-50SB3	N/A	3.6	45	11.0 $^{+0}_{-1}$	53.5 $^{+0}_{-2}$	13
N-180AAAS	N/A	1.2	160	11.0 $^{+0}_{-0.5}$	44.5 $^{+0}_{-1}$	10
N-100AAS	N/A	1.2	90	15.0 $^{+0}_{-1}$	17.5 $^{+0}_{-1}$	8
N-100SB2	N/A	2.4	90	15.5 $^{+0}_{-1}$	41.0 $^{+0}_{-2}$	17
N-100SB3	N/A	3.6	90	15.5 $^{+0}_{-1}$	58.0 $^{+0}_{-2}$	25
N-250AAS	N/A	1.2	225	15.0 $^{+0}_{-1}$	30.5 $^{+0}_{-1.5}$	14
N-500AAS	N/A	1.2	450	15.0 $^{+0}_{-1}$	50.5 $^{+0}_{-1.5}$	24

*Temperature Range: Charge, 0 to 65°C; Discharge, −20 to 65°C; Storage, −30 to 50°C
**Temperature Range: Charge, 0 to 65°C; Discharge, −20 to 65°C; Storage, −30 to 50°C

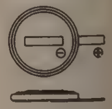
SANYO LITHIUM BATTERIES



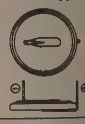
Shape		Model No.	Nominal Voltage (V)	Capacity (mAh)	Dimensions (mm) Outside Diameter (D)	Dimensions (mm) Total Height (H)	Weight (g)	Note*
Flat (button) cells	Standard models	CR1220	3	30	12.5	2.0	0.8	
		CR1620	3	50	16.0	2.0	1.2	
		CR2016	3	60	20.0	1.6	1.7	LF-¼V
		CR2025	3	120	20.0	2.5	2.5	
		CR2032	3	170	20.0	3.2	3.0	LF-½V
		CR2316	3	90	23.0	1.6	2.3	
		CR2420	3	120	24.5	2.0	3.2	LF-⅓W
		CR2430	3	200	24.5	3.0	4.0	LF-½W
		CR1240E	3	100	12.5	4.0	1.3	
		CR1161E	3	140	11.6	6.1	1.8	
Cylindrical cells		CR333	3	40	3.8	33.0	1.1	LR333
		CR772	3	30	7.9	7.2	1.0	LR-bH
		CR-⅓N	3	160	11.6	10.8	3.3	LR-⅓N
		2CR-⅓N	6	160	13.0	25.2	9.0	
		CR-2N	3	1000	12	60.2	16	LR-2N
Oval cell		CR736E-2	3	70	15.7 × 7.8	3.6	1.1	

TAB TYPES

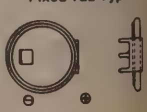
Flat Tab Type



Pin Tab Type



Fixed Tab Type



Sonnenschein dryfit systems

Maintenance-free sealed lead-acid batteries with fixed electrolyte

All US stock ▪ Superb technical service

A200 Cyclers/Floaters

Type code	Nominal voltage V	Nominal capacity 20 hr. rate Ah	Max. load approx. A
A 202/1.0 K	2	1.0	40
A 202/3.0 V	2	3.0	60
A 202/5.7 V	2	5.7	80
A 202/9.5 S	2	9.5	80
A 204/1.0 K	4	1.0	40
A 204/3.0 S	4	3.0	60
A 206/1.0 K	6	1.0	40
A 206/1.0 S	6	1.0	40
A 206/1.1 U	6	1.1	40
A 206/1.1 S	6	1.1	40
A 206/2.0 S	6	2.0	60
A 206/3.0 U	6	3.0	60
A 206/3.0 S	6	3.0	60
A 206/3.8 K	6	3.8	60
A 206/3.8 S	6	3.8	60
A 206/5.7 U	6	5.7	80
A 206/5.7 S	6	5.7	80
A 206/6.5 S	6	6.5	80
A 206/9.5 S	6	9.5	80
A 206/12.0 G	6	12.0	200
A 208/1.1 U	8	1.1	40
A 208/1.1 N	8	1.1	2
A 208/1.1 S	8	1.1	40
A 208/3.0 S	8	3.0	60
A 208/3.0 N	8	3.0	2
A 208/3.8 S	8	3.8	60
A 212/1.1 S	12	1.1	40
A 212/1.8 S	12	1.8	40
A 212/2.7 S	12	2.7	60
A 212/3.0 S	12	3.0	80
A 212/5.7 S	12	5.7	80
A 212/9.5 S	12	9.5	80
A 212/12.0 G	12	12.0	200
A 212/20.0 G	12	20.0	200
A 212/36.0 A	12	36.0	400
A 212/50.0 A	12	50.0	400
A 212/63.0 G	12	63.0	440
A 212/110.0 A	12	110.0	770

A300 Floaters

Type code	Nominal voltage V	Nominal capacity 10 hr. rate Ah	Max. load approx. A
A 302/3.0 V	2	3.0	60
A 302/5.7 V	2	5.7	80
A 302/9.5 S	2	9.5	80
A 304/3.0 S	4	3.0	60
A 306/1.0 S	6	1.0	40
A 306/1.1 S	6	1.1	40
A 306/2.0 S	6	2.0	60
A 306/3.0 S	6	3.0	60
A 306/6.5 S	6	6.5	80
A 306/9.5 S	6	9.5	80
A 312/1.1 S	12	1.1	40
A 312/1.8 S	12	1.8	40
A 312/3.0 S	12	3.0	80
A 312/5.7 S	12	5.7	80
A 312/9.5 S	12	9.5	80

A600 Floaters

Type code	Nominal voltage V	Nominal capacity 10 hr. rate Ah
4/180	2	180
5/225	2	225
6/270	2	270
5/315	2	315
6/380	2	380
7/440	2	440
6/540	2	540
8/720	2	720
10/900	2	900
12/1080	2	1080
12/1350	2	1350

Comparison chart dryfit A 200/A 300 batteries and other lead-acids

dryfit	Powersonic	Yuasa	Globe	Eagle Picher	Elpower Technacell
2 V/1,0 Ah					
2 V/3,0 Ah				CF2V2,5	
2 V/5,7 Ah	PS 250			CF2V5	
2 V/9,5 Ah			GC280		
4 V/1,0 Ah	PS 412		GC 410		
4 V/3,0 Ah	PS 426		GC 426		
6 V/1.0 Ah	PS 610	NP1-6	GC610	CF6V1	EP610
6 V/1,1 Ah	PS 612	NP1,2-6			
6 V/2,0 Ah	PS 618		GC 620		
6 V/3,0 Ah	PS 626	NP2,6-6	GC 626	CF6V2,6	EP 626
6 V/3,8 Ah	PS 642/640	NP4-6			EP 640
6 V/5,7 Ah	PS 660	NP6-6	GC 640/645	CF6V4,5/5,5	EP 650
6 V/6,5 Ah	PS 665		GC 660		
6 V/9,5 Ah	PS 6100	NP8-6/10-6	GC 680	CF6V8	EP 685
6 V/12 Ah					
8 V/1,1 Ah					
8 V/3,0 Ah	PS 826		GC 826		
8 V/3,8 Ah					
12 V/1,1 Ah	PS 1212	NP1,2-12		CF12V1	
12 V/1,8 Ah	PS 1218	NP1,9-12	GC 1215	CF12V1,5	
12 V/12,7 Ah					
12 V/3,0 Ah	PS 1226	NP2,6-12		CF12V2,6	EP 1226
12 V/5,7 Ah	PS 1245/1265	NP6-12	GC 1245/1260	CF12V4,5/5,5	EP 1250
12 V/9,5 Ah	PS 1282 s			CF12V8	EP 1295
12 V/12 Ah	PS 12150			CF12V15	EP 12120
12 V/20 Ah	PS 12200	NP24-12	GC 12230	CF12V20	EP 12240
12 V/36 Ah	PS 12400	NP38-12		CF12V33	EP 12380
12 V/50 Ah					
12 V/63 Ah		NP65-12			
12 V/110 Ah					

dryfit A200

The top performance of the dryfit range. Ideal for use on high-quality power supplies, in high-cycling operations involving total discharges and for float operations with periodic deep discharges.

- Maintenance-free
- Excellent float and cycle life

Applications

Alarm Systems
Buoy Lighting
Cable Television
Communication Equipment
Control Equipment
Computers
Electric Powered Wheelchairs
Electronic Cash Registers
Electronic Test Equipment
Emergency Power Supply System
Emergency Lighting Systems
Fire Alarm Systems
Geophysical Equipment
Marine Equipment
Medical Equipment
Office Machines
Portable Lighting, Video Lights
Power Tools
Radar Stations
Radio & TV Stations
Radio Relay Stations
Robotics
Safety Lighting Systems
Security Systems
Ships' Batteries
Solar-Powered Systems
Telecommunications Systems
UPS Systems
Vending Machines
Warning Systems

dryfit A300

The most economical battery type of the dryfit range for professional grade standby parallel operation.

- Maintenance-free
- Excellent float life

Applications

Alarm Systems
Cable Television
Communication Equipment
Control Equipment
Computers
Electronic Cash Registers
Electronic Test Equipment
Emergency Power Supply System
Emergency Lighting Systems
Fire Alarm Systems
Marine Equipment
Medical Equipment
Office Machines
Radar Stations
Radio & TV Stations
Radio Relay Stations
Safety Lighting Systems
Security Systems
Ships' Batteries
Telecommunications Systems
UPS Systems
Vending Machines
Warning Systems

dryfit A600

The stationary batteries for unattended industrial standby applications with a life expectancy far in excess of a decade.

- Maintenance-free
- Excellent float life up to 15 years

Applications

Alarm Systems
Buoy Lighting
Cable Television
Communication Equipment
Control Equipment
Computers
Emergency Power Supply System
Emergency Lighting Systems
Fire Alarm Systems
Marine Equipment
Medical Equipment
Office Machines
Radar Stations
Radio & TV Stations
Radio Relay Stations
Safety Lighting Systems
Security Systems
Ships' Batteries
Solar-Powered Systems
Telecommunications Systems
UPS Systems
Warning Systems

Sonnenschein

Sonnenschein Batteries Inc.
525 New Britain Avenue
Unionville, CT 06085
Telephone: (203) 677-5846
Telex: 710 4238 723

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1•B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

THINKING BATTERIES? TALK TO TAUBER!

PACKAGED POWER . . .

We've built our reputation on quality products, professional workmanship and flexible design and production capabilities. We can fabricate to your specification or assist you in a custom design for your application. Assemblies are available in rechargeable or primary types such as Sealed Lead-Acid, Nickel Cadmium, Lithium, Alkaline and others. Applications range from on-board memory backup, medical instruments, communication and video, to portable tools, oceanographic equipment and computer UPS systems.

Call or write for our Facilities Brochure/Design Guide.

OR RIGHT OFF THE SHELF,

Primary Cells

Alkaline
Carbon Zinc
Lithium
Mercury
Silver Oxide
Zinc Chloride

Manufacturers

Duracell
Electrochem
Eternacell
Panasonic

Rechargeable

- Sealed Lead-Acid
  - Gelled or Starved Electrolyte
- Nickel Cadmium
  - Cylinderical or Button Cells
- Silver Zinc
  - Button Cells
- Lead Calcium
  - Maintenance-free Wet Cells

Manufacturers

Gates
Panasonic
Yuasa
Varta
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Battery Chargers

Constant Voltage
Constant Current
Cyclic and Float Duty

Manufacturers

Ault
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Audio Transducers Buzzers	Star Micronics
Switching Power Supplies	Panasonic

WE DELIVER!

TAUBERELECTRONICS INC.

4901 Morena Blvd., ste. 314, San Diego, California 92117, **(619) 274-7242**

Eveready® wants you to know

how to choose the right battery for the right job, at the right price

GENERAL PURPOSE

EVEREADY
Lantern Battery
EVEREADY
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9

OUR "GOOD" BATTERY FOR OCCASIONAL GENERAL PURPOSE USE

- Our lowest price battery family
- Variety of shapes and sizes
- Provides from 1.5 Volts to 510 Volts
- Good shelf life
- Voltage drops gradually with use

APPLICATIONS

Low to moderate current in occasional use. Radios, flashlights, lanterns, small lighted toys and novelties, high voltage electronic photoflash, barricade flashers, lighting and alarm systems, electric fence controllers, laboratory instruments, telephone amplifiers, marine depth finders, smoke detectors (but only when recommended by manufacturer), pagers, electronic games, calculators, remote control transmitters.

SUPER HEAVY DUTY BATTERIES

EVEREADY
SUPER HEAVY DUTY
lantern battery

PREMIUM POWER
AT POPULAR PRICES

- Variety of shapes and sizes
- Provides 1.5 Volts, 6 Volts, or 9 Volts
- Good shelf life
- "Better" voltage maintenance under load than General Purpose Batteries
- "Better" low temperature characteristics than General Purpose Batteries
- Excellent leakage resistance

APPLICATIONS

Moderate to heavy current or regular use. Flashlights, lanterns, fluorescent lanterns, Halogen lanterns, calculators, radios, portable tape recorders and players, motor driven devices, communication equipment, electronic games, remote control transmitters.

"ENERGIZER"® CYLINDRICAL ALKALINE

OUR "BEST," LONGEST LASTING
ALL PURPOSE POWER SOURCE

- "Best" shelf life—outlasts General Purpose and Super Heavy Duty
- "Best" voltage maintenance under load
- "Best" low temperature characteristics
- Variety of shapes and sizes
- Provides 1.5 Volts, 3 Volts, 4.5 Volts, 6 Volts and 9 Volts

APPLICATIONS

Heavy current or continuous use. Electronic photoflash, movie cameras, still cameras and motor drives, motor toys, portable tape recorders and players, calculators, smoke detectors, shavers, television sets, portable communication systems, motor driven devices, medical instruments, signal lights, electronic games.

"Eveready," "Energizer," "Air Cell," are trademarks of

UNION CARBIDE CORPORATION

BATTERY PRODUCTS DIVISION
Old Ridgebury Road, Danbury, CT 06817

Sales Offices: Norcross-GA, Itasca-IL, Middleburg Heights-OH, Dallas, Saddle Brook-NJ, San Francisco

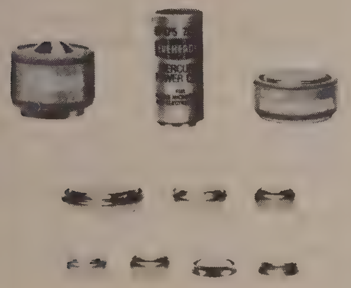
Union Carbide Corporation provides a consulting service of experienced battery engineers as an aid to manufacturers in need of special battery designs. For help with your specific battery problems, call (203) 794-7548 or write Battery Engineering Dept. No. 18 in Danbury (address shown on this page).

Recommend the right EVEREADY® battery for the right job

"EVEREADY"® BATTERY SYSTEMS AND THEIR PROMINENT FEATURES

...FROM THE MANUFACTURER OF THE MOST COMPLETE DRY BATTERY LINE IN THE WORLD

MINIATURE
(Silver Oxide, Mercuric Oxide, MnO_2)



HIGH ENERGY DENSITY MINIATURE POWER SOURCE

- Variety of shapes and sizes
- Provides 1.35 Volts to 12.6 Volts
- Outstanding shelf life
- "Good" voltage maintenance under load
- "Good" low temperature characteristic
- Exceptional salting resistance

APPLICATIONS

Miniature battery powered electronic equipment. LCD, LED, or Analog electronic watches or clocks, hearing aids, calculators, cameras, electronic thermometers, miniature radios, medical instruments, wireless microphones, paging devices, test instruments, electronic games, musical greeting cards and novelty items.

NICKEL-CADMIUM RECHARGEABLE
(High Rate and Fast Charge Types)

RECHARGEABLE POWER SOURCE

- Variety of shapes and sizes
- Standard voltages 1.2 Volts to 7.2 Volts
- Custom batteries available
- Good high and low temperature performance
- High rate discharge
- Long cycle life
- Fast Charge types available
- Consumer cells and chargers available

APPLICATIONS

Rechargeable devices, standby power and replacement cells for high usage devices. Portable tools and appliances, electronic photoflash, calculators, tape recorders, and dictating equipment, toys, R/C models, standby power, alarm systems, professional communication recording equipment, personal pagers and cordless phones.

LITHIUM

LITHIUM 3.6V
L-1002
EVEREADY
Lithium
ENERGIZER

HIGH ENERGY DENSITY, LONG LIFE POWER SOURCE

- Miniature provides 1.5 Volts or 3 Volts
- Cylindrical provides 3 to 7.2 Volts
- Outstanding shelf life
- Exceptional salting resistance
- Good low and high temperature use and storage performance

MINIATURE BATTERY APPLICATIONS

Long life, low drain electronic equipment. Quartz watches, Analog or LCD watches, calculators, cameras, microprocessor memory back-up.

CYLINDRICAL BATTERY APPLICATIONS

Long life, moderate drain electronic equipment. Hearing aids, cameras, microprocessor memory back-up.

VARTA Batteries—High quality

Button batteries

Nickel Cadmium. Rechargeable.

The unique Nickel-Cadmium button battery. Varta Nickel Cadmium button batteries have advantages unique to their construction: for equivalent power they take less room, require a lower charging rate and hold their charge longer than conventional Nickel Cadmium batteries. Available in single cells and stack formats for instruments, portable tools, cameras, recorders, standby power, toys, alarm systems and other industrial electronic applications.

Also available: cylindrical Nickel Cadmium batteries of industrial quality which provide higher discharge rates, better temperature performance and better reliability under mechanical stress.

Silver Oxide. High capacity, constant voltage throughout service life, leakage resistant, long shelf life. Low and high drain cells for electric and electronic watches with analog, LED, LCD and backlit displays. Also suitable for cameras, calculators and other electronic circuits.

Mercury Oxide. Low and moderate drain cells for electric/electronic watches with analog displays, and hearing aid applications. Also suitable for cameras, calculators, microphones, and other miniature electronic devices.

Lithium. High energy density and extremely long shelf life, excellent voltage stability over wide temperature ranges. For use in various electronic applications.

Standard dry cells

Zinc Carbon. Standard long life batteries for general use. For occasional low current demands in flashlights, portable recorders, radios, toys and other common uses.

Zinc Chloride. High performance. For moderate to heavy current demands in flashlights, radios, recorders, toys, small motor applications, cameras and other uses requiring more voltage under load than Zinc Carbon batteries deliver.

Alkaline Manganese. Superior voltage under load, extra long shelf life. For continuous heavy current demands in portable recorders, movie cameras, signal lights, electronic games and motorized applications. Highest voltage under heavy loads.

Varta was established in 1887, and is world renowned for its research and development of stored energy sources. Varta manufactures batteries and battery products EXCLUSIVELY.

VARTA

VARTA Batteries

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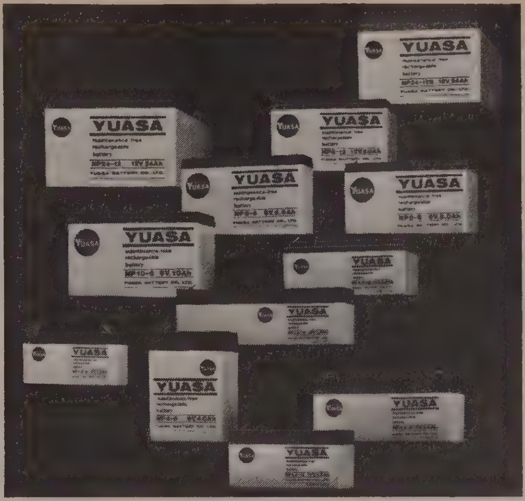
Yuasa Battery (America), Inc.
9728 Alburtis Ave., P.O. Box 3748
Santa Fe Springs, California 90670
Call (213) 949-4266 or (800) 423-4667
Telex 696272



YUASA MAINTENANCE-FREE SEALED LEAD ACID BATTERIES

FEATURES

- These compact and efficient power sources are especially designed for long life, rugged durability, and dependable service.
- Yuasa's unique suspended electrolyte and new venting systems give you the freedom to mount these batteries in any position without fear of leakage or loss of capacity.
- Unparalleled life expectancy in both float and cyclic applications.
- Available for immediate delivery from our warehouse.

COMMON SPECIFICATIONS

Operating temperature ranges

Charge: −20°C to 50°C (5°F to 122°F)

Discharge: −40°C to 50°C (−40°F to 122°F)

Storage: −40°C to 60°C (−40°F to 140°F)

Life expectancy

Standby use: 4 to 5 years

Cyclic use: 250 to 1200 cycles

Sealed construction

Can be operated, charged or stored in any position.

CHARGING METHODS

Constant Voltage Charging at 25°C
Standby use:

Maximum charging current .... 25% of rated capacity

Charging voltage** .... 2.25 to 2.30 volts per cell

Cyclic use:

Maximum charging current .... 25% of rated capacity

Charging voltage** .... 2.43 to 2.50 volts per cell

** When using a constant voltage, current limited charging system in the temperature range of 5° to 40°C (41° to 104°F), temperature compensation is not necessarily needed. Temperature compensation when required is -4mv/°C/cell.

MECHANICAL SPECIFICATIONS

	length		width		height		weight		
	mm	in.	mm	in.	mm	in.	kgs.	lbs.	terminals
NP1-6	51	(2.00)	42.5	(1.67)	51	(2.00)	10.25	(0.55)	faston tab .187
NP1.2-6	97	(3.82)	25	(.98)	50.5	(1.99)	0.34	(0.75)	faston tab .187
NP2.6-6	134	(5.27)	34	(1.33)	60	(2.36)	0.60	(1.32)	faston tab .187
NP4-6	70	(2.76)	47	(1.85)	102	(4.02)	0.90	(1.98)	faston tab .187
NP6-6	151	(5.95)	34	(1.33)	96	(3.78)	1.25	(2.75)	faston tab .187
NP8-6	151	(5.95)	50	(1.97)	96	(3.78)	1.65	(3.63)	faston tab .187
NP10-6	151	(5.95)	50	(1.97)	96	(3.78)	2.20	(4.85)	faston tab .187
NP1.2-12	97	(3.82)	48	(1.89)	50.5	(1.99)	0.59	(1.30)	faston tab .187
NP1.9-12	178	(7.01)	34	(1.33)	59	(2.36)	0.90	(1.98)	faston tab .187
NP2.6-12	134	(5.27)	67	(2.64)	60	(2.36)	1.10	(2.42)	faston tab .187
NP6-12	151	(5.95)	65	(2.56)	96	(3.78)	2.40	(5.28)	faston tab .187
NP24-12	166	(6.54)	175	(6.89)	125	(4.92)	7.70	(17.0)	faston tab .250 bolt terminal
NP38-12	197	(7.76)	165	(6.50)	170	(6.69)	14.00	(30.9)	bolt terminal

DISCHARGE RATES

6 VOLTS	20 hr.	10 hr.	5 hr.	3 hr.	1 hr.	12 VOLTS	20 hr.	10 hr.	5 hr.	3 hr.	1 hr.
NP1-6 6v1.0AH	0.05A	0.09A	0.17A	0.25A	0.60A	NP1.2-12 12v1.2AH	0.06A	0.11A	0.20A	0.30A	0.70A
NP1.2-6 6v1.2AH	0.06A	0.11A	0.20A	0.30A	0.70A	NP1.9-12 12v1.9AH	0.095A	0.18A	0.32A	0.50A	1.10A
NP2.6-6 6v2.6AH	0.13A	0.24A	0.44A	0.66A	1.60A	NP2.6-12 12v2.6AH	0.13A	0.24A	0.44A	0.66A	1.60A
NP4-6 6v4AH	0.20A	0.37A	0.68A	1.00A	2.40A	NP6-12 12v6AH	0.30A	0.56A	1.02A	1.50A	3.60A
NP6-6 6v6AH	0.30A	0.56A	1.02A	1.50A	3.60A	NP24-12 12v24AH	1.20A	2.23A	4.08A	6.85A	14.40A
NP8-6 6v8AH	0.40A	0.74A	1.36A	2.00A	4.80A	NP38-12 12v38AH	1.90A	3.50A	6.46A	9.50A	22.80A
NP10-6 6v10AH	0.50A	0.93A	1.70A	2.50A	6.00A						

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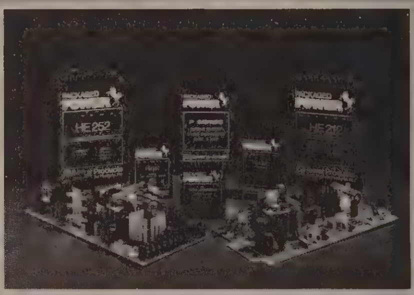

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power supplies, dc-4000

Manufacturer	Starting on EEM Page No.	Output						Dual	Three or More	Pro-grammable	DC-DC Converter	Linear	Switching	Open Frame	Encapsulated	Enclosed/ Modular	Lab or System
		Volts (V)			Current (A)												
		<28	28.01-1000	>1000	<1	1-1000	>1000										
Abbott Transistor	3•1441*	●	●		●	●		●	●	●	●	●	●	●	●	●	●
ACDC Electronics	3•1456	●			●	●		●	●		●	●	●	●		●	
Acopian	3•1461*	●	●		●	●		●	●	●	●	●			●	●	●
Arnold Magnetics	3•1496*	●	●	●	●	●		●	●		●		●		●	●	
Astec	3•1500	●	●		●	●					●			●		●	
Astron	3•1501	●				●						●				●	●
Astrosystems	3•1504*	●			●	●		●	●	●		●				●	●
Ault	3•1502	●	●		●	●		●				●	●			●	
B & K Precision	3•1509	●			●	●		●	●			●				●	●
Bertan Associates	3•1506		●	●	●	●		●	●	●			●			●	●
Bikor Corp.	3•1508	●	●		●	●		●	●			●	●	●			
Boschert	3•1510	●	●		●	●		●	●		●		●	●		●	
Calex Manufacturing	3•1512	●	●		●	●		●	●		●	●	●		●		
California DC	3•1514	●			●	●		●	●				●	●			
CEA Div. Berkleonics	3•1515*										●	●	●		●	●	
CETA Corp.	3•1516	●	●	●	●	●		●	●	●		●	●	●			●
Christie Electric	3•1517*	●	●		●	●	●					●					●
Computer Products	3•1701	●			●	●		●	●		●	●	●		●	●	
Condor, Inc.	3•1519	●			●	●		●	●			●	●	●			
Converter Concepts	3•1536	●	●		●	●		●	●		●		●	●		●	
CPS Div. Vector Gen.	3•1540*			●				●	●	●		●			●	●	●
D & B Power, Inc.	3•1542*	●			●	●						●				●	
Datel	3•1545	●	●		●	●		●	●			●					
Del Electronics	3•1546	●	●	●	●					●		●	●			●	●
Digi-power	3•1549	●	●		●	●		●	●			●	●	●		●	
EG&G Almond Instrs.	3•1550*	●	●		●	●		●	●		●	●	●			●	
Electronic Measurements	3•1552	●	●		●	●	●					●				●	●
Elpac Power Sys.	3•1554	●	●		●	●		●	●		●	●	●	●		●	
EMCO High Voltage	3•1560*	●	●	●	●	●		●			●	●	●		●	●	
Endicott Research	3•1561	●	●		●			●			●				●		
EPSCO, Inc.	3•1563	●	●		●	●		●				●				●	●
Ferrotran Electronics	3•1564*	●	●	●	●	●		●				●				●	
Fincor/Incom	3•1566*	●	●		●	●		●	●	●		●	●	●		●	●
John Franek	3•1570*	●				●			●			●				●	
Frederick Comps.	3•1572	●						●	●				●	●		●	
Gamma High Voltage	3•1574			●	●	●				●		●			●	●	●
GFC/Hammond	3•1583	●			●	●		●	●			●	●			●	
Glassman High Voltage	3•1578			●	●					●				●		●	●
Golden Pacific Elctrns.	3•1582	●	●									●	●	●			
Hewlett Packard	3•1585	●	●	●	●	●		●	●	●		●		●		●	●
Hipotronics	3•1590			●	●	●										●	●
Hitran	3•1592	●	●	●	●	●	●	●			●	●		●		●	●
Integrated Circuits	3•1593*	●			●	●		●			●	●	●		●	●	
Interelectronics	3•1598*	●	●	●							●	●			●	●	
Intl. High Voltage	3•1599			●	●							●				●	●
Intronics	3•1602	●			●	●		●			●	●			●	●	
IXYS	3•1605	●	●										●			●	
Jerome Industries	3•1606	●			●	●		●	●			●			●	●	
Kaiser Systems	3•1608			●	●			●	●			●	●			●	
KEC Electronics	3•1613	●			●	●		●	●				●	●		●	
Keltec Florida	3•1617*	●		●		●		●	●		●	●	●	●		●	

* Mil. Spec.

For manufacturers' sales offices, see yellow pages

power supplies, dc-4000

Manufacturer	Starting on EEM Page No.	Output						Dual	Three or More	Pro-grammable	DC-DC Converter	Linear	Switching	Open Frame	Encapsulated	Enclosed/ Modular	Lab or System
		Volts (V)			Current (A)												
		<28	28.01-1000	>1000	<1	1-1000	>1000										
KEPCO, Inc.	3•1621	●	●	●	●	●		●	●	●	●	●	●	●		●	●
KGS Electronics	3•1890	●			●	●					●					●	
Kikusui Intl.	3•1645	●	●					●		●		●				●	●
KSI	3•1646			●	●			●	●			●	●			●	
L-Com	3•1649	●				●		●	●				●	●		●	
LH Research	3•1650	●			●	●		●	●		●		●	●		●	
Lorain Products	3•1654	●				●		●	●			●	●			●	
LuTechnology	3•1657	●			●	●		●		●		●				●	
Marway Products	3•1892	●				●							●	●		●	
Multi Products	3•1658	●			●	●		●	●			●				●	
Murata Erie	3•1659		●	●	●			●				●			●	●	
National Power Technlg.	3•1660	●				●		●	●				●	●			
NJE	3•1661	●	●			●		●	●			●	●	●		●	●
North Hills	3•1662	●	●	●	●	●		●		●		●				●	●
NWL Transformers	3•1663							●	●			●	●	●		●	
OPT Industries	3•1665*	●				●		●	●				●			●	
Pioneer Magnetics	3•1666	●	●			●		●	●	●	●		●			●	
Power Components	3•1668	●				●		●	●			●	●	●		●	
Power Designs	3•1672	●	●	●	●	●		●	●	●		●				●	●
Power General	3•1680	●			●	●		●	●		●		●	●	●	●	
Power-One	3•1692*	●	●		●	●		●	●			●	●	●			
Power Pac Inc.	3•1696	●	●		●	●		●	●			●	●	●			
Power Systems	3•1726	●	●					●	●			●		●		●	●
Powertec	3•1728	●	●		●	●		●	●			●	●	●		●	
Power Technology	3•1746		●	●											●		
Precision Components	3•1747	●	●		●	●		●	●				●			●	
Prime Power	3•1671	●	●		●	●		●	●				●	●		●	
Qualidyne Systems	3•1748	●	●		●	●		●	●				●			●	
Reliability Inc.	3•1752	●			●			●			●		●		●		
RIFA, Inc.	3•1756	●	●		●	●		●	●		●		●		●	●	
RO Associates	3•1758	●	●		●	●		●			●		●	●		●	
S & H Industries	3•1767			●		●		●				●				●	
Semiconductor Circuits	3•1759	●			●	●		●	●		●	●	●	●	●	●	
Sierracin/Power Sys.	3•1768	●			●	●		●	●			●	●	●			
Sola	3•1772	●				●		●	●				●	●			
Spellman	3•1774*			●	●	●				●						●	●
Standard Energy	3•1777			●	●	●		●	●	●	●	●	●		●	●	●
Standard Power	3•1780	●	●		●	●		●	●			●	●	●			
Summit Electronics	3•1784*	●				●		●	●		●	●	●	●		●	
Taylor Electronics	3•1786	●	●			●		●	●			●				●	
TDK Corp.	3•1787	●						●	●		●	●			●	●	
Technipower	3•1789*	●	●					●	●		●	●	●	●	●		
Technology Dynamics	3•1790*	●	●		●	●		●	●		●		●	●		●	
TII Electronics	3•1796	●				●		●	●				●	●		●	
Todd Products	3•1798	●	●			●		●	●				●	●		●	
Transformation Elctrns.	3•1802	●			●			●	●			●	●			●	
Universal Voltronics	3•1803			●								●				●	●
Venus Scientific	3•1804*			●	●			●	●		●					●	
Voltex	3•1805	●	●	●								●	●	●		●	
Wilmore Electronics	3•1807*	●	●	●	●	●					●	●	●	●	●	●	●
Xentek, Inc.	3•1810	●			●	●		●	●			●		●			
Xylog Corp.	3•1813	●				●			●				●	●			

* Mil. Spec.

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MILITARY – INDUSTRIAL

Power Supply Modules

When reliability is imperative.

For Mil Spec and critical industrial applications where reliability is the prime consideration, Abbott Power Supplies have been the predominant choice for over 24 years. This enduring acceptance has been earned through sound design, dependable components, meticulous workmanship, exhaustive quality control and proven performance in the field under severe operating conditions. Whatever your demanding requirements, you will find the correct Abbott Power Supply module in the next 15 pages.

686 models are listed on the next 15 pages

MILITARY POWER SUPPLIES

FUNCTION	DESCRIPTION	MODEL	PAGE
AC to DC			
60/400 Hz to 5-28 VDC	High density single/ dual outputs	Model LV	3•1442
50-60 Hz to 5-28 VDC	High efficiency low EMI switcher	Model M	3•1443
400 Hz to 5-100 VDC	High performance single and dual outputs	Model W, WW	3•1445
400 Hz to 5-28 VDC	High density 3ϕ single/dual output	Model WL, WWL	3•1446
DC to DC			
20-32 VDC to 5-28 VDC	High efficiency switcher, single output	Model BA	3•1447
20-32 VDC to 5-50 VDC	High efficiency switcher single and dual outputs	Model BN, BBN	3•1448
20-32 VDC to 5-50 VDC	High performance single and dual outputs	Model C, CC	3•1449
24-30 VDC to 5-500 VDC	High reliability linear	Model B	3•1450
DC to AC			
22-32 VDC to 400-1600 Hz	Sine Wave Inverter	Model S	3•1451

INDUSTRIAL POWER SUPPLIES

FUNCTION	DESCRIPTION	MODEL	PAGE
AC to DC			
50-60 Hz to 5-30 VDC	Single and multiple output, high density switchers	Model ZB, ZBT, ZBQ	3•1452
50-500 Hz to 5, 12, 15 VDC	Universal input high efficiency switcher 50-500 watts	Model DA	3•1453
50-440 Hz to 5-28 VDC	Open frame single and dual output	Model NL	3•1454
50-420 Hz to 5-30 VDC	High reliability linear single and dual outputs high temperature	Model RN, RRN	3•1454
DC to DC			
48 VDC to 5, 12, 15 VDC	High efficiency switcher 50, 100, 150 watts	Model DC	3•1453
DC to AC			
12-48 VDC to 50-440 Hz	High reliability inverters	Models KN, PN, LN, TN In AC Power Supply Section Page	3•1822

Case Dimensions, Models W, WW, BN, BBN, C, CC, B and S — see page 3•1451

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Industrial Product Div. Western Offices: 8203 Vineland Ave., Sun Valley, CA 91352 (818) 504-0644. Telex: 75-2972
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London: Denholm House, Nutfield, Surrey. RH1 4HW, England, 0737 82 3273, Telex: 91-6101

abbott
MILITARY POWER SUPPLIES

60/400 Hz to 5-28 VDC

MODEL
LV

SPECIFICATIONS

INPUT VOLTAGE RANGE: 105 to 125 VRMS.

EFFICIENCY: Typical efficiency 35% for 5V, 65% for 28V.

LINE REGULATION: 0.05% (±1 VC for LLV model).

LOAD REGULATION: 0.10%.

PARD (NOISE & RIPPLE): 1 mVRMS, 5 mV ptp.

INPUT FREQUENCY RANGE: 55 to 65/380 to 420 Hz. Units may be operated down to 47 Hz with 20% derating.

OUTPUT ADJUSTMENT RANGE: ±5% of nominal at output terminals.

INSULATION VOLTAGE: 500 VDC input to case, input to output and output to case.

INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case when measured at 50 VDC.

POLARITY: Inputs and outputs are isolated, either positive or negative output may be grounded.

TEMPERATURE RANGE: Operating: −20°C to +71°C, −40°C to +85°C optional (please consult your nearest Abbott Sales Office for details). Storage temperatures: −55°C to +85°C.

TEMPERATURE EFFECT COEFFICIENT: 0.01% per degree Celsius over entire range.

ENVIRONMENT: Hermetically sealed and encapsulated to meet MIL-STD-810C, including altitude (to 1.3 inches of Hg), acceleration, vibration, shock and temperature altitude cycling. Unit meets MIL-S-901 (5 ft. hammer drop). Copies of certified test reports are available upon request.

ADJUSTMENT RANGE: Unit is equipped with an internal potentiometer. An external adjustment potentiometer is available. Please consult your nearest Abbott Sales Office.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed.

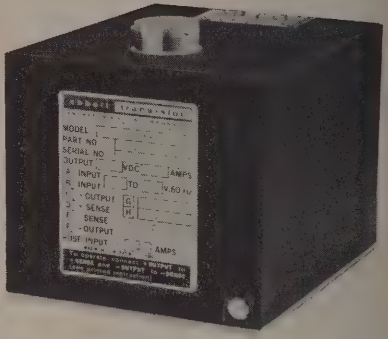
INPUT TRANSIENT PROTECTION: 143.8 VRMS, for 0.3 seconds.

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "sensing" leads. The regulator circuit action compensates for a DC voltage drop up to 0.3 volts in the load leads.

LOAD TRANSIENT: Output voltage returns to regulation limit within 100 microseconds after 50% step change in load current.

ELECTROMAGNETIC INTERFERENCE: Meets MIL-STD-461A, methods CE01 and CE03 for conducted emissions.

RELIABILITY: The Mean Time Between Failure (MTBF) per MIL-HDBK-217D under operating conditions of +50°C baseplate temperature, maximum rated output power for LV5DE20-1 was calculated to be 69,987 hrs. for ground benign environment and 10,384 hrs, for naval sheltered environment. MTBF for LLV12DE0.5-1 was calculated to be 186,947 hrs. for a ground benign environment and 30,081 for naval sheltered environment. With Enhanced Reliability Option (ER) MTBF for LV5DE20-1 (ER) was calculated to be 236,033 hrs. for ground benign environment and 35,585 hrs. for naval sheltered environment. For LLV12DE0.5-1 (ER) MTBF was calculated to be 330,349 hrs. for ground benign environment and 50,682 hrs. for a naval sheltered environment.



FEATURES

- Up to 65% efficiency
- Low Output Ripple, 5 mV peak-to-peak
- 0.1% Regulation
- High Density
- Single and Dual Outputs

SINGLE OUTPUT: LV SERIES

Output Voltage Range (VDC)	Output Current (Amps)	Size (see Dwg.)	Weight (Lbs.)	Model Number
4.75 to 5.25	2.4	9A	3.1	LV5DE2.4
	6.0	11C	5.8	LV5DE6
	10.0	12A	7.7	LV5DE10
	20.0	13B	10.9	LV5DE20
11.4 to 12.6	1.7	9A	3.1	LV12DE1.7
	4.0	11C	5.8	LV12DE4
	7.5	12A	7.7	LV12DE7.5
14.2 to 15.7	1.5	9A	3.1	LV15DE1.5
	3.0	11C	5.8	LV15DE3
14.5 to 15.5	4.0	12A	7.7	LV15DE4
22.8 to 25.2	0.9	9A	3.1	LV24DE0.9
	2.5	11C	5.8	LV24DE2.5
	3.9	12A	7.7	LV24DE3.9
	7.5	13B	10.9	LV24DE7.5
26.6 to 29.4	0.75	9A	3.1	LV28DE0.75
	2.0	11C	5.6	LV28DE2
	3.15	12A	7.5	LV28DE3.15
	7.5	13B	10.9	LV28DE7.5

DUAL OUTPUT: LLV SERIES

Output Voltage Range (VDC)	Output Current (Amps)	Size (see Dwg.)	Weight (Lbs)	Model Number
±11 to ±13	0.5	11N	3.6	LLV12DE0.5
	0.9	12K	4.8	LLV12DE0.9
	1.5	13D	6.6	LLV12DE1.5
±14 to ±16	0.5	11N	3.6	LLV15DE0.5
	0.9	12K	4.8	LLV15DE0.9
	1.5	13D	6.6	LLV15DE1.5

OPTIONAL FEATURES

TTL: (L Option) Abbott provides an isolated pair of terminals used to turn-on and turn-off the regulator portion of the power supply. The unit remains in an idling state while the output is off. The power supply will turn-on with TTL logic "1", and turn-off with TTL logic "0". To specify this feature, please add an "L" to the character after the character "E" in the model number. (EXAMPLE: LV5DE6 to LV5DEL5)

SPECIAL CONNECTORS: A hermetically sealed military-type connector is available for the LV series (as shown in picture). Please consult your nearest Abbott Sales Office for details.

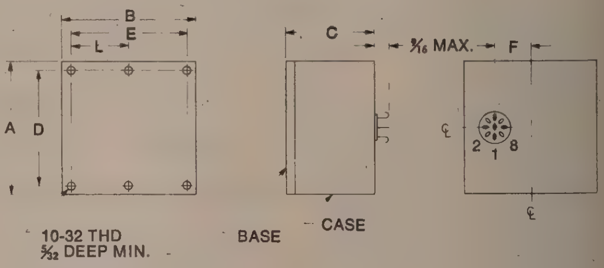
WIDER OPERATING TEMPERATURE RANGE: (T Option) −40°C to +85°C operating temperature range available. Please consult your nearest Abbott Sales Office for details.

OVER TEMPERATURE PROTECTION: (OT Option) Removes input power when conduction surfaces exceed safe limits. Please consult your nearest Abbott Sales Office for details.

OVERVOLTAGE PROTECTION: (-1 Option) An internal crowbar type OVP is available. Unit will crowbar output when output voltage exceeds adjustable set point. Unit input power must be recycled to restore unit. To specify this feature, please add a "-1" after the last number in the model number. (EXAMPLE: LV5DE6 to LV5DE6-1)

WIDER INPUT VOLTAGE RANGE: (H Option) Available at a voltage range 210 to 250 VAC. Please consult your nearest Abbott Sales Office for details.

ENHANCED RELIABILITY: (ER OPTION) This option provides increased reliability by using a higher level of military grade components. This feature allows the power supply to meet customer-specific requirements as to "Hi-Rel" components.



SIZE	A	B	C	D	E	F	L
9A	2.75	4.75	3.75	2.25	4.25	0.875	—
11C	4.25	5.25	4	3.75	4.75	1.875	2.375
12A	4.5	6	4	4	5.5	2.25	2.75
13B	5.5	6.5	5	5	6	2.188	3

SIZE	A	B	C	D	E	F	L
11N	3	6	3.375	2.5	5.5	2	—
12K	4	6.25	3.375	3.5	5.75	0.875	2.875
13D	5.5	6	3.375	5	5.5	1.25	2.5

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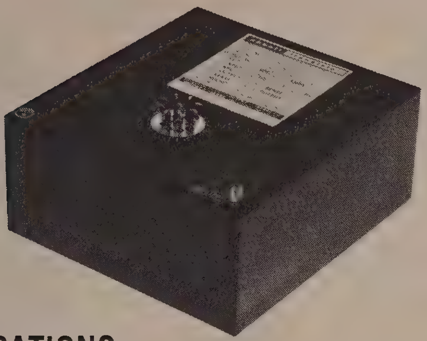
MILITARY POWER SUPPLIES

Switching Power Supplies

MODEL
M



103.5-126.5 VAC to 4.7-29.7 VDC 47 to 440 Hz. 1 Ø

- Tight line and load regulation.
- Wide temperature range.
- High reliability.
- Encapsulated and hermetically sealed. Meets MIL-STD-810C and MIL-S-901.
- Low EMI. Meets MIL-STD-461A, (Radiated C.E. and C.S. specs) with F option.
- High efficiency. 75% to 81% typical.
- Internal OVP available.
- Remote programming optional.
- TTL compatibility available.

SPECIFICATIONS

INPUT VOLTAGE: 103.5 to 126.5 Vac, (Vrms) single phase, 47 to 440 Hz. Wide input option is available.

INPUT TRANSIENT PROTECTION: Unit will withstand 143.8 Vac for 0.3 seconds in accordance with MIL-STD-1399.

INRUSH CURENT:

MAXIMUM:	(M-50)	16 times the peak input current at low line, full load output, and nominal output voltage, with source impedance of no less than 0.25 ohm.
	(M-100)	8 times the peak input current at low line, full load output, and nominal output voltage, with source impedance of no less than 0.25 ohm.
TYPICAL:	(M-50)	8 times the peak input current under the same conditions.
	(M-100)	4 times the peak input current under the same conditions.

EFFICIENCY: Minimum 65% @ FL, 25°C baseplate temperature and nominal output. Typical efficiency is 75-81% under same conditions.

LINE REGULATION: Within 0.2% or 25mV, whichever is greater for input change of 103.5 to 126.5 Vac, (Vrms) with load constant.

LOAD REGULATION: Within 0.2% or 25mV, whichever is greater for load change of NL to FL with line constant.

RIPPLE & NOISE: 30mVrms, 100mV, whichever is greater for load change of NL to FL with line constant.

LOAD TRANSIENT RECOVERY TIME: Output Voltage returns to regulation limits within 3 msec after a 50% change in load current. Maximum over/under shoot is less than 0.4 Vdc or 3% of the output voltage, whichever is greater.

BROWNOUT HOLDUP-TIME: 15 msec. minimum at low line and maximum output current, 30 msec. typical at nominal line and maximum output current.

OPERATING TEMPERATURE RANGE: 0°C to 71°C. Wider temperature range is available.

STORAGE TEMPERATURE: −55°C to +85°C.

TEMPERATURE COEFFICIENT: 0.03% per degree Celsius maximum.

ISOLATION: 500 Vdc input to output and input to case. 100 Vdc output to case.

INSULATION RESISTANCE: 50 megohms minimum between input and output, input to case, and output to case when measured at 50 Vdc (Input pins tied together, Output pins tied together).

POLARITY: Input and outputs are isolated, either positive or negative side may be grounded.

OUTPUT VOLTAGE ADJUSTMENT: Output continuously adjustable between the limits shown by means of an externally accessible adjustment potentiometer.

ADJUSTMENT RESOLUTION:	NOMINAL OUTPUT VOLTAGE	RESOLUTION
	5, 12, 15 Vdc units	35 milivolts
	24, 28 Vdc units	60 milivolts

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "Sensing" leads. The resulting circuit action compensates for a dc voltage drop up to 0.3 volts in the load leads.

OUTPUT IMPEDANCE: dc to 1 KHz; .03 R_L* or 0.5 ohm, whichever is greater. 1 KHz to 10 KHz: 0.5 R_L or 0.1 ohm, whichever is greater. 10 KHz to .100 KHz: 0.7 R_L to 0.3 ohm, whichever is greater. *Rate loaded.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against a short circuit of any duration. Unit automatically recovers to normal when short circuit is removed.

ENVIRONMENT: Unit is hermetically sealed to meet MIL-STD-810C. Unit meets MIL-S-901 (5 foot hammer drop). Certified test reports are available.

EMI: Units meet MIL-STD-461A, CEO1, CEO3 with optional filter.

JUNCTION TEMPERATURE: Maximum Junction Temperature of the power transistors is 85°C. Complies with NAVMAT NOTE 3080.

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MILITARY POWER SUPPLIES

Switching Power Supplies

MODEL M

OPTIONAL FEATURES

TTL: (L Option) Abbott provides an isolated pair of terminals used to turn-on and turn-off the regulator portion of the power supply. The unit remains in an idling state while the output is off. The power supply will turn-on with TTL logic "I", and turn-off with TTL logic "0". To specify this feature, please add an "L" to the character preceding the first dash of the model number. EXAMPLE: M100DL-5A, M50DL-5A

OVER-VOLTAGE PROTECTION: (-1 Option) An internal non-crowbar type OVP is available. Power supply turns off when output voltage exceeds set point. Unit input power must be recycled to restore output. To specify this feature, please add a "-1" after the "A" in the model number. EXAMPLE: M100DT-5A-1, M50D-5A-1

WIDER OPERATING TEMPERATURE RANGE: (T Option) −20°C to +71°C peak to peak output ripple spec increases to 200mV. To specify this option, please add a "T" to the character preceding the dash of the model number. EXAMPLE: M100DT-5A, M50DT-5A

SPECIAL CONNECTORS: A hermetically sealed military-type connector is available for the M Series. Please consult your nearest Abbott Sales Office for details.

WIDER INPUT VOLTAGE RANGE: (H Option) The standard input voltage range of the "M" line is 103.5 to 126.5 Vac. For the wider input voltage range of 90-126.5 Vac; output current is derated by 20%. To specify this feature, please add an "H" to the character preceding the first dash in the model number. EXAMPLE: M100DH-5A, M50DH-5A

REMOTE PROGRAM OPTION: (R Option) Units can be modified so that their output voltage can be adjusted from a remote location. This is accomplished by adding an additional pin to the header on the unit. To specify this option, please add an "R" after the character preceding the first dash of the model number. EXAMPLE: M100DR-5A, M50DR-5A

EMI FILTER: (F option) An internal EMI filter is available to reduce conducted interference on the input leads. With these filters the model M's will comply with MIL-STD-461A notice 3, CE01 and CE03 on the input leads. The addition of this filter alters the isolation of the input to case to 200 Vdc. To specify this feature, please add an "F" after the "D" in the model number. EXAMPLE: M100DF-5A, M50DF-5A

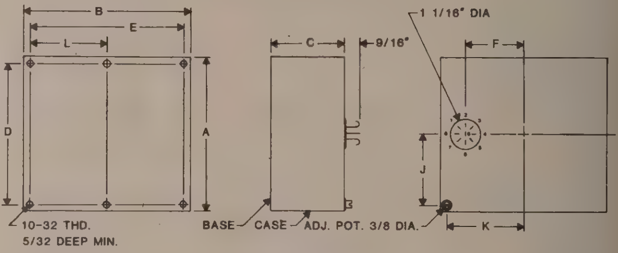
ENHANCED RELIABILITY: (ER Option) This option provides increased reliability by using higher levels of Mil. grade components. This feature allows the power supply to meet customer specific requirements as to "Hi Rel" components, environmental testing and extended Thermal Cycling. Please consult your nearest Abbott Sales Office for details.

SPECIAL ENCAPSULATION: (E Option) All of our hermetically sealed power modules are encapsulated to meet or exceed the shock, acceleration, and vibration requirements of MIL-STD-810C. Special encapsulation to enable these modules to withstand higher shock levels of 60g's, acceleration levels of 50g's, and vibration levels of 30g's, is available. To specify this feature, please add an "E" after the character preceding the first dash in the model number. EXAMPLE: M100DE-5A, M50DE-5A

TEN STANDARD MODELS

Output Voltage Range	Output Current (Amps)	Weight (Lbs.)	Model Number
4.7-5.3	10.0	4.0	M50D-5A
	20.0	5.0	M100D-5A
11.25-12.75	4.15	4.0	M50D-12A
	8.3	5.0	M100D-12A
14.1-15.9	3.35	4.0	M50D-15A
	6.7	5.0	M100D-15A
22.5-25.5	2.1	4.0	M50D-24A
	4.2	5.0	M100D-24A
26.3-29.7	1.8	4.0	M50D-28A
	3.6	5.0	M100D-28A

MECHANICAL DIMENSIONS



MODEL	A	B	C	D	E	F	J	K	L
M100	5¾	6¼	2¾	5.25	5.75	2³⁄₁₆	2⅝	2⅞	2.88
M50	3⅞	6¼	2¾	3.38	5.75	2⁷⁄₁₆	1¹¹⁄₁₆	2⅞	—

TOLERANCES: FRACTION — ±¹⁄₃₂, DECIMAL — ±.015
MATERIAL: BASE — ALUMINUM 6061-T6, CASE-STEEL
FINISH: BLACK FLAT LACQUER FED. STD. 595 COLOR 37038

PIN DESIGNATIONS:
1 AC INPUT
2 AC INPUT
3 −SENSE
4 −OUTPUT (DC)
5 −OUTPUT (DC)
6 +OUTPUT (DC)
7 +OUTPUT (DC)
8 +SENSE
9 CASE GROUND

RELIABILITY

RELIABILITY: MTBF for the Standard version calculated per MIL-HDBK-217D (50°C baseplate temperature, maximum operating input voltage, and maximum rated output power) is shown below.

Model Number	Baseline Temp.	Environment	MTBF
M50D-5A-1 (STD)	50°C	Ground Benign	100,659 hrs.
M50D-5A-1 (STD)	50°C	Naval Sheltered	16,819 hrs.
M100D-5A-1 (STD)	50°C	Ground Benign	71,126 hrs.
M100D-5A-1 (STD)	50°C	Naval Sheltered	11,214 hrs.

ENHANCED RELIABILITY: Abbott offers a higher MTBF unit, as shown below. (see optional features)

Model Number	Baseplate Temp.	Environment	MTBF
M50D-5A-1 (ER)	50°C	Ground Benign	187,251 hrs.
M50D-5A-1 (ER)	50°C	Naval Sheltered	29,261 hrs.
M100D-5A-1 (ER)	50°C	Ground Benign	119,095 hrs.
M100D-5A-1 (ER)	50°C	Naval Sheltered	18,350 hrs.

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MILITARY POWER SUPPLIES

400 Hz to 5-27 VDC

MODEL W and WW

SPECIFICATIONS

INPUT VOLTAGE RANGE: 105 to 125 VRMS

INPUT FREQUENCY RANGE: 380 to 420 Hertz, 1 phase

INPUT POWER: Per MIL-STD-704A for category B equipment

LINE REGULATION: 0.1% (0.2% for duals) or 10 mv (whichever is greater) for input change of 105 to 125 VRMS with load constant

LOAD REGULATION: 0.1% (0.2% for duals) or 20 mv (whichever is greater) for change from no load to full load with line constant

RIPPLE: 0.02% or 5 mv RMS (whichever is greater) 25 mv peak-to-peak maximum, each output, measured with scope having 25 MHz bandwidth

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer

TRACKING ACCURACY: The negative output will track the positive output to within 1.0% or 100 mv (whichever is greater) for all rated conditions of input voltage, output current, operating temperature, and output voltage adjustment

ISOLATION VOLTAGE: 750 vdc input to output and input to case • 200 vdc output to case

INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case, and output and case when measured at 50 vdc.

POLARITY: Inputs and outputs are isolated, either positive or negative side may be grounded

TEMPERATURE RANGE: Operating: −55°C to +100°C maximum at center of mounting base Storage: −65°C to +125°C

TEMPERATURE COEFFICIENT: 0.03% per degree Celsius maximum

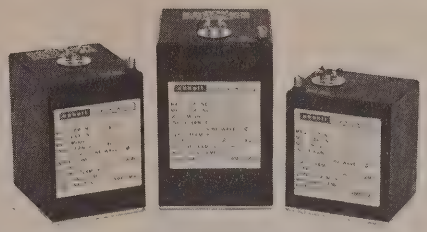
ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-STD-810C and MIL-E-5400P, Class 2, including: altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, explosion, etc.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output automatically restores to normal when the overload is removed

INPUT TRANSIENT PROTECTION: MIL-STD-704A Figure 3, Limit 1 (180 VAC for 0.1 seconds)

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 100 microseconds (200 microseconds for duals) after 50% step change in load current

ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD-461 for generation of and susceptibility to radiated and conducted interference



High Performance

- Encapsulated and hermetically sealed to meet MIL-STD-810C and MIL-E-5400P, Class 2.
- Operating temperature range: −55°C to +100°C.
- Low Peak-to-Peak Ripple.
- Tight line and load regulation.
- High reliability. Up to 214,600 hrs. MTBF per MIL-HDBK-217C.
- Compact. Power density up to 2 watts per cu. in.
- Low EMI.

RELIABILITY: MTBF per MIL-HDBK-217C up to 214.600 Hrs.

OVER-VOLTAGE PROTECTION*: An internal, non-crowbar type OVP is available. Power supply turns off when output voltage exceeds set-point.

TTL*: Abbott provides an isolated pair of terminals used to turn-on and turn-off the regulator portion of the power supply. The unit remains in an idling state while the output is off.

* Inclusion of these optional features on these models will most likely require that the case size increases slightly. Please consult nearest Abbott sales office for further details.

Output Voltage Range	Output Curr. (Amps)	Size*	Wt. (Lbs.)	Model Number
4.5-5.5	2.5	2E	1.9	W5D2.5
	5.0	4D	2.7	W5D5.0
	10.0	10B	5.1	W5D10
	15.0	14C	8.9	W5D15
	20.0	14C	8.9	W5D20
5.5-6.5	2.5	2E	1.9	W6D2.5
	5.0	4D	2.7	W6D5.0
	10.0	10B	5.1	W6D10
	15.0	14C	8.9	W6D15
	20.0	14C	8.9	W6D20
6.5-7.5	2.5	2E	1.9	W7D2.5
	5.0	4D	2.7	W7D5.0
	10.0	10B	5.1	W7D10
	15.0	14C	8.9	W7D15
	20.0	14C	8.9	W7D20
7.5-8.5	2.5	2E	1.9	W8D2.5
	5.0	4D	2.7	W8D5.0
	10.0	10B	5.1	W8D10
	15.0	14C	8.9	W8D15
	20.0	14C	8.9	W8D20
8.5-9.5	2.5	2E	1.9	W9D2.5
	5.0	4D	2.7	W9D5.0
	10.0	10B	5.1	W9D10
	15.0	14C	8.9	W9D15
	20.0	14C	8.9	W9D20
9.5-10.5	2.5	2E	1.9	W10D2.5
	5.0	4D	2.7	W10D5.0
	10.0	10B	5.1	W10D10
	15.0	14C	8.9	W10D15
	20.0	14C	8.9	W10D20
10.5-11.5	2.5	2E	1.9	W11D2.5
	5.0	4D	2.7	W11D5.0
	10.0	10B	5.1	W11D10
	15.0	14C	8.9	W11D15
	20.0	14C	8.9	W11D20
11-13	2.5	2E	1.9	W12D2.5
	5.0	4D	2.7	W12D5.0
	10.0	10B	5.1	W12D10
	15.0	14C	8.9	W12D15
	20.0	14C	8.9	W12D20
13-15	1.2	2E	1.9	W14D1.2
	2.5	4D	2.7	W14D2.5
	5.0	10B	5.1	W14D5.0
	10.0	14C	8.9	W14D10
	15.0	14C	8.9	W14D15
14-16	1.2	2E	1.9	W15D1.2
	2.5	4D	2.7	W15D2.5
	5.0	10B	5.1	W15D5.0
	10.0	14C	8.9	W15D10
	15.0	14C	8.9	W15D15
15-17	1.2	2E	1.9	W16D1.2
	2.5	4D	2.7	W16D2.5
	5.0	10B	5.1	W16D5.0
	10.0	14C	8.9	W16D10
	15.0	14C	8.9	W16D15
17-19	1.2	2E	1.9	W18D1.2
	2.5	4D	2.7	W18D2.5
	5.0	10B	5.1	W18D5.0
	10.0	14C	8.9	W18D10
19-21	1.2	2E	1.9	W20D1.2
	2.5	4D	2.7	W20D2.5
	5.0	10B	5.1	W20D5.0
	10.0	14C	8.9	W20D10
21-23	1.2	2E	1.9	W22D1.2
	2.5	4D	2.7	W22D2.5
	5.0	10B	5.1	W22D5.0
	10.0	14C	8.9	W22D10
23-25	1.2	2E	1.9	W24D1.2
	2.5	4D	2.7	W24D2.5
	5.0	10B	5.1	W24D5.0
	10.0	14C	8.9	W24D10
25-27	1.2	2E	1.9	W26D1.2
	2.5	4D	2.7	W26D2.5
	5.0	10B	5.1	W26D5.0
	10.0	14C	8.9	W26D10
27-29	1.2	2E	1.9	W28D1.2
	2.5	4D	2.7	W28D2.5
	5.0	10B	5.1	W28D5.0
	10.0	14C	8.9	W28D10
DUAL OUTPUT				
±3.75- ±4.25	0.3	8B	1.9	WW4D0.3
	0.5	9C	2.2	WW4D0.5
	1.0	9C	2.2	WW4D1.0
	2.0	9D	3.1	WW4D2.0
	4.0	11D	5.5	WW4D4.0
±4.5- ±5.5	0.3	8B	1.9	WW5D0.3
	0.5	9C	2.2	WW5D0.5
	1.0	9C	2.2	WW5D1.0
	2.0	9D	3.1	WW5D2.0
	4.0	11D	5.5	WW5D4.0
±11- ±13	0.3	8B	1.9	WW12D0.3
	0.5	9C	2.2	WW12D0.5
	1.0	9C	2.2	WW12D1.0
	2.0	9D	3.1	WW12D2.0
	4.0	11D	5.5	WW12D4.0
±14- ±16	0.3	8B	1.9	WW15D0.3
	0.5	9C	2.2	WW15D0.5
	1.0	9C	2.2	WW15D1.0
	2.0	9D	3.1	WW15D2.0
	4.0	11D	5.5	WW15D4.0
±29- ±31	0.3	9C	2.2	WW30D0.3
	0.5	9C	2.2	WW30D0.5
	1.0	9D	3.1	WW30D1.0
	2.0	11D	5.5	WW30D2.0
	4.0	14C	8.0	WW30D4.0

Other standard Models with any output up to 100 vdc are available. For complete information, please consult our nearest office.
Other standard Models with any output between ±2.75 and ±31.0 vdc are available. For complete information, please consult our nearest office.

* See page 3•1451 for size charts.

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MILITARY POWER SUPPLIES

400 Hz to 5-28 VDC

MODEL WL AND WWL

SPECIFICATIONS

INPUT VOLTAGE RANGE: 105-125 VRMS 3ϕ delta.

INPUT FREQUENCY RANGE: 380-420 Hz.

INPUT TRANSIENT PROTECTION: 180 VRMS for 0.1 seconds per MIL-STD-704, Figure 3, Limit 1.

LINE REGULATION: 0.1% or 20 mV, whichever is greater.

ELECTROMAGNETIC INTERFERENCES: Meets MIL-STD-461A, methods CE and CS for conducted emissions.

TURN-ON/TURN-OFF OVERSHOOT: 0.2% or 20 mV, whichever is greater.

LOAD REGULATION: 0.1% or 20 mV, whichever is greater. For load change of no load to full load.

RIPPLE: 0.02% or 5 mVRMS (whichever is greater) 25 mV peak-to-peak.

TRACKING ACCURACY: (WWL models only) The negative output will track the positive output to within 100 mV for all rated conditions of input voltage, output current, operating temperature, and output voltage adjustment.

POLARITY: Outputs are isolated. Either positive or negative may be grounded.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed.

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "sensing" leads. The regulator circuit action compensates for a DC voltage drop up to 0.5 volts in the load leads.

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limit within 100 microseconds after 50% step change in load current for units outputting 10A or less.

ISOLATION VOLTAGE: 750 VDC between input and output, input and case, and 200 VDC between output and case.

INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case when measured at 50 VDC.

TEMPERATURE RANGE: −55°C to +80°C baseplate temperature. 80% rated power at −55°C to +100°C. Storage: −65°C to +125°C.

RELIABILITY: MTBF per MIL-HBK-217D under operating conditions of 50°C baseplate temperature, maximum rated output power for standard model was calculated to be 164,406 hrs. for ground benign environment and 25,633 hrs. for air inhabited transport. With Enhanced Reliability Option (ER) MTBF was calculated to be 883,580 hrs. for ground benign environment and 94,956 hrs. for air inhabited transport.

ENVIRONMENT: Hermetically sealed and encapsulated to meet MIL-STD-810C, including altitude (to 1.3 inches of Hg), acceleration, vibration, shock and temperature altitude cycling.

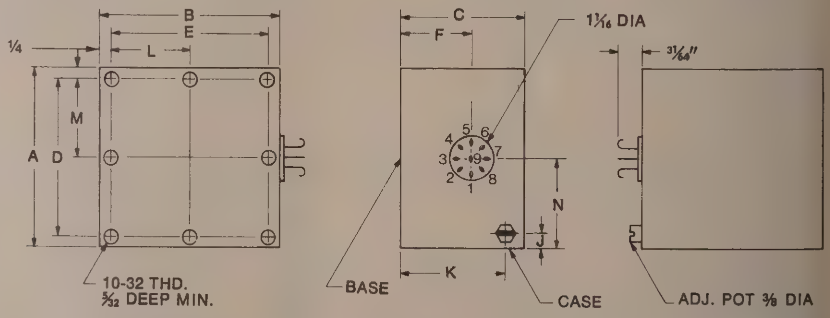
EFFICIENCY: Typical 55%.

SINGLE OUTPUT: WL SERIES

Output Voltage Range (VDC)	Output Current (Amps)	Size (see Dwg.)	Model Number
4.8 to 5.8	20	12M	WL5.3D-20
5.8 to 6.8	20	12M	WL6.3D-20
11 to 13	10	11S	WL12D-10
11 to 13	20	12N	WL12D-20
14 to 16	12	12M	WL15D-12
23 to 25	7.5	12M	WL24D-7.5
23 to 25	15	12N	WL24D-15
27 to 29	10	12N	WL28D-10
27 to 29	15	12N	WL28D-15

DUAL OUTPUT: WWL SERIES

Output Voltage Range (VDC)	Output Current (Amps)	Size (see Dwg.)	Model Number
±11 to 13	2	10J	WWL12D-2
±14 to 16	2	10J	WWL15D-2



SIZE	A	B	C	D	E	F	J	K	L	M	N
11S	3¼	6	2½	2.75	5.50	1½	¼	2⅛	2.75	—	1⅜
12M	4½	7⅜	2½	4.00	6.88	1½	¼	2	3.44	—	2¼
12N	4¾	8¾	2¾	4.25	8.25	1½	¼	2¼	4.13	—	2⅜
10J	3	5¼	2½	2.50	4.75	1½	¼	2⅛	2.38	—	1½

TOLERANCE: Fractions = ±¹⁄₃₂, Decimals = .015, ±.050
MATERIAL: Base — Aluminum 6061-T6, Case — Steel

OPTIONS

OVERVOLTAGE PROTECTION: (−1 Option) An internal crowbar-type OVP is available. Unit will crowbar output when output voltage exceeds adjustable set point, to 10% or 2V above maximum rated output. To specify option, add "−1" to model number.

ENHANCED RELIABILITY: (ER Option) This option provides increased reliability by using a higher level of military grade components. This feature allows the power supply to meet customer specific requirements as to "Hi-Rel" components. Please consult your nearest Abbott Sales Office for details.

TTL: (L Option) Abbott provides an isolated pair of terminals used to turn-on and turn-off the regulator portion of the power supply. The unit remains in an idling state while the output is off. The power supply will turn-on with TTL logic "1" and turn-off with TTL logic "0". To specify this feature, please add an "L" to the character preceding the first dash of the model number.

3ϕ WYE: (−3 Option) This input voltage is also available as an option. To specify, add "−3" to the end of the model number.

PIN DESIGNATIONS:

	Single Output	Dual Output		Single Output	Dual Output		Single Output	Dual Output
1	AC Input	AC Input	4	+ Output	+ Output	7	− Sense	− Output
2	AC Input	AC Input	5	+ Sense	+ Sense	8	Case Gnd	− Sense
3	AC Input	AC Input	6	− Output	Com Output	9	Not Used	Case Gnd

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MILITARY POWER SUPPLIES

28 VDC to 5-28 VDC

MODEL BA

SPECIFICATIONS

INPUT VOLTAGE: 24-30 VDC (20-32 VDC with option)

EFFICIENCY: Typical efficiency 55-75% for 5V units, 65-85% for 12, 15, and 18V units.

IN RUSH CURRENT: Less than 8 times the peak input current at low line, full out load and nominal output voltage.

LINE REGULATION: 0.1% (or 20 mV whichever is greater)

LOAD REGULATION: 0.1% (or 20 mV whichever is greater).

PARD (NOISE & RIPPLE): 100 mV peak-to-peak, 20 mVRMS from +25°C to +100°C; 130 mV peak-to-peak, 40 mVRMS from −55°C to +25°C.

ADJUSTMENT RANGE: Output is continuously adjustable between the limits shown by means of externally accessible adjustment potentiometer.

RESOLUTION:	Nominal Output Voltage	Resolution
	5, 12, 15	35 mV
	24, 28	60 mV

INSULATION VOLTAGE: 100 VDC between input and output, and input and case; 50 VDC between output and case.

INSULATION RESISTANCE: 50 megohms between input and output, input and case when measured at 50 VDC.

POLARITY: Inputs and outputs are isolated, either positive or negative side may be grounded.

TEMPERATURE RANGE: Operating −55°C to +100°C baseplate temperature. Derated maximum output current linearly above +85°C baseplate temperature to 80% of full load rating at +100°C baseplate temperature. Storage: −65°C to +125°C.

TEMPERATURE EFFECT (COEFFICIENT): Less than 0.01% per degree Celsius.

ENVIRONMENT: Hermetically sealed and encapsulated to meet MIL-STD-810C, including altitude (to 1.3 inches of Hg), acceleration, vibration, shock and temperature altitude cycling.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against a short circuit of any duration. Unit automatically recovers to normal when fault is removed.

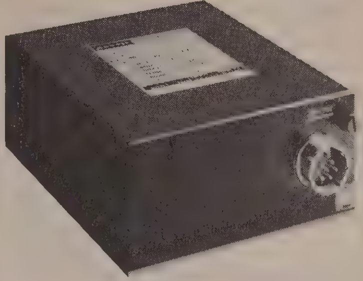
INPUT TRANSIENT PROTECTION: Unit will shut off at input voltage of 37V. Maximum voltage is 80V for one second.

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "sensing leads." The resulting circuit action compensates for a DC voltage drop up to 0.3V in the load leads.

LOAD TRANSIENT RESPONSE: Output voltage returns to regulation limits within 2 milliseconds after 50% step change in load current. Maximum overshoot is less than 0.8V.

ELECTROMAGNETIC INTERFERENCE: Meets MIL-STD-461A, Methods CE01 and CE03 for conducting emissions (available with "F" option).

RELIABILITY: The Mean Time Between Failure (MTBF) per MIL-HDBK-217D under operating conditions of +50°C baseplate temperature, maximum rated output power for BA100D-5A-1 was calculated to be 139,899 hrs. for a ground benign environment and 16,866 hrs. for an air inhabited transport environment. With Enhanced Reliability Option (ER) MTBF was calculated to be 378,759 hrs. for ground benign environment and 51,131 hrs. for air inhabited transport environment.



FEATURES

- Up to 85% efficiency
- Meets MIL-STD-810C
- Wide DC input range available (20-32 VDC)
- Tight Regulation within 0.1%

Output Voltage Range (VDC)	Output Current (Amps)	Size (see Dwg.)	Weight (Lbs.)	Model Number
4.7 to 5.3	20.0	12F	4.7	BA100D-5A
11.25 to 12.75	8.33	12F	4.7	BA100D-12A
14.1 to 15.9	6.67	12F	4.7	BA100D-15A
22.5 to 25.5	4.17	12F	4.7	BA100D-24A
26.3 to 29.7	3.57	12F	4.7	BA100D-28A

OPTIONAL FEATURES

TTL: (L Option) Abbott provides an isolated pair of terminals used to turn-on and turn-off the regulator portion of the power supply. The unit remains in an idling state while the output is off. The power supply will turn-on with TTL logic "1", and turn-off with TTL logic "0". To specify this feature, please add an "L" to the character preceding the first dash of the model number. (EXAMPLE: BA100D-5A to BA100DL-5A)

SPECIAL CONNECTORS: A hermetically sealed military-type connector is available for the BA series (as shown in picture). Please consult your nearest Abbott Sales Office for details.

EMI FILTER: (F Option) An internal EMI filter is available to reduce conducted interference on the input leads. With these filters the Model BA will comply with MIL-STD-461A Notice 3, CE01 and CE03 on the input leads. To specify this feature, please add an "F" after "D" in the model number. (EXAMPLE: BA100D-5A to BA100DF-5A)

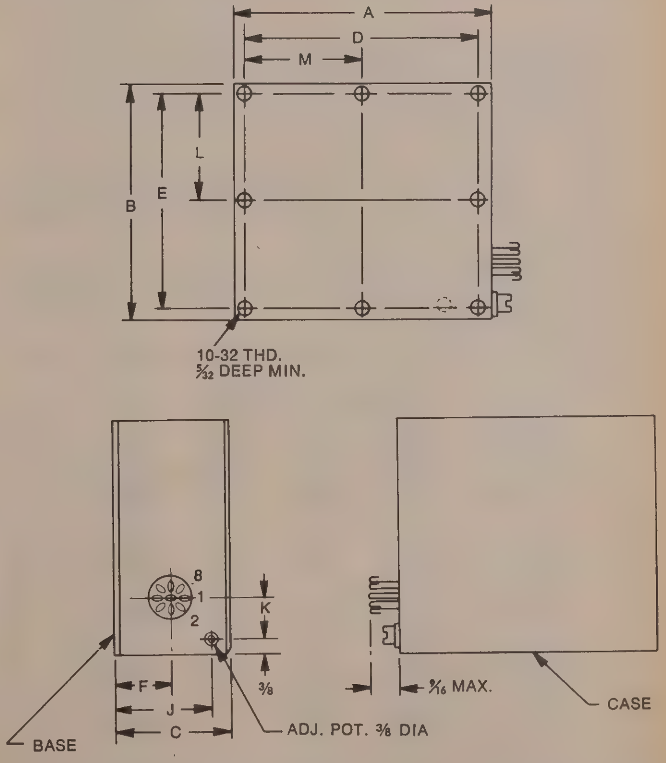
REMOTE PROGRAM OPTION: (R Option) Units can be modified so that their output voltage can be adjusted from a remote location. This is accomplished by adding an additional pin to the header on the unit. To specify this option, please add an "R" after this character "D" in the model number. (EXAMPLE: BA100D-5A to BA100DR-5A).

OVERVOLTAGE PROTECTION: (-1 Option) An internal non-crowbar type OVP, power supply turns off when output voltage exceeds set point (available as option by adding "-1" to model number)

WIDER INPUT VOLTAGE RANGE: (H Option) The standard model BA operates from an input voltage range of 24 to 30 VDC. The units can be modified to operate from 20 to 32 VDC. To have this feature included add an "H" after the "D" in the model number and specify the desired input voltage range in parentheses after the entire model number. (EXAMPLE: BA100D-5A to BA100DH-5A (20-26))

ENHANCED RELIABILITY: (ER Option) This option provides increased reliability by using higher levels of military grade components. This feature allows the power supply to meet customer specific requirements as to "Hi-Rel" components, environmental testing and extended Thermal Cycling. Please consult your nearest Abbott Sales Office for details.

SPECIAL ENCAPSULATION: (E Option) All of our hermetically sealed power modules are encapsulated to meet or exceed the shock, acceleration and vibration requirements of MIL-STD-810C. Special encapsulation to enable these modules to withstand higher shock levels of 60g's, acceleration levels of 50g's and vibration levels of 30g's is available. To specify this feature, please add an "E" after the character "D" in the model number. (EXAMPLE: BA100D-5A to BA100DE-5A)



A	B	C	D	E	F	J	K	L	M
5.875	5.5	2.625	5.37	5	1.375	2.125	1.37	2.5	2.68

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MILITARY POWER SUPPLIES

20-32 VDC to 5-50 VDC

MODEL
BN
and BBN

SPECIFICATIONS

INPUT VOLTAGE RANGE: 20 to 32 VDC

EFFICIENCY: Typical efficiency ranges from 50 to 70%.

INRUSH CURRENT: Less than 8 times normal steady-state full load input current

LINE REGULATION: Within 0.5% for input change of 20 to 32 VDC

LOAD REGULATION: Within 0.5%. For load change of no load to full load

PARD (RIPPLE & NOISE): 100 mv peak-to-peak, 25 mv rms from 25°C to +100°C: 130 mv peak-to-peak, 40 mv rms from −55°C to +25°C. Measured at power module terminals with measurement system noise bandwidth of 25 MHz

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown by means of an externally accessible screwdriver adjustment potentiometer. Wider output ranges are available by restricting the input voltage range. Consult the factory for further information

ADJUSTMENT RESOLUTION:

Nominal Output Voltage	Resolution
5-10 VDC	37 mv
12-18 VDC	49 mv
24-31 VDC	75 mv

ISOLATION VOLTAGE: 100 VDC between input & output and input & case; 50 VDC between output & case

INSULATION RESISTANCE: 50 megohms minimum between input & output, input & case and output & case when measured at 50 VDC

POLARITY: Inputs and outputs are isolated; either positive or negative side may be grounded.

TEMPERATURE RANGE: Operating; −55°C to +100°C baseplate temperature. Derate maximum output current linearly above 85°C baseplate temperature to 80% of full load rating at 100°C baseplate temperature. Storage; −65°C to +125°C

TEMPERATURE EFFECT (COEFFICIENT): 0.03% per degree Celsius

ENVIRONMENT: Hermetically sealed and encapsulated to meet the environmental requirements to MIL-STD-810C and MIL-E-5400P, Class 2 including altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, explosion, etc.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against overloads (greater than 150% rated load) and short circuits of any duration. The output automatically restores to normal when the fault is removed

INPUT TRANSIENT PROTECTION: Each unit is completely protected against the transients of MIL-STD-704, Category B, (80 VDC for 0.1 sec) having rise times greater than 100 microseconds. Unit will turn off and resume operation when the input returns to normal

OVERVOLTAGE PROTECTION: Internal OVP is available as an optional feature and is indicated by adding "—1" to the model number (i.e.: BN25D-5A-1 indicates that OVP has been included.) The overvoltage threshold is factory set to approximately 2 V or 10% (whichever is greater) above the nominal output voltage. The OVP circuitry has a built-in delay of approximately 500 microseconds to minimize 'nuisance' tripping

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit can monitor the voltage directly at the load by using extra "sense" leads. The resulting circuit action will compensate for a DC voltage drop of up to 0.3 volts in the load leads

LOAD TRANSIENT RESPONSE: Output voltage returns to regulation limits within 2 ms after a 50% step change in load current. Maximum overshoot is less than 0.8 V

SINGLE OUTPUT

Output Voltage Range	Output Current (Amps)	Size*	Weight (Lbs.)	Model Number
4.75-5.25	5.0 10.0	10E 11J	1.8 2.9	BN25D-5A BN50D-5A
5.7-6.3	4.17 8.33	10E 11J	1.8 2.9	BN25D-6A BN50D-6A
9.5-10.5	2.5 5.0	10E 11J	1.8 2.9	BN25D-10A BN50D-10A
11.4-12.6	2.08 4.17	10E 11J	1.8 2.9	BN25D-12A BN50D-12A
14.25-15.75	1.67 3.33	10E 11J	1.8 2.9	BN25D-15A BN50D-15A
17.1-18.9	1.39 2.78	10E 11J	1.8 2.9	BN25D-18A BN50D-18A
22.8-25.2	1.04 2.08	10E 11J	1.8 2.9	BN25D-24A BN50D-24A
26.6-29.4	0.89 1.79	10E 11J	1.8 2.9	BN25D-28A BN50D-28A
29.45-32.55	0.81 1.61	10E 11J	1.8 2.9	BN25D-31A BN50D-31A
45.6-50.4	0.52 1.04	10E 11J	1.8 2.9	BN25D-48A BN50D-48A

* See page 3•1451 for size charts.

High Efficiency

- Operating temperature range: −55°C to +100°C operation.
- Up to 70% efficiency.
- Small size.
- High reliability. MTBF: 112,000 hrs. per MIL-HDBK-217C.
- Short Circuit Protection.

TURN-ON/TURN-OFF OVERSHOOT: No overshoot during turn-on into loads greater than half load. For loads less than half load, turn-on overshoot is less than 0.8 V for 25 ms. No turn-off overshoot under any conditions

ELECTROMAGNETIC INTERFERENCE: Designed to meet the requirements of MIL-STD-461A for generation of conducted and radiated interference. Test report on a typical model is available.

RELIABILITY: MTBF per MIL-HDBK-217C up to 112,000 hrs.

DUAL OUTPUT

±11.4 to ±12.6	1.04 2.08	10F 11J	2.2 2.9	BBN25D-12A BBN50D-12A
±14.25 to ±15.75	0.83 1.67	10F 11J	2.2 2.9	BBN25D-15A BBN50D-15A

Dual Output Units: 1) The output current listed is for each output.
2) The negative output is "semiregulated" and will meet regulation specifications only when operated into a balanced load from ½ load to full load.
3) The negative output will typically be within 4% of the positive output voltage for load imbalances up to 3:1 in magnitude, provided outputs have a minimum of 30% full load.

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MILITARY POWER SUPPLIES

28 VDC to 5-37 VDC

MODEL
C
and CC

SPECIFICATIONS

INPUT VOLTAGE RANGE: 24 to 30 VDC. Other input ranges available

LINE REGULATION: 0.1% (0.2% for duals) or 10 mv (whichever is greater) for input change of 24 to 30 VDC with load constant

LOAD REGULATION: 0.1% (0.2% for duals) or 20 mv (whichever is greater) for change from no load to full load with line constant

RIPPLE: 0.02% or 5 mv RMS (whichever is greater) 50 mv peak-to-peak maximum, each output, measured with scope having 25 MHz bandwidth

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer

TRACKING ACCURACY: The negative output will track the positive output to within 1.0% or 100 mv (whichever is greater) for all rated conditions of input voltage, output current, operating temperature, and output voltage adjustment

ISOLATION VOLTAGE: 200 volts DC between input and output, input and case, and output and case

INSULATION RESISTANCE: 50 megohms minimum at 50 volts DC between input and output, input and case, and output and case

POLARITY: Inputs and outputs are isolated, either positive or negative side may be grounded.

TEMPERATURE RANGE: Operating: −55°C to +100°C maximum at center of mounting base
Storage: −65°C to +125°C

TEMPERATURE COEFFICIENT: 0.03% per degree Celsius maximum

ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-STD-810C and MIL-E-5400P, Class 2, including: altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, salt spray, fungus, explosion, etc.

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output automatically restores to normal when the overload is removed

INPUT TRANSIENT PROTECTION: MIL-STD-704A, Fig. 9, Limt 1 (80 VDC for 0.1 sec.).

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 100 microseconds (200 microseconds for duals) after 50% step change in load current

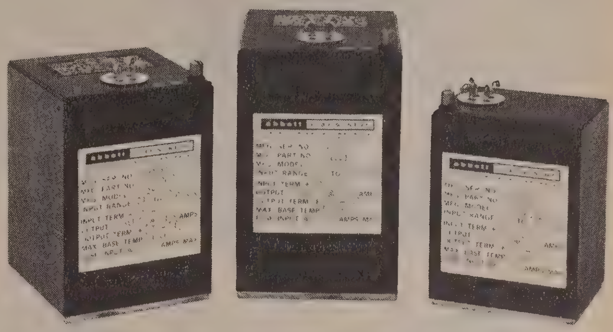
RELIABILITY: MTBF per MIL-HDBK-217C up to 277,200 hrs.

ELECTROMAGNETIC INTERFERENCE: Units meet EMI requirements of MIL-STD 461 conducted and radiated (F option).

OVER-VOLTAGE PROTECTION*: An internal, non-crowbar type OVP is available. Power supply turns off when output voltage exceeds set-point.

TTL*: Abbott provides an isolated pair of terminals used to turn-on and turn-off the regulator portion of the power supply. The unit remains in an idling state while the output is off.

* Inclusion of these optional features on these models will most likely require that the case size increases slightly. Please consult nearest Abbott sales office for further details.



High Performance

- Operating temperature range: −55°C to +100°C.
- Low Peak-to-Peak Ripple.
- Compact. Power density up to 2 watts per cu. in.
- High reliability. Up to 277,200 hrs. MTBF per MIL-HDBK-217C.
- Low EMI. To MIL-STD-461.
- Encapsulated and hermetically sealed to meet MIL-STD-810C and MIL-E-5400P, Class 2.
- 0.1% Line and Load regulation.
- TTL compatibility available.
- Internal OVP optional.

Output Voltage Range	Output Curr. (Amps)	Size†	Wt. (Lbs.)	Model Number
4.5-5.5	2.5	2D	1.2	C5D2.5
	5.0	6B	1.7	C5D5.0
	10.0	7A	2.6	C5D10
5.5-6.5	2.5	2D	1.2	C6D2.5
	5.0	6B	1.7	C6D5.0
	10.0	7A	2.6	C6D10
6.5-7.5	2.5	2D	1.2	C7D2.5
	5.0	6B	1.7	C7D5.0
	10.0	7A	2.6	C7D10
7.5-8.5	1.8	2D	1.2	C8D1.8
	3.5	6B	1.7	C8D3.5
	7.5	7A	2.6	C8D7.5
8.5-9.5	1.8	2D	1.2	C9D1.8
	3.5	6B	1.7	C9D3.5
	7.5	7A	2.6	C9D7.5
9.5-10.5	1.8	2D	1.2	C10D1.8
	3.5	6B	1.7	C10D3.5
	7.5	7A	2.6	C10D7.5
10.5-11.5	1.8	2D	1.2	C11D1.8
	3.5	6B	1.7	C11D3.5
	7.5	7A	2.6	C11D7.5
11-13	1.2	2D	1.2	C12D1.2
	2.5	6B	1.7	C12D2.5
	5.0	7A	2.6	C12D5.0
13-15	1.2	2D	1.2	C14D1.2
	2.5	6B	1.7	C14D2.5
	5.0	7A	2.6	C14D5.0
14-16	1.2	2D	1.2	C15D1.2
	2.5	6B	1.7	C15D2.5
	5.0	7A	2.6	C15D5.0
15-17	1.2	2D	1.2	C16D1.2
	2.5	6B	1.7	C16D2.5
	5.0	7A	2.6	C16D5.0
17-19	1.2	2D	1.2	C18D1.2
	2.5	6B	1.7	C18D2.5
	5.0	7A	2.6	C18D5.0
19-21	0.8	2D	1.2	C20D0.8
	1.8	6B	1.7	C20D1.8
	3.5	7A	2.6	C20D3.5
21-23	0.8	2D	1.2	C22D0.8
	1.8	6B	1.7	C22D1.8
	3.5	7A	2.6	C22D3.5
23-25	0.8	2D	1.2	C24D0.8
	1.8	6B	1.7	C24D1.8
	3.5	7A	2.6	C24D3.5
25-27	0.8	2D	1.2	C26D0.8
	1.8	6B	1.7	C26D1.8
	3.5	7A	2.6	C26D3.5
27-29	0.8	2D	1.2	C28D0.8
	1.8	6B	1.7	C28D1.8
	3.5	7A	2.6	C28D3.5
29-31	0.6	2D	1.2	C30D0.6
	1.2	6B	1.7	C30D1.2
	2.5	7A	2.6	C30D2.5
31-33	0.6	2D	1.2	C32D0.6
	1.2	6B	1.7	C32D1.2
	2.5	7A	2.6	C32D2.5
33-35	0.6	2D	1.2	C34D0.6
	1.2	6B	1.7	C34D1.2
	2.5	7A	2.6	C34D2.5
35-37	0.6	2D	1.2	C36D0.6
	1.2	6B	1.7	C36D1.2
	2.5	7A	2.6	C36D2.5

DUAL OUTPUT

Output Voltage Range	Output Curr. (Amps)	Size†	Wt. (Lbs.)	Model Number
±2.75-±3.25	0.5	10C	2.3	CC3D0.5
	1.0	10C	2.3	CC3D1.0
	2.0	10D	2.5	CC3D2.0
	3.5	11E	3.9	CC3D3.5
±4.5-±5.5	0.5	10C	2.3	CC5D0.5
	1.0	10C	2.3	CC5D1.0
	2.0	10D	2.5	CC5D2.0
	3.5	11E	3.9	CC5D3.5
±11-±13	0.5	10C	2.3	CC12D0.5
	1.0	10C	2.3	CC12D1.0
	2.0	10D	2.5	CC12D2.0
	3.5	11E	3.9	CC12D3.5
±14-±16	0.5	10C	2.3	CC15D0.5
	1.0	10C	2.3	CC15D1.0
	2.0	10D	2.5	CC15D2.0
	3.5	11E	3.9	CC15D3.5
±19-±21	0.5	10C	2.3	CC20D0.5
	1.0	10D	2.5	CC20D1.0
	2.0	11E	3.9	CC20D2.0
	3.5	14D	7.9	CC20D3.5
±23-±25	0.5	10C	2.3	CC24D0.5
	1.0	10D	2.5	CC24D1.0
	2.0	11E	3.9	CC24D2.0
	3.5	14D	7.9	CC24D3.5

* See page 3•1451 for size charts.

Other standard Models with any output up to 100 vdc are available. For complete information, please consult our nearest office.
Other standard Models with any output between ±2.75 and ±31.0 vdc are available. For complete information, please consult our nearest office.

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MILITARY POWER SUPPLIES

28 VDC to 500 VDC

MODEL B

SPECIFICATIONS

Input Voltage Range
24 to 30 volts DC Other ranges available

Line Regulation
Within 0.4% for input 24 to 30 VDC*

Combined Line and Load Regulation
Within 3.0% for input 24 to 30 VDC and from ½ load to full load on Model B's
Within 5.0% for input 24 to 30 VDC and from ½ load to full load on Model BL's

Ripple
0.5 RMS — Model B's
1.0% RMS — Model BL's

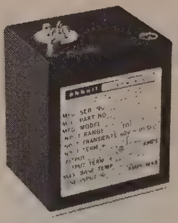
Voltage Adjustment Range
12% by screwdriver adjustment

Input Transient Protection
In accordance with MIL-STD-704A, Fig. 9, Limit 1, (80 VDC for 0.1 sec.)

Environment
+212°F max. at mounting base using adequate heat sink
−65°F min. at mounting surface
Altitude: To vacuum (true hermetic seal). Vibration, shock, sand, dust, humidity, salt-spray, fungus, sunshine, rain, and explosion to MIL-STD-810C and MIL-E-5400P, Class 2

Output Voltage and Current
See specific models listed
(Outputs and inputs are isolated)

Reliability: MTBF per MIL-HDBK-217C up to 626,400 hrs.



High Reliability

- Operating temperature range −54°C to +100°C.
- Small size.
- High reliability. Up to 626,400 hrs. MTBF per MIL-HDBK-217C.
- Encapsulated and hermetically sealed. Meets MIL-STD-810C and MIL-E-5400P, Class 2.

Output Voltage Range	Output Current (Amps)	Size*	Wt. lbs.	Model Number
4.7-5.3	0.400	1B	0.5	BL02D-5A
	1.0	1A	0.9	BL05D-5A
	2.0	1	1.0	BL1D-5A
	4.0	2	1.1	BL2D-5A
	6.0	4	1.3	BL3D-5A
	10.0	6A	2.5	BL5D-5A
5.3-5.9	0.357	1B	0.5	BL02D-5.6A
	0.9	1A	0.9	BL05D-5.6A
	1.8	1	1.0	BL1D-5.6A
	3.6	2	1.1	BL2D-5.6A
	5.4	4	1.3	BL3D-5.6A
	8.91	6A	2.5	BL5D-5.6A
5.9-6.6	0.318	1B	0.5	BL02D-6.3A
	0.8	1A	0.9	BL05D-6.3A
	1.6	1	1.0	BL1D-6.3A
	3.2	2	1.1	BL2D-6.3A
	4.8	4	1.3	BL3D-6.3A
	7.92	6	1.9	BL5D-6.3A
6.6-7.4	0.286	1B	0.5	BL02D-7A
	0.7	1A	0.9	BL05D-7A
	1.4	1	1.0	BL1D-7A
	2.8	2	1.1	BL2D-7A
	4.2	4	1.3	BL3D-7A
	7.15	6	1.9	BL5D-7A
7.4-8.3	0.253	1B	0.5	BL02D-7.9A
	0.63	1A	0.9	B05D-7.9A
	1.26	1	1.0	BL1D-7.9A
	2.52	2	1.1	BL2D-7.9A
	3.78	4	1.3	BL3D-7.9A
	6.32	6	1.9	BL5D-7.9A
8.3-9.3	0.227	1B	0.5	BL02D-8.8A
	0.57	1A	0.9	B05D-8.8A
	1.14	1	1.0	BL1D-8.8A
	2.28	2	1.1	BL2D-8.8A
	3.42	4	1.3	BL3D-8.8A
	5.68	6	1.9	BL5D-8.8A
9.3-10.4	0.202	1B	0.5	B02D-9.9A
	0.50	1A	0.9	B05D-9.9A
	1.00	1	1.0	BL1D-9.9A
	2.00	2	1.1	BL2D-9.9A
	3.00	4	1.3	BL3D-9.9A
	5.05	6	1.9	BL5D-9.9A
	10.10	11	3.7	BL10D-9.9A
10.4-11.6	0.182	1B	0.5	B02D-11A
	0.45	1A	0.9	B05D-11A
	0.91	1	1.0	BL1D-11A
	1.82	2	1.1	BL2D-11A
	2.73	4	1.3	BL3D-11A
	4.55	6	1.9	BL5D-11A
	9.10	11	3.7	BL10D-11A
11.6-13.0	0.163	1B	0.5	B02D-12.3A
	0.40	1A	0.9	B05D-12.3A
	0.81	1	1.0	BL1D-12.3A
	1.62	2	1.1	BL2D-12.3A
	2.43	4	1.3	BL3D-12.3A
	4.06	6	1.9	BL5D-12.3A
	8.12	11	3.7	BL10D-12.3A
	13.83	14	10.3	BL17D-12.3A
13.0-14.8	0.145	1B	0.5	B02D-13.8A
	0.36	1A	0.9	B05D-13.8A
	0.72	1	1.0	BL1D-13.8A
	1.44	2	1.1	BL2D-13.8A
	2.15	4	1.3	BL3D-13.8A
	3.62	6	1.9	BL5D-13.8A
	7.24	11	3.7	BL10D-13.8A
	12.31	14	10.3	BL17D-13.8A
14.8-16.6	0.127	1B	0.5	B02D-15.7A
	0.32	1A	0.9	B05D-15.7A
	0.64	1	1.0	BL1D-15.7A
	1.28	2	1.1	BL2D-15.7A
	1.92	4	1.3	BL3D-15.7A
	3.18	6	1.9	BL5D-15.7A
	6.36	11	3.7	BL10D-15.7A
	10.81	14	10.3	BL17D-15.7A
16.6-18.6	0.114	1B	0.5	B02D-17.6A
	0.28	1A	0.9	B05D-17.6A
	0.57	1	1.0	BL1D-17.6A
	1.14	2	1.1	BL2D-17.6A
	1.71	4	1.3	BL3D-17.6A
	2.84	6	1.9	BL5D-17.6A
	5.68	11	3.7	BL10D-17.6A
	9.65	14	10.3	BL17D-17.6A
18.6-20.8	0.101	1B	0.5	B02D-19.7A
	0.255	1A	0.9	B05D-19.7A
	0.510	1	1.0	BL1D-19.7A
	1.02	2	1.1	BL2D-19.7A
	1.63	4	1.3	BL3D-19.7A
	2.54	6	1.9	BL5D-19.7A
	5.08	11	3.7	BL10D-19.7A
	8.62	14	10.3	BL17D-19.7A
20.8-23.3	0.091	1B	0.5	B02D-22A
	0.230	1A	0.9	B05D-22A
	0.460	1	1.0	BL1D-22A
	0.920	2	1.1	BL2D-22A
	1.38	4	1.3	BL3D-22A
	2.27	6	1.9	BL5D-22A
	4.54	11	3.7	BL10D-22A
	7.72	14	10.3	BL17D-22A
23.3-26.1	0.081	1B	0.5	B02D-24.7A
	0.205	1A	0.9	B05D-24.7A
	0.410	1	1.0	BL1D-24.7A
	0.820	2	1.1	BL2D-24.7A
	1.23	4	1.3	BL3D-24.7A
	2.02	6	1.9	BL5D-24.7A
	4.04	11	3.7	BL10D-24.7A
	6.88	14	10.3	BL17D-24.7A
26.1-29.2	0.073	1B	0.5	B02D-27.6A
	0.180	1A	0.9	B05D-27.6A
	0.360	1	1.0	BL1D-27.6A
	0.720	2	1.1	BL2D-27.6A
	1.08	4	1.3	BL3D-27.6A
	1.81	6	1.9	BL5D-27.6A
	3.62	11	3.7	BL10D-27.6A
	6.16	14	10.3	BL17D-27.6A
29.2-32.6	0.065	1B	0.5	B02D-31A
	0.160	1A	0.9	B05D-31A
	0.320	1	1.0	B1D-31A
	0.640	2	1.1	B2D-31A
	0.960	4	1.3	BL3D-31A
	1.61	6	1.9	BL5D-31A
	3.22	11	3.7	BL10D-31A
	5.48	14	10.3	BL17D-31A
32.6-36.5	0.058	1B	0.5	B02D-34.6A
	0.145	1A	0.9	B05D-34.6A
	0.290	1	1.0	B1D-34.6A
	0.580	2	1.1	B2D-34.6A
	0.870	4	1.3	BL3D-34.6A
	1.44	6	1.9	BL5D-34.6A
	2.88	11	3.7	BL10D-34.6A
	4.91	14	10.3	BL17D-34.6A
36.5-40.9	0.052	1B	0.5	B02D-38.7A
	0.130	1A	0.9	B05D-38.7A
	0.260	1	1.0	B1D-38.7A
	0.520	2	1.1	B2D-38.7A
	0.780	4	1.3	BL3D-38.7A
	1.29	6	1.9	BL5D-38.7A
	2.58	11	3.7	BL10D-38.7A
	4.39	14	10.3	BL17D-38.7A
40.9-45.8	0.046	1B	0.5	B02D-43.3A
	0.155	1A	0.9	B05D-43.3A
	0.230	1	1.0	B1D-43.3A
	0.460	2	1.1	B2D-43.3A
	0.690	4	1.3	BL3D-43.3A
	1.15	6	1.9	BL5D-43.3A
	2.30	11	3.7	BL10D-43.3A
	3.92	14	10.3	BL17D-43.3A
45.8-51.4	0.041	1B	0.5	B02D-48.6A
	0.103	1A	0.9	B05D-48.6A
	0.206	1	1.0	B1D-48.6A
	0.412	2	1.1	B2D-48.6A
	0.618	4	1.3	B3D-48.6A
	1.03	6	1.9	BL5D-48.6A
	2.06	11	3.7	BL10D-48.6A
	3.49	14	10.3	BL17D-48.6A
51.4-59.0	0.036	1B	0.5	B02D-55.2A
	0.091	1A	0.9	B05D-55.2A
	0.182	1	1.0	B1D-55.2A
	0.364	2	1.1	B2D-55.2A
	0.546	4	1.3	B3D-55.2A
	0.905	6	1.9	BL5D-55.2A
	1.81	11	3.7	BL10D-55.2A
	3.07	14	10.3	BL17D-55.2A
59.0-66.0	0.032	1B	0.5	B02D-63A
	0.080	1A	0.9	B05D-63A
	0.160	1	1.0	B1D-63A
	0.320	2	1.1	B2D-63A
	0.480	4	1.3	B3D-63A
	0.795	6	1.9	BL5D-63A
	1.59	11	3.7	BL10D-63A
	2.69	14	10.3	BL17D-63A
66.0-74.0	0.029	1B	0.5	B02D-70A
	0.071	1A	0.9	B05D-70A
	0.143	1	1.0	B1D-70A
	0.286	2	1.1	B2D-70A
	0.429	4	1.3	B3D-70A
	0.715	6	1.9	BL5D-70A
	1.43	11	3.7	BL10D-70A
	2.42	14	10.3	BL17D-70A
74.0-83.0	0.025	1B	0.5	B02D-79A
	0.063	1A	0.9	B05D-79A
	0.127	1	1.0	B1D-79A
	0.254	2	1.1	B2D-79A
	0.381	4	1.3	B3D-79A
	0.634	6	1.9	BL5D-79A
	1.27	11	3.7	BL10D-79A
	2.15	14	10.3	BL17D-79A
83.0-514	Other standard models are available with output voltages between 83.0 and 514 Vdc at output power ratings of 2, 5, 10, 20, 30, 50, 100 or 170 watts. For complete information, please consult one of the offices listed below.			

* See page 3•1451 for size charts.

ABBOTT TRANSISTOR LABORATORIES, INC.

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Eastern: 520 Main St., Ft. Lee, NJ 07024 (201) 461-4411. Telex: 13-5332 • Southwest: 710 Kindred Lane, Richardson, TX 75080 (214) 437-0697
Florida: (305) 788-0845 • E. Canada: (613) 744-3066

abbott
MILITARY POWER SUPPLIES

28 VDC to 25-122 VAC

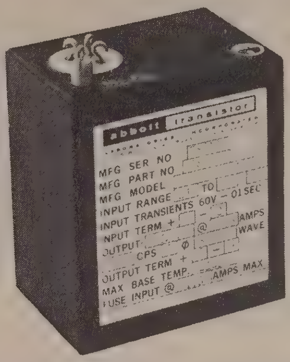
MODEL S

SPECIFICATIONS

Input Voltage Range: 24 to 30 volts DC. Other input ranges are available.
Load Regulation: ±1.0% from ½ to full load.
Frequency Stability: ±1.0%
Voltage Adjustment Range: 12% by screwdriver adjustment.
Reliability: Up to 340,600 Hrs. MTBF per MIL-HDBK-217C.
Input Transient Protection: In accordance with MIL-STD-704A, Limit 1, Fig. 9 (80 volts for 0.1 seconds).
Environment: +212°F max. at mtg. base using adequate heat sink. −65°F min. at mounting base. Encapsulated to meet the environmental requirements of MIL-STD 810C and MIL-E 5400P, Class 2, including: altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, saltspray, fungus, explosion, etc.

Input Voltage Range	Output Frequency (Hertz)	Output Voltage Range	Output Power (Volt-Amps)	Harmonic Distortion (%)	Size (See Below)	Weight (Lbs.)	Model Number
24-30	400	25.4-28.6	5	2.0	4	1.6	S05D-27A-400
			10	2.5	4C	1.7	S1D-27A-400
			20	2.5	4B	2.3	S2D-27A-400
			30	2.5	6A	2.4	S3D-27A-400
			60	3.0	12	4.8	S6D-27A-400
			120	4.0	14	9.1	S12D 27A-400
24-30	400	108-122	5	2.0	4	1.6	S05D-115A-400
			10	2.5	4C	1.7	S1D-115A-400
			20	2.5	4B	2.3	S2D-115A-400
			30	2.5	6A	2.4	S3D-115A-400
			60	3.0	12	4.8	S6D-115A-400
			120	4.0	14	9.1	S12D-115A-400
24-30	800	25.4-28.6	5	2.0	4	1.6	S05D-27A-800
			10	2.5	4C	1.7	S1D-27A-800
			20	2.5	4B	2.3	S2D-27A-800
			30	2.5	6A	2.4	S3D-27A-800
			60	3.0	12	4.8	S6D-27A-800
			120	4.0	14	9.1	S12D-27A-800
24-30	800	108-122	5	2.0	4	1.6	S05D-115A-800
			10	2.5	4C	1.7	S1D-115A-800
			20	2.5	4B	2.3	S2D-115A-800
			30	2.5	6A	2.4	S3D-115A-800
			60	3.0	12	4.8	S6D-115A-800
			120	4.0	14	9.1	S12D-115A-800

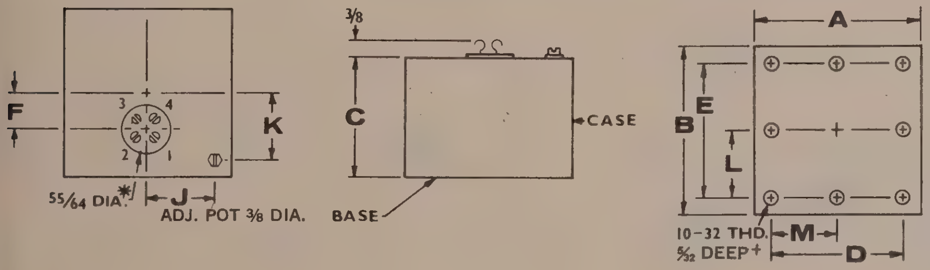
Output frequencies up to 1600 Hz are listed in our catalog as standard models. Contact our nearest office for your free copy.



Sine Wave — 1 Ø 400 to 1600 Hz

- Operating temperature range: −54°C to +100°C.
- High reliability. Up to 340,600 hrs. MTBF per MIL-HDBK-217C.
- Encapsulated and hermetically sealed per MIL-STD-810C and MIL-E-5400P.

CASE DIMENSIONS FOR ABBOTT MODELS W, WW, BN, BBN, C, CC, B AND S



* Models CC and WW use special 8 pin header.
Size of special headers is 1¹⁄₁₆ dia. by ⁹⁄₁₆ high.
† 6-32 Thd, ³⁄₁₆ deep on case size 1B.
** Model BN uses special terminals on A x C face.

Size	A	B	C	D	E	F	J	K	L	M
1	1½	2¾	3	1.00	2.25	⁹⁄₁₆	½	1⅛	—	—
1A	1½	2¾	2¾	1.00	2.25	⁹⁄₁₆	½	1⅛	—	—
1B	1½	2	2	1.00	1.50	0	½	¾	—	—
2	1⅞	2¾	3¼	1.37	2.25	¾	¹¹⁄₁₆	1⅛	—	—
2C	2	2¾	2⅛	1.50	2.25	0	¾	1⅛	—	—
2D	2	3	3½	1.50	2.50	¾	¾	1¼	—	—
2E	2⅛	3¼	3¼	1.62	2.75	⅞	¹³⁄₁₆	1⅜	—	—
3	2¾	2¾	3	2.25	2.25	¾	1⅛	1⅛	—	—
3A	2¾	2¾	2¾	2.25	2.25	¾	1⅛	1⅛	—	—
4	2¼	2¾	3¼	1.75	2.25	¾	⅞	1⅛	—	—
4B	2½	3	3¾	2.00	2.50	¾	1	1¼	—	—
4C	2¼	2¾	3½	1.75	2.25	¾	⅞	1⅛	—	—
4D	2½	3½	3½	2.00	3.00	0	1	1½	—	—
5	2¾	2¾	3¼	2.25	2.25	¾	1⅛	1⅛	—	—
6	2¾	3	3¼	2.25	2.50	¾	1⅛	1¼	—	—
6A	2¾	3	4	2.25	2.50	¾	1⅛	1¼	—	—
6B	2¾	3⅛	3⅝	2.25	2.62	¾	1⅛	¹⁵⁄₁₆	—	—
7	2¾	2¾	4	2.25	2.25	¾	1⅛	1⅛	—	—
7A	2⅞	3⅜	4½	2.37	2.87	¾	1³⁄₁₆	1⁷⁄₁₆	—	—
8B	2⅝	3½	2⅞	2.12	3.00	¾	1¹⁄₁₆	1½	—	—
9A	2¾	4¾	3¾	2.25	4.25	0	1⅛	2⅛	—	—
9B	2¾	4¾	3½	2.25	4.25	0	1⅛	2⅛	—	—
9C	2½	4⅜	3⅛	2.00	3.87	1	1	1¹⁵⁄₁₆	—	—
9D	2⅝	4¾	3⅝	2.12	4.25	1	1¹⁄₁₆	2⅛	—	—
10A	3	5	4	2.50	4.50	0	1¼	2¼	—	—

Size	A	B	C	D	E	F	J	K	L	M
10B	2⅞	4¼	4⅜	2.37	3.75	1⅜	1³⁄₁₆	1⅞	—	—
10C	3⅜	3⅜	3¾	2.87	2.87	¾	1⁷⁄₁₆	1⁷⁄₁₆	—	—
10D	3½	3½	4	3.00	3.00	¾	1½	1½	—	—
10E	2⅜	6¼	2½	1.87	5.75	**	**	**	2.87	—
10F	2¾	6¼	2½	2.25	5.75	**	**	**	2.87	—
10G	3½	5½	2½	3.00	3.50	**	**	**	—	—
10H	4	5½	2⅝	3.50	3.50	**	**	**	—	—
11	3	5½	3¼	2.50	5.00	2⅛	1¼	2½	2.50	—
11C	4¼	5¼	4	3.75	4.75	0	1⅞	2⅜	2.37	—
11D	4	4⅞	3⅞	3.50	4.37	1⅜	1¾	2³⁄₁₆	—	—
11E	3¾	4½	4¼	3.25	4.00	¾	1⅝	2	—	—
11F	2¾	6¼	2¾	2.25	5.75	1	1⅛	2⅞	2.87	—
11J	3⅜	6¼	2½	2.87	5.75	**	**	**	2.87	—
11K	3⅝	8¹³⁄₁₆	2⅝	2.55	4.31	**	**	**	—	—
12	3	5½	4	2.50	5.00	2⅛	1¼	2½	2.50	—
12A	4½	6	4	4.00	5.50	0	2	2¾	2.75	—
12C	3⅞	6¼	2¾	3.37	5.75	1½	1¹¹⁄₁₆	2⅞	2.87	—
12F	5½	5⅞	2⅝	5.00	5.37	**	**	**	2.68	2.50
12G	5⅛	8¾	2⅝	4.62	6.56	**	**	**	3.28	—
13A	5½	6½	4½	5.00	6.00	0	2½	3	3.00	2.50
14	6	6	4	5.50	5.50	2⅜	2¾	2¾	2.75	2.75
14C	5½	5½	3⅝	5.00	5.00	1⅞	2½	2½	2.50	2.50
14D	6	6¼	3⅞	5.50	5.75	1¼	2¾	2⅞	2.87	2.75
14E	5¾	6¼	2¾	5.25	5.75	1¼	2⅝	2⅞	2.87	2.62
16A	6¾	7½	4¼	6.25	7.00	2¾	3⅛	3½	3.50	3.12

DIMENSIONAL TOLERANCES: FRACTIONS ±¹⁄₃₂; DECIMALS .XX ±0.015.

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abbott
INDUSTRIAL POWER SUPPLIES

AC to DC Single & Multiple Output Switchers

MODELS ZB ZBT ZBQ

SPECIFICATIONS

AC INPUT RANGE: 90 to 132 and 180 to 265 VRMS, 47 to 440 Hz, single phase. Dual input selectable.

EFFICIENCY: 75% typical on single output models, 65% typical on others.

LINE REGULATION: 0.12% for full input change on singles, 0.2% on multiples.

LOAD REGULATION: 0.2% for main outputs, 1% on other outputs.

RIPPLE: 50 mV typical on single output models (100 mV max) 200 mV max on other outputs.

STABILITY: Output voltages changes less than ±.05% for 24 hours following an initial warmup period.

TEMPERATURE RANGE: Operating: 0°C to +80°C 100% rated power at 75°C conduction cooling. Storage: −25°C to +85°C. Units may be operated with convection cooling, operating temperature: −20°C to +80°C at extra cost. Consult factory for cooling curves.

TEMPERATURE COEFFICIENT: 0.01% per degree centigrade typical, 0.03% per degree centigrade maximum.

OUTPUT VOLTAGE ADJUSTMENT: Voltages are continuously adjustable ±5% by means of an externally accessible screwdriver adjustment potentiometer.

ISOLATION VOLTAGE: 1000 VDC input to output and input to case, 500 VDC output to case. (2750 VDC optional at additional cost)

INSULATION RESISTANCE: 50 megohms minimum between input and output, input and case, and output and case when measured at 50 VDC.

LOAD TRANSIENT RESPONSE: On regulated outputs, recovery to within 1% of nominal within 0.5 msecs for 50% load change. On semi-regulated outputs, recovery occurs within 1.5 msecs.

LOAD TRANSIENT OVERSHOOT: Maximum voltage deviation: 5% from nominal voltage set point.

HOLD-UP TIME: 20 milliseconds minimum on single output units, 16 milliseconds on multiple output units.

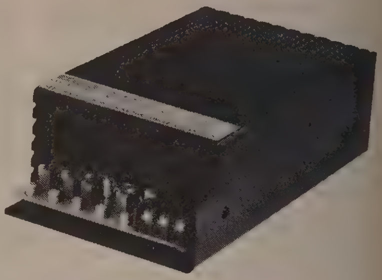
SHORT CIRCUIT PROTECTION: Each unit is completely protected against a short circuit of any duration. The output voltage automatically restores to normal when the short is removed.

OVER VOLTAGE PROTECTION: Standard. Non Crowbar OVP.

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "sensing" leads. The resulting circuit action compensates for a DC voltage drop up to 0.3 volts in the load leads. Remote off-on available at no extra charge.

INPUT POWER PROTECTION: Internal fuse standard on single output units, external fuse recommended on multiple output units.

WEIGHT: 2 lbs., (0.9 Kgs.)



FEATURES

- High power density, up to 2 watts per cu. in.
- High reliability, MTBF of 135,540 hrs. per MIL-HDBK-217D.
- High efficiency. Up to 80%. 65% minimum.
- Dual input 90 to 132 and 180 to 265 VRMS standard.
- Conduction or convection cooled.
- 100% power at 80°C with conduction cooling.
- Meets FCC 20780 Class A for EMI emissions.
- UL Recognition applied for on selected models.
- 2-year warranty.

SINGLE OUTPUT

Model Number	*Voltage	Maximum Load	
		Current	Power
Z5B20	5	20A	100W
Z6B18	6	18A	108W
Z10B12	10	12A	120W
Z12B10	12	10A	120W
Z15B8	15	8A	120W
Z18B7	18	6.7A	120W
Z20B6	20	6A	120W
Z22B6	22	5.5A	120W
Z24B5	24	5A	120W
Z28B4	28	4.3A	120W
Z30B4	30	4A	120W

* Voltage is continuously adjustable ±5% by means of an externally accessible screwdriver adjustment potentiometer.

TRIPLE OUTPUT

Model Number	Output No. 1		Output No. 2		Output No. 3		Maximum Continuous Power
	Voltage*	Max. Cur.	Voltage*	Max. Cur.	Voltage*	Max. Cur.	
ZB95T5/12	5	13A	+12	1.0A	−12	1.0A	90W
ZB95T5/15	5	13A	+15	1.0A	−15	1.0A	95W
ZB90T5/12	5	11A	+12	1.3A	−12	1.3A	85W
ZB90T5/15	5	10A	+15	1.3A	−15	1.3A	90W

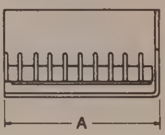
* All outputs are continuously adjustable ±5%. External adjustment accessible by a screwdriver to potentiometer.

QUAD OUTPUT

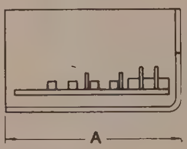
Model Number ZB100Q5/	Output No. 1		Output No. 2		Output No. 3		Output No. 4		Max. Cont. Power All Outputs
	Voltage*	Max. Cur.	Voltage*	Max. Cur.	Voltage*	Max. Cur.	Voltage*	Max. Cur.	
12/24	5	10A	+12	1.0A	−12	1.0A	24	2.0A	100W
15/24	5	10A	+15	1.0A	−15	1.0A	24	2.0A	100W
12/5	5	10A	+12	1.0A	−12	1.0A	−5	1.0A	79W
15/5	5	10A	+15	1.0A	−15	1.0A	−5	1.0A	85W
12/12	5	10A	+12	1.0A	−12	1.0A	12	2.0A	98W
15/12	5	10A	+15	1.0A	−15	1.0A	12	2.0A	100W

* All outputs are continuously adjustable ±5%. External adjustment accessible by a screwdriver to potentiometer.

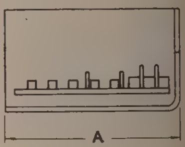
ZB

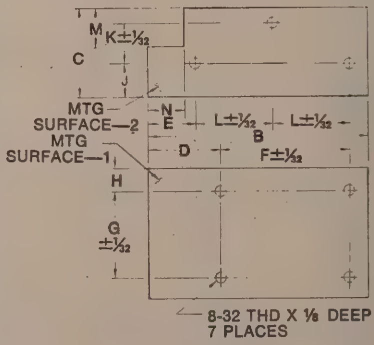


ZBT



ZBQ





A	B	C	D	E	F	G	H	J	K	L	M	N
4	6.75	2.25	1.875	1	4.125	2.5	.75	.875	.875	2.5	1	.75

Model ZB: Terminal functions left to right: 230 AC input, AC common, 115 AC input, ground, + out, + out, + sense, − out, − out, − sense.

Model ZBT: Output terminal functions right to left: +5V, 5V + sense, common return, 5V return sense, ± Output 2, ± Output 3. Input terminal functions right to left: 230 VAC, AC common, 115 VAC, chassis ground.

Model ZBQ: Output terminal functions right to left: + 5V, 5V + sense, common return, 5V return sense, ± Output 2, ± Output 4. Input terminal functions right to left: 230 VAC, AC common, 115 VAC, chassis ground.

Dimensional tolerances: ±0.0625 In. except as specified.

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abbott
INDUSTRIAL POWER SUPPLIES

41-52 VDC to 5, ±12, ±15 VDC
115-240, 1 Ø & 3 Ø to 5, ±12, ±15 VDC

MODELS
DA
DC

SPECIFICATIONS

INPUT: Models DA50, DA100, DA200: 103.5 to 126.5 VRMS 1ϕ or 3 ϕ wye, 207 to 253 VRMS 1ϕ or 3 ϕ delta 47-500 Hz
Model DA500: 103.5 to 126.5 VRMS 1ϕ 47-500 Hz
Model DE500: 207 to 253 VRMS 1 ϕ 47-500 Hz
Model DC50, DC100, DC150: 41 VDC to 52 VDC

EFFICIENCY: Minimum efficiency at full load is 60%. Typical efficiency ranges from 63% to 80% depending on output voltage and power

LINE REGULATION: Less than 0.5% over full input range.

LOAD REGULATION: Less than 0.5% from no load to full load.

CROSS REGULATION — DUAL UNITS: The negative output is semi-regulated and will meet regulation only when operated into balanced loads. In this case, negative output will track the positive output typically to within 1%. When operating into unbalanced loads, the negative output will typically be within 5% at load imbalances up to 3:1 in magnitude.

RIPPLE AND NOISE: Less than 100 mV peak to peak (measured with a scope having a 25 MHz bandwidth).

TEMPERATURE RANGE: 0°C to +71°C ambient operating temperature.

THERMAL PROTECTION: Power shutdown if temperature exceeds safe operating limits.

TEMPERATURE COEFFICIENT: 0.01% per degree centigrade typical; 0.03% per degree maximum.

OUTPUT VOLTAGE ADJUSTMENT: Output is factory set to within 1% of nominal voltage. Remote voltage adjustment programming is available as an option. Outputs may be adjusted ±6%.

ISOLATION: Voltage — 500 VDC input to case, input to output; 100 VDC output to case. Resistance — 50 megohms @ 50 VDC input to case, input to output, output to case.

SHORT CIRCUIT PROTECTION: Complete protection from short circuits of any duration. Automatic recovery when short is removed.

OVERVOLTAGE PROTECTION: Standard on all units. Set at 6.2 ±0.5 VDC on 5V units. 14 ±1 VDC on 12V units and 17 ±1 VDC on 15V units.

REMOTE ERROR SENSING: Sensing terminals are provided to compensate for up to 0.5 VDC drop in the load leads. Open sense lead protection is also provided.

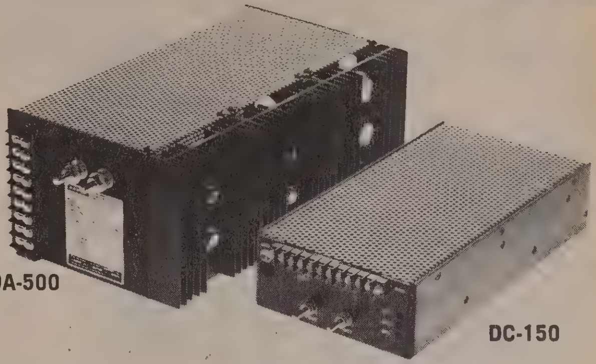
SWITCHING FREQUENCY: 20 KHz typical.

LOAD TRANSIENT RESPONSE: Output returns to regulation band within 1.0 mS after a 50% step change in load current.

TURN-ON/TRANSIENT OVERSHOOT: Maximum output voltage overshoot is less than 0.8V under all conditions.

HOLDUP TIME: Typically 20 mS at full load and nominal line voltage.

PARALLEL OPTION: Terminals are provided for Master/Slave paralleling of up to 5 units of models DA50, DA100, DA200, DC50, DC100, DC150.



50 to 500 watts

- Universal inputs: 115 VAC or 240 VAC single or three phase, 48 VDC.
- High efficiency, up to 80%.
- Low operating temperature: −20°C.
- 2 year warranty.

AC INPUT MODELS DA-DE

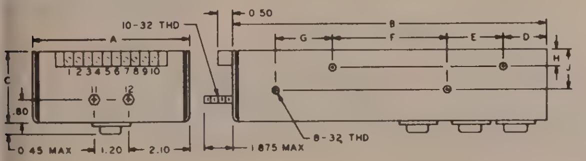
Output			Case Size	Model Number
Voltage	Current (Amps)	Watts		
5	10	50	D1	DA50-5
5	20	100	D3	DA100-5
5	40	200	D4	DA200-5
5	100	500	D6	DA500-5*
5	100	500	D6	DE500-5
±12	2.1	50	D2	DA50-12
±12	4.2	100	D3	DA100-12
±12	8.3	200	D5	DA200-12
±15	1.7	50	D2	DA50-15
±15	3.3	100	D3	DA100-15
±15	6.7	200	D5	DA200-15

DC INPUT MODELS DC

Output			Case Size	Model Number
Voltage	Current (Amps)	Watts		
5	10	50	D1	DC50-5
5	20	100	D3	DC100-5
5	30	150	D4	DC150-5
±12	2.1	50	D2	DC50-12
±12	4.2	100	D3	DC100-12
±12	6.3	150	D5	DC150-12
±15	1.7	50	D2	DC50-15
±15	3.3	100	D3	DC100-15
±15	5.0	150	D5	DC150-15

* Model VDE is 230 VAC input

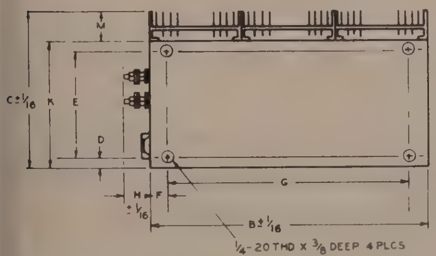
CASE D1, 2, 3, 4, 5



SIZE	A	B	C	D	E	F	G	H	J
D1	5.50	9.40	2.00	1.20	2.00	3.00	2.00	0.68	1.48
D2	5.50	10.20	2.00	1.00	2.00	2.00	2.00	0.68	1.48
D3	5.50	10.50	2.50	1.50	2.00	2.00	2.00	0.70	1.70
D4	5.50	11.00	2.50	1.50	2.00	4.00	2.00	0.70	1.70
D5	5.50	11.20	2.50	1.60	2.00	4.00	2.00	0.70	1.70

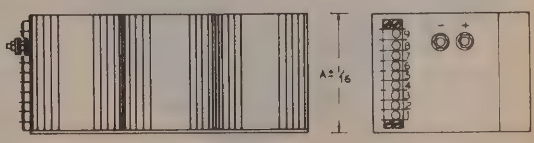
TOLERANCES — Fraction = ±1/32, Decimal = ±0.015
MATERIAL — Base-Aluminum 6061-T6, Case-Steel
FINISH — Black Semigloss Lacquer, Fed. Std. 595, Color 37038

CASE D6



A — 5
B — 12
C — 7⅝
D — ⅜
E — 4¾
F — ¾
G — 10½
H — 1-1/20
K — 5½
M — 2⅛

TERMINAL FUNCTIONS	
1	AC Input
2	AC Input
3	+ Output
4	+ Sense
5	− Sense
6	− Output
7	Output Trim
8	T^2L On/Off
9	Ground



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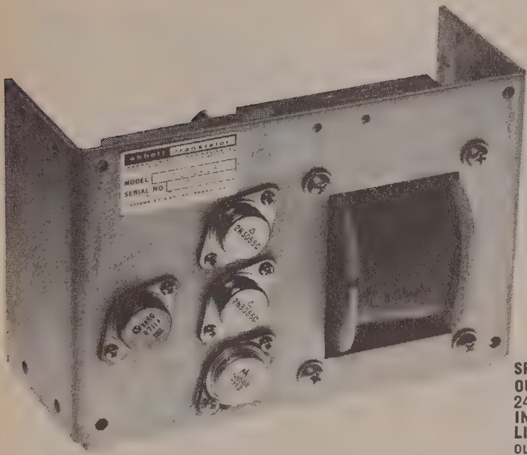
INDUSTRIAL POWER SUPPLIES

60 Hz to DC Power Modules

MODELS
NL,
RN



MODEL NL

SINGLE, DUAL AND TRIPLE OUTPUTS
5 to 28 VDC, ±12 and ±15 VDC

- Low cost.
- Operating temperature full current 0°C to +50°C, derated 40% at 71°C.
- 2 year warranty.

SPECIFICATIONS

OUTPUTS: Single output models: 5 through 28 VDC, 15 to 168 watts. Dual output models: ±12 and ±15, 24 to 80 watts. Triple output models 5, ±12 and 5, ±15, 22 watts to 105 watts

INPUT: 105-125, 210-250 VRMS, 47-440 Hz

LINE REGULATION: 0.02% for 10% input change single output, 0.1% for 10% input change multiple output

LOAD REGULATION: 0.1% for no load to full load change with line constant single output, 0.2% for no load to full load change with line constant multiple output

RIPPLE: 1.0 mv RMS maximum, 1.5 mv peak-to-peak typical. 5 mv peak-to-peak maximum

LOAD TRANSIENT RECOVERY TIME: 50 μSec typical after a 50% step change in load current

SHORT CIRCUIT PROTECTION: Each unit is completely protected against a short circuit of any duration. The output voltage automatically restores to normal in approximately 5 mSec after removal of the short

REVERSE VOLTAGE PROTECTION: Provided on output and on pass element

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra sensing leads. The resulting circuit action compensates for a DC voltage drop of up to 0.5 VDC in the load leads. Open sense lead protection is built in. Not included on units in case size "A".

STABILITY: Typically, ±0.05% for 24 hours after warm-up (single output), and ±0.3% for 24 hours after warm-up (dual and triple output).

TEMPERATURE: Operating: 0°C to +50°C, derated to 40% at +71°C. Storage: −40°C to +85°C

TEMPERATURE COEFFICIENT: ±0.04% per degree Celsius maximum, ±0.002% per degree Celsius typical

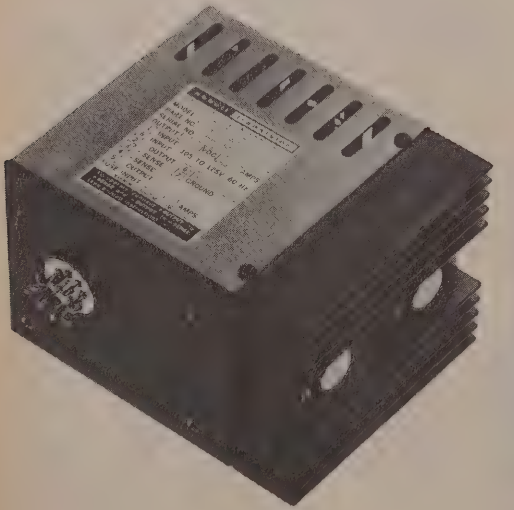
EFFICIENCY: Typically 45% to 60%

OVERVOLTAGE PROTECTION: Additional circuitry will reduce the output voltage to approximately 1 VDC within 25 μSec typ. If the output voltage rises to 10% or 2 VDC (whichever is greater) above nominal. Available as an optional feature by adding "-1" to the model number

For dimensions, see our catalog or call factory.

MODEL RN

HIGH QUALITY LINEAR POWER SUPPLY
SINGLE OUTPUT: 5 to 30 VDC, 1.5 to 150 WATTS
DUAL OUTPUT: ±12, ±15, 28 to 150 WATTS



- 2 year warranty.
- Full power at 71°C operating temperature.
- High reliability.

SPECIFICATIONS

OUTPUT: Single output models 5 through 30 VDC, 1.5 to 150 watts. Dual output models ±12, ±15, 28 to 150 watts

INPUT: 105-125, 210-250 VRMS 50-420 Hz

LINE REGULATION: 0.1% or 10 mv (whichever is greater) for input change of 105-125 VRMS

LOAD REGULATION: 0.1% or 10 mv (whichever is greater) for change from no load to full load

RIPPLE: 0.02% or 5 mv RMS (whichever is greater)

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in table by means of an externally accessible screwdriver adjustment potentiometer

ADJUSTMENT RESOLUTION: 30 mv max.

ISOLATION VOLTAGE: 300 VDC between output terminals and chassis ground

INSULATION RESISTANCE: 50 megohms between output terminals and chassis ground when measured at 50 VDC

POLARITY: Inputs and outputs are isolated; either positive or negative side may be grounded

TEMPERATURE: Operating: −4°F (−20°C) to +160°F (+71°C) without derating, forced air, or heat-sinking. Storage: −40°F (−40°C) to +185°F (+85°C)

TEMPERATURE COEFFICIENT: 0.03% per degree Celsius

ALTITUDE: 10,000 feet above sea level

LOAD TRANSIENT RECOVERY TIME: Output voltage typically returns to regulation limits within 75 microseconds after a 50% step change in load current

REMOTE ERROR SENSING: Each unit contains a means by which the regulator circuit monitors the voltage directly at the load using extra "sensing" leads. The resulting circuit action compensates for a DC voltage drop up to 0.5 volts in the load leads

TURN ON/TURN OFF OVERSHOOT: The output voltage overshoot during "turn on" or "turn off" typically will not exceed 0.1% of the output voltage, or 20 mv, (whichever is greater)

MOUNTING: Threaded inserts are provided for mounting of cases

For dimensions, see our catalog or call factory.

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MINIGLOSSARY
POWER SUPPLIES

Ambient reference: Refers to the temperature of the still air surrounding the power supply

Case reference: One of the specs that make up the nominal rating. The temperature of the case with the temperature of the surrounding still air at a stated temperature (usually 25°C).

Crowbar circuit: Protects the load. A protective circuit that applies a short circuit across the output immediately upon overload. (See overvoltage).

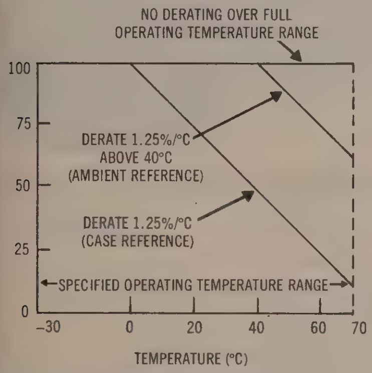

Fig. 1. Power output derating can be referred to ambient or case.

Derating: The degree output is reduced as temperature increases. Usually referenced to ambient case temperature and shown on a graph.

Efficiency: Ratio of the output power to the required input power. Usually expressed as a percentage given nominal environmental temperature.

EMI/RFI: Interference electronic circuitry caused by energy from electromechanical or radio frequency power supplies.

Foldback: Built-in protective circuits that automatically reduce the output voltage and/or current to very low levels in the event of an overload.

Holdover (Holdup): The interval that rated output will continue after input ceases. Usually milliseconds.

Input reflected current: The peak-to-peak alternating current generated by switching transients in DC/DC converters. Should not exceed 1%.

Inrush current limiting: Built-in circuits that monitor high currents through the rectifiers to the capacitors at turn ON. Circuit is usually inhibited as capacitors attain full charge.

Nominal rating: The spec value of the supply at stated conditions of input, output, and temperature.

Overshoot: A transient voltage change occurring during turn ON or OFF or during an abrupt load change.

Overvoltage (Overload) protection: Built-in circuits that protect the load or the supply by shutting it down or providing foldback.

Recovery: The time interval between the termination of an overload and restoration to normal operations.

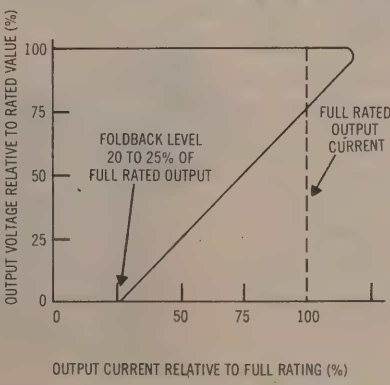

Fig. 2. Current foldback limiting self-resets with removal of fault.

Response: The time interval between a stated step change in input voltage or load current and return of output to normal operating conditions.

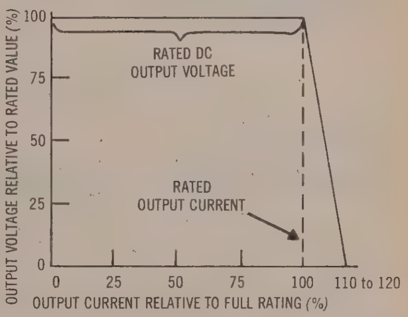

Fig. 3. Current limiting restrictions output current to a valve somewhat greater than full rated output; it resets when fault is removed.

Sensing: Regulation techniques that monitor output voltage and/or current. *Local sensing* refers to the output terminals. *Remote sensing* allows a feedback from the load circuit to the power supply.

Soft start: Allows the supply to start from zero current and/or voltage over a stated period of time during start up to prevent voltage overshoots and current imbalances.

Switchers: Power supplies using switching techniques to achieve high efficiency regulation. These techniques can have attendant EMI/RFI problems.

Tracking: The maintaining of fixed ratios between multiple outlets despite variations in line, load or temperature. Particularly important in supplies with symetrical (+)(−) outputs.

Transient protection: Circuitry designed to protect the supply from high amplitude line transients. Generally expressed in terms of peak voltage and maximum transient time duration.

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EMERSON®

For over thirty years, ACDC Electronics, a division of Emerson Electric Company, has manufactured Linear and Switching Power Supplies for quality conscious Data Processing, Communications, Industrial, Scientific, and Medical Equipment manufacturers. With over 200,000 square feet of manufacturing space, ACDC is now the second largest manufacturer of catalog power supplies in the United States and offers the broadest product line in the industry. All ACDC Power Supplies are UL recognized and CSA certified. Also, we offer the most comprehensive installation and operation manuals in the industry.

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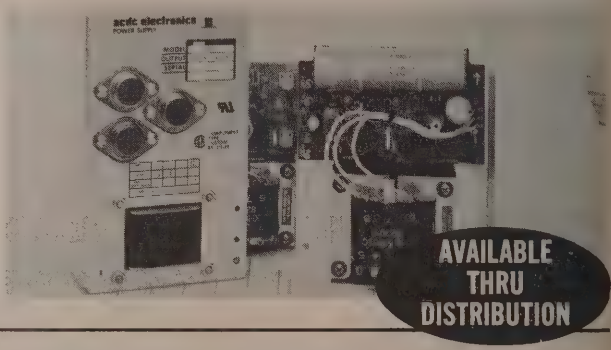
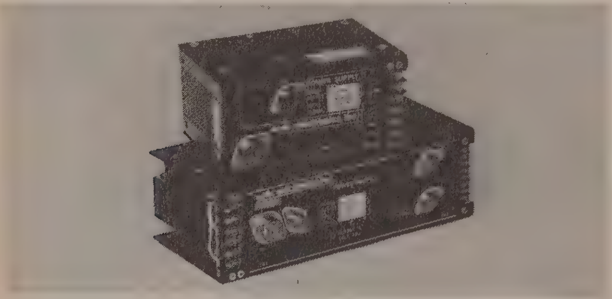
LINEARS

ECV/ETV UNIVERSAL SERIES

- Open-frame construction • Cermet pots
- 15W-150W output range • 2 year warranty
- Single, dual and triple output models available
- O.V.P. standard on all 5V models
- World-wide voltage taps for 100/117/220/230/240 VAC
- Plug compatible, interchangeable with competitive models





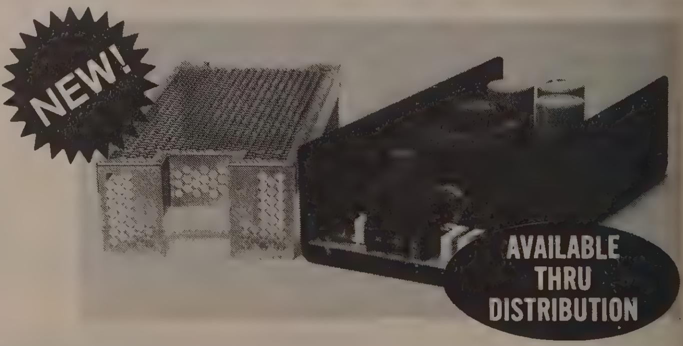
OEM/TR SERIES

- Modular construction, fully enclosed chassis
- Output current to 35A
- Single, dual and triple outputs available
- Universal input voltages
- Over 90 standard models available
- Superior thermal design
- Optional steel covers
- 5 year warranty

SWITCHERS

RH SERIES

- Open-frame Mosfet switcher (100 kHz)
- 100 watt model available now, 50 watt model 1st qtr. '85
- Single output
- Compact size, fits anywhere. (8" x 4.0" x 2.2")
- Designed to meet IEC 380
- 115/230 VAC selectable
- Fully protected; O.L., O.V.P., over temp.
- EMI filtering
- 2 year warranty



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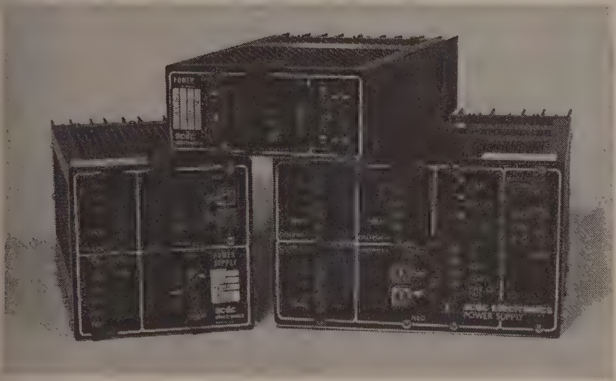
EMERSON®

RM SERIES, “ULTRA FRAME™”

- Open-frame construction
- 80W-220W output range
- Triple and quad output models available
- Field selectable 115/230 VAC operation
- Unique proportional switching drive circuit
- Floating, independent outputs are adjustable
- 100% computer tested-data sheet with every unit
- 2 year warranty

AVAILABLE THRU DISTRIBUTION



RS/RT/RQ SERIES

- Unique sub-modular construction
- 50W-300W output range
- Single, thru quad output models available
- Inhibit, remote sense, margining, O.V.P., O.T. all standard
- Complies with FCC docket 20780, part 15, class A
- 100% computer tested — data sheet with every unit
- Wide range of options
- DC inputs available. Consult factory
- 5 year warranty

RSF SERIES

- Exclusive sub-modular construction
- Complete 500 watt family
- Industry standard 5″ x 8″ profile
- Field selectable 115/230 VAC operation
- One thru five output models available
- Complies with IEC 380
- Wide range of standard options
- 2 year warranty

RE SERIES

- Unique sub-modular construction
- 750W-1000W output range
- Dual thru quad output models available
- Industry standard 5″ x 8″ profile
- Field selectable 115/230 or 208 VAC operation
- Fan cooled
- Wide selection of standard options
- 2 year warranty

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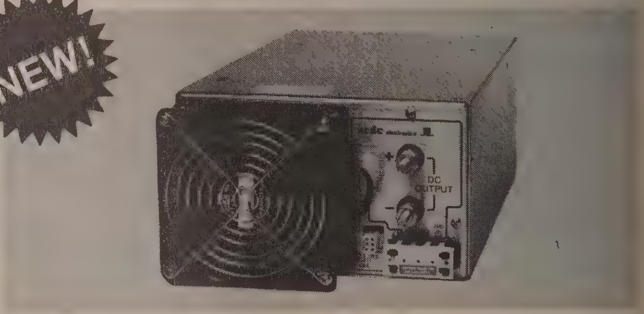
JF151, JF101

NEW!

- High power, fan cooled "slot" supply
- 1500 watts available now, 1000 watts 1st qtr. '85
- Single output • Industry standard 5″ x 8″ profile
- The most contemporary power circuitry on the market
- Designed to meet IEC 380
- Plug compatible for multiple sourcing
- Fully protected: O.L., O.V.P., over temp.
- Wide input range (brown-out proof)
- 18 month warranty



POWER SUPPLY TEST INSTRUMENTATION

EL300/LOAD MODULE

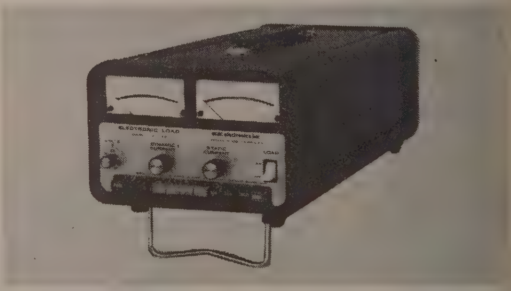
- Dissipates up to 300W
- 4.5 VDC to 60 VDC — up to 60A
- 150 watt capacity with no external power
- Can operate in parallel • Wide range of accessories
- Optional carrying case or retma rack configuration available
- Comprehensive operation manual outlining calibration, troule-shooting, etc. • 1 year warranty

EL301/CONTROL MODULE

- Digital amp meter • Monitors up to 6 load modules
- Provides testing down to 1.8 VDC
- Allows external programming
- Permits transient load applications
- Wide range of accessories
- Optional carrying case or retma rack configuration available
- Comprehensive operation manual outlining calibration, troubleshooting, etc. • 1 year warranty

EL750B DYNAMIC LOAD

- Dissipates up to 750W • 1.8 VDC to 55 VDC — up to 150A
- Static or dynamic testing
- Constant current or constant resistance modes
- Built-in square wave generator 120 Hz or 1 kHz operation
- Programmable with an externally applied, variable DC voltage
- Parallel operation for greater flexibility
- Meter shunt for calibration or digital read-out
- Front panel fault detectors • Size: 9″ x 6″ x 17.3″, 24 pounds
- Available in retma rack configuration • 1 year warranty



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Any time you order Acopian power modules selected from the thousands of models described on the following pages, shipment will be made within 3 days after your purchase order is received. To save more time, telephone your order. We'll ship within 3 days after you've put down the phone.

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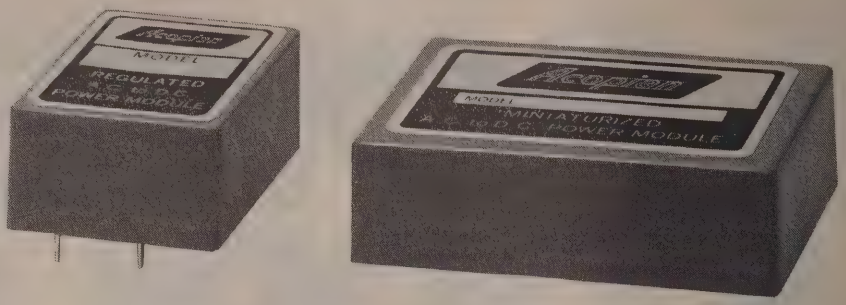
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MODEL
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A.C. to D.C.
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A.C. to D.C. POWER MODULE

MINIATURIZED REGULATED SINGLE OUTPUT

ALL MODELS U.L. RECOGNIZED

Conserve space with mini-modules as small as 2.3″ x 1.8″ x 1.0″. Models with outputs ranging from 1 to 75 volts, and from 30 ma to 2.5 amps are available. All feature excellent regulation and ripple parameters, and are short circuit protected.

Rugged encapsulated construction and generously derated components insure years of reliable operation. Mini-modules are also available with multiple outputs—see pages 4 and 5.

STANDARD FEATURES

- May be used in series
- No derating or heat sinking required
- Short circuit protected
- Small, lightweight

SPECIFICATIONS

Input Voltage: 105–125 VAC, 47 to 420 Hz, single phase.

Output Specifications: See table.

Output Voltage Trim Adjustment: Output is factory preset to ±2% (1 to 9 volt models) or ±1% (10 to 75 volt models) of nominal output voltage. Output may be trimmed to the nominal voltage rating with an external trim resistor.

Polarity: Output is floating. Either positive or negative terminal may be grounded.

Ambient Operating Temperature: −20 to +71°C. (Model 5E150, 0 to +71°C.) No derating required.

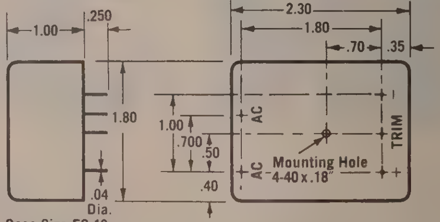
Storage Temperature: −55 to +85°C.

Temperature Coefficient: From 9 to 75 volts, approximate TC is .015%/°C; 1 to 8 volts, .03%/°C.

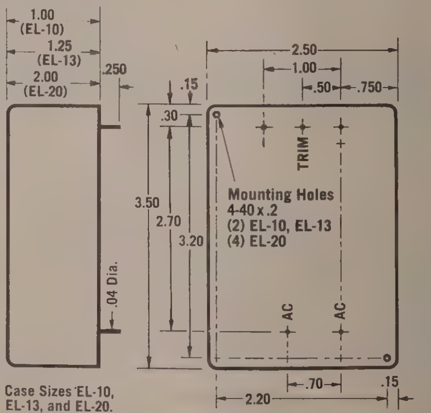
Impedance: 0.07 ohms at 1 kHz and 0.2 ohms at 10 kHz (approx.).

Weight: 7 oz. (Case size ES-10.)
1 lb. (Case size EL-10.)
1 lb. 3 oz. (Case size EL-13.)
2 lb. (Case size EL-20.)

Optional 230 Volt Input: All models can be alternately furnished for operation on an input of 210 to 250 VAC, 47-420 Hz. To order, add suffix "–230" to model number and $10.00 to price.


1.00
.250
1.80
.04 Dia.
2.30
1.80
.70
.35
1.00
.700
.50
.40
AC
AC
TRIM
Mounting Hole 4-40 x .18″

Case Size ES-10

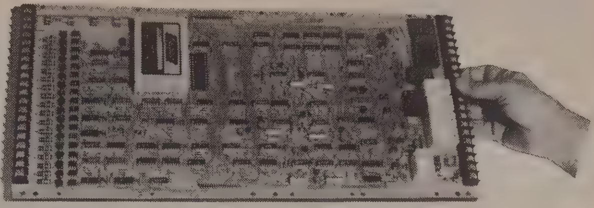

1.00 (EL-10)
1.25 (EL-13)
2.00 (EL-20)
.250
.04 Dia.
.15
.30
3.50
2.70
3.20
2.50
1.00
.50
.750
TRIM
Mounting Holes 4-40 x .2 (2) EL-10, EL-13 (4) EL-20
AC
AC
.70
.15
2.20

Case Sizes EL-10, EL-13, and EL-20.

High voltage displays such as NIXIE* indicators may be powered with the Model NX-25A or NX-50. With an input of 115 VAC 47-420 Hz, they provide nominal (unregulated) outputs of 185 VDC.

*Registered trademark of Burroughs Corp.

Placement of a mini-module on a printed circuit assembly eliminates the need for an outboard power supply, as well as all the associated wiring, connectors and hardware. Layout and construction are simplified, equipment size can be reduced, and system reliability is improved. The assembly shown is used in a control system manufactured by JB Systems Inc.



Output Voltage	Output Current Amps.	Regulation		Ripple mv RMS	Price	Model	Case Size
		Load ±%	Line ±%				
1	.250	.1	.05	0.5	$ 59	1E25	ES-10
1	.500	.2	.05	1	75	1E50A	EL-10
1.5	.250	.1	.05	0.5	59	1.5E25	ES-10
1.5	.500	.2	.05	1	75	1.5E50A	EL-10
1.5	1.0	.3	.05	1	98	1.5E100	EL-13
1.5	2.5	.3	.05	1	130	1.5E250	EL-20
2	.200	.1	.05	0.5	59	2E20	ES-10
2	.400	.2	.05	1	75	2E40A	EL-10
3	.250	.1	.05	0.5	59	3E25	ES-10
3	.500	.2	.05	1	75	3E50A	EL-10
3.6	.250	.05	.05	0.5	59	3.6E25	ES-10
3.6	.500	.1	.05	1	75	3.6E50A	EL-10
3.6	1.0	.3	.05	1	98	3.6E100	EL-13
3.6	2.5	.3	.05	1	130	3.6E250	EL-20
4	.200	.05	.05	0.5	59	4E20	ES-10
4	.400	.1	.05	1	75	4E40A	EL-10
5	.250	.05	.05	0.5	59	5E25	ES-10
5	.500	.1	.05	1	69	5E50A	EL-10
5	1.0	.2	.05	1	85	5E100	EL-13
5	1.5	.3	.1	1	98	5E150	EL-13
5	2.0	.15	.05	1	115	5E200	EL-20
5	2.5	.15	.05	1	130	5E250	EL-20
6	.200	.05	.05	0.5	59	6E20	ES-10
6	.400	.1	.05	1	75	6E40A	EL-10
6	.550	.2	.05	1	89	6E55	EL-10
6	1.0	.2	.05	1	105	6E100	EL-13
6	1.75	.15	.05	1	125	6E175	EL-20
7	.170	.05	.05	0.5	59	7E17	ES-10
7	.340	.1	.05	1	75	7E34A	EL-10
7	.450	.2	.05	1	89	7E45	EL-10
7	.900	.2	.05	1	105	7E90	EL-13
7	1.15	.15	.05	1	125	7E115	EL-20
8	.150	.05	.05	0.5	59	8E15	ES-10
8	.300	.1	.05	1	75	8E30A	EL-10
8	.700	.2	.05	1	105	8E70	EL-13
8	1.1	.15	.05	1	125	8E110	EL-20
9	.130	.05	.05	0.5	59	9E13	ES-10
9	.260	.1	.05	1	75	9E26A	EL-10
9	.450	.15	.05	1	89	9E45	EL-10
9	.850	.15	.05	1	105	9E85	EL-13
9	1.5	.15	.05	1	130	9E150	EL-20
10	.120	.02	.02	0.5	49	10E12	ES-10
10	.240	.05	.05	1	75	10E24A	EL-10
10	.400	.15	.05	1	89	10E40	EL-10
10	.750	.15	.05	1	105	10E75	EL-13
10	1.2	.1	.05	1	130	10E120	EL-20
11	.110	.02	.02	0.5	59	11E11	ES-10
11	.220	.05	.05	1	75	11E22A	EL-10
11	.350	.15	.05	1	89	11E35	EL-10
11	.600	.15	.05	1	105	11E60	EL-13
11	1.0	.1	.05	1	130	11E100	EL-20
12	.100	.02	.02	0.5	49	12E10	ES-10
12	.150	.05	.05	0.5	65	12E15	ES-10
12	.200	.05	.05	1	75	12E20A	EL-10
12	.400	.1	.05	1	89	12E40	EL-10
12	.700	.1	.05	1	110	12E70	EL-13
12	1.2	.15	.05	1	130	12E120	EL-20
13	.100	.02	.02	0.5	59	13E10	ES-10
13	.200	.05	.05	1	75	13E20A	EL-10
13	.350	.1	.05	1	89	13E35	EL-10
13	1.0	.1	.05	1	130	13E100	EL-20
14	.100	.02	.02	0.5	59	14E10	ES-10
14	.200	.05	.05	1	75	14E20A	EL-10
14	.300	.1	.05	1	89	14E30	EL-10
14	.500	.1	.05	1	105	14E50	EL-13
14	1.0	.1	.05	1	130	14E100	EL-20
15	.100	.02	.02	0.5	49	15E10	ES-10
15	.150	.05	.05	0.5	65	15E15	ES-10
15	.200	.05	.05	1	75	15E20A	EL-10
15	.400	.1	.05	1	89	15E40	EL-10
15	.600	.1	.05	1	105	15E60	EL-13
15	1.0	.1	.05	1	130	15E100	EL-20
16	.080	.02	.02	0.5	59	16E08	ES-10
16	.160	.05	.05	1	75	16E16A	EL-10
16	.350	.1	.05	1	95	16E35	EL-10
16	.500	.1	.05	1	110	16E50	EL-13
16	.900	.1	.05	1	130	16E90	EL-20
17	.070	02	.02	0.5	59	17E07	ES-10
17	.140	05	05	1	75	17E14A	EL-10
17	.450	.1	.05	1	$110	17E45	EL-13
17	.750	.1	.05	1	130	17E75	EL-20
18	.060	.02	.02	0.5	49	18E06	ES-10
18	.120	.05	.05	1	75	18E12A	EL-10
18	.270	.1	.05	1	89	18E27	EL-10
18	.400	.1	.05	1	105	18E40	EL-13
18	.550	.1	.05	1	125	18E55	EL-20
19	.060	.02	.02	0.5	59	19E06	ES-10
19	.120	.05	.05	1	75	19E12A	EL-10
19	.250	.1	.05	1	89	19E25	EL-10
19	.400	.1	.05	1	105	19E40	EL-13
19	.700	.1	.05	1	130	19E70	EL-20
20	.060	.02	.02	0.5	59	20E06	ES-10
20	.120	.05	.05	1	75	20E12A	EL-10
20	.200	.1	.05	1	89	20E20	EL-10
20	.400	.1	.05	1	105	20E40	EL-13
20	.700	.1	.05	1	130	20E70	EL-20
21	.060	.02	.02	0.5	59	21E06	ES-10
21	.120	.05	.05	1	75	21E12A	EL-10
21	.175	.1	.05	1	89	21E18	EL-10
21	.375	.1	.05	1	105	21E38	EL-13
21	.600	.1	.05	1	125	21E60	EL-20
22	.050	.02	.02	0.5	59	22E05	ES-10
22	.100	.05	.05	1	75	22E10A	EL-10
22	.150	.1	.05	1	89	22E15	EL-10
22	.300	.1	.05	1	105	22E30	EL-13
22	.500	.1	.05	1	125	22E50	EL-20
23	.050	.02	.02	0.5	59	23E05	ES-10
23	.100	.05	.05	1	75	23E10A	EL-10
23	.200	.1	.05	1	89	23E20	EL-10
23	.300	.1	.05	1	105	23E30	EL-13
23	.600	.1	.05	1	130	23E60	EL-20
24	.050	.02	.02	0.5	49	24E05	ES-10
24	.100	.05	.05	1	75	24E10A	EL-10
24	.200	.1	.05	1	89	24E20	EL-10
24	.350	.1	.05	1	110	24E35	EL-13
24	.600	.1	.05	1	130	24E60	EL-20
25	.050	.02	.02	0.5	59	25E05	ES-10
25	.100	.05	.05	1	75	25E10A	EL-10
25	.190	.1	.05	1	89	25E19	EL-10
25	.325	.1	.05	1	110	25E33	EL-13
25	.550	.1	.05	1	130	25E55	EL-20
26	.040	.02	.02	0.5	59	26E04	ES-10
26	.080	.05	.05	1	75	26E08A	EL-10
26	.170	.1	.05	1	89	26E17	EL-10
26	.300	.1	.05	1	105	26E30	EL-13
26	.450	.1	.05	1	125	26E45	EL-20
27	.040	.02	.02	0.5	59	27E04	ES-10
27	.080	.05	.05	1	75	27E08A	EL-10
27	.160	.1	.05	1	89	27E16	EL-10
27	.300	.1	.05	1	105	27E30	EL-13
27	.500	.1	.05	1	130	27E50	EL-20
28	.040	.02	.02	0.5	49	28E04	ES-10
28	.080	.05	.05	1	75	28E08A	EL-10
28	.150	.1	.05	1	89	28E15	EL-10
28	.300	.1	.05	1	110	28E30	EL-13
28	.500	.1	.05	1	130	28E50	EL-20
30	.080	.02	.02	1	79	30E08A	EL-13
32	.070	.02	.02	1	79	32E07A	EL-13
34	.060	.02	.02	1	79	34E06A	EL-13
35	.050	.02	.02	1	79	35E05A	EL-13
36	.050	.02	.02	1	79	36E05A	EL-13
38	.040	.02	.02	1	79	38E04A	EL-13
40	.030	.02	.02	1	79	40E03A	EL-13
40	.060	.02	.02	1	98	40E06A	EL-13
42	.030	.02	.02	1	79	42E03A	EL-13
44	.030	.02	.02	1	79	44E03A	EL-13
45	.030	.02	.02	1	79	45E03A	EL-13
48	.030	.02	.02	1	79	48E03A	EL-13
48	.050	.02	.02	1	98	48E05A	EL-13
50	.030	.02	.02	1	79	50E03A	EL-13
50	.050	.02	.02	1	98	50E05A	EL-13
55	.040	.02	.02	1	98	55E04A	EL-13
60	.050	.02	.02	1	98	60E05A	EL-13
65	.050	.02	.02	1	98	65E05A	EL-13
70	.040	.02	.02	1	98	70E04A	EL-13
75	.030	.02	.02	1	98	75E03A	EL-13
185	.025	Unregulated		2V	49	NX-25A	EL-10
185	.050	Unregulated		3.5V	69	NX-50	EL-13

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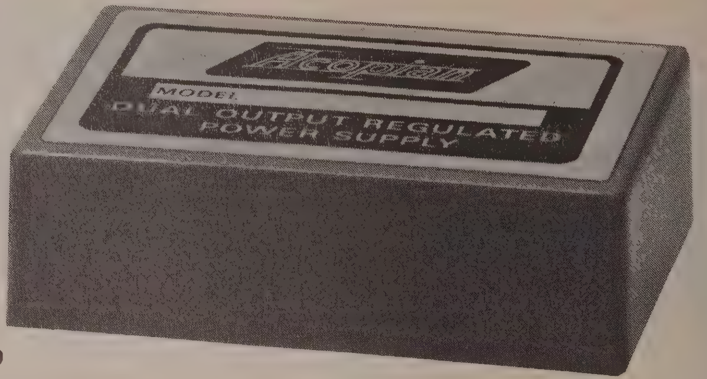
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POWER SUPPLY

MINIATURIZED REGULATED MULTIPLE OUTPUT

ALL MODELS U.L. RECOGNIZED

These dual and triple output mini-modules are compact and convenient sources of the voltages required to power operational amplifiers and related circuits. They may be mounted directly on printed circuit board assemblies, simplifying system layout and minimizing the connectors and wiring required.

STANDARD FEATURES

- May be used in series
- No derating or heat sinking required
- Short circuit protected
- Compact, lightweight

SPECIFICATIONS

Input Voltage: 105–125 VAC, 47 to 420 Hz, single phase.

Output Specifications: See table.

Output Voltage Setting: Each output is factory preset to ±2% (1 to 9 volt outputs) or ±1% (10 to 28 volt outputs) of the nominal output voltage. Outputs of Case Size END modules, except those marked (*), may be trimmed to the nominal voltage rating with an external trim resistor.

Polarity: Single output sections may be used in either polarity. Dual output sections, marked (*), are provided with a plus/common/minus output connection configuration.

Ambient Operating Temperature: −20 to +71°C. No derating required.

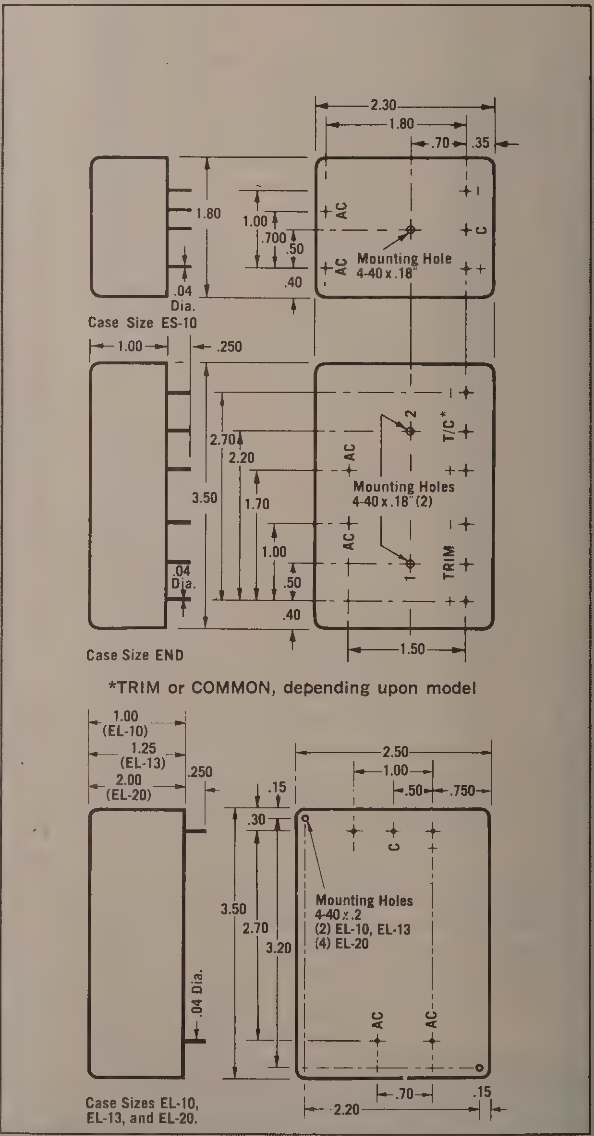
Storage Temperature: −55 to +85°C.

Temperature Coefficient: From 9 to 28 volts, approximate TC is .015%/°C; 1 to 8 volts, .03%/°C.

Impedance: 0.07 ohms at 1 kHz and 0.2 ohms at 10 kHz (approx.).

Weight: 7 oz. (Case size ES-10.)
13 oz. (Case size END.)
1 lb. (Case size EL-10.)
1 lb. 3 oz. (Case size EL-13.)
2 lb. (Case size EL-20.)

Optional 230 Volt Input: All models can be alternately furnished for operation on an input of 210 to 250 VAC, 47-420 Hz. To order, add suffix "–230" to model number and $10.00 to price.


2.30
1.80
.70
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1.80
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.700
.50
.40
.04 Dia.
+AC
+AC
C
Mounting Hole 4-40 x .18"
Case Size ES-10
1.00
.250
2.70
2.20
3.50
1.70
1.00
.50
.40
.04 Dia.
AC
AC
2
1
T/C*
TRIM
Mounting Holes 4-40 x .18" (2)
1.50
Case Size END
*TRIM or COMMON, depending upon model
1.00 (EL-10)
1.25 (EL-13)
2.00 (EL-20)
.250
.15
.30
2.50
1.00
.50
.750
3.50
2.70
3.20
.04 Dia.
C
AC
AC
Mounting Holes 4-40 x .2 (2) EL-10, EL-13 (4) EL-20
.70
.15
2.20
Case Sizes EL-10, EL-13, and EL-20.

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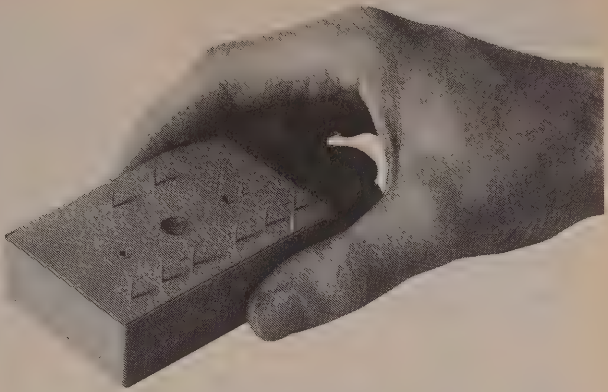
Complete system assemblies only 1¾-inches high. Mini-modules permit exceptional flexibility in the design of rack-mounting assemblies built on standard 19-inch panels as small as 1¾-inches high.



Dual output modules have isolated outputs; triples provide two balanced and tracking voltages in a three-terminal configuration, plus an isolated third output for logic, control circuits, etc.

HOW TO ORDER:

Any two of the sections listed below, or two of the same section, can be combined into a multiple-output module. The complete model number is the combination of the two section numbers selected. Note that some sections provide two outputs; combination with a single output section results in a triple-output module.

Example: The combination of sections 6E20D and 15E10D is the Model 6E20D-15E10D. Always assign the lower voltage section first. For pricing purposes, add the costs of the sections selected. Example: The price of the Model 6E20D-15E10D is $52.00 plus $45.00, or $97.00 total.

Output Voltage	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to order")	Case Size
		Load ±%	Line ±%				
1	.250	.1	.05	0.5	$52	1E25D	END
1.5	.250	.1	.05	0.5	52	1.5E25D	END
2	.200	.1	.05	0.5	52	2E20D	END
3	.250	.1	.05	0.5	52	3E25D	END
3.6	.250	.05	.05	0.5	52	3.6E25D	END
4	.200	.05	.05	0.5	52	4E20D	END
5	.250	.05	.05	0.5	52	5E25D	END
6	.200	.05	.05	0.5	52	6E20D	END
7	.170	.05	.05	0.5	52	7E17D	END
8	.150	.05	.05	0.5	52	8E15D	END
9	.130	.05	.05	0.5	45	9E13D	END
10	.120	.02	.02	0.5	45	10E12D	END
±12*	.050	.10	.05	1.0	52	D12E05	END
12	.100	.02	.02	0.5	45	12E10D	END
12	.150	.05	.05	0.5	55	12E15D	END
13	.100	.02	.02	0.5	45	13E10D	END

Output Voltage	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to order")	Case Size
		Load ±%	Line ±%				
14	.100	.02	.02	0.5	$45	14E10D	END
±15*	.050	.10	.05	1.0	52	D15E05	END
15	.100	.02	.02	0.5	45	15E10D	END
15	.150	.05	.05	0.5	55	15E15D	END
16	.080	.02	.02	0.5	45	16E08D	END
17	.070	.02	.02	0.5	45	17E07D	END
18	.060	.02	.02	0.5	45	18E06D	END
20	.060	.02	.02	0.5	45	20E06D	END
21	.060	.02	.02	0.5	45	21E06D	END
22	.050	.02	.02	0.5	45	22E05D	END
23	.050	.02	.02	0.5	45	23E05D	END
24	.050	.02	.02	0.5	45	24E05D	END
25	.050	.02	.02	0.5	45	25E05D	END
26	.040	.02	.02	0.5	45	26E04D	END
27	.040	.02	.02	0.5	45	27E04D	END
28	.040	.02	.02	0.5	45	28E04D	END

*Dual output section. Combination with a single output section results in a triple output module.

DUAL OUTPUT SUPPLIES FOR OP AMPS

(These model numbers are complete as shown.)

Nominal Output Voltages	Current per Output Amps.	Regulation		Ripple mv RMS	Price	Model	Case Size
		Load ±%	Line ±%				
±12	.025	.1	.05	1	$ 49	D12-03	ES-10
±12	.050	.1	.05	1	59	D12-05	ES-10
±12	.100	.05	.05	1	69	D12-10A	EL-10
±12	.150	.05	.05	1	79	D12-15A	EL-10
±12	.200	.05	.05	1	89	D12-20	EL-10
±12	.300	.05	.05	1	105	D12-30	EL-13
±12	.350	.05	.05	1	115	D12-35	EL-13
±12	.500	.1	.05	1	135	D12-50	EL-20

Nominal Output Voltages	Current per Output Amps.	Regulation		Ripple mv RMS	Price	Model	Case Size
		Load ±%	Line ±%				
±15	.025	.1	.05	1	$ 49	D15-03	ES-10
±15	.050	.1	.05	1	59	D15-05	ES-10
±15	.100	.05	.05	1	69	D15-10A	EL-10
±15	.150	.05	.05	1	79	D15-15A	EL-10
±15	.200	.05	.05	1	89	D15-20	EL-10
±15	.300	.05	.05	1	105	D15-30	EL-13
±15	.350	.05	.05	1	115	D15-35	EL-13
±15	.500	.1	.05	1	135	D15-50	EL-20

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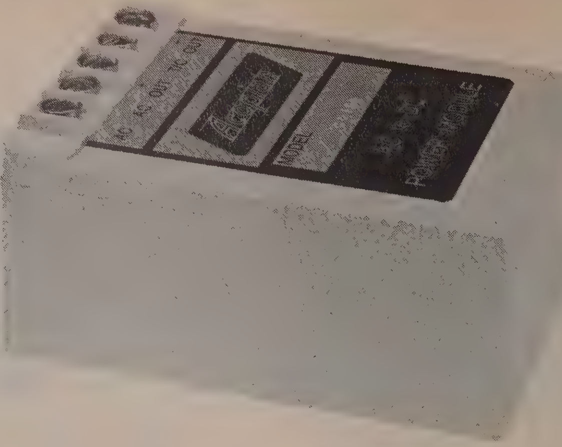


MINIATURIZED REGULATED Terminal Strip Connections

ALL MODELS U.L. RECOGNIZED

Although small in size, these mini-modules offer high performance at modest prices. All models, with series regulated outputs ranging from 1 to 75 volts and as high as 2.5 amps, may be mounted in an area only 3.5″ x 2.5″. Dual output models are available with the ratings commonly required for driving op amps and other balanced loads. Terminal strip input/output connections eliminate all need for sockets or soldering. Short circuit protection, encapsulated construction, and conservative design assure long term reliability.

STANDARD FEATURES

- May be used in series
- No derating or heat sinking required
- Short circuit protected
- Small, lightweight

SPECIFICATIONS

Input Voltage: 105–125 VAC, 47 to 420 Hz, single phase.

Output Specifications: See tables.

Output Voltage Trim Adjustment: Outputs factory preset to ±2% (1 to 9 volt models) or ±1% (10 to 75 volt models) of nominal output voltage. Single output models may be trimmed to the nominal voltage rating with an external trim resistor.

Polarity: Either positive or negative terminal of a single output module may be grounded. Dual output modules have a positive/common/negative output terminal configuration.

Ambient Operating Temperature: −20 to +71°C. (Model 5EB150, 0 to +71°C.) No derating required.

Storage Temperature: −55 to +85°C.

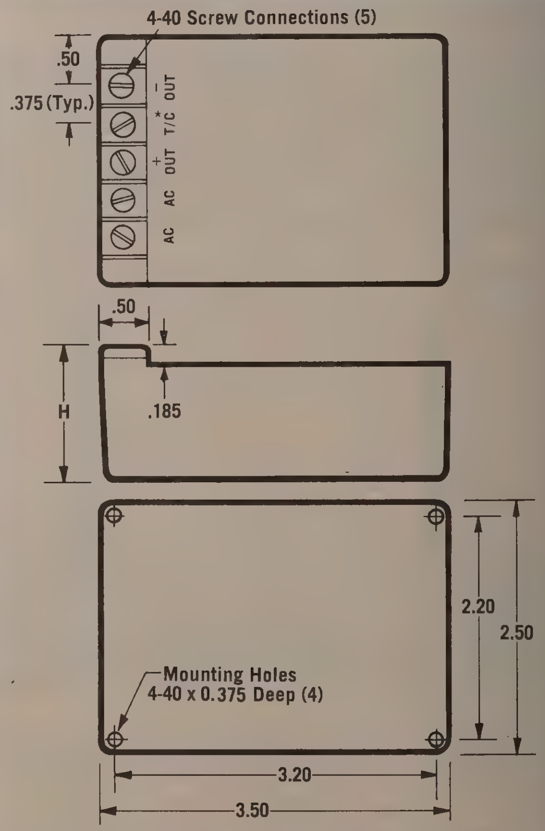
Temperature Coefficient: From 9 to 75 volts, approximate TC is .015%/°C; 1 to 8 volts, .03%/°C.

Impedance: 0.07 ohms at 1 kHz and 0.2 ohms at 10 kHz (approx.).

Optional 230 Volt Input: All models can be alternately furnished for operation on an input of 210 to 250 VAC, 47-420 Hz. To order, add suffix "–230" to model number and $10.00 to price.

High voltage displays such as NIXIE* indicators may be powered with the Model NX-25B or NX-50B. With an input of 115 VAC 47-420 Hz, they provide nominal (unregulated) outputs of 185 VDC.

*Registered trademark of Burroughs Corp.



*TRIM on single output modules; COMMON on duals

Case	H	Approx. Weight
EB-10	1.375	15oz
EB-13	1.625	1lb 5oz
EB-20	2.375	2lb 1oz

SINGLE OUTPUT MODELS

Output Voltage	Output Current Amps.	Regulation		Ripple mv RMS	Price	Model	Case Size
		Load ±%	Line ±%				
1	.500	.4	.05	1	$ 79	1EB50	EB-10
1.5	.500	.3	.05	1	79	1.5EB50	EB-10
1.5	1.0	.5	.05	1	105	1.5EB100	EB-13
1.5	2.5	.6	.05	1	140	1.5EB250	EB-20
2	.400	.25	.05	1	79	2EB40	EB-10
3	.500	.25	.05	1	79	3EB50	EB-10
3.6	.500	.15	.05	1	79	3.6EB50	EB-10
3.6	1.0	.4	.05	1	105	3.6EB100	EB-13
3.6	2.5	.4	.05	1	140	3.6EB250	EB-20
4	.400	.15	.05	1	79	4EB40	EB-10
5	.500	.15	.05	1	79	5EB50	EB-10
5	1.0	.25	.05	1	95	5EB100	EB-13
5	1.5	.35	.1	1	110	5EB150	EB-13
5	2.0	.25	.05	1	125	5EB200	EB-20
5	2.5	.25	.05	1	140	5EB250	EB-20
6	.400	.1	.05	1	79	6EB40	EB-10
6	.550	.25	.05	1	95	6EB55	EB-10
6	1.0	.25	.05	1	110	6EB100	EB-13
6	1.75	.2	.05	1	130	6EB175	EB-20
7	.340	.1	.05	1	79	7EB34	EB-10
7	.450	.2	.05	1	95	7EB45	EB-10
7	.900	.25	.05	1	110	7EB90	EB-13
7	1.15	.2	.05	1	130	7EB115	EB-20
8	.300	.1	.05	1	79	8EB30	EB-10
8	.700	.2	.05	1	110	8EB70	EB-13
8	1.1	.2	.05	1	130	8EB110	EB-20
9	.260	.1	.05	1	79	9EB26	EB-10
9	.450	.15	.05	1	95	9EB45	EB-10
9	.850	.2	.05	1	110	9EB85	EB-13
9	1.5	.2	.05	1	135	9EB150	EB-20
10	.240	.05	.05	1	79	10EB24	EB-10
10	.400	.15	.05	1	95	10EB40	EB-10
10	.750	.2	.05	1	110	10EB75	EB-13
10	1.2	.15	.05	1	135	10EB120	EB-20
11	.220	.05	.05	1	79	11EB22	EB-10
11	.350	.15	.05	1	95	11EB35	EB-10
11	.600	.15	.05	1	110	11EB60	EB-13
11	1.0	.15	.05	1	135	11EB100	EB-20
12	.200	.05	.05	1	79	12EB20	EB-10
12	.400	.1	.05	1	95	12EB40	EB-10
12	.700	.15	.05	1	115	12EB70	EB-13
12	1.2	.2	.05	1	135	12EB120	EB-20
13	.200	.05	.05	1	79	13EB20	EB-10
13	.350	.1	.05	1	95	13EB35	EB-10
13	.600	.1	.05	1	115	13EB60	EB-13
13	1.0	.15	.05	1	135	13EB100	EB-20
14	.200	.05	.05	1	79	14EB20	EB-10
14	.300	.1	.05	1	95	14EB30	EB-10
14	.500	.1	.05	1	110	14EB50	EB-13
14	1.0	.15	.05	1	135	14EB100	EB-20
15	.200	.05	.05	1	79	15EB20	EB-10
15	.400	.1	.05	1	95	15EB40	EB-10
15	.600	.1	.05	1	110	15EB60	EB-13
15	1.0	.15	.05	1	135	15EB100	EB-20
16	.160	.05	.05	1	79	16EB16	EB-10
16	.350	.1	.05	1	100	16EB35	EB-10
16	.500	.1	.05	1	115	16EB50	EB-13
16	.900	.15	.05	1	135	16EB90	EB-20
17	.140	.05	.05	1	79	17EB14	EB-10
17	.325	.1	.05	1	100	17EB33	EB-10
17	.450	.1	.05	1	115	17EB45	EB-13
17	.750	.15	.05	1	135	17EB75	EB-20
18	.120	.05	.05	1	79	18EB12	EB-10
18	.270	.1	.05	1	95	18EB27	EB-10
18	.400	.1	.05	1	$110	18EB40	EB-13
18	.550	.1	.05	1	130	18EB55	EB-20
19	.120	.05	.05	1	79	19EB12	EB-10
19	.250	.1	.05	1	95	19EB25	EB-10
19	.400	.1	.05	1	110	19EB40	EB-13
19	.700	.1	.05	1	135	19EB70	EB-20
20	.120	.05	.05	1	79	20EB12	EB-10
20	.200	.1	.05	1	95	20EB20	EB-10
20	.400	.1	.05	1	110	20EB40	EB-13
20	.700	.1	.05	1	135	20EB70	EB-20
21	.120	.05	.05	1	79	21EB12	EB-10
21	.175	.1	.05	1	95	21EB18	EB-10
21	.375	.1	.05	1	110	21EB38	EB-13
21	.600	.1	.05	1	130	21EB60	EB-20
22	.100	.05	.05	1	79	22EB10	EB-10
22	.150	.1	.05	1	95	22EB15	EB-10
22	.300	.1	.05	1	110	22EB30	EB-13
22	.500	.1	.05	1	130	22EB50	EB-20
23	.100	.05	.05	1	79	23EB10	EB-10
23	.200	.1	.05	1	95	23EB20	EB-10
23	.300	.1	.05	1	110	23EB30	EB-13
23	.600	.1	.05	1	135	23EB60	EB-20
24	.100	.05	.05	1	79	24EB10	EB-10
24	.200	.1	.05	1	95	24EB20	EB-10
24	.350	.1	.05	1	115	24EB35	EB-13
24	.600	.1	.05	1	135	24EB60	EB-20
25	.100	.05	.05	1	79	25EB10	EB-10
25	.190	.1	.05	1	95	25EB19	EB-10
25	.325	.1	.05	1	115	25EB33	EB-13
25	.550	.1	.05	1	135	25EB55	EB-20
26	.080	.05	.05	1	79	26EB08	EB-10
26	.170	.1	.05	1	95	26EB17	EB-10
26	.300	.1	.05	1	110	26EB30	EB-13
26	.450	.1	.05	1	130	26EB45	EB-20
27	.080	.05	.05	1	79	27EB08	EB-10
27	.160	.1	.05	1	95	27EB16	EB-10
27	.300	.1	.05	1	110	27EB30	EB-13
27	.500	.1	.05	1	135	27EB50	EB-20
28	.080	.05	.05	1	79	28EB08	EB-10
28	.150	.1	.05	1	95	28EB15	EB-10
28	.300	.1	.05	1	115	28EB30	EB-13
28	.500	.1	.05	1	135	28EB50	EB-20
30	.080	.02	.02	1	85	30EB08	EB-13
32	.070	.02	.02	1	85	32EB07	EB-13
34	.060	.02	.02	1	85	34EB06	EB-13
35	.050	.02	.02	1	85	35EB05	EB-13
36	.050	.02	.02	1	85	36EB05	EB-13
38	.040	.02	.02	1	85	38EB04	EB-13
40	.030	.02	.02	1	85	40EB03	EB-13
40	.060	.02	.02	1	105	40EB06	EB-13
42	.030	.02	.02	1	85	42EB03	EB-13
44	.030	.02	.02	1	85	44EB03	EB-13
45	.030	.02	.02	1	85	45EB03	EB-13
48	.030	.02	.02	1	85	48EB03	EB-13
48	.050	.02	.02	1	105	48EB05	EB-13
50	.030	.02	.02	1	85	50EB03	EB-13
50	.050	.02	.02	1	105	50EB05	EB-13
55	.040	.02	.02	1	105	55EB04	EB-13
60	.050	.02	.02	1	105	60EB05	EB-13
65	.050	.02	.02	1	105	65EB05	EB-13
70	.040	.02	.02	1	105	70EB04	EB-13
75	.030	.02	.02	1	105	75EB03	EB-13
185	.025	Unregulated		2V	55	NX-25B	EB-10
185	.050	Unregulated		3.5V	75	NX-50B	EB-13

DUAL OUTPUT MODELS

Output Voltage Voltages	Current per Output Amps.	Regulation		Ripple mv RMS	Price	Model	Case Size
		Load ±%	Line ±%				
±12	.100	.05	.05	1	$ 75	DB12-10	EB-10
±12	.150	.05	.05	1	85	DB12-15	EB-10
±12	.200	.05	.05	1	95	DB12-20	EB-10
±12	.300	.05	.05	1	115	DB12-30	EB-13
±12	.350	.05	.05	1	125	DB12-35	EB-13
±12	.500	.1	.05	1	145	DB12-50	EB-20
±15	.100	.05	.05	1	$ 75	DB15-10	EB-10
±15	.150	.05	.05	1	85	DB15-15	EB-10
±15	.200	.05	.05	1	95	DB15-20	EB-10
±15	.300	.05	.05	1	115	DB15-30	EB-13
±15	.350	.05	.05	1	125	DB15-35	EB-13
±15	.500	.1	.05	1	145	DB15-50	EB-20

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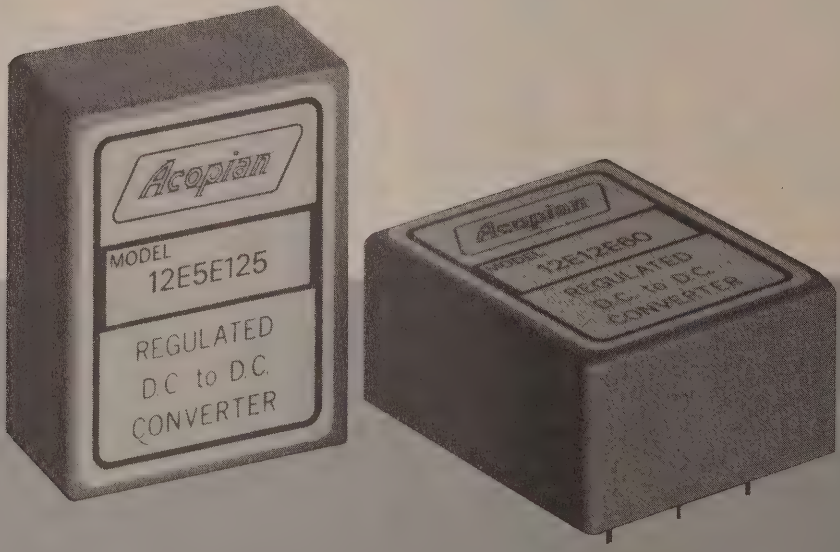
MINIATURIZED DC-DC CONVERTERS



These versatile DC/DC converters are ideally suited for powering a wide variety of analog and digital circuitry, such as op amps, logic and microprocessors. All have been designed to provide high performance and long-term reliability in combination with small size and high efficiency. They may be mounted directly on a printed circuit board for OEM applications, or installed in a socket for developmental and small quantity requirements.

Efficiency is in the order of 65%, and is maintained down to low levels of output current. Provision for trimming the single output models permits setting the voltage to an accuracy of better than 1%, when required. Input reflected ripple is reduced to less than 1% by means of a standard built-in pi filter, and electrostatic shielding on all six sides minimizes radiated energy. High input/output isolation permits separation of the output from the dc input bus to minimize circuit interaction due to ground loops, and the use of inputs (and the outputs of single output models) in either polarity.

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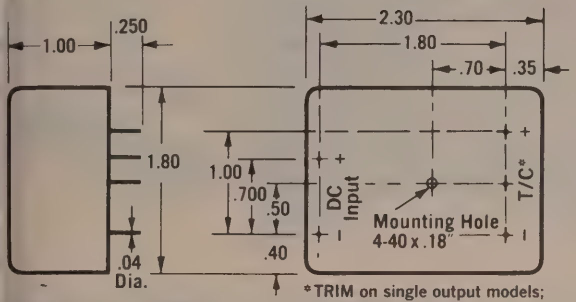
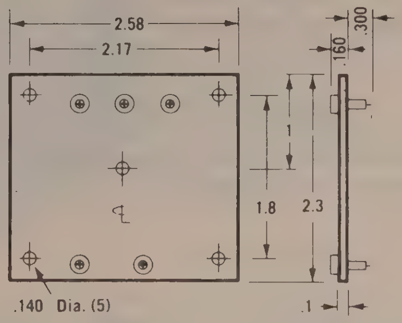
DIMENSIONS



Case Size ESC-10; Weight: 5 oz.

*TRIM on single output models; COMMON on duals.



MODEL ES-1 SOCKET

SPECIFICATIONS

Input Voltage: Nominal voltage ±10%

Input Reflected Ripple: 1% E_{in} (max.)

Output Regulation:
Line: ±.02%
Load: ±.05%

Output Ripple: 1 mv rms, 50 mv P-P (25 MHz BW)

Output Voltage Tolerance: Output(s) factory preset within ±1% of nominal. Single output models may be trimmed to the nominal rating with an external trim resistor.

Polarity: The output of single output models may be connected in either polarity. Dual output models have a positive/common/negative output terminal configuration.

Transient Response (NL-FL): 50 microseconds

Output Protection: Electronic current limiting with automatic recovery.

Input/Output Isolation:
Voltage: 500 Vdc
Resistance: 100 megohms
Capacitance: 100 pF

Switching Frequency: 20 kHz minimum

Temperature Coefficient: .02%/°C

Ambient Operating Temperature: −20 to +71°C

Storage Temperature: −40 to +85°C

Humidity: 20% to 80% R.H. (non-condensing)

Mounting: May be mounted on printed circuit board or in socket (Order Model ES-1. Price, $5.00)

SINGLE OUTPUT

Nominal Input Voltage	Output Voltage	Output Current Amps at		%Efficiency at Nominal Input (typ.)	Price	Model
		55°C	71°C			
5	5	1.25	1.0	59	$98	5E5E125
5	12	.600	.500	64	98	5E12E60
5	15	.500	.400	65	98	5E15E50
12	5	1 25	1 0	60	98	12E5E125
12	12	600	500	67	98	12E12E60
12	15	500	400	68	98	12E15E50
24	5	1 25	1 0	61	98	24E5E125
24	12	600	500	68	98	24E12E60
24	15	500	400	69	98	24E15E50
28	5	1 25	1 0	62	98	28E5E125
28	12	600	500	69	98	28E12E60
28	15	500	400	70	98	28E15E50

DUAL OUTPUT

Nominal Input Voltage	Output Voltage	Output Current Amps at		%Efficiency at Nominal Input (typ.)	Price	Model
		55°C	71°C			
5	±12	300	250	62	$105	5E12D30
5	±15	250	250	63	105	5E15D25
12	±12	300	250	65	105	12E12D30
12	±15	250	250	66	105	12E15D25
24	±12	300	250	65	105	24E12D30
24	±15	250	250	66	105	24E15D25
28	±12	300	250	65	105	28E12D30
28	±15	250	250	66	105	28E15D25

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SERIES A REGULATED PREMIUM PERFORMANCE

SERIES B REGULATED LOWEST COST

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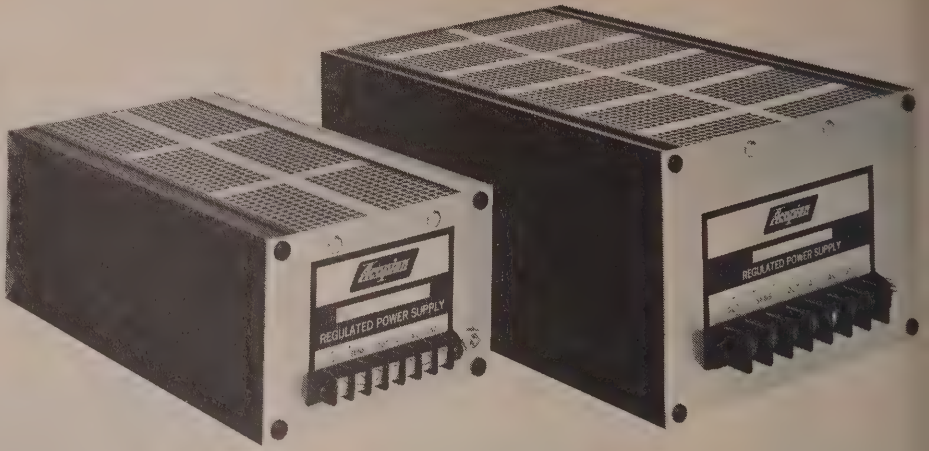
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Acopian
REGULATED POWER SUPPLY

A broad selection of power supplies offering unusually high performance – many models have regulation of ±0.005%. Electronic current limiting and provision for remote voltage sensing are standard features; overvoltage protection is available as a built-in option. Rugged extruded aluminum cases include threaded mounting holes on bottom, back, and side, permitting mounting in any position.

SERIES A PREMIUM PERFORMANCE POWER SUPPLIES

STANDARD FEATURES

- Provision for remote sensing and/or external out-
- put adjustment
- Short circuit proof with automatic recovery (electronic current limiting)
- Can be mounted on any of three surfaces (case sizes H8, H11 and H16, two surfaces)
- Convection cooled – no heat sinking or forced-air ventilation is necessary
- Silicon semiconductors
- Completely serviceable

SPECIFICATIONS

Input Voltage: 105–125 VAC, 50–400 Hz, single phase.

Output Specifications: See pages 10 and 11. Series A supplies have model numbers beginning with the letter A.

Remote Voltage Sensing: Provision for sensing the output voltage across the load, so that drops in the load line are compensated, is a standard feature.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Ambient Operating Temperature: −20 to +71°C.

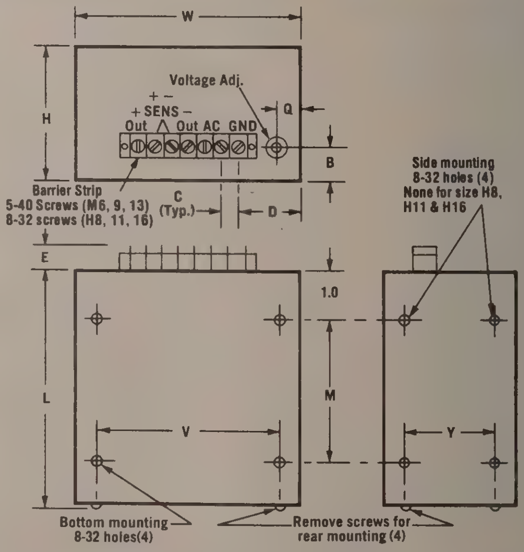
Storage Temperature: −55 to +85°C.

Response Time: Less than 20 microseconds.

OPTIONS

Overvoltage Protection: An internal preset overvoltage protector is available on all models with outputs of 3 to 70 volts. To order, add prefix "V" to the model number, and increase standard price as follows:

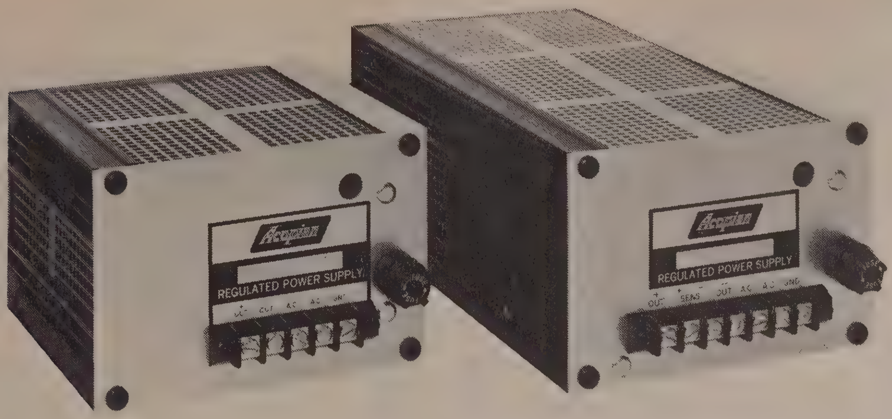
For all case sizes except H16:
Nominal output voltages from 3 to 28 V. $25.00
30 to 70 V. 35.00
Case size H16 (all voltages) 75.00


W
H
Voltage Adj.
+ −
+ SENS −
Out Λ Out AC GND
Q
B
Barrier Strip
5-40 Screws (M6, 9, 13)
8-32 screws (H8, 11, 16)
C
(Typ.)
D
Side mounting
8-32 holes (4)
None for size H8,
H11 & H16
E
1.0
L
M
V
Y
Bottom mounting
8-32 holes(4)
Remove screws for
rear mounting (4)

Size	L	W	H	M	V	Y	E	Q	B	C	D	Approx. Weight
M6	6.59	5.12	3.44	4.0	4.5	3.0	.38	.5	.75	.375	1.44	4lb 4oz
M9	9.25	5.12	3.44	6.0	4.5	3.0	.38	.5	.75	.375	1.44	7lb 4oz
M13	13.25	5.12	3.44	10.0	4.5	3.0	.38	.5	.75	.375	1.44	11lb
H8	8.75	7.37	5.12	6.0	6.75	4.56	.75	1.12	1.25	.562	2.25	15lb 8oz
H11	11.25	7.37	5.12	8.0	6.75	4.56	.75	1.12	1.25	.562	2.25	18lb 4oz
H16	16.00	7.37	5.12	11.0	6.75	4.56	.75	1.12	1.25	.562	2.25	23lb

230 Volt Input: All models can be alternately furnished for operation on inputs of 210–250 VAC, 50–400 Hz. To order, add suffix "-230" to model number and $25.00 to price.

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478 • 3-DAY SHIPMENT GUARANTEED


Acopian
REGULATED POWER SUPPLY
OUT OUT AC AC GND
Acopian
REGULATED POWER SUPPLY
OUT SENS OUT AC AC GND

These low-cost supplies provide the same high reliability as the Series A, and without sacrificing the basic features necessary for most applications. Many models have regulation of ±0.1% or better. All components are generously derated to insure a long and trouble-free life. And they use the same rugged construction as the Series A line. Overvoltage protection and other options are available.

SERIES B LOW-COST POWER SUPPLIES

STANDARD FEATURES

- Delivers current surges without damage—built-in fuse protects supply against prolonged overloads and shorts
- May be mounted on any of three surfaces
- Convection cooled—no heat sinking or forced-air ventilation is necessary
- Silicon semiconductors
- Completely serviceable

SPECIFICATIONS

Input Voltage: 105–125 VAC, 50–400 Hz, single phase.

Output Specifications: See pages 10 and 11. Series B supplies have model numbers beginning with the letter B.

Remote Voltage Adjustment/Sensing: Available as an option. See below.

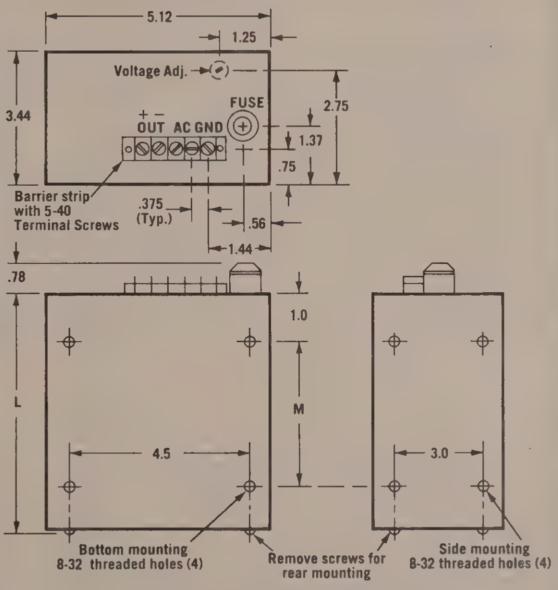
Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Ambient Operating Temperature: 0 to +71°C.
Storage Temperature: −55 to +85°C.

OPTIONS

Overvoltage Protection: An internal preset overvoltage protector is available on all models with outputs of 3 to 70 volts. To order, add prefix "V" to the model number and add $25.00 to the standard price of models with output voltages of 3 to 28 V, $35.00 to the price of models with output voltages from 30 to 70 V.

Remote Voltage Sensing: Provision for sensing the output voltage across the load, so that drops in the load lines are compensated, is available on all models. (This option also permits the use of an externally located potentiometer to adjust output voltage.) To order, add prefix "R" to the model number. No increase in price.


5.12
1.25
Voltage Adj.
3.44
FUSE
2.75
+ −
OUT AC GND
1.37
.75
Barrier strip with 5-40 Terminal Screws
.375 (Typ.)
.56
1.44
.78
1.0
L
M
4.5
3.0
Bottom mounting 8-32 threaded holes (4)
Remove screws for rear mounting
Side mounting 8-32 threaded holes (4)

Size	L	M	Approx. Weight
G3	3.71	1.62	3 lb 2 oz
G5	5.09	3.00	4 lb 14 oz
G6	6.59	4.00	5 lb 8 oz
G9	9.25	6.00	7 lb 4 oz
G13	13.25	10.00	11 lb

230 Volt Input: All models can be alternately furnished for operation on inputs of 210–250 VAC, 50–400 Hz. To order, add suffix "-230" to model number and $25.00 to price.

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SERIES A
SERIES B

Nominal Output Voltage	Ad- just ±V.	Output Current Amps. at			Regulation		Ripple mv RMS	Price	Model	Size
		40°C	55°C	71°C	Load ±%*	Line ±%*				
1.5	.5	6.0	4.3	3.5	.005	.005	.250	$195	A1.5MT600	M6
1.5	.5	9.0	7.2	5.5	.005	.005	.250	225	A1.5MT900	M9
1.5	.5	12.0	10.0	8.0	.005	.005	.250	250	A1.5MT1200	M13
1.5	.5	22.0	18.5	15.5	.005	.005	.250	340	A1.5H2200	H11
1.5	.5	32.0	27.0	22.5	.005	.005	.250	410	A1.5H3200	H16
3	.5	.250	.250	.250	.2	.1	1	75	B3G25	G3
3	.5	.500	.500	.500	.2	.1	1	95	B3G50	G3
3	.5	.750	.750	.750	.2	.1	1	100	B3G75	G3
3	.5	1.2	1.1	1.0	.2	.1	1	115	B3G120	G3
3	.5	2.1	2.1	2.0	.5	.1	1	135	B3G210	G5
3	.5	4.0	3.5	3.0	.5	.1	1.5	170	B3G400	G6
3	.5	6.0	4.3	3.5	.005	.005	.250	200	A3MT600	M6
3	.5	7.0	5.9	4.9	.5	.1	1.5	210	B3G700	G9
3	.5	9.0	7.2	5.5	.005	.005	.250	225	A3MT900	M9
3	.5	10.0	9.0	7.0	.5	.1	1.5	240	B3G1000	G13
3	.5	12.0	10.0	8.0	.005	.005	.250	250	A3MT1200	M13
3	.5	17.0	14.5	12.0	.005	.005	.250	300	A3H1700	H8
3	.5	20.0	16.5	13.5	.005	.005	.250	340	A3H2000	H11
3	.5	30.0	25.0	20.0	.005	.005	.250	410	A3H3000	H16
3.6	.5	.250	.250	.250	.2	.1	1	75	B3.6G25	G3
3.6	.5	.500	.500	.500	.2	.1	1	95	B3.6G50	G3
3.6	.5	.750	.750	.750	.2	.1	1	100	B3.6G75	G3
3.6	.5	1.2	1.1	1.0	.2	.1	1	115	B3.6G120	G3
3.6	.5	2.1	2.1	2.0	.5	.1	1	135	B3.6G210	G5
3.6	.5	4.0	3.5	3.0	.5	.1	1.5	170	B3.6G400	G6
3.6	.5	6.0	4.3	3.5	.005	.005	.250	200	A3.6MT600	M6
3.6	.5	7.0	5.9	4.9	.5	.1	1.5	210	B3.6G700	G9
3.6	.5	9.0	7.2	5.5	.005	.005	.250	225	A3.6MT900	M9
3.6	.5	12.0	10.0	8.0	.005	.005	.250	250	A3.6MT1200	M13
3.6	.5	17.0	14.5	12.0	.005	.005	.250	300	A3.6H1700	H8
3.6	.5	22.0	18.5	15.5	.005	.005	.250	340	A3.6H2200	H11
3.6	.5	32.0	27.0	22.5	.005	.005	.250	410	A3.6H3200	H16
5	.5	.250	.250	.250	.1	.1	1	75	B5G25	G3
5	.5	.500	.500	.500	.1	.1	1	95	B5G50	G3
5	.5	.750	.750	.750	.1	.1	1	100	B5G75	G3
5	.5	1.2	1.1	1.0	.1	.1	1	115	B5G120	G3
5	.5	1.7	1.5	1.3	.2	.1	1.5	120	B5G170	G3
5	.5	2.1	2.1	2.0	.2	.1	1.5	135	B5G210	G5
5	.5	4.0	3.5	3.0	.3	.1	1.5	160	B5G400	G6
5	.5	5.0	4.4	3.0	.4	.1	1.5	175	B5G500	G6
5	.5	5.1	3.6	2.6	.005	.005	.250	190	A5MT510	M6
5	.5	6.0	4.3	3.5	.005	.005	.250	200	A5MT600	M6
5	.5	8.0	7.0	5.0	.4	.1	1.5	205	B5G800	G9
5	.5	9.0	7.2	5.5	.005	.005	.250	225	A5MT900	M9
5	.5	10.0	9.0	7.0	.4	.1	1.5	230	B5G1000	G13
5	.5	12.0	10.0	8.0	.005	.005	.250	250	A5MT1200	M13
5	.5	17.0	14.5	12.0	.005	.005	.250	300	A5H1700	H8
5	.5	22.0	18.5	15.0	.005	.005	.250	340	A5H2200	H11
5	.5	32.0	27.0	22.0	.005	.005	.250	410	A5H3200	H16
6	1	.250	.250	.250	.1	.1	1	75	B6G25	G3
6	1	.500	.500	.500	.1	.1	1	95	B6G50	G3
6	1	.750	.750	.750	.1	.1	1	100	B6G75	G3
6	.5	1.2	1.1	1.0	.1	.1	1	115	B6G120	G3
6	.5	1.7	1.5	1.3	.2	.1	1.5	120	B6G170	G3
6	.5	3.2	3.1	3.0	.3	.1	1.5	155	B6G320	G6
6	.5	4.9	3.5	2.5	.005	.005	.250	175	A6MT490	M6
6	.5	5.5	4.5	3.5	.4	.1	1.5	180	B6G550	G6
6	.5	6.0	4.5	3.5	.005	.005	.250	200	A6MT600	M6
6	.5	8.5	7.5	5.2	.005	.005	.250	225	A6MT850	M9
6	.5	8.8	6.9	5.0	.4	.1	1.5	225	B6G880	G9
6	.5	10.0	8.0	7.0	.4	.1	1.5	230	B6G1000	G13
6	.5	11.0	9.3	7.5	.005	.005	.250	250	A6MT1100	M13
6	.5	16.0	13.6	11.2	.005	.005	.250	300	A6H1600	H8
6	.5	21.0	17.0	14.0	.005	.005	.250	340	A6H2100	H11
6	.5	28.0	23.0	19.0	.005	.005	.250	410	A6H2800	H16
7	1	.200	.200	.200	.05	.05	1	75	B7G20	G3
7	1	.500	.500	.500	.1	.05	1	95	B7G50	G3
7	1	.750	.750	.750	.1	.1	1	105	B7G75	G3
7	1	1.0	1.0	1.0	.1	.1	1	115	B7G100	G3
7	.5	2.0	2.0	2.0	.2	.1	1.5	145	B7G200	G5
7	.5	3.0	2.7	2.5	.3	.1	1.5	155	B7G300	G6
7	.5	5.0	4.0	3.0	.005	.005	.250	175	A7MT500	M6
7	.5	6.5	5.2	4.0	.4	.1	1.0	200	B7G650	G9
7	.5	8.0	6.5	5.0	.005	.005	.250	225	A7MT800	M9
7	.5	10.0	8.0	7.0	.4	.1	1.5	240	B7G1000	G13
7	.5	10.0	8.8	7.0	.005	.005	.250	250	A7MT1000	M13
8	1	.200	.200	.200	.05	.05	1	75	B8G20	G3
8	1	.500	.500	.500	.1	.05	1	95	B8G50	G3
8	1	.750	.750	.750	.1	.1	1	100	B8G75	G3
8	1	1.0	1.0	1.0	.1	.1	1	115	B8G100	G3
8	.5	2.0	2.0	2.0	.2	.1	1.5	145	B8G200	G5
8	.5	3.0	2.7	2.5	.2	.1	1.5	155	B8G300	G6
8	.5	5.0	4.0	3.5	.005	.005	.250	175	A8MT500	M6
8	.5	6.5	5.2	4.0	.3	.1	1.5	200	B8G650	G9
8	.5	8.0	6.5	5.0	.005	.005	.250	225	A8MT800	M9
8	.5	10.0	8.0	7.0	.4	.1	1.5	225	B8G1000	G13
8	.5	10.5	8.8	7.0	.005	.005	.250	250	A8MT1050	M13
8	.5	20.0	16.8	13.5	.005	.005	.250	340	A8H2000	H11
8	.5	28.0	23.0	19.0	.005	.005	.250	410	A8H2800	H16
9	1	.200	.200	.200	.05	.05	1	75	B9G20	G3
9	1	.500	.500	.500	.1	.05	1	95	B9G50	G3
9	1	.750	.750	.750	.1	.1	1	105	B9G75	G3
9	1	1.0	1.0	1.0	.1	.1	1	115	B9G100	G3
9	.5	2.0	2.0	2.0	.2	.1	1.5	145	B9G200	G5
9	.5	3.0	2.7	2.5	.2	.1	1.5	155	B9G300	G6
9	.5	6.5	5.2	4.0	.3	.1	1.5	195	B9G650	G9
9	.5	10.0	8.3	7.0	.4	.1	1.5	240	B9G1000	G13
9	.5	10.0	8.3	7.0	.005	.005	.250	250	A9MT1000	M13
10	1	.200	.200	.200	.05	.05	1	75	B10G20	G3
10	1	.500	.500	.500	.1	.05	1	95	B10G50	G3
10	1	.750	.750	.75	.1	.1	1	105	B10G75	G3
10	1	1.0	1.0	1.0	.1	.1	1	115	B10G100	G3
10	.5	2.0	2.0	2.0	.2	.1	1.5	$145	B10G200	G5
10	.5	3.0	2.7	2.5	.2	.1	1.5	155	B10G300	G6
10	.5	4.5	3.6	2.7	.005	.005	.250	175	A10MT450	M6
10	.5	6.0	5.0	4.0	.3	.1	1.5	205	B10G600	G9
10	.5	7.5	6.0	4.5	.005	.005	.250	225	A10MT750	M9
10	.5	10.0	8.3	7.0	.4	.1	1.5	225	B10G1000	G13
10	.5	10.0	8.3	7.0	.005	.005	.250	250	A10MT1000	M13
10	.5	14.0	11.9	9.8	.005	.005	.250	300	A10H1400	H8
10	.5	18.0	15.0	12.0	.005	.005	.250	340	A10H1800	H11
10	.5	25.0	20.0	16.5	.005	.005	.250	410	A10H2500	H16
12	1	.200	.200	.200	.05	.05	1	75	B12G20	G3
12	1	.500	.500	.500	.1	.05	1	95	B12G50	G3
12	1	.750	.750	.750	.1	.1	1	105	B12G75	G3
12	1	1.0	1.0	1.0	.1	.1	1	115	B12G100	G3
12	1	1.3	1.1	1.0	.1	.1	1	120	B12G130	G3
12	1	1.5	1.4	1.3	.1	.1	1.5	130	B12G150	G3
12	.5	2.0	1.7	1.5	.2	.1	1.5	135	B12G200	G5
12	.5	3.0	2.7	2.5	.2	.1	1.5	155	B12G300	G6
12	.5	3.8	3.3	2.6	.2	.1	1.5	160	B12G380	G6
12	.5	4.0	3.3	2.6	.005	.005	.250	175	A12MT400	M6
12	.5	6.5	5.3	4.0	.3	.1	1.5	205	B12G650	G9
12	.5	6.5	5.3	4.0	.005	.005	.250	225	A12MT650	M9
12	.5	9.0	7.5	6.0	.4	.1	1.5	240	B12G900	G13
12	.5	9.0	7.5	6.0	.005	.005	.250	250	A12MT900	M13
12	.5	13.0	11.0	9.1	.005	.005	.250	300	A12H1300	H8
12	.5	17.0	14.3	11.5	.005	.005	.250	340	A12H1700	H11
12	.5	21.0	17.5	14.5	.005	.005	.250	410	A12H2100	H16
13	1	.200	.200	.200	.05	.05	1	75	B13G20	G3
13	1	.500	.500	.500	.1	.05	1	95	B13G50	G3
13	1	.750	.750	.750	.1	.1	1	105	B13G75	G3
13	1	1.0	1.0	1.0	.1	.1	1	115	B13G100	G3
13	1	1.5	1.4	1.3	.1	.1	1.5	130	B13G150	G3
13	.5	2.0	2.0	2.0	.2	.1	1.5	145	B13G200	G5
13	.5	3.0	2.7	2.5	.2	.1	1.5	160	B13G300	G6
13	.5	3.5	3.0	2.5	.005	.005	.250	175	A13MT350	M6
13	.5	5.0	4.5	4.0	.2	.1	1.5	195	B13G500	G9
13	.5	8.0	7.5	7.0	.3	.1	1.5	230	B13G800	G13
13	.5	8.0	7.5	7.0	.005	.005	.250	250	A13MT800	M13
14	1	.200	.200	.200	.05	.05	1	75	B14G20	G3
14	1	.500	.500	.500	.1	.05	1	95	B14G50	G3
14	1	1.0	1.0	1.0	.1	.1	1	115	B14G100	G3
14	1	1.5	1.4	1.3	.1	.1	1.5	130	B14G150	G3
14	.5	2.0	2.0	2.0	.2	.1	1.5	145	B14G200	G5
14	.5	3.0	2.7	2.5	.2	.1	1.5	160	B14G300	G6
14	.5	3.0	2.7	2.5	.005	.005	.250	175	A14MT300	M6
14	.5	5.0	4.5	4.0	.2	.1	1.5	195	B14G500	G9
14	.5	7.0	6.5	6.0	.3	.1	1.5	230	B14G700	G13
14	.5	8.0	6.7	7.0	.005	.005	.250	250	A14MT800	M13
15	1	.200	.200	.200	.05	.05	1	75	B15G20	G3
15	1	.500	.500	.500	.1	.05	1	95	B15G50	G3
15	1	.750	.750	.750	.1	.1	1	105	B15G75	G3
15	1	1.0	1.0	1.0	.1	.1	1	115	B15G100	G3
15	1	1.3	1.1	1.0	.1	.1	1	120	B15G130	G3
15	1	1.5	1.4	1.3	.1	.1	1.5	130	B15G150	G3
15	.5	2.0	1.7	1.5	.1	.1	1.5	145	B15G200	G5
15	.5	3.0	2.8	2.5	.1	.1	1.5	160	B15G300	G6
15	.5	3.0	2.8	2.5	.005	.005	.250	175	A15MT300	M6
15	.5	4.2	3.8	3.0	.15	.1	1.5	195	B15G420	G9
15	.5	5.5	4.7	4.0	.005	.005	.250	225	A15MT550	M9
15	.5	6.0	5.0	4.0	.2	.1	1.5	225	B15G600	G9
15	.5	7.0	6.0	5.0	.2	.1	1.5	230	B15G700	G13
15	.5	8.0	6.5	5.5	.005	.005	.250	250	A15MT800	M13
15	.5	11.5	9.7	8.0	.005	.005	.250	300	A15H1150	H8
15	.5	15.0	12.8	10.5	.005	.005	.250	340	A15H1500	H11
15	.5	19.0	16.3	13.5	.005	.005	.250	410	A15H1900	H16
16	1	.200	.200	.200	.05	.05	1	75	B16G20	G3
16	1	.500	.500	.500	.1	.05	1	95	B16G50	G3
16	1	.750	.750	.750	.1	.1	1	105	B16G75	G3
16	.5	1.0	1.0	1.0	.1	.1	1	120	B16G100	G3
16	.5	3.0	2.5	2.0	.15	.1	1	175	B16G300	G9
16	.5	5.0	5.0	5.0	.2	.1	1.5	225	B16G500	G9
16	.5	6.5	5.0	5.5	.005	.005	.250	250	A16MT650	M13
18	1	.200	.200	.200	.05	.05	1	75	B18G20	G3
18	1	.500	.500	.500	.05	.05	1	95	B18G50	G3
18	1	.750	.750	.750	.1	.1	1	100	B18G75	G3
18	.5	1.1	1.1	1.0	.1	.1	1	115	B18G110	G5
18	.5	2.1	2.0	1.8	.1	.1	1	145	B18G210	G5
18	.5	2.1	2.1	2.0	.005	.005	.250	160	A18MT210	M6
18	.5	3.0	2.8	2.5	.15	.1	1	190	B18G300	G9
18	.5	4.5	4.0	3.5	.005	.005	.250	210	A18MT450	M9
18	.5	5.5	5.0	5.0	.2	.1	1.5	225	B18G550	G13
18	.5	6.5	6.0	5.5	.005	.005	.250	250	A18MT650	M13
18	.5	14.0	12.0	10.0	.005	.005	.250	340	A18H1400	H11
18	.5	18.0	15.5	13.0	.005	.005	.250	410	A18H1800	H16
20	1	.200	.200	.200	.05	.05	1	75	B20G20	G3
20	1	.500	.500	.500	.05	.05	1	95	B20G50	G3
20	1	.750	.750	.750	.1	.05	1	100	B20G75	G3
20	1	1.1	1.1	1.0	.1	.1	1	115	B20G110	G5
20	.5	1.7	1.7	1.5	.1	.1	1.5	130	B20G170	G5
20	.5	2.0	2.0	2.0	.005	.005	.250	160	A20MT200	M6
20	.5	2.7	2.0	1.2	.15	.1	1.5	190	B20G270	G6
20	.5	4.0	3.5	3.0	.005	.005	.250	210	A20MT400	M9
20	.5	5.0	5.0	5.0	.15	.1	1.5	225	B20G500	G13
20	.5	6.0	5.5	5.0	.005	.005	.250	250	A20MT600	M13
20	.5	9.5	8.0	6.6	.005	.005	.250	300	A20H950	H8
20	.5	13.0	11.3	9.5	.005	.005	.250	340	A20H1300	H11
20	.5	16.0	14.0	12.0	.005	.005	.250	410	A20H1600	H16
24	1	.200	.200	.200	.05	.05	1	75	B24G20	G3
24	1	.500	.500	.500	.05	.05	1	95	B24G50	G3
24	1	.750	.750	.750	.1	.05	1	100	B24G75	G3
24	1	1.1	1.1	1.0	.1	.1	1.5	120	B24G110	G5
24	.5	1.7	1.7	1.5	.1	.1	1.5	130	B24G170	G5

*or 2 mv, whichever is greater

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ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478 • 3-DAY SHIPMENT GUARANTEED

Nominal Output Voltage	Adjust ±V.	Output Current Amps. at 40°C	55°C	71°C	Regulation Load ±%*	Line ±%*	Ripple mv RMS	Price	Model	Size
24	.5	2.1	2.0	2.0	.1	.1	1.5	$145	B24G210	G5
24	.5	2.1	2.0	2.0	.005	.005	.250	160	A24MT210	M6
24	.5	3.5	3.0	2.5	.15	.1	1.5	200	B24G350	G9
24	5	3.5	3.0	2.5	.005	.005	.250	220	A24MT350	M9
24	.5	5.0	5.0	5.0	.15	.1	1.5	230	B24G500	G13
24	.5	5.5	5.0	4.5	.005	.005	.250	250	A24MT550	M13
24	.5	8.5	7.2	5.9	.005	.005	.250	300	A24H850	H8
24	.5	12.0	10.5	9.0	.005	.005	.250	340	A24H1200	H11
24	.5	15.0	13.0	11.0	.005	.005	.250	410	A24H1500	H16
25	1	.200	.200	.200	.05	.05	1	80	B25G20	G3
25	1	.500	.500	.500	.05	.05	1	95	B25G50	G3
25	1	.750	.750	.750	.1	.05	1	100	B25G75	G3
25	1	1.2	1.1	1.0	.1	.1	1.5	120	B25G120	G5
25	.5	1.7	1.7	1.5	.1	.1	1.5	145	B25G170	G5
25	.5	2.1	2.1	2.0	.1	.1	1.5	155	B25G210	G5
25	.5	3.5	3.0	2.5	.15	.1	1.5	200	B25G350	G9
25	.5	5.0	5.0	5.0	.15	.1	1.5	230	B25G500	G13
28	1	.100	.100	.100	.05	.05	1	80	B28G10	G3
28	1	.200	.200	.200	.05	.05	1	85	B28G20	G3
28	1	.500	.500	.500	.05	.05	1	95	B28G50	G3
28	1	.800	.800	.800	.1	.05	1	120	B28G80	G5
28	1	1.1	1.1	1.0	.1	.05	1	135	B28G110	G5
28	.5	1.8	1.6	1.5	.1	.1	1.5	150	B28G180	G5
28	.5	2.1	2.1	2.0	.1	.1	1.5	155	B28G210	G5
28	.5	2.1	2.1	2.0	.005	.005	.250	170	A28MT210	M6
28	.5	3.0	2.7	2.5	.15	.1	1.5	180	B28G300	G9
28	.5	3.0	2.7	2.5	.005	.005	.250	200	A28MT300	M9
28	.5	5.0	5.0	5.0	.15	.1	1.5	230	B28G500	G13
28	.5	5.0	5.0	5.0	.005	.005	.250	250	A28MT500	M13
28	.5	8.0	6.8	5.6	.005	.005	.250	300	A28H800	H8
28	.5	11.0	9.5	8.0	.005	.005	.250	340	A28H1100	H11
28	.5	14.0	12.0	10.0	.005	.005	.250	410	A28H1400	H16
30	1	.100	.100	.100	.05	.05	1	80	B30GT10	G3
30	1	.200	.200	.200	.05	.05	1	85	B30GT20	G3
30	1	.500	.500	.500	.05	.05	1	95	B30GT50	G3
30	1	.750	.750	.700	.1	.05	1	120	B30GT75	G5
30	1	1.1	1.1	1.0	.1	.1	1	135	B30GT110	G5
30	.5	1.7	1.6	1.5	.1	.1	1.5	150	B30GT170	G5
30	.5	2.1	2.1	2.0	.1	.1	1.5	155	B30GT210	G5
30	.5	2.1	2.1	2.0	.005	.005	.250	175	A30MT210	M6
30	.5	3.0	2.7	2.5	.005	.005	.250	205	A30MT300	M9
30	.5	5.0	5.0	5.0	.15	.1	1.5	230	B30GT500	G13
30	.5	5.0	5.0	5.0	.005	.005	.250	250	A30MT500	M13
30	.5	7.5	6.3	5.2	.005	.005	.250	300	A30H750	H8
30	.5	10.0	9.0	8.0	.005	.005	.250	340	A30H1000	H11
30	.5	14.0	12.0	10.0	.005	.005	.250	410	A30H1400	H16
32	1	.100	.100	.100	.05	.05	1	80	B32GT10	G3
32	1	.300	.300	.300	.05	.05	1	95	B32GT30	G3
32	1	.500	.500	.500	.05	.05	1	100	B32GT50	G3
32	1	.600	.600	.600	.1	.05	1	120	B32GT60	G3
32	1	1.0	1.0	1.0	.1	.1	1	135	B32GT100	G5
32	1	1.5	1.5	1.5	.1	.1	1.5	155	B32GT150	G5
34	1	.200	.200	.200	.05	.05	1	85	B34GT20	G3
34	1	.800	.800	.800	.1	.1	1	130	B34GT80	G5
34	1	1.5	1.5	1.5	.1	.1	1.5	155	B34GT150	G5
35	1	.100	.100	.100	.05	.05	1	80	B35GT10	G3
35	1	.200	.200	.200	.05	.05	1	85	B35GT20	G3
35	1	.500	.500	.500	.05	.05	1	100	B35GT50	G3
35	1	.600	.600	.600	.1	.05	1	120	B35GT60	G3
35	1	.800	.800	.800	.1	.1	1.5	130	B35GT80	G5
36	1	.100	.100	.100	.05	.05	1	80	B36GT10	G3
36	1	.200	.200	.200	.05	.05	1	95	B36GT20	G3
36	1	.500	.500	.500	.05	.05	1	105	B36GT50	G3
36	1	.600	.600	.500	.1	.05	1	120	B36GT60	G5
36	1	.800	.750	.700	.1	.05	1	130	B36GT80	G5
36	.5	1.3	1.3	1.3	.1	.1	1.5	145	B36GT130	G6
36	.5	1.3	1.3	1.3	.005	.005	.250	160	A36MT130	M6
36	.5	2.3	2.0	1.8	.1	.1	1.5	200	B36GT230	G9
36	.5	2.3	2.0	1.8	.005	.005	.250	220	A36MT230	M9
36	.5	4.0	3.2	2.5	.005	.005	.250	260	A36MT400	M13
40	1	.100	.100	.100	.05	.05	1	80	B40GT10	G3
40	1	.200	.200	.200	.05	.05	1	95	B40GT20	G3
40	1	.300	.300	.300	.05	.05	1	105	B40GT30	G3
40	1	.400	.400	.400	.05	.05	1	115	B40GT40	G3
40	1	.500	.500	.500	.1	.05	1	125	B40GT50	G5
45	1	.100	.100	.100	.05	.05	1	80	B45GT10	G3
45	1	.200	.200	.200	.05	.05	1	95	B45GT20	G3
45	1	.300	.300	.300	.05	.05	1	105	B45GT30	G3
45	1	.400	.400	.400	.05	.05	1	125	B45GT40	G3
48	1	.100	.100	.100	.05	.05	1	85	B48GT10	G3
48	1	.200	.200	.200	.05	.05	1	100	B48GT20	G3
48	1	.300	.300	.300	.05	.05	1	120	B48GT30	G3
48	1	.400	.400	.400	.05	.05	1	130	B48GT40	G3
48	1	.600	.600	.600	.1	.1	1	150	B48GT60	G5
48	1	1.1	1.0	.600	.1	.1	1.5	170	B48GT110	G6
48	1	1.8	1.6	1.2	.1	.1	1.5	205	B48GT180	G9
48	1	1.8	1.6	1.2	.005	.005	.250	225	A48MT180	M9
48	.5	3.0	2.6	2.1	.005	.005	.250	260	A48MT300	M13
50	1	.100	.100	.100	.05	.05	1	80	B50GT10	G3
50	1	.200	.200	.200	.05	.05	1	95	B50GT20	G3
50	1	.300	.300	.300	.05	.05	1	120	B50GT30	G3
50	1	.400	.400	.400	.05	.05	1	130	B50GT40	G3
50	1	.500	.500	.500	.05	.05	1	160	B50GT50	G5
50	.5	2.7	2.3	1.8	.005	.005	.250	275	A50MT270	M13
55	1	.100	.100	.100	.05	.05	1	95	B55GT10	G3
55	1	.200	.200	.200	.05	.05	1	120	B55GT20	G3
55	1	.300	.300	.300	.05	.05	1	130	B55GT30	G3
55	1	.400	.400	.400	.05	.05	1	155	B55GT40	G5
55	1	.500	.500	.500	.05	.05	1	160	B55GT50	G5
60	1	.050	.050	.050	.05	.05	1	$ 95	B60GT05	G3
60	1	.100	.100	.100	.05	.05	1	105	B60GT10	G3
60	1	.200	.200	.200	.05	.05	1	120	B60GT20	G3
60	1	.300	.300	.300	.05	.05	1	155	B60GT30	G3
60	1	.400	.400	.400	.05	.05	1	160	B60GT40	G5
65	1	.050	.050	.050	.05	.05	1	95	B65GT05	G3
65	1	.100	.100	.100	.05	.05	1	105	B65GT10	G3
65	1	.300	.300	.300	.05	.05	1	155	B65GT30	G3
70	1	.050	.050	.050	.05	.05	1	95	B70GT05	G3
70	1	.100	.100	.100	.05	.05	1	105	B70GT10	G3
70	1	.200	.200	.200	.05	.05	1	120	B70GT20	G3
70	1	.300	.300	.300	.05	.05	1	155	B70GT30	G3
75	1	.050	.050	.050	.05	.05	1	105	B75GT05	G3
75	1	.100	.100	.100	.05	.05	1	120	B75GT10	G3
75	1	.200	.200	.200	.05	.05	1	155	B75GT20	G3
75	.5	2.0	1.8	1.5	.005	.005	.250	275	A75MT200	M13
80	1	.050	.050	.050	.05	.05	1	105	B80GT05	G3
80	1	.100	.100	.100	.05	.05	1	120	B80GT10	G3
80	1	.200	.200	.200	.05	.05	1	155	B80GT20	G3
85	1	.050	.050	.050	.05	.05	1	115	B85GT05	G3
85	1	.100	.100	.100	.05	.05	1	145	B85GT10	G3
85	1	.200	.200	.200	.05	.05	1	155	B85GT20	G3
90	1	.050	.050	.050	.05	.05	1	120	B90GT05	G3
90	1	.100	.100	.100	.05	.05	1	150	B90GT10	G3
90	1	.200	.200	.200	.05	.05	1	160	B90GT20	G3
90	1	1.5	1.3	1.0	.005	.005	.250	275	A90MT150	M13
95	1	.050	.050	.050	.05	.05	1	135	B95GT05	G3
95	1	.100	.100	.100	.05	.05	1	150	B95GT10	G3
95	1	.200	.200	.200	.05	.05	1	160	B95GT20	G3
100	1	.050	.050	.050	.05	.05	1	135	B100GT05	G3
100	1	.100	.100	.100	.05	.05	1	150	B100GT10	G3
100	1	.200	.200	.200	.05	.05	1	160	B100GT20	G3
100	1	.460	.460	.340	.1	.1	1.5	180	B100GT46	G6
100	1	.650	.650	.650	.1	.1	1.5	200	B100GT65	G9
100	1	1.3	1.2	1.0	.005	.005	.250	275	A100MT130	M13
110	1	.050	.050	.050	.05	.05	1	145	B110GT05	G3
110	1	.100	.100	.100	.05	.05	1	155	B110GT10	G3
110	1	.200	.200	.200	.05	.05	1	170	B110GT20	G3
120	1	.050	.050	.050	.05	.05	1	145	B120GT05	G3
120	1	.100	.100	.100	.05	.05	1	155	B120GT10	G3
120	1	.200	.200	.200	.05	.05	1	170	B120GT20	G3
120	1	.400	.400	.300	.1	.1	1.5	190	B120GT40	G6
120	1	.550	.550	.550	.1	.1	1.5	200	B120GT55	G9
120	1	1.2	1.1	1.0	.005	.005	.250	275	A120MT120	M13
125	1	.050	.050	.050	.05	.05	1	150	B125GT05	G3
125	1	.100	.100	.100	.05	.05	1	160	B125GT10	G3
125	1	.200	.200	.200	.05	.05	1	175	B125GT20	G3
130	1	.200	.200	.200	.05	.05	1	175	B130GT20	G3
135	1	.200	.200	.200	.05	.05	1	175	B135GT20	G3
140	1	.200	.200	.200	.05	.05	1	175	B140GT20	G3
150	1	.050	.050	.050	.05	.05	1	150	B150GT05	G3
150	1	.100	.100	.100	.05	.05	1	160	B150GT10	G3
150	1	.200	.200	.200	.05	.05	1	175	B150GT20	G3
150	1	.320	.320	.250	.1	.1	1.5	190	B150GT32	G6
150	1	.420	.420	.420	.1	.1	1.5	200	B150GT42	G9
150	1	1.0	.900	.800	.005	.005	.250	300	A150MT100	M13
200	1	.050	.050	.050	.5	.5	5	155	B200GT05	G3
200	1	.100	.100	.100	.5	.5	5	170	B200GT10	G3

or 2 mv, whichever is greater

MODELS WITH WIDE ADJUSTMENT RANGES

Load Regulation: ±0.005%*

Line Regulation: ±0.005%*

Ripple: 0.250 mv RMS

Other Specifications:
Same as Series A

Contact factory for information on other models with wide adjustment ranges.

Output Voltage Range	Output Current Amps. at 40°C	55°C	71°C	Price	Model	Size
0-6	1.2	1.2	1.2	$140	A06MT120	M6
0-6	2.0	2.0	2.0	160	A06MT200	M6
0-6	3.0	2.5	2.0	190	A06MT300	M6
0-6	5.0	4.0	3.0	215	A06MT500	M9
0-6	8.0	7.0	6.0	260	A06MT800	M13
0-6	12.0	10.0	7.0	355	A06HT1200	H11
0-6	16.0	13.0	10.0	420	A06HT1600	H16
0-15	1.0	1.0	1.0	140	A015MT100	M6
0-15	2.0	2.0	2.0	190	A015MT200	M6
0-15	2.5	2.0	1.5	215	A015MT250	M9
0-15	5.0	4.0	2.5	260	A015MT500	M13
0-15	8.0	6.0	4.0	355	A015HT800	H11
0-15	10.0	8.0	6.0	420	A015HT1000	H16
0-30	.500	.500	.500	160	A030MT50	M6
0-30	1.0	1.0	1.0	190	A030MT100	M6
0-30	1.6	1.4	1.2	215	A030MT160	M9
0-30	2.5	2.0	1.5	260	A030MT250	M13
0-30	4.0	3.0	2.0	355	A030HT400	H11
0-30	5.0	4.0	3.0	420	A030HT500	H16
0-50	.350	.340	.330	160	A050MT35	M6
0-50	.600	.500	.400	190	A050MT60	M6
0-50	.850	.750	.650	215	A050MT85	M9
0-100	.100	.090	.080	205	A0100MT10	M6
0-100	.250	.200	.150	230	A0100MT25	M6

Acopian

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NARROW PROFILE REGULATED

ALL MODELS U.L. RECOGNIZED

Where only a narrow mounting space is available, Acopian narrow profile power supplies fit when many others cannot. Choose from Series A (high performance) and Series B (lower priced) models with output ratings up to 150 volts, up to 3.5 amps.

SPECIFICATIONS

Input Voltage: 105–125 VAC, 50–400 Hz, single phase.

Output Specifications: See table. Series A supplies have model numbers beginning with the letter A; Series B, with the letter B.

Remote Voltage Adjustment/Sensing: Standard in Series A, not available in Series B.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Ambient Operating Temperature: Series A, −20 to +71°C; Series B, 0 to 71°C.

Storage Temperature: −55 to +85°C.

Short Circuit and Overload Protection: Series A, electronic current limiting with automatic recovery; Series B, fused—delivers current surges without damage.

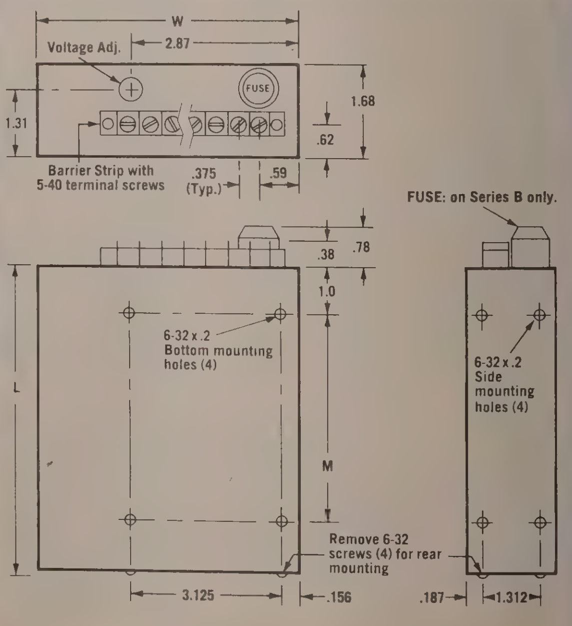
OPTIONS

Overvoltage Protection: An internal preset overvoltage protector is available on all models with outputs of 3 to 70 V. To order, add prefix "V" to the model number and add $25.00 to the standard price of models with output voltages of 3 to 28 V, $35.00 to the price of models with output voltages from 30 to 70 V.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210–250 VAC, 50–400 Hz. To order, add suffix "-230" to model number and $25.00 to price.

MODELS WITH WIDE ADJUSTMENT RANGES

Output Voltage Range	Output Current (To +71°C)	Regulation Load ±%*	Regulation Line ±%*	Ripple mv RMS	Price	Model	Size
0-7	1.0	0.005	0.005	0.250	$130	A07NT100	N8
0-7	2.1	0.005	0.005	0.250	155	A07NT210	N8H
0-18	.400	0.005	0.005	0.250	120	A018NT40	N8
0-18	1.0	0.005	0.005	0.250	150	A018NT100	N8H
0-32	.250	0.005	0.005	0.250	120	A032NT25	N8
0-32	.600	0.005	0.005	0.250	165	A032NT60	N8H
0-60	.125	0.005	0.005	0.250	145	A060NT12	N8T
0-60	.250	0.005	0.005	0.250	165	A060NT25	N8H
0-150	.050	0.005	0.005	0.250	175	A0150NT05	N8T
0-150	.100	0.005	0.005	0.250	215	A0150NT10	N8H



W
Voltage Adj.
2.87
FUSE
1.31
1.68
.62
Barrier Strip with 5-40 terminal screws
.375 (Typ.)
.59
FUSE: on Series B only.
.38
.78
1.0
L
6-32 x .2 Bottom mounting holes (4)
6-32 x .2 Side mounting holes (4)
M
Remove 6-32 screws (4) for rear mounting
3.125
.156
.187
1.312

Size	L	W	M	Approx. Weight
F6	6.59	3.44	4.0	2lb 4oz
F6T	6.59	3.81	4.0	2lb 4oz
N8	8.47	3.44	5.0	3lb
F8T	8.47	3.81	5.0	3lb 2oz
N8T	8.47	3.81	5.0	3lb 2oz
N8H	8.47	4.68	5.0	3lb 14oz

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478 • 3-DAY SHIPMENT GUARANTEED

Nominal Output Voltage	Adjust ±V.	Output Current Amps. at			Regulation		Ripple mv RMS	Price	Model	Size
		40°C	55°C	71°C	Load ±%*	Line ±%*				
1	.5	1.1	1.0	1.0	.005	.005	.250	$125	A1NT110	N8
1	.5	2.2	2.1	2.0	.005	.005	.250	150	A1NT220	N8T
1	.5	3.5	3.5	3.0	.005	.005	.250	180	A1NT350	N8H
1.5	.5	1.1	1.0	1.0	.005	.005	.250	125	A1.5NT110	N8
1.5	.5	2.2	2.1	2.0	.005	.005	.250	150	A1.5NT220	N8T
1.5	.5	3.5	3.5	3.0	.005	.005	.250	180	A1.5NT350	N8H
2	.5	1.1	1.0	1.0	.005	.005	.250	125	A2NT110	N8
2	.5	2.2	2.1	2.0	.005	.005	.250	150	A2NT220	N8T
2	.5	3.0	3.0	3.0	.005	.005	.250	180	A2NT300	N8H
3	.5	.500	.500	.500	.5	.05	1	100	B3N50	F6
3	.5	1.0	1.0	1.0	.5	.1	1	115	B3N100	F6
3	.5	1.1	1.0	1.0	.005	.005	.250	125	A3NT110	N8
3	.5	2.2	2.1	2.0	.005	.005	.250	150	A3NT220	N8T
3	.5	3.5	3.5	3.0	.005	.005	.250	180	A3NT350	N8H
3.6	.5	.500	.500	.500	.5	.05	1	100	B3.6N50	F6
3.6	.5	1.0	1.0	1.0	.5	.1	1	115	B3.6N100	F6
3.6	.5	1.1	1.0	1.0	.005	.005	.250	125	A3.6NT110	N8
3.6	.5	2.2	2.1	2.0	.005	.005	.250	150	A3.6NT220	N8T
3.6	.5	3.5	3.5	3.0	.005	.005	.250	180	A3.6NT350	N8H
5	.5	.500	.500	.500	.1	.1	1	100	B5N50	F6
5	.5	1.0	1.0	1.0	.1	.1	1	115	B5N100	F6
5	.5	1.1	1.0	1.0	.005	.005	.250	125	A5NT110	N8
5	.5	2.2	2.1	2.0	.005	.005	.250	150	A5NT220	N8T
5	.5	3.5	3.5	3.0	.005	.005	.250	180	A5NT350	N8H
6	1	.500	.500	.500	.1	.1	1	100	B6N50	F6
6	.5	1.0	1.0	1.0	.1	.1	1	115	B6N100	F6
6	.5	1.1	1.0	1.0	.005	.005	.250	125	A6NT110	N8
6	.5	2.2	2.1	2.0	.005	.005	.250	150	A6NT220	N8T
6	.5	3.0	3.0	3.0	.005	.005	.250	180	A6NT300	N8H
7	1	.500	.500	.500	.1	.1	1	100	B7N50	F6
7	1	1.0	1.0	1.0	.1	.1	1	115	B7N100	F6
7	.5	1.1	1.0	1.0	.005	.005	.250	130	A7NT110	N8
7	.5	2.0	2.0	2.0	.005	.005	.250	155	A7NT200	N8H
8	1	.500	.500	.500	.1	.1	1	100	B8N50	F6
8	1	1.0	1.0	1.0	.1	.1	1	115	B8N100	F6
8	.5	1.1	1.0	1.0	.005	.005	.250	130	A8NT110	N8
8	.5	2.0	2.0	2.0	.005	.005	.250	155	A8NT200	N8H
9	1	.500	.500	.500	.1	.1	1	105	B9N50	F6
9	1	1.0	1.0	1.0	.1	.1	1	120	B9N100	F6
9	.5	1.1	1.0	1.0	.005	.005	.250	135	A9NT110	N8
9	.5	2.0	2.0	2.0	.005	.005	.250	165	A9NT200	N8H
10	1	.500	.500	.500	.1	.1	1	105	B10N50	F6
10	1	1.0	1.0	1.0	.1	.1	1	120	B10N100	F6
10	.5	1.1	1.0	1.0	.005	.005	.250	135	A10NT110	N8
10	.5	2.0	2.0	2.0	.005	.005	.250	165	A10NT200	N8H
11	1	.500	.500	.500	.1	.1	1	105	B11N50	F6
11	1	1.0	1.0	.750	.1	.1	1	120	B11N100	F6
11	.5	1.1	1.0	1.0	.005	.005	.250	135	A11NT110	N8
11	.5	2.0	2.0	2.0	.005	.005	.250	165	A11NT200	N8H
12	1	.500	.500	.500	.1	.1	1	105	B12N50	F6
12	1	1.0	1.0	.750	.1	.1	1	120	B12N100	F6
12	.5	1.1	1.0	1.0	.005	.005	.250	135	A12NT110	N8
12	.5	2.0	2.0	2.0	.005	.005	.250	165	A12NT200	N8H
13	1	.500	.500	.500	.1	.1	1	105	B13N50	F6
13	1	1.0	1.0	.750	.1	.1	1	120	B13N100	F6
13	.5	1.1	1.0	1.0	.005	.005	.250	135	A13NT110	N8
13	.5	2.0	2.0	2.0	.005	.005	.250	165	A13NT200	N8H
14	1	.500	.500	.500	.1	.1	1	105	B14N50	F6
14	1	1.0	1.0	.750	.1	.1	1	120	B14N100	F6
14	.5	1.1	1.0	1.0	.005	.005	.250	135	A14NT110	N8
14	.5	2.0	2.0	2.0	.005	.005	.250	165	A14NT200	N8H
15	1	.500	.500	.500	.1	.1	1	105	B15N50	F6
15	1	1.0	1.0	.750	.1	.1	1	120	B15N100	F6
15	.5	1.1	1.0	1.0	.005	.005	.250	135	A15NT110	N8
15	.5	2.0	2.0	2.0	.005	.005	.250	165	A15NT200	N8H
16	1	.500	.500	.500	.1	.1	1	105	B16N50	F6
16	1	1.0	1.0	.750	.1	.1	1	120	B16N100	F6
16	.5	1.0	1.0	1.0	.005	.005	.250	140	A16NT100	N8
16	.5	1.75	1.75	1.75	.005	.005	.250	160	A16NT175	N8H
18	1	.500	.500	.500	.1	.1	1	105	B18N50	F6
18	1	.750	.750	.750	.1	.1	1	120	B18N75	F6
18	.5	1.0	1.0	1.0	.005	.005	.250	140	A18NT100	N8
18	.5	1.5	1.5	1.5	.005	.005	.250	160	A18NT150	N8H
20	1	.400	.400	.400	.05	.05	1	105	B20N40	F6
20	1	.750	.750	.750	.1	.1	1	120	B20N75	F6
20	.5	.900	.900	.900	.005	.005	.250	140	A20NT90	N8
20	.5	1.25	1.25	1.25	.005	.005	.250	160	A20NT125	N8H
24	1	.200	.200	.200	.05	.05	1	90	B24N20	F6
24	1	.400	.400	.400	.05	.05	1	105	B24N40	F6
24	1	.750	.750	.750	.1	.1	1	120	B24N75	F6
24	.5	.900	.800	.750	.005	.005	.250	140	A24NT90	N8
24	.5	1.0	1.0	1.0	.005	.005	.250	145	A24NT100	N8
24	.5	1.25	1.25	1.25	.005	.005	.250	160	A24NT125	N8H
25	1	.200	.200	.200	.05	.05	1	90	B25N20	F6
25	1	.400	.400	.400	.05	.05	1	105	B25N40	F6
25	1	.750	.750	.750	.1	.05	1	120	B25N75	F6
25	.5	.750	.750	.750	.005	.005	.250	140	A25NT75	N8
25	.5	1.25	1.25	1.25	.005	.005	.250	160	A25NT125	N8H
26	1	.200	.200	.200	.05	.05	1	90	B26N20	F6
26	1	.400	.400	.400	.05	.05	1	105	B26N40	F6
26	1	.750	.750	.750	.1	.05	1	120	B26N75	F6
26	.5	1.2	1.25	1.25	.005	.005	.250	160	A26NT125	N8H
28	1	.200	.200	.200	.05	.05	1	90	B28N20	F6
28	1	.400	.400	.400	.05	.05	1	105	B28N40	F6
28	1	.700	.700	.700	.1	.05	1	120	B28N70	F6
28	.5	.800	.800	.800	.005	.005	.250	140	A28NT80	N8T
28	.5	1.25	1.25	1.25	.005	.005	.250	160	A28NT125	N8H
30	1	.200	.200	.200	.05	.05	1	90	B30FT20	F6
30	1	.400	.400	.400	.05	.05	1	105	B30FT40	F6
30	1	.500	.500	.500	.05	.05	1	115	B30FT50	F6
30	.5	.750	.750	.750	.005	.005	.250	145	A30NT75	N8T
30	.5	1.1	1.1	1.1	.005	.005	.250	165	A30NT110	N8H
32	1	.100	.100	.100	.05	.05	1	90	B32FT10	F6
32	1	.200	.200	.200	.05	.05	1	105	B32FT20	F6
32	1	.400	.400	.400	.05	.05	1	120	B32FT40	F6
32	.5	.600	.600	.600	.005	.005	.250	140	A32NT60	N8
32	.5	1.1	1.1	1.1	.005	.005	.250	$165	A32NT110	N8H
34	1	.100	.100	.100	.05	.05	1	90	B34FT10	F6
34	1	.200	.200	.200	.05	.05	1	105	B34FT20	F6
34	1	.400	.400	.400	.05	.05	1	120	B34FT40	F6
34	.5	.600	.600	.600	.005	.005	.250	145	A34NT60	N8
34	.5	1.1	1.1	1.1	.005	.005	.250	165	A34NT110	N8H
35	1	.100	.100	.100	.05	.05	1	90	B35FT10	F6
35	1	.200	.200	.200	.05	.05	1	105	B35FT20	F6
35	1	.400	.400	.400	.05	.05	1	120	B35FT40	F6
35	.5	.600	.600	.600	.005	.005	.250	145	A35NT60	N8
35	.5	1.1	1.1	1.1	.005	.005	.250	165	A35NT110	N8H
36	1	.100	.100	.100	.05	.05	1	90	B36FT10	F6
36	1	.200	.200	.200	.05	.05	1	105	B36FT20	F6
36	1	.400	.400	.400	.05	.05	1	120	B36FT40	F6
36	.5	.600	.600	.600	.005	.005	.250	145	A36NT60	N8
36	.5	1.0	1.0	1.0	.005	.005	.250	165	A36NT100	N8H
38	1	.100	.100	.100	.05	.05	1	90	B38FT10	F6
38	1	.200	.200	.200	.05	.05	1	105	B38FT20	F6
40	1	.100	.100	.100	.05	.05	1	90	B40FT10	F6
40	1	.200	.200	.200	.05	.05	1	105	B40FT20	F6
40	1	.400	.400	.400	.05	.05	1	120	B40FT40	F6
40	.5	.600	.600	.600	.005	.005	.250	145	A40NT60	N8
40	.5	.750	.750	.750	.005	.005	.250	165	A40NT75	N8T
45	1	.100	.100	.100	.05	.05	1	95	B45FT10	F6
45	1	.200	.200	.200	.05	.05	1	110	B45FT20	F6
45	1	.400	.400	.400	.05	.05	1	130	B45FT40	F6
45	.5	.600	.600	.600	.005	.005	.250	165	A45NT60	N8T
48	1	.050	.050	.050	.05	.05	1	90	B48FT05	F6
48	1	.100	.100	.100	.05	.05	1	100	B48FT10	F6
48	1	.200	.200	.200	.05	.05	1	115	B48FT20	F6
48	1	.400	.400	.400	.05	.05	1	135	B48FT40	F6
48	.5	.500	.500	.500	.005	.005	.250	165	A48NT50	N8T
50	1	.050	.050	.050	.05	.05	1	90	B50FT05	F6T
50	1	.100	.050	.100	.05	.05	1	100	B50FT10	F6T
50	1	.200	.050	.200	.05	.05	1	115	B50FT20	F6T
50	1	.400	.400	.400	.05	.05	1	135	B50FT40	F6T
50	1	.450	.450	.450	.005	.005	.250	165	A50NT45	N8T
55	1	.050	.050	.050	.05	.05	1	95	B55FT05	F6T
55	1	.100	.100	.100	.05	.05	1	105	B55FT10	F6T
55	1	.200	.200	.200	.05	.05	1	120	B55FT20	F6T
55	1	.400	.400	.400	.005	.005	.250	165	A55NT40	N8T
60	1	.050	.050	.050	.05	.05	1	100	B60FT05	F6T
60	1	.100	.100	.100	.05	.05	1	110	B60FT10	F6T
60	1	.150	.150	.150	.05	.05	1	120	B60FT15	F6T
60	1	.300	.300	.300	.05	.05	1	140	B60FT30	F8T
60	1	.350	.350	.350	.005	.005	.250	165	A60NT35	N8T
65	1	.050	.050	.050	.05	.05	1	105	B65FT05	F6T
65	1	.100	.100	.100	.05	.05	1	120	B65FT10	F6T
65	1	.250	.250	.250	.05	.05	1	140	B65FT25	F8T
65	1	.270	.270	.270	.005	.005	.250	165	A65NT27	N8T
67	1	.050	.050	.050	.05	.05	1	110	B67FT05	F6T
67	1	.100	.100	.100	.05	.05	1	120	B67FT10	F6T
70	1	.050	.050	.050	.05	.05	1	110	B70FT05	F6T
70	1	.100	.100	.100	.05	.05	1	120	B70FT10	F6T
70	1	.200	.200	.200	.05	.05	1	135	B70FT20	F8T
70	1	.250	.250	.250	.005	.005	.250	165	A70NT25	N8T
75	1	.050	.050	.050	.05	.06	1	115	B75FT05	F6T
75	1	.100	.100	.100	.05	.05	1	125	B75FT10	F6T
75	1	.200	.200	.200	.05	.05	1	140	B75FT20	F8T
75	1	.250	.250	.250	.005	.005	.250	170	A75NT25	N8T
80	1	.050	.050	.050	.05	.05	1	120	B80FT05	F6T
80	1	.100	.100	.100	.05	.05	1	130	B80FT10	F6T
80	1	.200	.200	.200	.05	.05	1	145	B80FT20	F8T
80	1	.250	.250	.250	.005	.005	.250	175	A80NT25	N8T
85	1	.050	.050	.050	.05	.05	1	125	B85FT05	F6T
85	1	.100	.100	.100	.05	.05	1	135	B85FT10	F6T
85	1	.200	.200	.200	.05	.05	1	150	B85FT20	F8T
85	1	.250	.250	.250	.005	.005	.250	175	A85NT25	N8T
90	1	.050	.050	.050	.05	.05	1	130	B90FT05	F6T
90	1	.100	.100	.100	.05	.05	1	140	B90FT10	F6T
90	1	.200	.200	.200	.05	.05	1	155	B90FT20	F8T
90	1	.250	.250	.250	.005	.005	.250	180	A90NT25	N8T
95	1	.050	.050	.050	.05	.05	1	135	B95FT05	F6T
95	1	.100	.100	.100	.05	.05	1	145	B95FT10	F6T
95	1	.200	.200	.200	.05	.05	1	160	B95FT20	F8T
95	1	.200	.200	.200	.005	.005	.250	180	A95NT20	N8T
100	1	.020	.020	.020	.05	.05	1	120	B100FT02	F6T
100	1	.050	.050	.050	.05	.05	1	140	B100FT05	F6T
100	1	.100	.100	.100	.05	.05	1	150	B100FT10	F6T
100	1	.200	.200	.200	.05	.05	1	170	B100FT20	F8T
100	1	.200	.200	.200	.005	.005	.250	185	A100NT20	N8T
105	1	.050	.050	.050	.05	.05	1	140	B105FT05	F6T
105	1	.100	.100	.100	.05	.05	1	155	B105FT10	F6T
105	1	.200	.200	.200	.05	.05	1	170	B105FT20	F8T
105	1	.200	.200	.200	.005	.005	.250	185	A105NT20	N8T
110	1	.050	.050	.050	.05	.05	1	145	B110FT05	F6T
110	1	.100	.100	.100	.05	.05	1	160	B110FT10	F6T
110	1	.200	.200	.200	.05	.05	1	170	B110FT20	F8T
110	1	.200	.200	.200	.005	.005	.250	185	A110NT20	N8T
115	1	.050	.050	.050	.05	.05	1	145	B115FT05	F6T
115	1	.100	.100	.100	.05	.05	1	160	B115FT10	F6T
115	1	.200	.200	.200	.05	.05	1	170	B115FT20	F8T
115	1	.200	.200	.200	.005	.005	.250	185	A115NT20	N8T
120	1	.050	.050	.050	.05	.05	1	150	B120FT05	F6T
120	1	.200	.200	.200	.05	.05	1	175	B120FT20	F8T
120	1	.200	.200	.200	.005	.005	.250	190	A120NT20	N8T
125	1	.050	.050	.050	.05	.05	1	155	B125FT05	F6T
125	1	.200	.200	.200	.05	.05	1	175	B125FT20	F8T
125	1	.200	.200	.200	.005	.005	.250	190	A125NT20	N8T
130	1	.150	.150	.150	.05	.05	1	170	B130FT15	F8T
130	1	.170	.170	.170	.005	.005	.250	190	A130NT17	N8T
135	1	.150	.150	.150	.005	.005	.250	190	A135NT15	T
140	1	.130	.130	.130	.005	.005	.250	190	A140NT13	8T
150	1	.100	.100	.100	.05	.05	1	170	B150FT10	F8T
150	1	.100	.100	.100	.005	.005	.250	190	A150NT10	N8T

*or 2 mv, whichever is greater

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
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15

Acopian

VOLTAGE PROGRAMMABLE

Adjustable Current Limiting

ALL MODELS U.L. RECOGNIZED

Acopian
REGULATED POWER SUPPLY
FINE
ADJ
COARSE
OUT
SENS
OUT
AC
AC
GND

Power supplies with the broad adjustment capability required for analog instrumentation and circuitry, electronic system development; basic research, and similar applications.

For applications requiring a constant current or adjustable current limiting, a power supply with a true constant current characteristic, such as those with model numbers beginning with the letter P, should be used.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Regulation, Ripple (constant voltage operation):
Line Regulation: ±0.005% or 2 mv, whichever is greater.
Load Regulation: ±0.005% or 2 mv, whichever is greater.
Ripple: 0.25 mv rms.

Regulation, Ripple (constant current operation):
Line Regulation: ±0.1%.
Load Regulation: ±0.2%.
Ripple: 0.1% rms.

Remote Voltage Sensing: Provision for sensing the output voltage across the load, to compensate voltage drops in output wiring, is a standard feature.

Remote Voltage Programming: The output voltage of all models may be controlled by means of external resistance connected in series with the −S lead.

Voltage Programming Coefficient: See table. Calibration tolerance, ±2%.

For applications where the capability for external adjustment of output voltage is necessary, but a guaranteed programming coefficient tolerance is not required, these power supplies may be ordered with the programming coefficient uncalibrated. To order, change the letter "X" in the model number to the letter "T", and subtract $15.00 from the standard price.

Current Limiting: Models with fixed current limiting have a foldback-type characteristic with automatic recovery. All others have current limiting with a constant-voltage/constant-current crossover characteristic.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Ambient Operating Temperature Range: −20 to +71°C.
Storage Temperature Range: −55 to +85°C.

OPTIONS

Remote Current Limiting Adjustment: All models having numbers beginning with the letter P have a built in (front panel) current limit control. Provision for control of the current limit setting by adjustment of an external resistance is available as an option. To order, add the prefix letter "E" to the model number, and add $10.00 to the standard price.

The current limit setting is inversely related to resistance. Use a 200 ohm ½ W potentiometer.

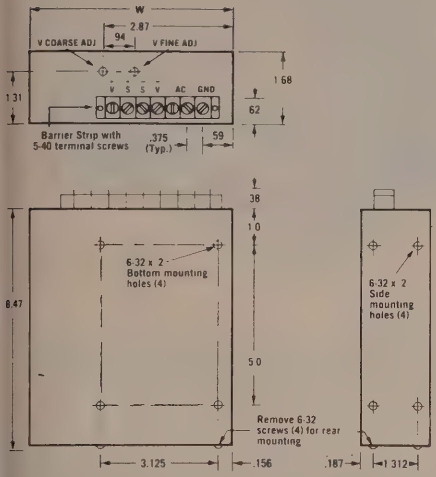
Overvoltage Protection: An internally mounted overvoltage protection circuit, fixed set approximately 20% above the maximum output voltage rating of the supply, is available on all models with maximum outputs of 60 volts or less. To order, add prefix "V" to the model number, and increase standard price as follows:

For all case sizes except H16:

0-6V through 0-18V models	$25.00
0-30V through 0-60V models	35.00
Case size H16 (all voltages)	75.00

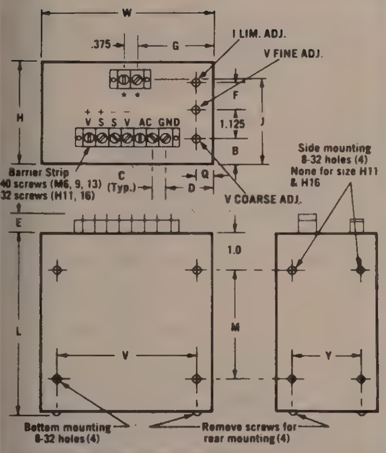
230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz. To order, add suffix "-230" to model number and $25.00 to price.

NARROW PROFILE MODELS FOR LIMITED SPACE APPLICATIONS — foldback current limiting


W
2.87
94
V COARSE ADJ
V FINE ADJ
V
S
S
V
AC
GND
1 31
1 68
62
Barrier Strip with 5-40 terminal screws
.375 (Typ.)
59
38
1 0
6.47
6-32 x 2 Bottom mounting holes (4)
6-32 x 2 Side mounting holes (4)
5 0
Remove 6-32 screws (4) for rear mounting
3.125
.156
.187
1 312

Output Voltage Range	Output Current Amps. (To +71°C)	Voltage Prgmg. Coeff. (Ω/V)	Case Size	Model	Price
0-7	1.0	700	N8	A07NX100	$145
0-7	2.1	700	N8H	A07NX210	170
0-18	.400	270	N8	A018NX40	135
0-18	1.0	270	N8H	A018NX100	165
0-32	.250	150	N8	A032NX25	135
0-32	.600	150	N8H	A032NX60	180
0-60	.125	820	N8T	A060NX12	160
0-60	.250	820	N8H	A060NX25	180
0-150	.050	330	N8T	A0150NX05	190
0-150	.100	330	N8H	A0150NX10	230

Case Size	W	Approx. Weight
N8	3.44	3lb
N8T	3.81	3lb 2oz
N8H	4.68	3lb 14oz


W
.375
G
I LIM. ADJ.
V FINE ADJ.
H
F
1.125
J
B
+ + − −
V S S V AC GND
Barrier Strip
-40 screws (M6, 9, 13)
-32 screws (H11, 16)
C (Typ.)
Q
D
V COARSE ADJ.
Side mounting 8-32 holes (4) None for size H11 & H16
E
1.0
L
M
V
Y
Bottom mounting 8-32 holes (4)
Remove screws for rear mounting (4)

*To external current limit control (optional)

Output Voltage Range	Output Current Amps. at 40°C	55°C	71°C	Voltage Prgmg. Coeff. (Ω/V)	Case Size	Voltage Programmable Fixed Current Limiting Model	Price	Voltage Programmable Adjustable Current Limiting Model	Price
0-6	1.2	1.2	1.2	820	M6	A06MX120	$155	P06MX120	$175
0-6	2.0	2.0	2.0	820	M6	A06MX200	175	P06MX200	195
0-6	3.0	2.5	2.0	820	M6	A06MX300	205	P06MX300	230
0-6	5.0	4.0	3.0	820	M9	A06MX500	230	P06MX500	255
0-6	8.0	7.0	6.0	820	M13	A06MX800	275	P06MX800	300
0-6	12.0	10.0	7.0	820	H11	A06HX1200	370	P06HX1200	395
0-6	16.0	13.0	10.0	820	H16	A06HX1600	435	P06HX1600	465
0-15	1.0	1.0	1.0	330	M6	A015MX100	155	P015MX100	175
0-15	2.0	1.6	1.2	330	M6	A015MX200	205	P015MX200	230
0-15	3.0	2.4	1.8	330	M9	A015MX300	230	P015MX300	255
0-15	5.0	4.0	2.5	330	M13	A015MX500	275	P015MX500	300
0-15	8.0	6.0	4.0	330	H11	A015HX800	370	P015HX800	395
0-15	10.0	8.0	6.0	330	H16	A015HX1000	435	P015HX1000	465
0-30	.50	.50	.50	160	M6	A030MX50	175	P030MX50	195
0-30	1.0	1.0	1.0	160	M6	A030MX100	205	P030MX100	230
0-30	1.6	1.4	1.2	160	M9	A030MX160	230	P030MX160	255
0-30	2.5	2.0	1.5	160	M13	A030MX250	275	P030MX250	300
0-30	4.0	3.0	2.0	160	H11	A030HX400	370	P030HX400	395
0-30	5.0	4.0	3.0	160	H16	A030HX500	435	P030HX500	465
0-50	.35	.34	.33	1000	M6	A050MX35	175	P050MX35	195
0-50	.60	.50	.40	1000	M6	A050MX60	205	P050MX60	230
0-50	.85	.75	.65	1000	M9	A050MX85	230	P050MX85	255
0-100	.10	.09	.08	500	M6	A0100MX10	220	P0100MX10	245
0-100	.25	.20	.15	500	M6	A0100MX25	245	P0100MX25	270

Case Size	L	W	H	M	V	Y	E	Q	B	C	D	F	G	J	Approx. Weight
M6	6.59	5.12	3.44	4.0	4.5	3.0	.38	.5	.75	.375	1.44	.75	2.37	3.09	4lb 4oz
M9	9.25	5.12	3.44	6.0	4.5	3.0	.38	.5	.75	.375	1.44	.75	2.37	3.09	7lb 4oz
M13	13.25	5.12	3.44	10.0	4.5	3.0	.38	.5	.75	.375	1.44	.75	2.37	3.09	11lb
H11	11.25	7.37	5.12	8.0	6.75	4.56	.75	1.12	1.25	.562	2.25	1.12	3.75	4.72	18lb 4oz
H16	16.00	7.37	5.12	11.0	6.75	4.56	.75	1.12	1.25	.562	2.25	1.12	3.75	4.72	23lb

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
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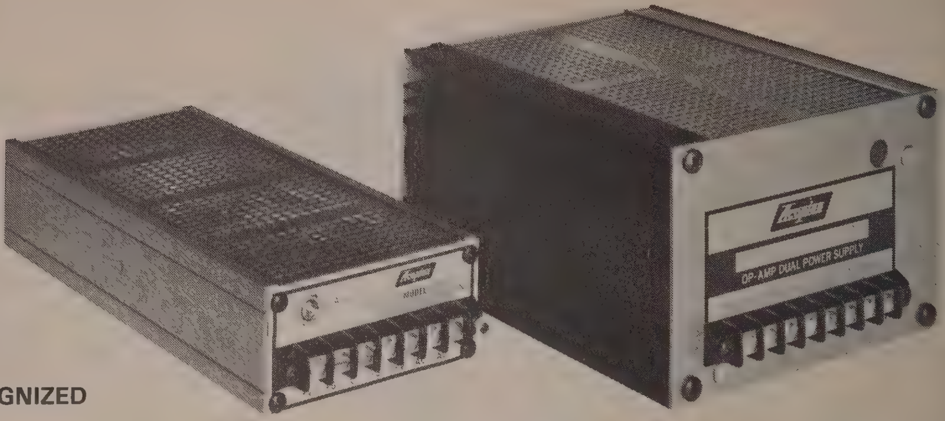
DUAL OUTPUT For Op Amps.



ALL MODELS U.L. RECOGNIZED

Series D dual output power supplies are a convenient source of the tracking voltages required for powering operational amplifiers and related circuits. Their positive/common/negative output terminal configuration minimizes system wiring. Provision for remote sensing permits compensation of load line effects. Although moderately priced, they are sturdily constructed and conservatively rated.

SPECIFICATIONS

Input Voltage: 105–125 VAC, 50–400 Hz, single phase.

Output Voltages: Tracking within 1%.
Output Currents:
Output Voltage Adjustment Ranges:
} See tables. Outputs are short circuit protected.

Load Regulation: ±0.1%.

Line Regulation: ±0.1%.

Ripple: 1.5 mv RMS.

Polarity: Positive output, common, and negative output.

Remote Voltage Sensing: Standard.

Ambient Operating Temperature: −10 to +71°C.

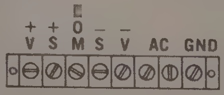
Storage Temperature: −55 to +85°C.

OPTIONS

Overvoltage Protection: A built-in preset overvoltage protection circuit is available on all models. If either output fails, both outputs are "crowbarred." To order, add prefix "V" to the model number, and increase standard price by $30.00.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210–250 VAC, 50–400 Hz. To order, add suffix "-230" to model number and $25.00 to price.

*Connections:
(Supplies for Op Amps)



Nominal Output Voltages	Adjust ±V.	Current/Output Amps. at 40°C	55°C	71°C	Price	Model	Size*
±5	.5	.750	.650	.550	$170	TD5-75	TG5
±5	.5	1.5	1.25	1.0	200	TD5-150	TG6
±5	.5	2.5	2.0	1.5	235	TD5-250	TG9
±12	1	1.0	.900	.800	170	TD12-100	TG5
±12	1	1.6	1.4	1.0	200	TD12-160	TG6
±12	1	2.5	2.0	1.5	235	TD12-250	TG9
±12	.5	4.5	3.7	3.0	290	TD12-450	TG13
±12	.5	8.5	7.0	5.5	375	TD12-850	TH11
±15	1	.400	.400	.400	125	TD15-40	TG5
±15	1	1.0	.900	.800	170	TD15-100	TG5
±15	1	1.6	1.4	1.0	200	TD15-160	TG6
±15	1	2.5	2.0	1.5	235	TD15-250	TG9
±15	.5	4.5	3.7	3.0	290	TD15-450	TG13
±15	.5	8.5	7.0	5.5	375	TD15-850	TH11

NARROW PROFILE MODELS — for limited space applications

Nominal Output Voltage	Adjust ±V.	Current/Output Amps. at 40°C	55°C	71°C	Price	Model	Size*
±12	1	.500	.500	.400	$140	FD12-50	TN6
±12	.5	1.0	.900	.800	185	LD12-100	TN8H
±15	1	.500	.500	.400	140	FD15-50	TN6
±15	.5	1.0	.900	.800	185	LD15-100	TN8H

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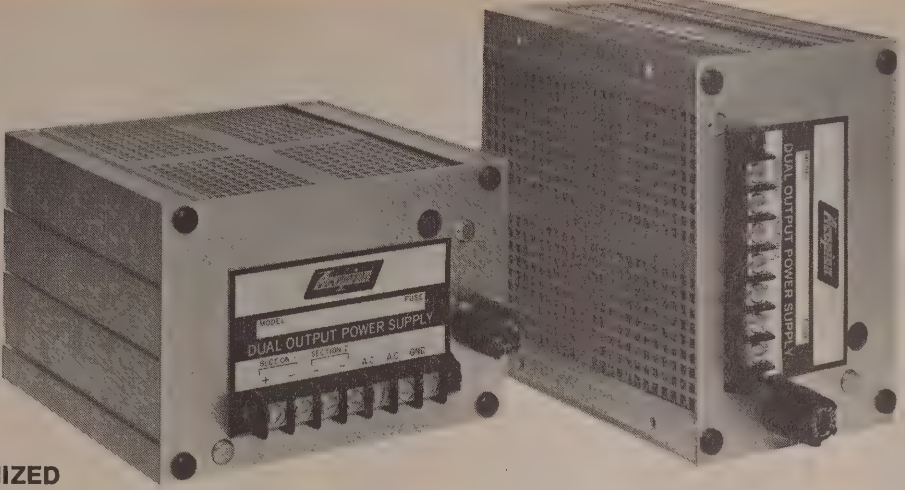
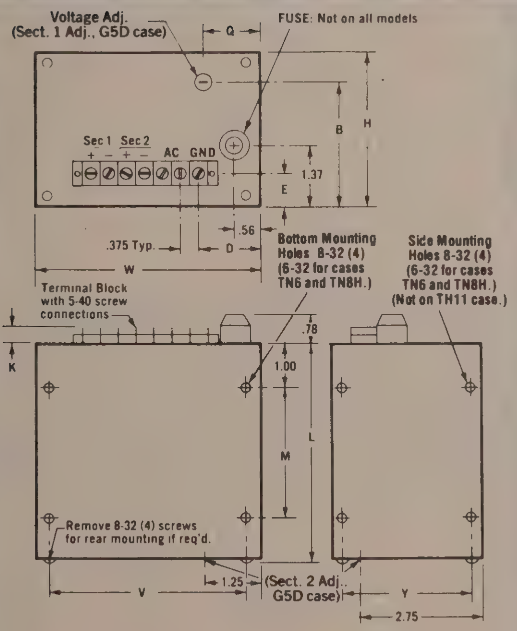
Acopian

DUAL OUTPUT General Purpose


Acopian
DUAL OUTPUT POWER SUPPLY
MODEL
FUSE
SECTION 1
SECTION 2
AC
AC
GND
DUAL OUTPUT POWER SUPPLY
Acopian

ALL MODELS U.L. RECOGNIZED

Acopian general purpose duals furnish two completely independent outputs, either identical or different, in less space and at less cost than two equivalent single output supplies. Thousands of output voltage/current rating combinations are available. Mounting and system wiring are simplified. Quality components, generously derated, insure long-term reliability.


Voltage Adj.
(Sect. 1 Adj., G5D case)
Q
FUSE: Not on all models
Sec 1 Sec 2
+ − + −
AC GND
B
H
1.37
E
.56
.375 Typ.
D
W
Bottom Mounting Holes 8-32 (4) (6-32 for cases TN6 and TN8H.)
Side Mounting Holes 8-32 (4) (6-32 for cases TN6 and TN8H.) (Not on TH11 case.)
Terminal Block with 5-40 screw connections
K
.78
1.00
L
M
Remove 8-32 (4) screws for rear mounting if req'd.
1.25
(Sect. 2 Adj., G5D case)
V
Y
2.75

Size	L	W	H	M	V	Y	E	Q	B	K	D	Approx. Weight
G5D	5.09	5.12	3.44	3.00	4.50	3.00	.75	1.25	2.73	.38	1.44	4 lb
TG5	5.09	5.12	3.44	3.00	4.50	3.00	.75	1.25	2.73	.38	1.44	3 lb 4 oz
TG6	6.59	5.12	3.44	4.00	4.50	3.00	.75	1.25	2.73	.38	1.44	4 lb 4 oz
TG9	9.25	5.12	3.44	6.00	4.50	3.00	.75	1.25	2.73	.38	1.44	6 lb 8 oz
TG13	13.25	5.12	3.44	10.00	4.50	3.00	.75	1.25	2.73	.38	1.44	12 lb
TH11	11.25	7.37	5.12	8.00	6.75	4.56	.75	2.73	4.36	.38	2.38	18 lb 4 oz
TN6	6.59	3.44	1.68	4.00	3.12	1.31	.62	2.87	1.31	.53	.59	2 lb 4 oz.
TN8H	8.47	4.68	1.68	5.00	3.12	1.31	.62	2.87	1.31	.53	.59	3 lb 14 oz

HOW TO ORDER: Select two sections from one of the three tables on pages 20 and 21. The complete model number is the combination of the two sections selected. Example: The combination of section 5GT20D and section 8GT50D is Model 5GT20D-8GT50D. Always assign the lower voltage section first. For pricing purposes, add the cost of the individual sections selected.

SPECIFICATIONS

Input Voltage: 105—125 VAC, 50—400 Hz, single phase.

Output Specifications: See pages 20 and 21. No derating required through ambient temperature range of — 10 to + 71°C.

Short Circuit Protection: Delivers current surges without damage—built-in fuse protects supply against prolonged overloads and shorts.

Polarity: Outputs are floating. Each output may be independently connected to provide any combination of positive and negative voltages. Outputs may be floated up to 300 V above ground.

Ambient Operating Temperature: — 10 to + 71°C.

Storage Temperature: —55 to + 85°C.

Dimensions and Weight: Case size G5D.

OPTIONS

Overvoltage Protection: Separate preset overvoltage protection circuit for each output. To order, add prefix "V" to model number. When both outputs are in the range of 3 to 28V, add $20.00 to the standard price. An additional $5.00/output charge applies for outputs from 30 to 70V. Not available for other voltages.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz. To order, add suffix "-230" to the model number and $25.00 to the standard price.

Acopian DUAL OUTPUT

(500 MA MAXIMUM)

Nominal Output Voltage	Adjust ±V.	Output Current Amps.	Regulation Load ±%	Regulation Line ±%	Ripple mv RMS	Price per Section	Section (See "How to Order")
1.5	.5	.200	.4	.05	1	$60	1.5GT20D
1.5	.5	.400	.5	.1	1	65	1.5GT40D
2.5	.5	.200	.4	.05	1	60	2.5GT20D
2.5	.5	.400	.5	.1	1	65	2.5GT40D
3	.5	.200	.3	.05	1	60	3GT30D
3	.5	.400	.5	.1	1	65	3GT40D
3.6	.5	.200	.2	.05	1	60	3.6GT20D
3.6	.5	.400	.3	.1	1	65	3.6GT40D
5	.5	.200	.2	.05	1	60	5GT20D
5	.5	.500	.3	.05	1	65	5GT50D
6	1	.200	.05	.05	1	60	6GT20D
6	1	.500	.15	.05	1	65	6GT50D
7	1	.200	.05	.05	1	60	7GT20D
7	1	.500	.15	.05	1	65	7GT50D
8	1	.200	.05	.05	1	60	8GT20D
8	1	.500	.1	.05	1	65	8GT50D
9	1	.200	.05	.05	1	60	9GT20D
9	1	.500	.1	.05	1	65	9GT50D
10	1	.250	.05	.05	1	60	10GT25D
10	1	.500	.1	.05	1	65	10GT50D
11	1	.250	.05	.05	1	60	11GT25D
11	1	.500	.1	.05	1	65	11GT50D
12	1	.250	.05	.05	1	60	12GT25D
12	1	.500	.1	.05	1	65	12GT50D
13	1	.250	.05	.05	1	60	13GT25D
13	1	.500	.1	.05	1	65	13GT50D
15	1	.150	.05	.05	1	55	15GT15D
15	1	.250	.05	.05	1	60	15GT25D
15	1	.500	.1	.05	1	65	15GT50D
16	1	.250	.05	.05	1	60	16GT25D
16	1	.500	.1	.05	1	65	16GT50D
17	1	.250	.05	.05	1	60	17GT25D
17	1	.500	.1	.05	1	65	17GT50D
18	1	.250	.05	.05	1	60	18GT25D
18	1	.500	.1	.05	1	65	18GT50D
19	1	.250	.05	.05	1	60	19GT25D
19	1	.500	.1	.05	1	65	19GT50D
20	1	.250	.05	.05	1	60	20GT25D
20	1	.500	.1	.05	1	65	20GT50D
21	1	.250	.05	.05	1	60	21GT25D
21	1	.500	.1	.05	1	65	21GT50D
22	1	.250	.05	.05	1	60	22GT25D
22	1	.500	.1	.05	1	65	22GT50D
23	1	.250	.05	.05	1	60	23GT25D
23	1	.500	.1	.05	1	65	23GT50D
24	1	.250	.05	.05	1	60	24GT25D
24	1	.500	.05	.05	1	65	24GT50D
25	1	.250	.05	.05	1	60	25GT25D
25	1	.500	.05	.05	1	65	25GT50D
	1	.250	.05	.05	1	60	26GT25D
26	1	.400	.05	.05	1	65	26GT40D
28	1	.250	.05	.05	1	60	28GT25D
28	1	.400	.05	.05	1	65	28GT40D
30	1	.250	.05	.05	1	60	30GT25D
30	1	.400	.05	.05	1	65	30GT40D
31	1	.100	.05	.05	1	60	31GT10D
31	1	.300	.05	.05	1	65	31GT30D
32	1	.100	.05	.05	1	60	32GT10D
32	1	.300	.05	.05	1	65	32GT30D
33	1	.100	.05	.05	1	60	33GT10D
33	1	.300	.05	.05	1	65	33GT30D
34	1	.100	.05	.05	1	$60	34GT10D
34	1	.300	.05	.05	1	65	34GT30D
35	1	.100	.05	.05	1	60	35GT10D
35	1	.200	.05	.05	1	65	35GT20D
36	1	.100	.05	.05	1	60	36GT10D
36	1	.200	.05	.05	1	65	36GT20D
38	1	.100	.05	.05	1	60	38GT10D
38	1	.200	.05	.05	1	65	38GT20D
40	1	.100	.05	.05	1	60	40GT10D
40	1	.200	.05	.05	1	65	40GT20D
42	1	.100	.05	.05	1	60	42GT10D
42	1	.200	.05	.05	1	65	42GT20D
44	1	.100	.05	.05	1	60	44GT10D
44	1	.200	.05	.05	1	65	44GT20D
45	1	.100	.05	.05	1	60	45GT10D
45	1	.200	.05	.05	1	65	45GT20D
46	1	.100	.05	.05	1	60	46GT10D
46	1	.200	.05	.05	1	65	46GT20D
48	1	.100	.05	.05	1	60	48GT10D
48	1	.200	.05	.05	1	65	48GT20D
50	1	.100	.05	.05	1	65	50GT10D
50	1	.200	.05	.05	1	70	50GT20D
52	1	.100	.05	.05	1	65	52GT10D
52	1	.200	.05	.05	1	70	52GT20D
54	1	.100	.05	.05	1	65	54GT10D
54	1	.200	.05	.05	1	70	54GT20D
55	1	.100	.05	.05	1	65	55GT10D
55	1	.200	.05	.05	1	70	55GT20D
56	1	.050	.05	.05	1	60	56GT05D
56	1	.100	.05	.05	1	65	56GT10D
58	1	.050	.05	.05	1	60	58GT05D
58	1	.100	.05	.05	1	65	58GT10D
60	1	.050	.05	.05	1	60	60GT05D
60	1	.100	.05	.05	1	65	60GT10D
62	1	.050	.05	.05	1	65	62GT05D
62	1	.100	.05	.05	1	70	62GT10D
64	1	.050	.05	.05	1	65	64GT05D
64	1	.100	.05	.05	1	70	64GT10D
65	1	.050	.05	.05	1	65	65GT05D
65	1	.100	.05	.05	1	70	65GT10D
67	1	.050	.05	.05	1	65	67GT05D
67	1	.100	.05	.05	1	70	67GT10D
68	1	.050	.05	.05	1	65	68GT05D
68	1	.100	.05	.05	1	70	68GT10D
69	1	.050	.05	.05	1	65	69GT05D
69	1	.100	.05	.05	1	70	69GT10D
70	1	.050	.05	.05	1	65	70GT05D
70	1	.100	.05	.05	1	70	70GT10D
75	1	.050	.05	.05	1	70	75GT05D
75	1	.100	.05	.05	1	75	75GT10D
76	1	.020	.05	.05	1	70	76GT02D
76	1	.050	.05	.05	1	75	76GT05D
80	1	.020	.05	.05	1	70	80GT02D
80	1	.050	.05	.05	1	75	80GT05D
85	1	.020	.05	.05	1	70	85GT02D
85	1	.050	.05	.05	1	75	85GT05D
90	1	.020	.05	.05	1	70	90GT02D
90	1	.050	.05	.05	1	75	90GT05D
95	1	.020	.05	.05	1	75	95GT02D
95	1	.050	.05	.05	1	80	95GT05D
100	1	.020	.05	.05	1	75	100GT02D
100	1	.050	.05	.05	1	80	100GT05D

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
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(2 AMP MAXIMUM)

Nominal Output Voltage	Adjust ±V.	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to Order")
			Load ±%	Line ±%			
1.5	.5	.200	.4	.05	1	$60	1.5GT20D
1.5	.5	.400	.5	.1	1	65	1.5GT40D
2.5	.5	.200	.4	.05	1	60	2.5GT20D
2.5	.5	.400	.5	.1	1	65	2.5GT40D
3	.5	.200	.3	.05	1	60	3GT20D
3	.5	.400	.5	.1	1	65	3GT40D
3	.5	.700	.5	.1	1	75	3GT70D
3	.5	1.0	.5	.1	1	85	3GT100D
3.6	.5	.200	.2	.05	1	60	3.6GT20D
3.6	.5	.400	.3	.1	1	65	3.6GT40D
3.6	.5	.700	.4	.1	1	75	3.6GT70D
3.6	.5	1.0	.5	.1	1	85	3.6GT100D
5	.5	.200	.2	.05	1	60	5GT20D
5	.5	.500	.3	.05	1	65	5GT50D
5	.5	.700	.4	.05	1	75	5GT70D
5	.5	1.0	.5	.05	1	85	5GT100D
5*	.25	2.0	.5	.05	1	95	5GT200D
6	1	.200	.05	.05	1	60	6GT20D
6	1	.500	.15	.05	1	65	6GT50D
6	.5	.700	.2	.05	1	75	6GT70D
6	.5	1.0	.3	.05	1	85	6GT100D
7	1	.200	.05	.05	1	60	7GT20D
7	1	.500	.15	.05	1	65	7GT50D
7	.5	.700	.2	.05	1	75	7GT70D
7	.5	1.0	.3	.05	1	85	7GT100D
8	1	.200	.05	.05	1	60	8GT20D
8	1	.500	.1	.05	1	65	8GT50D
8	.5	.700	.15	.05	1	75	8GT70D
8	.5	1.0	.2	.05	1	85	8GT100D
9	1	.200	.05	.05	1	60	9GT20D
9	1	.500	.1	.05	1	65	9GT50D
9	.5	.700	.15	.05	1	75	9GT70D
9	.5	1.0	.2	.05	1	85	9GT100D

Nominal Output Voltage	Adjust ±V.	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to Order")
			Load ±%	Line ±%			
10	1	.250	.05	.05	1	$60	10GT25D
10	1	.500	.1	.05	1	65	10GT50D
10	.5	.700	.15	.05	1	75	10GT70D
10	.5	1.0	.2	.05	1	85	10GT100D
12	1	.250	.05	.05	1	60	12GT25D
12	1	.500	.1	.05	1	65	12GT50D
12	.5	.700	.1	.05	1	75	12GT70D
12	.5	1.0	.1	.05	1	85	12GT100D
14	1	.250	.05	.05	1	60	14GT25D
14	1	.500	.1	.05	1	65	14GT50D
14	.5	.700	.1	.05	1	75	14GT70D
14	.5	1.0	.1	.05	1	85	14GT100D
15	1	.250	.05	.05	1	60	15GT25D
15	1	.500	.1	.05	1	65	15GT50D
15	.5	.700	.1	.05	1	75	15GT70D
15	.5	1.0	.1	.05	1	85	15GT100D
16	1	.250	.05	.05	1	60	16GT25D
16	1	.500	.1	.05	1	65	16GT50D
16	.5	.700	.1	.05	1	75	16GT70D
16	.5	1.0	.1	.05	1	85	16GT100D
18	1	.250	.05	.05	1	60	18GT25D
18	1	.500	.1	.05	1	65	18GT50D
18	.5	.700	.1	.05	1	75	18GT70D
18	.5	1.0	.1	.05	1	85	18GT100D
19	1	.250	.05	.05	1	60	19GT25D
19	1	.500	.1	.05	1	65	19GT50D
19	.5	.750	.1	.05	1	85	19GT75D
20	1	.250	.05	.05	1	60	20GT25D
20	1	.500	.1	.05	1	65	20GT50D
20	.5	.750	.1	.05	1	85	20GT75D

*Other section chosen may not have output current rating exceeding 500 ma.

(90 TO 150 VOLTS)

Nominal Output Voltage	Adjust ±V.	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to Order")
			Load ±%	Line ±%			
90	1	.050	.05	.05	1	$75	90GT05D
90	1	.100	.05	.05	1	85	90GT10D
95	1	.050	.05	.05	1	80	95GT05D
95	1	.100	.05	.05	1	85	95GT10D
100	1	.050	.05	.05	1	80	100GT05D
100	1	.100	.05	.05	1	85	100GT10D
105	1	.050	.05	.05	1	80	105GT05D
105	1	.100	.05	.05	1	85	105GT10D
110	1	.050	.05	.05	1	80	110GT05D
110	1	.100	.05	.05	1	85	110GT10D
115	1	.050	.05	.05	1	80	115GT05D
115	1	.100	.05	.05	1	85	115GT10D
120	1	.050	.05	.05	1	80	120GT05D

Nominal Output Voltage	Adjust ±V.	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to Order")
			Load ±%	Line ±%			
120	1	.100	.05	.05	1	$85	120GT10D
125	1	.050	.05	.05	1	80	125GT05D
125	1	.100	.05	.05	1	85	125GT10D
130	1	.050	.05	.05	1	85	130GT05D
130	1	.100	.05	.05	1	90	130GT10D
135	1	.050	.05	.05	1	85	135GT05D
135	1	.100	.05	.05	1	90	135GT10D
140	1	.050	.05	.05	1	85	140GT05D
140	1	.100	.05	.05	1	90	140GT10D
145	1	.050	.05	.05	1	85	145GT05D
145	1	.100	.05	.05	1	90	145GT10D
150	1	.050	.05	.05	1	85	150GT05D
150	1	.100	.05	.05	1	90	150GT10D

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
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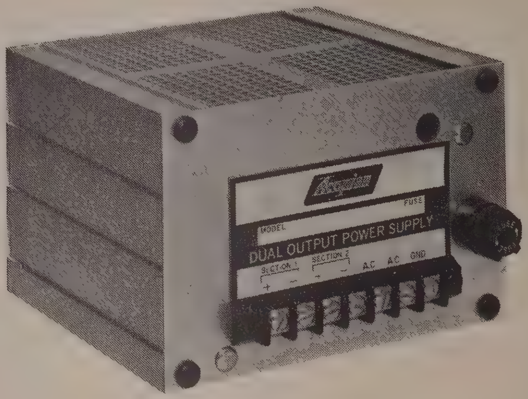
Acopian

DUAL OUTPUT

For Microprocessors

Isolated Outputs


Acopian
MODEL
FUSE
DUAL OUTPUT POWER SUPPLY
SECTION 1
SECTION 2
AC
AC
GND

Dual isolated output power supplies may be connected to provide any desired arrangement of positive and negative output voltages. Each voltage is independently adjustable. No derating is required up to +60°C. A separate overvoltage protector on each output is available as a built-in option.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Output Specifications: No derating required through ambient temperature range.

Polarity: Outputs are floating. Each may be independently connected to provide any combination of positive and negative voltages. Outputs may be floated up to 300 V above ground.

Ambient Operating Temperature: −10 to +60°C.

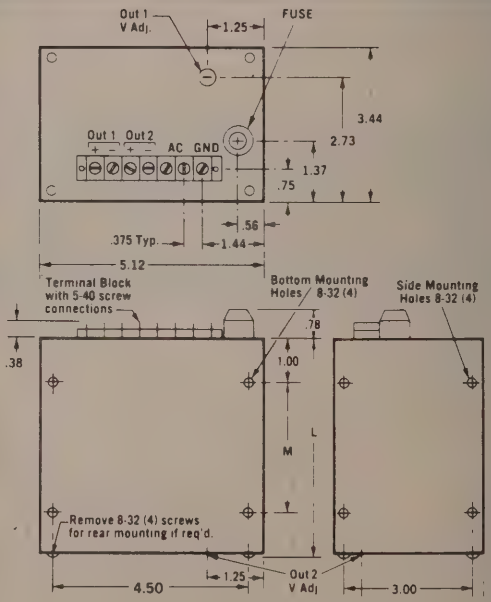
Storage Temperature: −55 to +85°C.

Nominal Output Voltage	Adjustment ±Volts	Output Current Amps.	Regulation		Ripple mv RMS	Price	Model	Size
			Load ±%	Line ±%				
5 9	.25 1	2.5 .400	.15 .15	.15 .15	1 1	$170	59D5	D5G
5 9	.25 1	4.0 .700	.15 .15	.15 .15	1 1	190	59D6	D6G
5 9	.25 1	7.0 1.4	.15 .15	.15 .15	1 1	230	59D9	D9G
5 12	.25 1	2.0 .600	.15 .15	.15 .15	1 1	170	512D5	D5G
5 12	.25 1	3.0 1.2	.15 .15	.15 .15	1 1	190	512D6	D6G
5 12	.25 1	6.0 2.4	.15 .15	.15 .15	1 1	230	512D9	D9G

OPTIONS

Overvoltage Protection: Two separate, preset overvoltage protection circuits, one for each output. To order, add prefix "V" to model number and add $20.00 to the standard price.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz. To order, add suffix "-230" to the model number and $25.00 to the standard price.

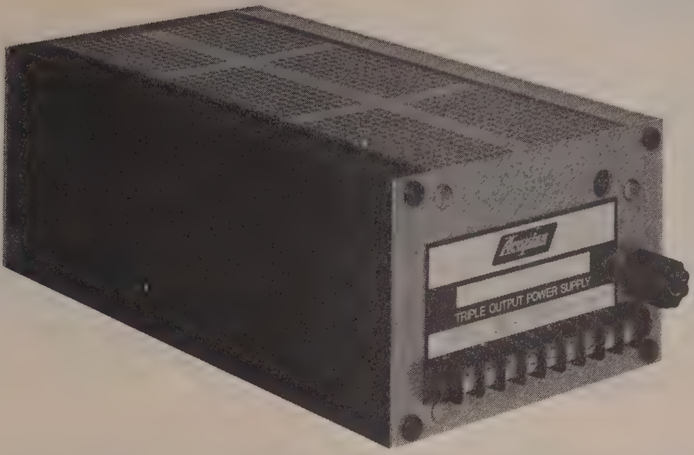

Out 1
V Adj.
1.25
FUSE
3.44
Out 1
Out 2
+
−
+
−
AC
GND
2.73
1.37
.75
.56
.375 Typ.
1.44
5.12
Terminal Block
with 5-40 screw
connections
Bottom Mounting
Holes 8-32 (4)
Side Mounting
Holes 8-32 (4)
.78
.38
1.00
L
M
Remove 8-32 (4) screws
for rear mounting if req'd.
4.50
1.25
Out 2
V Adj
3.00
2.75

Size	L	M	Approx. Weight
D5G	5.09	3.00	4lb
D6G	6.59	4.00	4lb 4oz
D9G	9.25	6.00	6lb 8oz

TRIPLE OUTPUT

For Microprocessors

Isolated Outputs


Acopian
TRIPLE OUTPUT POWER SUPPLY

Triple isolated output power supplies provide the features and characteristics of three supplies in one compact, easy-to-use package. They are available in the voltage combinations most frequently required for driving microprocessors and associated circuitry.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Output Specifications: No derating required through ambient temperature range of −10 to +60°C.

Polarity: Outputs are floating. Each output may be independently connected to provide any combination of positive and negative voltages. Outputs may be floated up to 300 V above ground.

Ambient Operating Temperature: −10 to +60°C.

Storage Temperature: −55 to +85°C.

OPTIONS

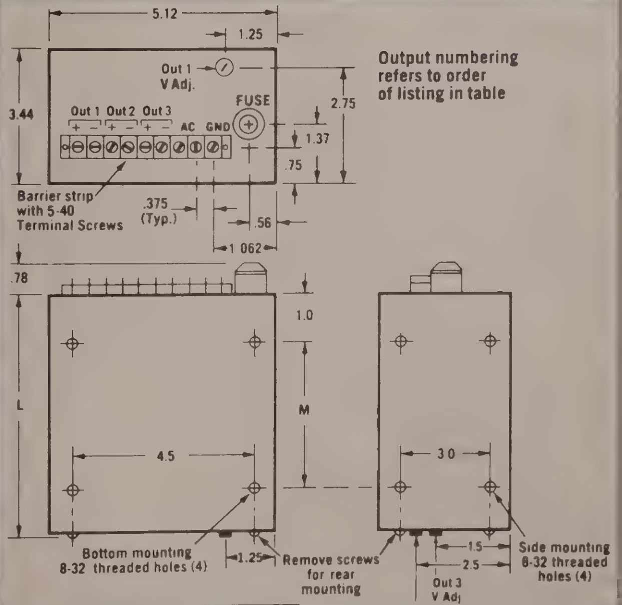
Overvoltage Protection:

On Output 1 only: Add prefix "V" to model number and add $10.00 to the standard price.

Separate overvoltage protection circuit on each output: Add prefix "3V" to model number and add $25.00 to the standard price.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210-250 VAC, 50-400 Hz. To order, add suffix "-230" to the model number and $25.00 to the standard price.

Nominal Output Voltage	Adjustment ±Volts	Output Current Amps.	Regulation Load ±%	Regulation Line ±%	Ripple mv RMS	Price	Model	Size
5 5 12	.25 .25 1	2.0 .500 .300	.15 .15 .15	.15 .15 .15	1 1 1	$180	5512T5	G5T
5 5 12	.25 .25 1	3.0 1.0 .600	.15 .15 .15	.15 .15 .15	1 1 1	200	5512T6	G6T
5 5 12	.25 .25 1	6.0 2.0 1.2	.15 .15 .15	.15 .15 .15	1 1 1	245	5512T9	G9T
5 9 12	.25 1 1	2.0 .400 .300	.15 .15 .15	.15 .15 .15	1 1 1	180	5912T5	G5T
5 9 12	.25 1 1	3.0 .700 .600	.15 .15 .15	.15 .15 .15	1 1 1	200	5912T6	G6T
5 9 12	.25 1 1	6.0 1.4 1.2	.15 .15 .15	.15 .15 .15	1 1 1	245	5912T9	G9T
5 12 12	.25 1 1	2.0 .300 .300	.15 .15 .15	.15 .15 .15	1 1 1	180	51212T5	G5T
5 12 12	.25 1 1	3.0 .600 .600	.15 .15 .15	.15 .15 .15	1 1 1	200	51212T6	G6T
5 12 12	.25 1 1	6.0 1.2 1.2	.15 .15 .15	.15 .15 .15	1 1 1	245	51212T9	G9T
5 15 15	.25 1 1	2.0 .250 .250	.15 .15 .15	.15 .15 .15	1 1 1	180	51515T5	G5T
5 15 15	.25 1 1	3.0 .500 .500	.15 .15 .15	.15 .15 .15	1 1 1	200	51515T6	G6T
5 15 15	.25 1 1	6.0 1.0 1.0	.15 .15 .15	.15 .15 .15	1 1 1	245	51515T9	G9T


5.12
1.25
Out 1 V Adj.
FUSE
2.75
3.44
Out 1 Out 2 Out 3
+ − + − + − AC GND
1.37
.75
Barrier strip with 5-40 Terminal Screws
.375 (Typ.)
.56
1 062
Output numbering refers to order of listing in table
.78
1.0
L
M
4.5
3.0
Bottom mounting 8-32 threaded holes (4)
1.25
Remove screws for rear mounting
1.5
2.5
Side mounting 8-32 threaded holes (4)
Out 3 V Adj
Out 2 V Adj.

Size	L	M	Approx. Weight
G5T	5.09	3.00	4lb 14oz
G6T	6.59	4.00	5lb 8oz
G9T	9.25	6.00	7lb 4oz

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
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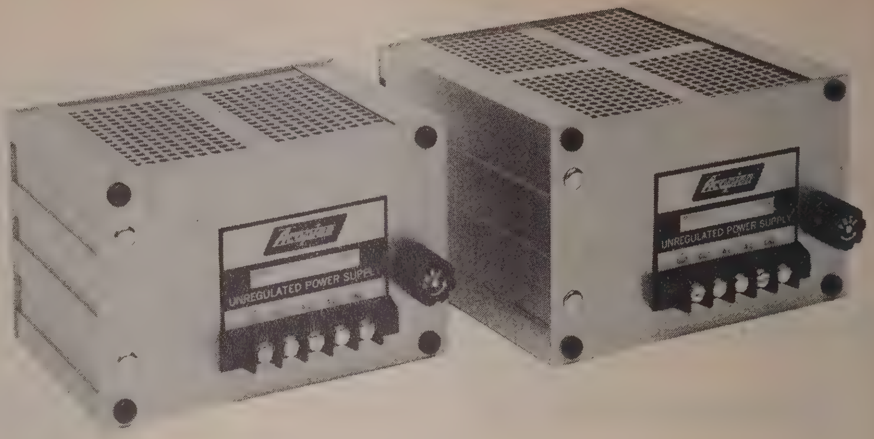
Acopian

SERIES U UNREGULATED


Acopian
UNREGULATED POWER SUPPLY

U.L. RECOGNIZED

Low-cost DC power suitable for driving loads such as lamps, relays, and small motors is provided by Series U unregulated power supplies. All components are generously derated, insuring a long and trouble-free life; built-in fusing prevents damage due to prolonged overloading or short circuits. Mechanically similar to the regulated supplies shown on pages 10 and 11, they are housed in extruded aluminum cases which can be mounted in any position.

STANDARD FEATURES

- Silicon rectifiers
- Capacitive filtering
- Fused input
- May be used in series or parallel
- No derating or heat sinking required
- Completely serviceable

SPECIFICATIONS

Input Voltage: 0–125 VAC, 50–400 Hz, single phase.

Output Voltage:
Output Current: } See table
Ripple:

Load Regulation: Nominal output voltage is based on 115 VAC input, with approximately 50% of rated output current being drawn.

Line Regulation: With fixed load, output voltage change is proportional to input voltage change.

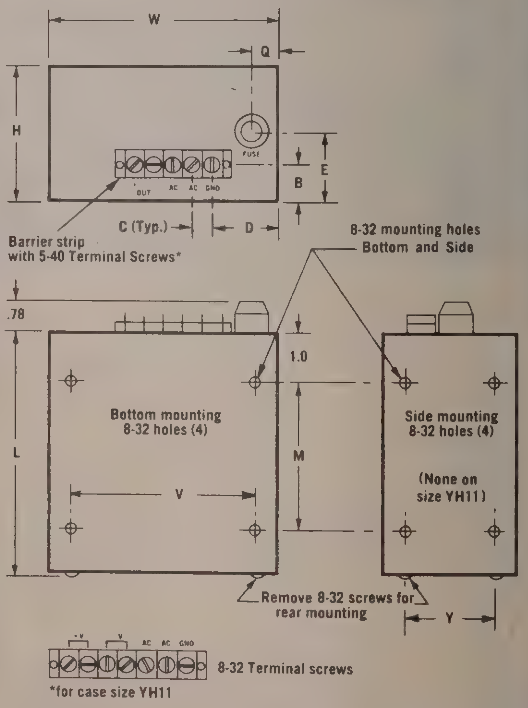
Output Voltage Adjustment: An adjustable autotransformer (not included) may be used to adjust output voltage by varying the AC input voltage to the supply.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

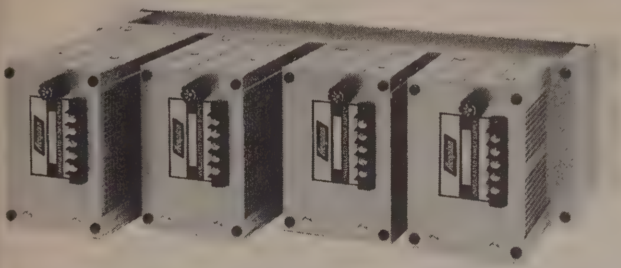
Ambient Operating Temperature: −10 to +65°C. No derating required.

Storage Temperature: −55 to +85°C.

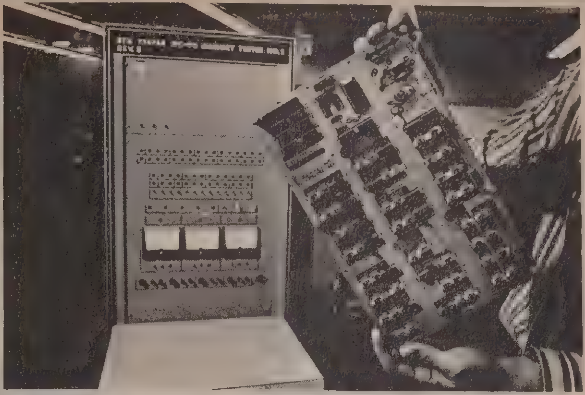
Optional 230 Volt Input
Provision for inputs of 0—250 VAC, 50—400 Hz, replacing the standard 0—125 VAC input voltage range, is available on all models except those having an output current rating of 20 ma. To order, add the suffix "-230" to the model number, and $25.00 to the standard price.


W
Q
H
FUSE
OUT
AC
AC
GND
E
B
C (Typ.)
D
Barrier strip with 5-40 Terminal Screws*
8-32 mounting holes Bottom and Side
.78
1.0
Bottom mounting 8-32 holes (4)
Side mounting 8-32 holes (4)
(None on size YH11)
L
M
V
Remove 8-32 screws for rear mounting
Y
+V
V
AC
AC
GND
8-32 Terminal screws
*for case size YH11

Size	L	W	H	M	V	Y	Q	E	B	D	C	Approx. Weight
Y3	3.71	5.12	3.44	1.62	4.5	3.0	.56	1.37	.75	1.44	.375	2 lb. 8 oz.
Y5	5.09	5.12	3.44	3.00	4.5	3.0	.56	1.37	.75	1.44	.375	4 lb. 8 oz.
Y6	6.59	5.12	3.44	4.00	4.5	3.0	.56	1.37	.75	1.44	.375	7 lb. 8 oz.
YH11	11.25	7.37	5.12	8.0	6.75	4.56	1.10	2.64	1.25	2.25	.562	18 to 23 lb.



The cross-sectional dimensions of Series U power supplies permit efficient rear mounting on either 3½″ or 5¼″ rack assemblies. Threaded holes on three surfaces permit mounting in any position.



Hamilton Standard uses Acopian power supplies in a memory tester which checks jet engine control. The equipment performs tests on the PROM (Programmable Read Only Memory) board which supplies information to the jet fuel control's processor.

Nominal Output Voltage	Output Amps.	Output Voltage N/L—F/L	Ripple Volts RMS	Price	Model	Size
4	.200	4.4 to 3.6	.2	$45	U4Y20	Y3
5	10.0 (@ 5.0)	6.7 to 3.6 (5.0)	1.8 (1.3)	95	U5Y1000	Y6
6	.800	6.6 to 5.4	.7	50	U6Y80	Y3
6	10.0 (@ 5.0)	7.8 to 4.3 (5.7)	2.0 (1.3)	95	U6Y1000	Y6
7	1.0	7.7 to 6.3	.8	50	U7Y100	Y3
8	.400	8.8 to 7.2	.4	45	U8Y40	Y3
9	1.0	9.9 to 8.1	.7	50	U9Y100	Y3
9	10.0 (@ 5.0)	11.5 to 7.5 (9.0)	2.3 (1.3)	95	U9Y1000	Y6
10	10.0 (@ 5.0)	12.4 to 8.0 (9.8)	2.3 (1.3)	95	U10Y1000	Y6
11	10.0 (@ 5.0)	13.5 to 9.1 (10.6)	2.3 (1.3)	95	U11Y1000	Y6
12	1.5	14.9 to 10.9	2.5	45	U12Y150	Y3
12	10.0 (@ 5.0)	14.1 to 9.8 (11.5)	2.3 (1.3)	95	U12Y1000	Y6
14	1.0	15.4 to 12.6	.7	50	U14Y100	Y3
14	10.0 (@ 5.0)	16.4 to 12.1 (14.0)	2.3 (1.3)	95	U14Y1000	Y6
15	10.0 (@ 5.0)	17.2 to 12.8 (14.5)	2.3 (1.3)	95	U15Y1000	Y6
16	1.0	17.6 to 14.4	.7	50	U16Y100	Y3
16	10.0 (@ 5.0)	18.8 to 14.2 (16.0)	2.3 (1.3)	95	U16Y1000	Y6
17	.250	18.7 to 15.3	.2	45	U17Y25	Y3
17	1.0	18.7 to 15.3	.7	50	U17Y100	Y3
18	1.0	19.8 to 16.2	.7	50	U18Y100	Y3
18	10.0 (@ 5.0)	21.0 to 15.8 (18.0)	2.4 (1.4)	95	U18Y1000	Y6
19	.600	20.9 to 17.1	.5	45	U19Y60	Y3
20	10.0 (@ 5.0)	23.7 to 18.3 (20.4)	2.4 (1.4)	95	U20Y1000	Y6
24	1.0	26.4 to 21.6	1.7	45	U24Y100	Y3
24	5.0	26.5 to 21.0	2.5	95	U24Y500	Y6
24	10.0	26.8 to 21.4	2.4	135	U24Y1000	Y6
24	17.0	26.4 to 21.6	1.5	180	U24Y1700	YH11
24	23.0	27.0 to 21.0	1.5	220	U24Y2300	YH11
25	5.0	28.1 to 22.3	2.5	95	U25Y500	Y6
27	5.0	30.0 to 24.0	2.6	95	U27Y500	Y6
28	1.0	30.8 to 25.2	1.7	45	U28Y100	Y3
28	5.0	31.2 to 24.8	2.6	95	U28Y500	Y6
28	8.0	30.2 to 25.0	2.4	135	U28Y800	Y6
28	15.0	30.8 to 25.2	1.5	180	U28Y1500	YH11
28	20.0	30.4 to 24.5	1.5	220	U28Y2000	YH11
30	1.0	33.0 to 27.0	1.6	55	U30Y100	Y5
30	2.0	33.0 to 27.0	1.5	75	U30Y200	Y5
30	5.0	33.0 to 26.5	2.6	95	U30Y500	Y6
32	.400	35.2 to 28.8	.6	45	U32Y40	Y3
32	5.0	35.5 to 28.0	3.3	95	U32Y500	Y6
35	1.0	38.5 to 34.5	1.6	55	U35Y100	Y5
35	2.0	38.5 to 31.5	1.5	75	U35Y200	Y5
35	5.0	38.0 to 30.0	3.3	95	U35Y500	Y6
37	.400	40.3 to 33.7	.6	45	U37Y40	Y3
37	5.0	40.5 to 32.2	3.3	95	U37Y500	Y6
38	5.0	43.0 to 34.0	3.3	95	U38Y500	Y6
40	1.0	44.0 to 36.0	1.6	55	U40Y100	Y5
40	2.0	44.0 to 36.0	1.5	75	U40Y200	Y5
40	5.0	45.0 to 37.0	3.3	95	U40Y500	Y6
41	.400	45.1 to 36.9	.6	45	U41Y40	Y3
42	5.0	48.0 to 36.0	6.5	95	U42Y500	Y6
44	.100	48.4 to 39.6	.7	50	U44Y10	Y3
44	2.0	48.4 to 39.6	1.5	85	U44Y200	Y5
45	1.0	49.5 to 40.5	1.6	60	U45Y100	Y5
45	5.0	51.0 to 38.5	6.5	95	U45Y500	Y6
48	.400	52.8 to 43.2	.6	55	U48Y40	Y3
50	1.0	55.0 to 45.0	1.6	65	U50Y100	Y5
52	.400	57.2 to 46.8	.6	55	U52Y40	Y3

Nominal Output Voltage	Output Amps.	Output Voltage N/L—F/L	Ripple Volts RMS	Price	Model	Size
55	.250	60.5 to 49.5	.4	$55	U55Y25	Y3
55	1.0	59.4 to 48.4	2.8	70	U55Y100	Y5
56	.400	61.6 to 51.4	.6	65	U56Y40	Y3
60	1.0	65.3 to 53.0	2.8	75	U60Y100	Y5
62	.400	69.0 to 58.0	1.5	65	U62Y40	Y3
65	.250	71.5 to 58.5	.4	65	U65Y25	Y3
72	.250	79.2 to 64.8	.9	65	U72Y25	Y3
80	.150	88.0 to 72.0	.6	60	U80Y15	Y3
80	.300	88.0 to 72.0	1.0	70	U80Y30	Y3
85	.150	93.5 to 76.5	.6	65	U85Y15	Y3
90	.150	99.0 to 81.0	1.1	65	U90Y15	Y3
90	.400	99.0 to 81.0	2.2	75	U90Y40	Y3
95	.150	105 to 85	1.1	75	U95Y15	Y3
100	.200	110 to 93	1.0	80	U100Y20	Y3
110	.200	121 to 100	1.0	80	U110Y20	Y3
120	.200	132 to 110	1.0	80	U120Y20	Y3
130	.200	143 to 120	1.5	80	U130Y20	Y3
140	.200	154 to 126	1.7	80	U140Y20	Y3
150	.200	165 to 135	1.7	85	U150Y20	Y3
165	.200	176 to 144	1.7	85	U165Y20	Y3
170	.200	187 to 153	2.0	85	U170Y20	Y3
180	.200	190 to 162	2.0	85	U180Y20	Y3
200	.200	220 to 180	2.0	90	U200Y20	Y3
210	.100	231 to 189	2.0	75	U210Y10	Y3
215	.100	236 to 193	2.0	75	U215Y10	Y3
230	.100	252 to 207	3.0	75	U230Y10	Y3
250	.100	275 to 225	3.0	75	U250Y10	Y3
250	.200	275 to 225	5.0	90	U250Y20	Y5
275	.100	303 to 247	3.0	75	U275Y10	Y3
275	.200	303 to 247	3.6	90	U275Y20	Y5
300	.200	330 to 270	5.0	90	U300Y20	Y5
325	.200	360 to 295	6.0	90	U325Y20	Y5
340	.100	374 to 306	3.0	75	U340Y10	Y3
350	.200	385 to 330	6.0	95	U350Y20	Y5
360	.100	396 to 324	3.0	80	U360Y10	Y3
370	.100	407 to 333	3.0	80	U370Y10	Y3
375	.200	412 to 352	6.0	95	U375Y20	Y5
400	.200	440 to 360	6.0	95	U400Y20	Y5
420	.100	462 to 378	7.0	80	U420Y10	Y3
425	.200	467 to 383	9.1	100	U425Y20	Y5
450	.200	495 to 405	9.1	100	U450Y20	Y5
475	.020	523 to 426	3.1	65	U475Y02	Y3
475	.200	524 to 426	9.1	100	U475Y20	Y5
500	.200	550 to 450	9.1	100	U500Y20	Y5
525 †	.100	574 to 473	4.8	95	U525Y10	Y5
550 †	.100	605 to 495	4.8	95	U550Y10	Y5
575 †	.100	630 to 518	4.8	95	U575Y10	Y5
580 †	.020	638 to 522	3.1	70	U580Y02	Y3
600 †	.100	660 to 540	10.0	95	U600Y10	Y5
625 †	.100	680 to 565	10.0	95	U625Y10	Y5
650 †	.100	715 to 595	10.0	95	U650Y10	Y5
675 †	.100	732 to 608	10.0	95	U675Y10	Y5
700 †	.100	770 to 630	10.0	100	U700Y10	Y5
725 †	.100	790 to 665	10.0	100	U725Y10	Y5
750 †	.020	825 to 675	3.1	75	U750Y02	Y3
750 †	.100	838 to 710	13.0	100	U750Y10	Y5
800 †	.100	880 to 720	13.0	100	U800Y10	Y5
850 †	.100	935 to 765	13.0	100	U850Y10	Y5
900 †	.020	990 to 810	5.0	80	U900Y02	Y3
900 †	.100	990 to 810	13.0	105	U900Y10	Y5
950 †	.100	1045 to 855	13.0	105	U950Y10	Y5
1000 †	.100	1100 to 900	13.0	105	U1000Y10	Y5

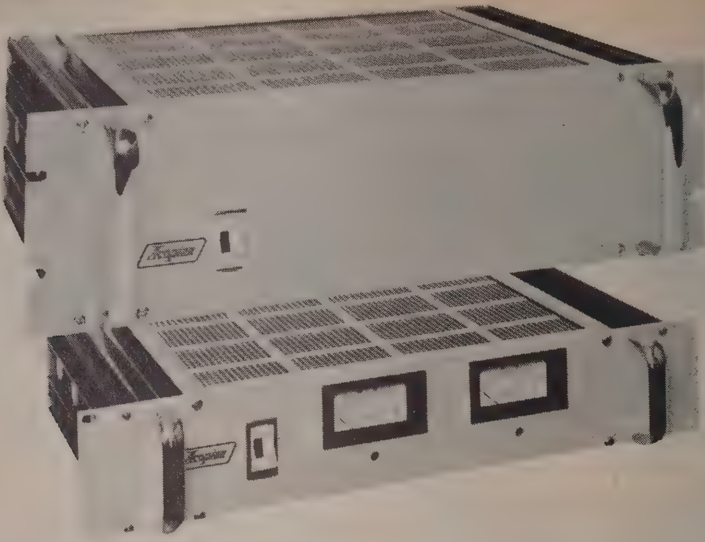
†Not U.L. recognized when this catalog was published.

Acopian

RACK MOUNTING
GENERAL PURPOSE

Shipped in 9 Days

ALL MODELS U.L. RECOGNIZED



Acopian rack-mounting power supplies feature excellent regulation and ripple specifications in 92 models with outputs up to 60 volts and 60 amps. Metering and overvoltage protection are available as options. These power supplies are constructed in sturdy extruded aluminum assemblies designed expressly for mounting in standard 19″ wide RETMA cabinet racks. The front panels are finished in light gray enamel; sides are black; the remaining casework is finished in gold alodyne.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Remote Voltage Sensing: Provision for sensing the output voltage across the load is a standard feature.

Output Voltage/Current:
Line Regulation:
Load Regulation:
Ripple:
Output Voltage Adjustment Range:
See tables

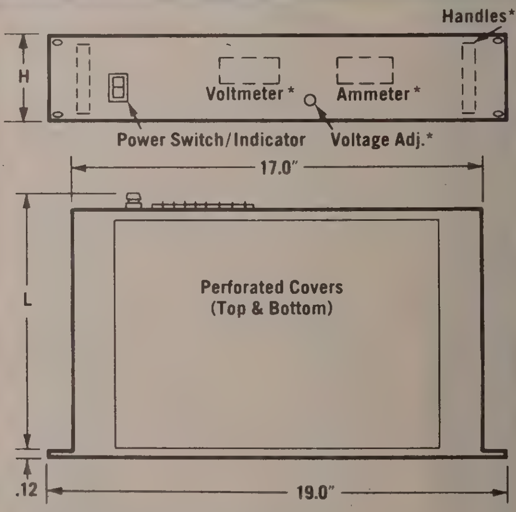
Polarity—Single Output Models: Output is floating; either positive or negative terminal may be grounded or floated up to 300V above ground.

Polarity—Dual Output Models: Positive output, common, negative output.

Storage Temperature: −55 to +85°C.

Ambient Operating Temperature—
Single Output Models: −20 to +55°C.
Dual Output Models: −10 to +55°C.

Short Circuit and Overload Protection: Electronic current limiting with automatic recovery.

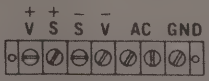


*Optional (Option positions shown are for single output models.)

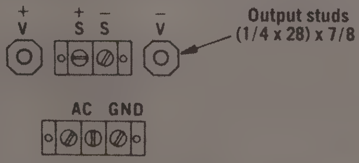
Size	H	L	Approx. Weight
3P11	3½	11.0	22 lb.
3P17	3½	17.0	38 lb.
5P12	5¼	12.0	28 lb.
5P17	5¼	17.0	53 lb.

CONNECTIONS: Single Output Models

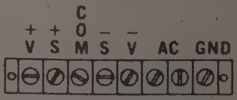
Case Sizes 3P11 and 5P12



Case Sizes 3P17 and 5P17



CONNECTIONS: Dual Output Models



ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478

SINGLE OUTPUT

Nominal Output Voltage	Adjust Range ±V	Output Current Amps @		Regulation		Ripple mv RMS	Price	Model	Size
		40°C	55°C	Load* ±%	Line* ±%				
1.5	.5	20	20	.005	.005	.25	$420	1.5PT20	3P11
1.5	.5	32	27	.005	.005	.25	515	1.5PH32	5P12
1.5	.25	60	47	.05	.05	1	790	1.5PT60	5P17
3	.5	20	20	.005	.005	.25	420	3PT20	3P11
3	.5	30	25	.005	.005	.25	515	3PH30	5P12
3	.25	48	37	.05	.05	1	675	3PT48	3P17
3	.25	60	47	.05	.05	1	790	3PT60	5P17
3.6	.5	20	20	.005	.005	.25	420	3.6PT20	3P11
3.6	.5	32	27	.005	.005	.25	515	3.6PH32	5P12
3.6	.25	60	47	.05	.05	1	790	3.6PT60	5P17
4	.25	60	47	.05	.05	1	790	4PT60	5P17
5	.5	20	20	.005	.005	.25	420	5PT20	3P11
5	.5	32	27	.005	.005	.25	515	5PH32	5P12
5	.25	48	37	.05	.05	1	675	5PT48	3P17
5	.25	60	47	.05	.05	1	790	5PT60	5P17
6	.5	20	20	.005	.005	.25	420	6PT20	3P11
6	.5	28	23	.005	.005	.25	515	6PH28	5P12
6	.25	47	36	.05	.05	1	675	6PT47	3P17
6	.25	58	45	.05	.05	1	790	6PT58	5P17
7	.5	20	20	.005	.005	.25	420	7PT20	3P11
8	.5	20	20	.005	.005	.25	420	8PT20	3P11
8	.5	28	23	.005	.005	.25	515	8PH28	5P12
8	.5	44	34	.05	.05	1	675	8PT44	3P17
8	.25	54	42	.05	.05	1	790	8PT54	5P17
9	.5	20	20	.005	.005	.25	420	9PT20	3P11
9	.5	41	32	.05	.05	1	675	9PT41	3P17
9	.5	52	41	.05	.05	1	790	9PT52	5P17
10	.5	20	20	.005	.005	.25	420	10PT20	3P11
10	.5	25	20	.005	.005	.25	515	10PH25	5P12
10	.5	38	30	.05	.05	1	675	10PT38	3P17
10	.5	50	39	.05	.05	1	790	10PT50	5P17
12	.5	17	17	.005	.005	.25	420	12PT17	3P11
12	.5	22	22	.005	.005	.25	515	12PH22	5P12
12	.5	33	26	.05	.05	1	675	12PT33	3P17
12	.5	45	35	.05	.05	1	790	12PT45	5P17
13	.5	16	16	.005	.005	.25	420	13PT16	3P11
13	.5	43	34	.05	.05	1	790	13PT43	5P17
14	.5	12	12	.005	.005	.25	420	14PT12	3P11
15	.5	10	10	.005	.005	.25	420	15PT10	3P11
15	.5	19	16	.005	.005	.25	515	15PH19	5P12
15	.5	25	20	.05	.05	1	675	15PT25	3P17
15	.5	40	31	.05	.05	1	790	15PT40	5P17
16	.5	10	10	.005	.005	.25	420	16PT10	3P11
18	.5	10	10	.005	.005	.25	420	18PT10	3P11

Nominal Output Voltage	Adjust Range ±V	Output Current Amps @		Regulation		Ripple mv RMS	Price	Model	Size
		40°C	55°C	Load* ±%	Line* ±%				
18	.5	18	15	.005	.005	.25	$515	18PH18	5P12
18	.5	24	19	.05	.05	1	675	18PT24	3P17
18	.5	36	28	.05	.05	1	790	18PT36	5P17
20	.5	10	10	.005	.005	.25	420	20PT10	3P11
20	.5	16	14	.005	.005	.25	515	20PH16	5P12
20	.5	23	18	.05	.05	1	675	20PT23	3P17
20	.5	32	25	.05	.05	1	790	20PT32	5P17
22	.5	10	10	.005	.005	.25	420	22PT10	3P11
24	.5	10	10	.005	.005	.25	420	24PT10	3P11
24	.5	15	13	.005	.005	.25	515	24PH15	5P12
24	.5	20	16	.05	.05	1	675	24PT20	3P17
24	.5	30	23	.05	.05	1	790	24PT30	5P17
25	.5	10	10	.005	.005	.25	420	25PT10	3P11
26	.5	10	10	.005	.005	.25	420	26PT10	3P11
28	.5	10	10	.005	.005	.25	420	28PT10	3P11
28	.5	14	12	.005	.005	.25	515	28PH14	5P12
28	.5	19	15	.05	.05	1	675	28PT19	3P17
28	.5	28	22	.05	.05	1	790	28PT28	5P17
30	.5	10	10	.005	.005	.25	420	30PT10	3P11
30	.5	14	12	.005	.005	.25	515	30PH14	5P12
32	.5	5	5	.005	.005	.25	360	32PT5	3P11
32	.5	10	10	.005	.005	.25	450	32PT10	5P12
34	.5	5	5	.005	.005	.25	370	34PT5	3P11
34	.5	10	10	.005	.005	.25	460	34PT10	5P12
35	.5	5	5	.005	.005	.25	380	35PT5	3P11
35	.5	10	10	.005	.005	.25	470	35PT10	5P12
36	.5	5	5	.005	.005	.25	390	36PT5	3P11
36	.5	10	10	.005	.005	.25	480	36PT10	5P12
38	.5	5	5	.005	.005	.25	400	38PT5	3P11
38	.5	10	10	.005	.005	.25	490	38PT10	5P12
40	.5	5	5	.005	.005	.25	410	40PT5	3P11
40	.5	10	10	.005	.005	.25	500	40PT10	5P12
45	.5	5	5	.005	.005	.25	420	45PT5	3P11
45	.5	10	10	.005	.005	.25	525	45PT10	5P12
48	.5	5	5	.005	.005	.25	430	48PT5	3P11
48	.5	10	10	.005	.005	.25	540	48PT10	5P12
48	.5	15	12	.005	.005	.25	790	48PT15	5P17
50	.5	5	5	.005	.005	.25	440	50PT5	3P11
50	.5	10	10	.005	.005	.25	550	50PT10	5P12
55	.5	5	3.8	.005	.005	.25	450	55PT5	3P11
55	.5	8	6	.005	.005	.25	560	55PT8	5P12
60	.5	5	3.8	.005	.005	.25	460	60PT5	3P11
60	.5	8	6	.005	.005	.25	575	60PT8	5P12
60	.5	12	9	.005	.005	.25	790	60PT12	5P17

*or 2 mv, whichever is greater.

OPTIONS

Overvoltage Protection: An internal preset overvoltage protector is available on all models. To order, add prefix "V" to the model number, and increase standard price as follows:

For case size 3P11:
Nominal output voltages from 3 to 28 V. $25.00
30 to 70 V. 35.00
Case sizes 3P17, 5P12 & 5P17 (all voltages) 75.00

Front Panel Voltage Adjustment: Standard models have a voltage adjustment located at the rear. A voltage control mounted on the front panel is available as an option. To order, add suffix "P" to the model number and $10.00 to price.

Voltmeter: Add suffix "F" to model number and $30.00 to price.

Ammeter: Add suffix "A" to model number and $30.00 to price.

230 Volt Input: Add suffix "-230" to model number and $40.00 to price.

Handles: Add suffix "H" to model number and $20.00 to price.

EXAMPLE: The Model 5PT20 equipped with all options is designated as the Model V5PT20AFHP-230. (List suffix letters in alphabetical sequence.)

DUAL OUTPUT

Nominal Output Voltages	Adjust. Range ±V	Output Current Amps. 40°C	55°C	Regulation Load ±%	Line ±%	Ripple mv RMS	Price	Model	Size
± 12	.5	7	5.6	.1	.1	1.5	$490	PD12-700	3P11
± 12	.5	9	7.2	.1	.1	1.5	575	PD12-900	5P12
± 15	.5	7	5.6	.1	.1	1.5	490	PD15-700	3P11
± 15	.5	9	7.2	.1	.1	1.5	575	PD15-900	5P12

OPTIONS

Voltmeters: One for each output. Add suffix "F" to model number and $60.00 to price. "A" and "F" options cannot be combined in one power supply.

Ammeters: One for each output. Add suffix "A" to model number and $60.00 to price. "A" and "F" options cannot be combined in one power supply.

Voltmeter and Ammeter: Each with switch for selecting output to be monitored. Add suffix "G" to model number and $100.00 to price.

Overvoltage Protection: An internally installed and preset overvoltage protector is available for all models. If either output fails, both outputs are "crowbarred." To order, add prefix "V" to the model number, and $30.00 to the price of models in case size 3P11; $50.00 to the price of models in case size 5P12.

Handles: Add suffix "H" to model number and $20.00 to price.

Front Panel Voltage Adjustment: Standard models have a voltage adjustment located at the rear. A voltage control mounted on the front panel is available as an option. To order, add suffix "P" to the model number and $10.00 to price.

230 Volt Input: Add suffix "-230" to model number and $40.00 to price.

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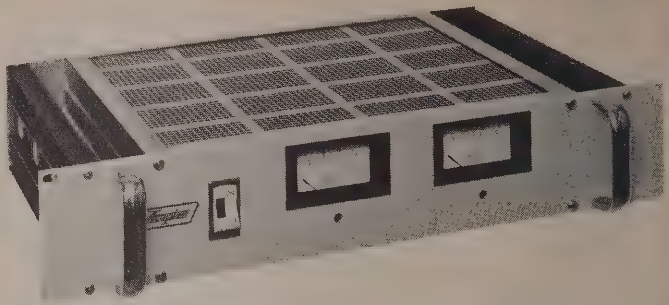


RACK MOUNTING PROGRAMMABLE

Shipped in 9 Days

ALL MODELS U.L. RECOGNIZED

Similar to the rack mounting power supplies listed on pages 26 and 27, but with broadened output voltage ranges. All models may be programmed through their voltage ranges by means of external resistance. Models with adjustable current limiting have a constant-voltage / constant-current crossover characteristic, and so may be used as constant current sources.

Output Voltage Range	Output Current Amps. at 40°C	55°C	71°C	Voltage Prgmg. Coeff. (Ω/V)	Size	Voltage Programmable Fixed Current Limiting Model	Price	Voltage Programmable Adjustable Current Limiting Model	Price
0-6	10.0	8.0	6.0	820	3P11	A06PX10	$450	P06PX10	$475
0-6	16.0	12.8	9.6	820	5P12	A06PX16	575	P06PX16	600
0-15	7.0	5.6	4.2	330	3P11	A015PX7	450	P015PX7	475
0-15	10.0	8.0	6.0	330	5P12	A015PX10	575	P015PX10	600
0-30	4.0	3.2	2.4	160	3P11	A030PX4	450	P030PX4	475
0-30	5.0	4.0	3.0	160	5P12	A030PX5	575	P030PX5	600
0-50	2.4	1.9	1.5	1000	3P11	A050PX2	450	P050PX2	475
0-50	3.0	2.4	1.8	1000	5P12	A050PX3	575	P050PX3	600

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Regulation, Ripple (constant voltage operation):

Line Regulation: ±0.005% or 2 mv, whichever is greater.

Load Regulation: ±0.005% or 2 mv, whichever is greater.

Ripple: 0.25 mv rms.

Regulation, Ripple (constant current operation):

Line Regulation: ±0.1% or 2 ma.

Load Regulation: ±0.2% or 5 ma.

Ripple: 0.1% rms.

Remote Voltage Sensing: Provision for sensing the output voltage across the load, to compensate voltage drops in output wiring, is a standard feature.

Remote Voltage Programming: The output voltage of all models may be controlled by means of external resistance connected in series with the −S lead.

Voltage Programming Coefficient: See table. Calibration tolerance, ±2%.

For applications where the capability for external adjustment of output voltage is necessary, but a guaranteed programming coefficient tolerance is not required, these power supplies may be ordered with the programming coefficient uncalibrated. To order, change the letter "X" in the model number to the letter "T", and subtract $15.00 from the standard price.

Current Limiting/Programming: Models with fixed current limiting have a foldback-type characteristic with automatic recovery. All others have current limiting with a constant-voltage/constant-current crossover characteristic.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Controls: Coarse and fine voltage adjustments, and the current limit adjustment, are located at the rear of the assembly.

Ambient Operating Temperature Range: −20 to +71°C.

Storage Temperature Range: −55 to +85°C.

Input/Output Connections: Barrier strip terminals at the rear (#5 screws for case size 3P11, #8 screws for case size 5P12).

OPTIONS

Remote Current Limit Adjustment: All models having numbers beginning with the letter P have a built in current limit control. Provision for control of the current limit setting by adjustment of an external resistance is available as an option. To order, add the prefix letter "E" to the model number, and add $20.00 to the standard price.

The current limit setting is inversely related to resistance. Use a 200 ohm ½ W potentiometer.

Overvoltage Protection: An internally installed and preset overvoltage protector is available for all models. To order, add the prefix "V" to the model number and $25.00 to the price of models with output voltage ranges of 0-6 and 0-15V, add $35.00 to the price of other models.

Ammeter: Add suffix "A" to model number and $30.00 to price.

Voltmeter: Add suffix "F" to model number and $30.00 to price.

Handles: Add suffix "H" to model number and $20.00 to price.

230 Volt Input: Add suffix "-230" to model number and $40.00 to price.

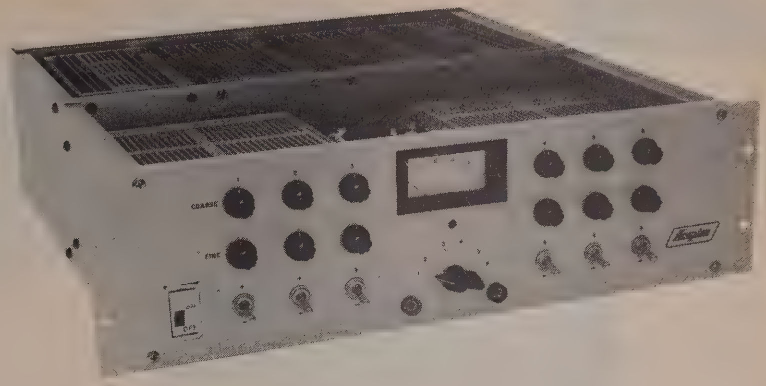
Front Panel Controls: For voltage controls (coarse and fine) mounted on the front panel, instead of the standard screwdriver-slot adjustments at the rear, add suffix "P" to the model number and $20.00 to price. For a current limit control mounted on the front panel, add suffix "Y" to the model number and $10.00 to price.

ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478

Acopian

MULTIPLE-OUTPUT POWER SUPPLY SYSTEMS

Shipped in 9 Days



Now you can fill your requirements for completely wired multiple-output rack-mounting power supply systems, without any need to search through a catalog and prepare time-consuming mechanical layouts, item-by-item pricing and detailed purchase requisitions. Instead, simply call Acopian and specify the output voltages and currents that you require.

Each system is designed and constructed to provide an optimum mechanical and wiring configuration for the complement of power modules necessary to deliver the outputs specified. Acopian production expertise assures shipment of each system, completely wired and 100% tested, within 9 days after your order is received.

Ordering an Acopian power system is this easy: List the DC outputs that you require. (Or, select the power modules that you wish to be included.) Note the system features which you consider necessary. Then, call Acopian toll-free at (800) 523-9478 and ask for the POWER SYSTEM DEPARTMENT.

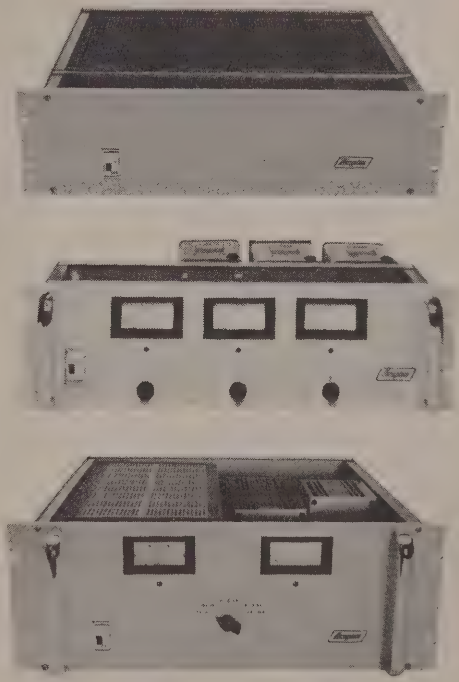
An Acopian Applications Engineer will answer—on the phone—any questions which you may have. A distinctive system model number will be assigned, and a firm price will be quoted. Your completely-wired power supply system will be shipped within 9 days.

System Description

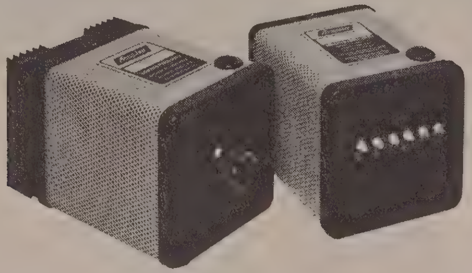
Any of the power modules listed in this catalog can be included in a power system. Commonly required features such as voltmeters, ammeters, front panel controls, handles, and chassis slides can also be provided. The rack assembly will be designed and wired in a manner optimum for the complement of modules and operating features to be included.

Each assembly is constructed from ⅛-inch thick aluminum extrusions. The front panel is finished in oven baked light gray enamel. The rear portion is finished in gold alodyne. Input and output connections are on a screw terminal strip at the rear.

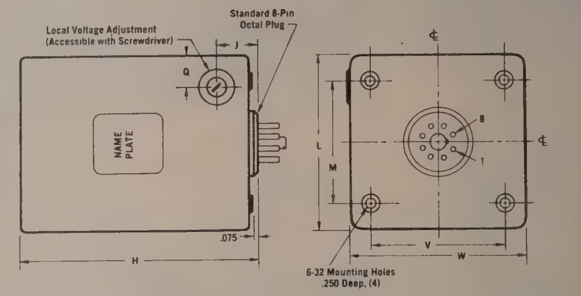
TYPICAL BUILT-TO-ORDER POWER SUPPLY SYSTEMS



SINGLE OUTPUT REGULATED PLUG-IN



An Acopian plug-in power module can be installed in a matter of seconds. Simply plug it into an octal socket. You don't even have to screw it down (although threaded holes are provided) unless it is to be mounted in other than a vertical position, or will be subjected to shock or vibration.


Local Voltage Adjustment (Accessible with Screwdriver)
Standard 8-Pin Octal Plug
J
Q
NAME PLATE
.075
H
L
M
8
1
℄
V
W
6-32 Mounting Holes .250 Deep, (4)

Size	L	W	H	M	V	J	Q	Approx. Weight
AS	3.40	3.28	4.67	2.625	2.625	1.00	0.66	2lb 8oz
BS	3.40	3.28	5.25	2.625	2.625	1.00	0.66	2lb 14oz
TS	3.33	4.15	4.85	2.562	2.750	1.12	0.62	3lb 6oz
US	3.33	4.15	5.43	2.562	2.750	1.12	0.62	3lb 8oz
WS	3.40	5.02	5.43	2.562	3.562	1.12	0.62	4lb 14oz
HS	3.40	5.02	6.57	2.562	3.562	1.12	0.62	5lb

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Polarity: Output floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Ambient operating temperature: −10 to +65°C. No derating required.

MIL Tested/Increased Temperature Range: Contact factory for specific information.

Storage Temperature: −55 to +85°C.

Installation: Plugs into standard octal socket. Mounting holes (6-32) provided at each corner for installation in any position.

OPTIONS

Solder Terminals: All models can be furnished with solder terminals instead of the octal-type plug. To order, add suffix "L" to model number and $10.00 to price.

Remote Output Adjustment: All models have a local voltage adjustment. When provision for remote (external) adjustment is also desired, add prefix "E" to model number. No increase in price.

Remote Sensing: Provision for remote sensing of the output voltage to compensate for drops in the load lines can be furnished at an additional charge of $10.00 per unit. Add prefix "R" to model number when ordering. "R" power supplies have a local voltage adjustment and provision for remote (external) output adjustment.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210 to 250 VAC, 50-400 Hz. Add suffix "–230" to model number and $25.00 to price.

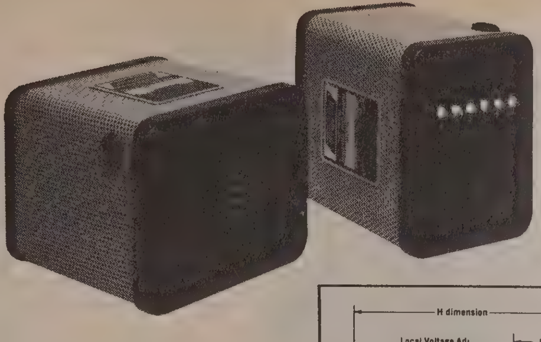
Standard models are available for any voltage from 1 to 200. For information on those not listed, contact factory.

Nominal Output Voltage	Adjustment ±Volts	Output Current Amps.	Regulation		Ripple mv RMS	Price	Model	Size
			Load ±%	Line ±%				
5	1	.050	.5	.5	5	$ 60	5L05	AS
5	1	.100	.5	.5	5	65	5L10	AS
5	1	.200	.5	.5	5	75	5L20	AS
5	1	.200	.2	.05	1	80	5J20	AS
5	1	.400	.3	.05	1	95	5J40	AS
5	1	.750	.4	.05	1	110	5J75	AS
5	.5	1.0	.5	.05	1	125	5J100	AS
5	.5	1.5	.4	.05	1	140	5J150	US
5	.5	2.0	.5	.05	1	155	5J200	WS
5	.5	3.0	.5	.05	1	170	5J300	WS
5	.5	4.0	.5	.05	1	185	5J400	HS
5	.5	5.0	.7	.05	1	200	5J500	HS
12	1	.100	.5	.5	5	65	12L10	AS
12	1	.200	.5	.5	5	80	12L20	AS
12	1	.200	.05	.05	0.5	85	12J20	AS
12	1	.400	.5	.5	5	90	12L40	AS
12	1	.400	.1	.05	1	95	12J40	AS
12	1	.750	.15	.05	1	115	12J75	AS
12	1	1.0	.1	.05	1	130	12J100	AS
12	.5	2.0	.1	.05	1	175	12J200	WS
12	.5	3.0	.25	.05	1	200	12J300	HS
15	1	.100	.05	.05	0.5	70	15J10	AS
15	1	.200	.05	.05	0.5	85	15J20	AS
15	1	.400	.5	.5	5	90	15L40	AS
15	1	.400	.1	.05	1	95	15J40	AS
15	1	.750	.5	.5	5	110	15L75	AS
15	1	.750	.15	.05	1	115	15J75	AS
15	1	1.0	.15	.05	1	130	15J100	AS
15	1	1.5	.2	.05	1	150	15J150	US
15	.5	2.0	.1	.05	1	175	15J200	WS
15	.5	3.0	.25	.05	1	200	15J300	HS
24	1	.100	.05	.05	0.5	75	24J10	AS
24	1	.200	.5	.5	5	80	24L20	AS
24	1	.200	.05	.05	0.5	85	24J20	AS
24	1	.400	.5	.5	5	95	24L40	AS
24	1	.400	.05	.05	1	100	24J40	AS
24	1	.750	.5	.5	5	110	24L75	AS
24	1	.750	.1	.05	1	115	24J75	AS
24	1	1.0	.1	.05	1	130	24J100	US
24	1	1.5	.15	.05	1	150	24J150	WS
24	.5	2.0	.1	.05	1	175	24J200	WS
28	1	.100	.05	.05	0.5	80	28J10	AS
28	1	.200	.5	.5	5	85	28L20	AS
28	1	.200	.05	.05	0.5	90	28J20	AS
28	1	.400	.5	.5	5	100	28L40	AS
28	1	.400	.05	.05	1	105	28J40	AS
28	1	.750	.1	.05	1	120	28J75	TS
28	1	1.0	.1	.05	1	135	28J100	US
28	1	1.5	.15	.05	1	160	28J150	WS
28	.5	2.0	.1	.05	1	185	28J200	WS

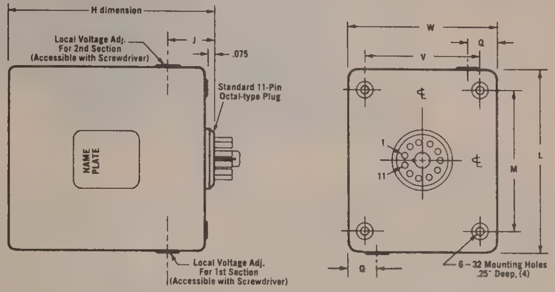
ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478 • 3-DAY SHIPMENT GUARANTEED

Acopian

DUAL OUTPUT REGULATED PLUG-IN



Space-saving Acopian duals combine two electrically independent DC outputs in a single case. Either identical or different outputs may be selected. And with a choice of more than 300 output ratings, over 10,000 combinations can be supplied . . . each with Acopian's usual 3-day shipment guarantee.


H dimension
Local Voltage Adj. For 2nd Section (Accessible with Screwdriver)
J
.075
Standard 11-Pin Octal-type Plug
NAME PLATE
Local Voltage Adj. For 1st Section (Accessible with Screwdriver)
W
Q
V
1
11
L
M
Q
6–32 Mounting Holes .25" Deep, (4)

Size	L	W	H	M	V	J	Q	Approx. Weight
ADJ	3.28	3.40	4.60	2.625	2.625	1.0	.66	1lb 8oz
TDJ	4.15	3.33	4.85	2.750	2.562	1.12	.62	3lbs
UDJ	4.15	3.33	5.43	2.750	2.562	1.12	.62	3lbs
WDJ	5.02	3.40	5.43	3.562	2.562	1.12	.62	4lb 12oz

SPECIFICATIONS

Input Voltage: 105-125 VAC, 50-400 Hz, single phase.

Output Adjustment Range: ±1 volt.

Polarity: Outputs are floating. Each section may be independently connected to provide any combination of positive and negative outputs.

Short Circuit Protection: Delivers current surges without damage — to protect against prolonged overloads and shorts, use of an input fuse is recommended.

Ambient operating temperature: −10 to +65°C. No derating required.

MIL Tested/Increased Temperature Range: Contact factory for specific information.

Storage Temperature: −55 to +85°C.

HOW TO ORDER

Select the two sections desired. The complete model number is the combination of the two sections selected. Example: The combination of section 6J20D and section 12L40D is Model 6J20D-12L40D. Always assign the lower voltage section first. Where the indicated case sizes for the two sections differ, the larger case size applies.

For pricing purposes, add the cost of the individual sections selected.

OPTIONS

Solder Terminals: All models can be furnished with solder terminals instead of the 11-pin plug. To order, add suffix "L" to model number and $10.00 to price.

Remote Output Adjustment: All models have local voltage adjustments. When provision for remote (external) adjustments is also desired, add prefix "E" to model number.

Remote Sensing: Provision for remote sensing of the output voltages, to compensate for drops in the load lines, can be furnished at an additional charge of $20.00 per unit. Add prefix "R" to model number when ordering.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210 to 250 VAC, 50-400 Hz. Add suffix "–230" to model number and $25.00 to price.

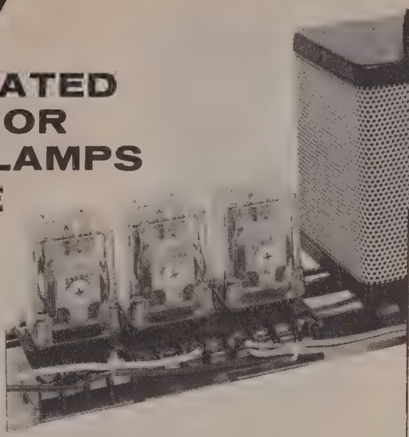
Standard models are available for any voltages from 1 to 150, and with current ratings to 1 amp. For information on those not listed, contact factory.

Nominal Output Voltage	Output Current Amps.	Regulation		Ripple mv RMS	Price per Section	Section (See "How to Order")	Size
		Load ±%	Line ±%				
5	.200	.2	.05	1	$64	5J20D	TDJ
5	.400	.3	.05	1	67	5J40D	TDJ
6	.100	.05	.05	1	60	6J10D	ADJ
6	.200	.5	.5	5	55	6L20D	TDJ
6	.200	.05	.05	1	64	6J20D	TDJ
6	.400	.5	.5	5	64	6L40D	TDJ
6	.400	.15	.05	1	67	6J40D	TDJ
10	.100	.05	.05	1	55	10J10D	ADJ
10	.200	.5	.5	5	55	10L20D	TDJ
10	.200	.05	.05	1	60	10J20D	TDJ
10	.400	.5	.5	5	64	10L40D	TDJ
10	.400	.1	.05	1	67	10J40D	TDJ
12	.100	.05	.05	1	55	12J10D	ADJ
12	.200	.5	.5	5	55	12L20D	TDJ
12	.200	.05	.05	1	60	12J20D	TDJ
12	.400	.5	.5	5	64	12L40D	TDJ
12	.400	.1	.05	1	67	12J40D	TDJ
15	.060	.02	.02	.25	44	15J06D	ADJ
15	.100	.05	.05	1	55	15J10D	ADJ
15	.200	.5	.5	5	55	15L20D	TDJ
15	.200	.05	.05	1	60	15J20D	TDJ
15	.400	.5	.5	5	64	15L40D	TDJ
15	.400	.1	.05	1	67	15J40D	TDJ
18	.100	.5	.5	5	55	18L10D	ADJ
18	.100	.05	.05	1	60	18J10D	ADJ
18	.200	.5	.5	5	60	18L20D	TDJ
18	.200	.05	.05	1	64	18J20D	TDJ
18	.400	.5	.5	5	64	18L40D	TDJ
18	.400	.1	.05	1	67	18J40D	TDJ
24	.100	.05	.05	1	60	24J10D	TDJ
24	.200	.5	.5	5	60	24L20D	TDJ
24	.200	.05	.05	1	64	24J20D	TDJ
24	.400	.5	.5	5	64	24L40D	TDJ
24	.400	.1	.05	1	67	24J40D	TDJ
28	.100	.05	.05	1	60	28J10D	TDJ
28	.200	.5	.5	5	60	28L20D	TDJ
28	.200	.05	.05	1	64	28J20D	TDJ
28	.400	.5	.5	5	64	28L40D	TDJ
28	.400	.05	.05	1	67	28J40D	TDJ
30	.100	.05	.05	1	60	30J10D	TDJ
30	.200	.5	.5	5	60	30L20D	TDJ
30	.200	.05	.05	1	64	30J20D	TDJ
30	.400	.5	.5	5	64	30L40D	TDJ
30	.400	.05	.05	1	67	30J40D	TDJ

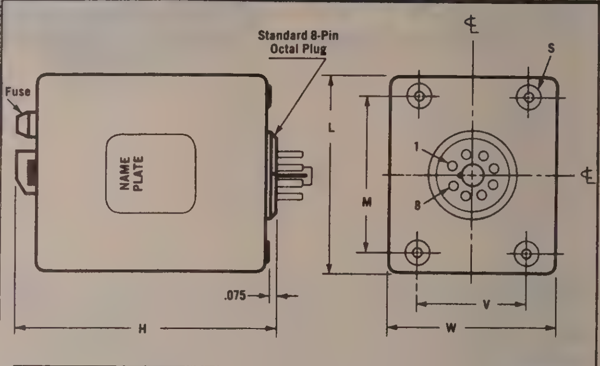
ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478 • 3-DAY SHIPMENT GUARANTEED

Acopian

UNREGULATED PLUG-IN FOR RELAYS, LAMPS AND NIXIE TUBES



These low-cost, yet highly reliable unregulated power supplies have been specially designed to power DC relays, lamps and NIXIE tubes. Each has husky silicon rectifiers and a fused input to insure long and trouble-free operation. Installation consists of simply plugging the unit into a standard octal socket.



Size	L	W	H	M	V	S	Approx. Weight
G	3.40	3.28	5.0	2.625	2.625	Four 6–32 x ¼" deep mounting holes	2lb 8oz
K	4.15	3.33	5.2	2.750	2.562	Four 6–32 x ¼" deep mounting holes	2lb 14oz
Q	4.15	3.33	7.0	2.750	2.562	Four 10–32 x ½" long mounting studs	7lb

SPECIFICATIONS

Input Voltage: 0-125 VAC, 50-400 Hz, single phase.

Output Voltage:
Output Current: See table.
Ripple:

Load Regulation: Nominal voltage is based on 115 VAC input with approximately one-half load. At no load, the output voltage will increase by approximately 10%. At full load, the output voltage will be reduced by approximately 10%.

Line Regulation: Output voltage change due to input voltage change is directly proportional to the change in input.

Polarity: Output is floating; either positive or negative terminal may be grounded or floated up to 300 V above ground.

Ambient Operating Temperature: −10 to +65°C. No derating required.

Storage Temperature: −55 to 85°+.

Installation: Plugs into standard octal socket.

OPTIONS

Solder Terminals: All models can be furnished with solder terminals instead of the octal plug. To order, add suffix "L" to model number and add $10.00 to price. Example: Model 24U100 becomes 24U100L.

230 Volt Input: All models can be alternately furnished for operation on inputs of 210 to 250 VAC, 50-400 Hz. Add suffix "-230" to model number and $25.00 to price.

Nominal Output Voltage	Output Current Amps.	Ripple Volts RMS	Model	Price	Size
4	.200	.2	4U20	$45	G
6	.800	.7	6U80	50	G
7	1.0	.8	7U100	50	G
7	2.0	1.5	7U200	75	Q
8	.400	.4	8U40	45	G
9	.600	.6	9U60	45	G
9	1.0	.7	9U100	50	G
13	.600	.5	13U60	45	G
13	2.5	1.8	13U250	85	Q
14	1.0	.7	14U100	50	G
16	1.0	.7	16U100	50	G
18	1.0	.7	18U100	50	G
20	3.0	2.3	20U300	85	Q
22	.400	.7	22U40	50	G
24	.600	1.1	24U60	45	G
24	1.0	1.7	24U100	50	G
24	3.0	2.2	24U300	85	Q
28	1.0	1.7	28U100	50	G
28	3.0	2.7	28U300	85	Q
30	1.0	1.6	30U100	55	K
30	2.0	1.5	30U200	80	Q
32	.400	.6	32U40	45	G
35	1.0	1.6	35U100	55	K
35	2.0	1.5	35U200	80	Q
40	1.0	1.6	40U100	55	K
40	2.0	1.5	40U200	80	Q
45	1.0	1.6	45U100	65	K
48	.400	.6	48U40	55	G
56	.400	.6	56U40	65	G
62	.300	2.7	62U30	65	K
72	.250	.9	72U25	65	G
80	.150	.6	80U15	65	G
80	.300	1	80U30	75	K
100	.200	1	100U20	80	K
120	.200	1	120U20	80	K
140	.200	2	140U20	85	K
150	.200	2	150U20	85	K
160	.100	1.7	160U10	70	G
*180	.100	1.7	180U10	70	G
*200	.150	2	200U15	85	K
250	.100	3	250U10	80	K
340	.100	3	340U10	80	K
420	.100	6.7	420U10	80	K
475	.020	3.1	475U02	70	G
580	.020	3.1	580U02	75	G
750	.020	3.1	750U02	80	G
900	.020	5	900U02	85	G

*Suitable for supplying input voltages to NIXIE tubes. NIXIE is a registered trademark of Burroughs Corporation.

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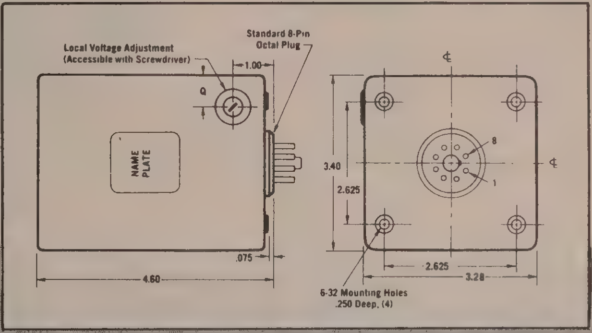
ACOPIAN CORP., P.O. BOX 638, EASTON, PA 18042
TOLL FREE NO.: (800) 523-9478 • 3-DAY SHIPMENT GUARANTEED

Acopian

HIGH ISOLATION REGULATED PLUG-IN

For applications where high isolation in a regulated power supply is required, such as in powering strain gage and other transducer bridge circuits, Acopian offers models with ratings from 5 to 36 volts and 0.050 to 0.200 amperes. All models feature input-output isolation of 10,000 megohms minimum to ground in parallel with 100 pF maximum. To install, simply plug into a standard octal socket. No other mounting is normally required, but threaded holes are provided in the base for fastening the module in other than a vertical position, or to secure it against shock or vibration. Both slot (narrow adjustment about a nominal voltage) and wide voltage adjustment models are available.

ALL MODELS U.L. RECOGNIZED


Local Voltage Adjustment (Accessible with Screwdriver)
Standard 8-Pin Octal Plug
1.00
Q
NAME PLATE
.075
4.60
℄
℄
8
1
3.40
2.625
2.625
3.28
6-32 Mounting Holes .250 Deep, (4)

SPECIFICATIONS

Isolation: 10,000 megohms to ground (min) in parallel with 100 pF (typical).

Leakage Current: 10 uA (typical).

Input-Output Coupling: 50 pF (typical).

Input Voltage: 105-125 VAC, 50-60 Hz, single phase.

Output Voltage:
Output Current:
Voltage Adjustment:
Ripple:
} See table.

Load Regulation: ±0.05%

Line Regulation: ±0.05%

Polarity: Output floating; either positive or negative terminal may be grounded.

Ambient Operating Temperature: −20 to +71°C. No derating required.

Storage Temperature: −55 to +85°C.

Installation: Plugs into standard octal socket. Mounting holes (6-32) provided at each corner for installation in any position.

Weight: 1 lb 8 oz

OPTIONS

Remote Output Adjustment: All standard models are provided with local voltage adjustment. For remote (external) adjustment, add prefix "E" to model number. Example: Model 15X10 will be E15X10. No increase in price.

Solder Terminals: All Acopian plug-in power supplies are also available with solder terminals in place of an octal-type plug. To order, add suffix "L" to model number and $10.00 to price. Example: Model 12X20 becomes Model 12X20L.

Nominal Output Voltage	Adjustment ± Volts	Output Current Amps.	Ripple μV RMS	Price	Model
5	1	.100	250	$100	5X10
5	1	.200	350	125	5X20
6	1	.100	250	100	6X10
6	1	.200	350	125	6X20
7	1	.100	250	100	7X10
7	1	.200	350	125	7X20
8	1	.100	250	100	8X10
8	2	.150	300	115	8X15
8	1	.200	350	125	8X20
9	1	.100	250	100	9X10
9	1	.200	350	125	9X20
10	1	.100	250	100	10X10
10	2	.150	300	115	10X15
10	1	.200	350	125	10X20
12	1	.100	250	100	12X10
12	1	.200	350	125	12X20
15	1	.100	250	100	15X10
15	1	.200	350	125	15X20
16	1	.100	250	100	16X10
16	1	.200	350	125	16X20
18	1	.100	250	100	18X10
18	2	.150	300	115	18X15
18	1	.200	350	125	18X20
20	1	.100	250	100	20X10
20	1	.200	350	125	20X20
22	1	.100	250	100	22X10
22	2	.150	300	115	22X15
22	1	.200	350	125	22X20
24	1	.100	250	100	24X10
24	2	.150	300	115	24X15
24	1	.200	350	125	24X20
25	1	.100	250	100	25X10
25	2	.150	350	125	25X15
28	1	.100	250	100	28X10
28	2	.150	350	125	28X15
30	1	.050	200	100	30X05
30	2	.100	250	125	30X10
32	1	.050	200	100	32X05
32	2	.100	250	125	32X10
34	1	.050	200	100	34X05
34	2	.100	250	125	34X10
35	1	.050	200	110	35X05
36	1	.050	200	110	36X05

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33

Acopian

LABORATORY BENCHTOP

Single, dual and triple output

These benchtop power supplies provide all the performance and operating features necessary in a laboratory instrument. A wide choice of single and multiple output models offer optimum combinations of the operating features and output ratings that are most often needed.

They are also "human engineered" for convenience and ease of use. Two meters provide for the simultaneous monitoring of voltage and current on single output supplies, or a combination of two output voltages or currents on dual and triple output models. When more than one is required, they may be stacked to conserve bench space. Interlocking design prevents the upper units from slipping off.

Coarse and fine voltage controls permit setting outputs to a high degree of resolution, and adjustable current limiting prevents the load from drawing a higher current than intended. Many models provide constant voltage/constant current crossover, and may be used to deliver a regulated current to a varying impedance load. Some also include adjustable overvoltage protection.

The rugged casework is attractively finished in black and gold. "Five way" output binding posts and a retracting handle contribute to user convenience.

SPECIFICATIONS:

Input Voltage: 105-125 Vac, 50-400 Hz, single phase.

Output Ratings: See table.

Regulation, Ripple (constant voltage operation):

Line Regulation: ±0.01% or 2 mv, whichever is greater.

Load Regulation: ±0.01% or 2 mv, whichever is greater.

Ripple: 0.25 mv rms.

(Model KT7-20, ±10-20 V outputs only: Line regulation, ±0.05%; load regulation, ±0.05%; ripple, 1.0 mv rms.)

Regulation, Ripple (constant current operation):

Line Regulation: 2.0 ma (Model K7S500, 6.0 ma).

Load Regulation: 10.0 ma.

Ripple: 1.0 ma rms (Model K7S500, 2.0 ma rms).

Output Current Control: Outputs marked ACL are short circuit and overload protected by means of a continuously adjustable rolloff type current limiting circuit.

Outputs marked CV/CC deliver constant voltages with increasing load until the current limiting point (continuously adjustable) is reached, beyond which voltage decreases as required to maintain a constant current. In addition to providing short circuit and overload protection, this feature permits the supply to be used as a current regulated power source.

Temperature Coefficient: 0.015%/° C.

Stability: Over an eight-hour period, following a 30 minute warmup.

Constant voltage operation: 0.1%.

Constant current operation: 15 ma.

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SINGLE OUTPUT MODELS

OUTPUT VOLTAGE RANGE	OUTPUT CURRENT, AMPS.	CURRENT CONTROL	PRICE	MODEL	CASE SIZE
0-7	1.0	ACL	$149	K7S100	K9
0-7	2.0	CV/CC	199	K7S200	K10
0-7	5.0	CV/CC	285	K7S500	K11
0-18	0.6	ACL	149	K18S60	K9
0-18	1.0	CV/CC	199	K18S100	K10
0-32	0.35	ACL	149	K32S35	K9
0-32	0.6	CV/CC	199	K32S60	K10
0-50	0.35	CV/CC	199	K50S35	K10

DUAL OUTPUT MODELS

OUTPUT VOLTAGE RANGES	CURRENT PER OUTPUT, AMPS.	CURRENT CONTROL	PRICE	MODEL	CASE SIZE
0-20/0-20	0.25	ACL	$199	K20D25	DK9
0-20/0-20	0.5	ACL	265	K20D50	DK10

TRIPLE OUTPUT MODEL

OUTPUT VOLTAGE RANGE	CURRENT PER OUTPUT, AMPS.	CURRENT CONTROL	PRICE	MODEL	CASE SIZE
0-7 ±10-20 (tracking)	2.0 0.5	CV/CC Fixed	$325	KT7-20	TK10

Temperature Range:
Operating: 0 to +50° C.
Storage: −40 to +85° C.

Protection:
Input: Line fuse.
Overload: Adjustable electronic current limiting.
Overvoltage: "Crowbar" circuit, continuously adjustable down to 3 volts, protects load by effectively short circuiting output when "crowbar" trip point setting is exceeded. (Models K7S200, K7S500 and KT7-20 only.)

Transient Response Time: Less than 50 μsec, for a step change in input from 105 to 125 Vac, or in output current from no load to full rated output current.

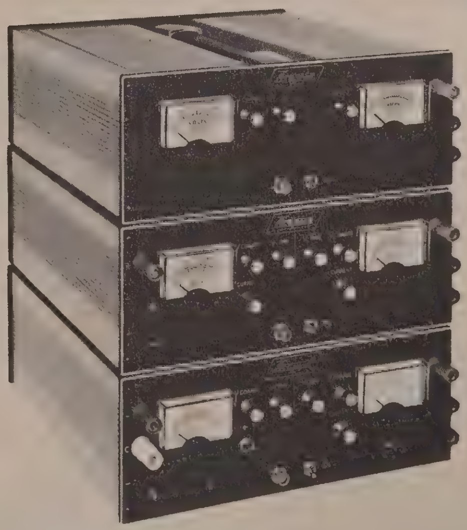
Output Impedance (constant voltage operation):
Less than 0.03 ohms from dc to 1 kHz.
Less than 0.5 ohms from 1 kHz to 100 kHz.

Meters: Two, each accurate to 2% of full scale. On multiple output models, selector switches permit monitoring every output voltage and current.

Controls:
Power switch
Output voltage, coarse and fine adjustments
Output current limit
Overvoltage protection trip point (Models K7S200, K7S500 and KT7-20 only)
Meter switches (multiple output models only)

Construction: Gold-finished extruded aluminum top and sides. Bottom, perforated aluminum panel. Front and rear panels, molded black phenolic. Retracting handle. Input power cord, 3-wire UL approved. Output connections, "five way" binding posts.

Case Size	Dimensions (overall) H x W x D (inches)	Approx. Weight
K9 DK9	3.3 x 8.5 x 10.9	4 lb 1 oz 4 lb 6 oz
K10 DK10 TK10	3.3 x 8.5 x 11.3	5 lb 5 lb 6 oz 7 lb 6 oz
K11	3.3 x 8.5 x 12.2	7 lb 8 oz



Stackable Case Design permits using more than one supply without requiring more bench area.

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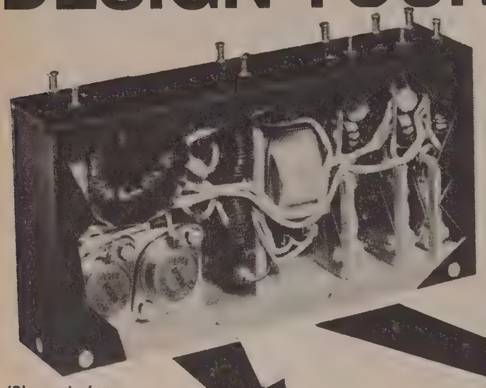
ARNOLD MAGNETICS

AC-DC/DC-DC MODULAR MINIATURIZED SWITCHING POWER SUPPLIES

DESIGN YOUR OWN POWER SUPPLY



(Shown before encapsulation)

FROM OFF-THE-SHELF MODULES!

Miniature Packages to 400 Watts Output

You select from over 120 Standard Sub-Modules to design your own "Tailor-Made" Switching Power Supply. Why wait many months for a "custom" supply and still risk the failure of an unproven circuit or thermal design?

- MIL-Spec or Industrial
- 50% to 75% smaller than other switchers
- Delivery in 8-12 weeks ARO
- From 1 to 10 DC Outputs — DC Input AC or DC Inputs
- Power Density to 5.33 Watts/cubic inch
- Encapsulated for Reliability: MIL-STD-810C, MIL-E-5400, MIL-E-16400

1. SELECT OUTPUT REGULATORS

(All outputs adjustable ±5% from nominal voltage. Outputs are isolated and can be connected in positive or negative polarity.)

Specify Nominal VDC Output	Output Current (maximum)	Model	Regulator Length (Inches)	Worst Case Efficiency
From 2.0 to 3.9	1.0	ARS**	0.6	30%
	2.0	ARA	0.6	30%
	3.0	ARC	1.2	30%
	5.0	ARF	2.1	60%
	10.0	ARM	2.1	60%
	20.0*	ARP	2.7	60%
From 4.0 to 6.0	1.5	ARS**	0.6	35%
	3.5	ARA	0.6	45%
	6.0	ARC	1.2	45%
	10.0	ARF	2.1	70%
	20.0	ARM	2.1	70%
	40.0*	ARP	2.7	75%
From 6.1 to 16	1.0	ARS**	0.6	45%
	2.0	ARA	0.6	50%
	4.0	ARC	1.2	50%
	5.0	ARF	2.1	80%
	10.0	ARM	2.1	80%
	16.0*	ARP	2.7	80%
From 16.1 to 30	0.5	ARS**	0.6	60%
	1.5	ARA	0.6	65%
	2.5	ARC	1.2	65%
	3.0	ARF	2.1	80%
	5.0	ARM	2.1	80%
	8.0*	ARP	2.7	80%
From 30.1 to 55	0.5	ARB	0.6	65%
	1.5	ARK	1.2	65%
From 56 to 110	0.25	ARB	0.6	70%
	0.75	ARK	1.2	70%
From 111 to 160	0.15	ARB	0.6	70%
	0.3	ARK	1.2	70%
From 161 to 200	0.1	ARB	0.6	75%
	0.2	ARK	1.2	75%
From 201 to 250	0.05	ARB	0.6	75%
	0.10	ARK	1.2	75%
From 251 to 300	0.05	ARB	0.6	75%
	0.1	ARK	1.2	75%

* Higher currents also available.

2. SELECT INPUT DRIVER

(Use "E options" for ranges not shown)

AC INPUT

Input Voltage Range	Model	Output Power Rating (Watts)	Driver Length (Inches)
115 ±12 VAC 47-500 Hz	TL	100	4.2
	TH	200	4.8
	TV	300	8.1
	TW	400	9.6
115 ±12 VAC 340-500 Hz	BL*	100	4.5

DC INPUT

Input Voltage Range	Model	Output Power Rating (Watts)	Driver Length (Inches)
28 VDC (24-30 VDC)	NL	100	2.4
	NH	200	3.0
	NV	300	5.4
48 ±4 VDC	JL	100	2.4
	JH	200	2.4
	JV	300	Consult Factory
125 ±10 VDC (100-150 VDC using "E" option)	KL	100	2.4
	KH	200	2.4
	KV	300	Consult Factory

* Cannot be used with ARF, ARM or ARP Regulators.

3. SELECT OPTIONS

(Contact Factory for prices)

Option Letter	Description	Option Letter	Description
V	Output Overvoltage Protection	TS	Over-Temperature Shutdown
T	Extended Temperature Operation	SYN*	External Synchronization
E	Extended Input Voltage Range	LC*	TTL On/Off Control
TP	Input Transient Protection	D*	Power-Down Signal
R	Remote Sense	S*	Output Sequencing
A	Remote Voltage Adjustment	LP*	Programmable Outputs

* Minimum Order of 10 units or Small-Lot Charge for these Options.
** For ARS Regulator, do not exceed agreed upon output current rating.

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INSERT YOUR SPECIFICATIONS

USE SEPARATE SHEET FOR 7 OR MORE OUTPUT VOLTAGES

ARNOLD MAGNETICS

	MODEL i.e. ARA	VOLTS (Nominal)	AMPS (Maximum)	OUTPUT POWER	REGULATOR EFFICIENCY	REGULATOR INPUT POWER FROM DRIVER	REGULATOR LENGTH (Include Options)	**PRICE** (Include Options)
1.	______	______VDC ×	______A =	______Watts ÷	______% =	______Watts	______Inches	$______
2.	______	______VDC ×	______A =	______Watts ÷	______% =	______Watts	______Inches	$______
3.	______	______VDC ×	______A =	______Watts ÷	______% =	______Watts	______Inches	$______
4.	______	______VDC ×	______A =	______Watts ÷	______% =	______Watts	______Inches	$______
5.	______	______VDC ×	______A =	______Watts ÷	______% =	______Watts	______Inches	$______
6.	______	______VDC ×	______A =	______Watts ÷	______% =	______Watts	______Inches	$______
		TOTAL OUTPUT POWER		______Watts		______Watts (Add 10% to AC inputs for ripple)	______Inches TOTAL REGULATORS (Include options)	$______ TOTAL REGULATOR

POWER REQUIRED FROM DRIVER

INPUT DRIVER	**MODEL** i.e. TH, NL	RATED OUTPUT POWER
	______	______Watts

→ MUST BE GREATER THAN → POWER REQUIRED FROM DRIVER

+ ______Inches DRIVER LENGTH (Include Options) | $______ DRIVER PRICE

TOTAL MODULE LENGTH = ______Inches Driver and Regulators | $______ TOTAL PRICE

CASE SELECTION

Arnold Magnetics Power Supplies are designed to be cooled by heat conduction through the mounting baseplate.
Provide **Safe Thermal Margins** in the selection of the Power Supply Case:

Please see next page for: OPERATING, ENVIRONMENTAL and MECHANICAL SPECIFICATIONS

A. Select a case size that will accommodate the sum of all the Regulators, Options and Driver Module, then...

TOTAL MODULE LENGTH ______INCHES ≤ CASE______CONTAINING ______INCHES

B. Assure that the "Watts Dissipated through Baseplate" does not exceed **6.25 watts/square inch** for standard +71°C designs or **4.17 watts/square inch** for optional +85°C designs (calculations are made under worst-case conditions).

POWER REQ'D FROM DRIVER		DRIVER EFFICIENCY		TOTAL INPUT POWER		TOTAL OUTPUT POWER		POWER DISSIPATION		BASEPLATE AREA (from Table)		WATTS DISSIPATED THROUGH BASEPLATE
WATTS	÷	95% **90% for DC**	=	WATTS	−	WATTS	=	WATTS	÷	______IN²	=	______ WATTS/BASEPLATE IN² (Not to exceed 6.25 watts)

C. Contact factory for assignment of final model number. (For example TV-3018 This Model Number includes all voltage and current levels, options and package size information.

TV-3 018)
Driver No. of Outputs Master List No.

THERMAL INTERFACE

Because Arnold Magnetics Power Supplies are cooled by conduction, always use thermal compound during installation. To assure reliability the thermal interface must be designed to maintain specified Baseplate Temperature under worst-case conditions. (See Note B above to determine power to be dissipated.) Heat transfer via forced air or natural convection will be minimal.

Please consult the Factory to discuss heat-sinking considerations.

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ARNOLD MAGNETICS

AC-DC/DC-DC MODULAR MINIATURIZED SWITCHING POWER SUPPLIES

CURRENT APPLICATIONS

GOVERNMENT/MILITARY

Space Shuttle — Flight Compartment Instrumentation
UYK-40 Military Computer — Including Arnold UPS Power Supply
Airborne Command Center Instrumentation — Over 140 Different Models in Use
Radar Warning Training System
Portable Dynamic Simulator (PDS) Threat Simulation System
Tow Missile Test Set
Stinger Missile Test Set
F-16 Ground Support Equipment
Aircraft Anti-Stall System
M47 Weapons System
Military Preparedness Data Bank
Dockside EW Training System
Mark 48 Torpedo Projectile Power Supply

HI-REL INDUSTRIAL

Voice Controlled Wheel Chair
Alaska Pipeline Monitor
Deep Water Camera for Cable Recovery
Medical Plasma Display
Microwave Station Alarm System
Oil Rig Control Computer
Multi-Channel Aircraft Flight Recorder
Nuclear Reactor Moderator System
Telephone Switching and Test
Ultra-Wide Band Oscilloscope
Putman Wind Generator
Turbine Control Electronics
Auto Analysis Data Recorder
Synthesized Sweeping Signal Generator (SSSG)
Communication Frequency Synthesizer
Power Switching Distribution Control

OPERATING SPECIFICATIONS

• REGULATOR SPECIFICATIONS

ARA, ARC, ARB, ARK
LINE REGULATION (for ±10% input change): 0.1% of E out +10 mV
LOAD REGULATION (½ to full load change): 0.1% of E out +10 mV.
TEMPERATURE COEFFICIENT: 0.01%/°C.

ARS, ARF, ARM, ARP
LINE REGULATION (for ±10% input change): 0.2% of E out +10 mV.
LOAD REGULATION (½ to full load change): 0.2% of E out +10 mV.
TEMPERATURE COEFFICIENT: 0.02%/°C.

• RIPPLE/NOISE

ARA, ARC, ARB, ARK
0.1% of E out +10 mV RMS.

ARS
0.25% of E out +10 mV RMS.
23 mV RMS max. for outputs from 2-4 VDC.

ARF, ARM, ARP
0.5% of E out +10 mV RMS.
35 mV RMS max. for outputs from 2-4 VDC.

- **Operating Temperature** (Baseplate): −10°C to +71°C (optional −55°C to +85°C).
- **Storage Temperature:** −65°C to +100°C.
- **Short Circuit Protection:** All outputs are short circuit protected and feature foldback current limiting.
- **Output Adjustment Range:** All outputs are adjustable over a plus or minus 5% range minimum.
- **Input Voltage Surge Protection** (AC Input Units): 140 VAC. Unit will turn off if surge exceeds 140 VAC. (See TP option).
- **Semiconductor Junction Temperature:** Maximum of 120°C at operating baseplate temperature of +71°C or optional +85°C.
- **Isolation:** The inputs, case and outputs are isolated (floating) from each other. Isolation test voltage is the greater of 50 VDC or 1.3 X E out.

ENVIRONMENTAL SPECIFICATIONS

(Test Reports Available)

- **Temperature Range:** Operating Temperature: −10°C to +71°C Baseplate Temperature. Optional −55°C to +85°C range. Non-Operating Storage Temperature: −65°C to +100°C.
- **High Temperature:** Per MIL-STD-810, Method 501, Procedure II.
- **Low Temperature:** Per MIL-STD-810, Method 502, Procedure I.
- **Temperature-Altitude:** Per MIL-STD-810, Method 504, Procedure I; the following details apply: −10°C to +71°C (and −55°C to +85°C) at Altitude: Sea level to 70,000 ft.
- **Humidity:** Per MIL-STD-810, Method 507, Procedure I.
- **Acceleration:** Per MIL-STD-810, Method 513, Procedure I and II, at a test level of 14 G.
- **Vibration:** Per MIL-STD-810, Method 514, Procedure I, at a test level of 15 G.
- **Shock:** Per MIL-STD-810, Method 516, Procedures I, II, III, V, and VI at a test level of 40 G.

MIL-STD 461A

Noise/Ripple Considerations

Qualification to the provisions of MIL-STD 461A is a system level concern. Arnold Magnetics Power Supplies have been included in many systems that have received MIL-STD 461A approval without additional filtering. Other systems may require moderate filtering external to the power supply to pass all provisions of the MIL-STD 461A tests.

For example, a single two-pole filter has been used with over 140 different Arnold models to achieve MIL-STD 461A system approvals. We can recommend a variety of filters and installation techniques that can assist in MIL-STD 461A approval.

Because of the more stringent AC input voltage line leakage specifications of MIL-STD 461B, please consult us on applications affected by that specification.

CASE SELECTION

Case Size	Total of Module Lengths (in.)	Base-plate Area	Case Dimensions (in.) (L)	(W)	(H)	Mounting Holes (in.) M	N	Quan.	Final Unit Wt. (oz.)	Fig. No.
AA	3.2	4.8	3.5	1.6	3.6	1.125	2.750	4	21	1
BA	4.7	7.1	5.0	1.6	3.6	1.125	4.250	4	30	1
CA	6.7	10.1	7.0	1.6	3.6	1.125	2.750	6	41	1
FA	8.2	12.4	8.5	1.6	3.6	1.125	3.500	6	50	1
DA	10.2	15.4	10.5	1.6	3.6	1.125	4.500	6	62	1
"DOUBLE WIDE" Packages below allow modules to be mounted side by side.										
AB	2x3.2	9.7	3.5	3.1	3.6	2.625	2.750	4	42	2
BB	2x4.7	14.2	5.0	3.1	3.6	2.625	4.250	4	60	2
CB	2x6.7	20.2	7.0	3.1	3.6	2.625	2.750	6	82	2
FB	2x8.2	24.8	8.5	3.1	3.6	2.625	3.500	6	100	2
DB	2x10.2	30.8	10.5	3.1	3.6	2.625	4.500	6	124	2
"TRIPLE WIDE" Packages below allow modules to be mounted three across.										
AC	3x3.2	14.4	3.5	4.6	3.6	4.126	2.750	4	63	2
BC	3x4.7	21.3	5.0	4.6	3.6	4.126	4.250	4	90	2
CC	3x6.7	30.3	7.0	4.6	3.6	4.126	2.750	6	123	2
FC	3x8.2	37.2	8.5	4.6	3.6	4.126	3.500	6	150	2
DC	3x10.2	46.2	10.5	4.6	3.6	4.126	4.500	6	186	2

All cases are black anodized aluminum with turret-style solder terminals, and Teflon insulation.

Figure 1

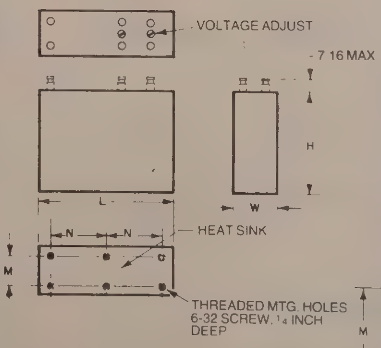
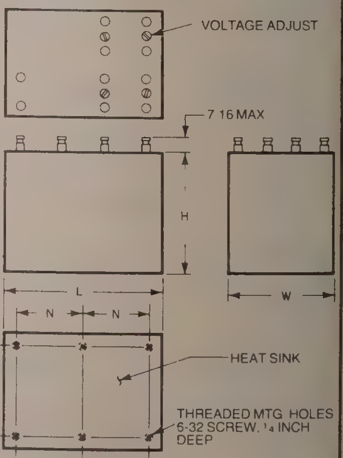


Figure 2



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AC-DC/DC-DC MODULAR MINIATURIZED
SWITCHING POWER SUPPLIES

ARNOLD MAGNETICS

IN-HOUSE TEST PROGRAM AT ARNOLD MAGNETICS
—Stress Testing Proves Reliability

"Readiness and Reliability to defend our Nation . . ."

Traditional MTBF Predictions for Power Supply Reliability can be quite misleading. The key to accurate MTBF Prediction is analysis under stress.

Beginning in March of 1978, Arnold's "Life-Time Analytic Stress Tests" (LAST) have been continually performed on our products to provide this necessary dimension of performance verification.

Some Switching Power Supplies have been shown to exhibit poor reliability when subjected to rapid load changes or when input power is cycled on and off. Many users of switching supplies have been disappointed by failures in field application after accepting calculated MTBF estimates.

Arnold's "Life-Time Analytic Stress Tests" (LAST) are designed to eliminate the disparity between calculated and actual operation. The LAST Test Program includes the continuous Input Power cycling to a Power Supply under a series of operating conditions:

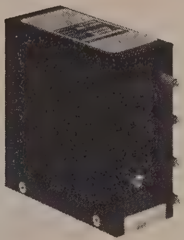
- Full Load, Half Load, and No Load conditions on All Outputs
- Multiple Short Circuits on Outputs
- Highly Reactive Loads on Outputs
- Input Power Over-Voltage and Under-Voltage
- Elevated Temperature Operation

During tests like these, the most extreme operating conditions are simulated. The tests are conducted 24 hours per day, 365 days per year. Designs must pass 1,000,000 On/Off Cycles without failure before they are introduced to our Customer. Arnold tests for reliability to assure that hardware is always in a state of readiness.

Arnold Magnetics' "Gold-Line" of High Reliability Switching Power Supplies have emerged from these stressful tests. Certain Design Improvements have been implemented that could not have been defined by paper analysis.

Arnold Magnetics' "GOLD-LINE" Switching Power Supplies . . . PROVEN RELIABILITY

HIGH VOLTAGE POWER SUPPLIES



PHU & SHU SERIES

- **Select any voltage from 2 VDC to 5,000 VDC**
- **Miniature designs with extreme reliability**
- **Meets MIL-STD 810C, MIL-E 5400, MIL-E 16400**

OPERATING SPECIFICATIONS

Line Regulation (±10% line change): 0.3% of E out maximum
Load Regulation (½ load to full load): 2.0% of E out maximum
Output Voltage Adjustment: ±5% minimum
Output Isolation: 3 X output voltage (1 kV minimum, 5 kV maximum)
Operating Baseplate Temperature: −10°C to +71°C
Storage Temperature: −65°C to +100°C
Package Size: Dimensions shown above apply to all models.

Output Voltages (VDC)	INPUT RANGES					
	115 ±10 VAC, 47-500 Hz		12 ±1 VDC		28 ±2 VDC	
	Amps	Model	Amps	Model	Amps	Model
2	5	PHU-2	2.5	SHU-2EE	5	SHU-2
5	5	PHU-5	2.5	SHU-5EE	5	SHU-5
12	3.3	PHU-12	1.0	SHU-12EE	3.3	SHU-12
15	2.6	PHU-15	1.0	SHU-15EE	2.6	SHU-15
24	1.6	PHU-24	0.8	SHU-24EE	1.6	SHU-24
28	1.4	PHU-28	0.7	SHU-28EE	1.4	SHU-28
30	1.3	PHU-30	0.5	SHU-30EE	1.3	SHU-30
50	0.8	PHU-50	0.4	SHU-50EE	0.8	SHU-50
100	0.4	PHU-100	0.2	SHU-100EE	0.4	SHU-100
250	0.16	PHU-250	0.08	SHU-250EE	0.16	SHU-250
300	0.13	PHU-300	0.06	SHU-300EE	0.13	SHU-300
500	0.08	PHU-500	0.04	SHU-500EE	0.08	SHU-500
750	0.05	PHU-750	0.02	SHU-750EE	0.05	SHU-750
1000	0.03	PHU-1000	0.02	SHU-1000EE	0.04	SHU-1000
2000	0.01	PHU-2000	0.01	SHU-2000EE	0.02	SHU-2000
3500	n/a	n/a	n/a	n/a	0.01	SHU-3500
5000	n/a	n/a	n/a	n/a	0.008	SHU-5000

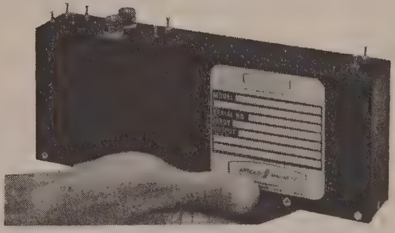
Multiple Output Models

+5	2	PHU-30(CT)-5	1	SHU-30(CT)-5EE	2.0	SHU-30(CT)-5
+15	0.5		0.2		0.5	
−15	0.5		0.2		0.5	
+15	1.3	PHU-30(CT)	0.4	SHU-30(CT)EE	1.0	SHU-30(CT)
−15	1.3		0.4		1.0	

TV-1036:
ULTRA-MINIATURE SWITCHER

- **5 Volts/40 Amps!!**
- **4 Watts per Cubic Inch!!**

ARNOLD MAGNETICS introduces Model **TV-1036**, a new standard of high-density switching power. Providing 5 VDC at 40 amps from an AC source, the Model **TV-1036** performs to these specifications:

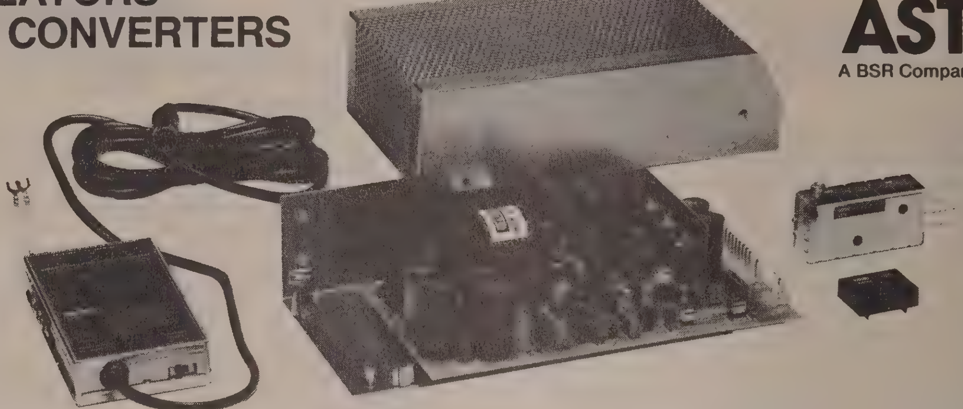


4.0 Watts per Cubic Inch Package measures 8.85″ x 1.57″ x 3.57″
Input Voltage: 103-127 VAC, 47-500 Hz
Output Voltage: 5 VDC at 40 amps. (**Triple Output** — Model **TV-3018** — also available: 5 VDC/35 amps, ±15 VDC @ 1 amp.)
Efficiency: 71%; remains constant over input voltage range
M.T.B.F.: 70,000 Hours @ 45°C Ground Base per MIL-HDBK217
Line Regulation: .1% (Line Variation ±10%)
Load Regulation: .1% +10 MV Full Load to No Load
Remote Sensing: Within .05%. Terminals are provided which correct for Load Lead Drop of up to .25 VDC. Load is protected if sensing leads are opened.
Ripple and Noise: .25% +10 MV RMS
100 MV P-P @ 10 MHZ bandwidth
150 MV P-P @ 100 MHZ bandwidth
Overvoltage Protection: Set at 120% of nominal output voltage
Semiconductor Junction Temperature: Maximum of 100°C at Operating Baseplate Temperature of +71°C
Transient Response: Output voltage returns to within 1% in less than 1.5 millisec during change from Full Load to 25% Load or No Load to Full Load. Maximum transient excursion for 25% load change: 500 millivolts.
Temperature Coefficient: 0.01% per °C
Carry Over Time: 15 milliseconds at nominal line with full load
Input Voltage Surge Protection: 145 VAC. Unit will turn off if surge exceeds 145 VAC
Thermal Protection: Internal Thermostat shuts off output during over-temperature condition. Automatic reset to normal operation when internal temperature is within safe limits.
Inrush Current Limiting: 35 amps maximum
Turn on and Turn Off Transient: No overshoot or undershoot outside of regulation band
Operating Temperature Range: −10 to +71°C Baseplate without derating
Input, Case and Outputs are isolated (floating) from each other.

ARNOLD MAGNETICS CORPORATION
11520 W. Jefferson Blvd., Culver City, California 90230 • Phone: (213) 390-3537, (213) 390-8837 • TWX: 910-343-6468

POWER SUPPLIES
MODULATORS
DC-DC CONVERTERS

ASTEC®
A BSR Company



POWER SUPPLIES

MODEL NUMBER	MAX OUTPUT WATTS	OUTPUT LOAD CURRENT—AMPS						PHOTO KEY (PACKAGE TYPE)	DIMENSIONS (inches) H x W x L
		+5V MAX	−5V MAX	+12V* MAX	+12V* MAX	−12V MAX	+24V MAX		
AC9365[1]	65	6.0		1.5	2.1	0.1		(L BRACKET)	2.4 x 4.4 x 8
AC8151	40	2.5		2.0		0.1		(OPEN PCB)	2.0 x 3.9 x 6.3
AC8254	43	2.0	0.2				1.3	(OPEN PCB)	2.0 x 4.25 x 7.75
AC9252	50	6.0	0.5	2.5		0.5		(OPEN PCB)	1.75 x 4.25 x 7.75
AC9262[1]	50	6.0	0.5	2.5		0.5		(L BRACKET)	2.4 x 4.4 x 8
AC9250	50	6.0	0.5	2.0		1.0		(OPEN PCB)	2.0 x 4.25 x 7.75
AC9351	62	8.0	0.75	1.0		0.5		(OPEN PCB)	2.2 x 6.2 x 7.4
AC9355	65	6.0		1.5	2.1	0.1		(OPEN PCB)	1.75 x 4.25 x 7.75
AC9431	100	12.0	0.5	4.0		0.5		(BOX)	2.4 x 6.5 x 8
AC9354	75	4.7		2.0	2.0	0.5		(OPEN PCB)	2.0 x 6.2 x 7.4
AC8353	70	3.0				0.17	2.2	(OPEN PCB)	2.0 x 6.2 x 7.4
AC9461[1]	100	12.0	0.5	4 0		0.5		(L BRACKET)	2.4 x 6.5 x 8
AC9531[2]	128	10.0		3.5	2.5	0.5		(BOX)	2.6 x 5 x 10.5
AC9561[2]	128	10.0		3.5	2.5	0.5		(L BRACKET)	2.6 x 5 x 10.5
AC9664	145	13.5		1.5	.75	0.2	2.0	(L BRACKET)	2.5 x 6.7 x 10

Input voltages to all units are strap selectable at 115/230 VAC
*Dual +12V output available on some models
†Listed or pending approval
1.)Also available with metal cover
2.)Requires min. 15 CFM airflow

WE SPECIALIZE IN CUSTOM POWER SUPPLIES

RF MODULATORS

Model Number	Video Application	Audio (sub-carrier frequency)	Market	Channel Number (carrier frequency)	Mounting	Comments
UM1082L	VHF-Color	No	US (NTSC)	A2 (55.5 MHz) A3 (61.5 MHz)	PCB Mount	Low Profile
UM1233	UHF-Color	No	Europe/UK (PAL)	E36 (591.25 MHz)	PCB Mount	Low Profile
UM1622	VHF-Color	No	US (NTSC)	A3 (61.25 MHz) A4 (67.25 MHz)	PCB Mount	Low Profile
UM1285-8	VHF-Color	Yes (4.5 MHz)	US (NTSC)	A3 (61.25 MHz) A4 (67.25 MHz)	PCB Mount	VSB Filter
UM1285E3-4	VHF-Color	Yes (5.5 MHz)	Europe (PAL)	A3 (61.25 MHz) A4 (67.25 MHz)	PCB Mount	VSB Filter
UM1286	UHF-Color	Yes (6 MHz)	UK (PAL)	E36 (591.25 MHz)	PCB Mount	
UM1286-2	UHF-Color	Yes (5.5 MHz)	Europe (PAL)	E36 (591.25 MHz)	PCB Mount	
UM1381-1	VHF-Color	Yes (4.5 MHz)	US (NTSC)	A3 (61.25 MHz) A4 (67.25 MHz)	STANDALONE	FCC Approval

DC-DC CONVERTERS

Model Number	Input	Output (V)	Voltage (%)	Output Min	Current Max	Max Cont Power Out	Efficiency	Output Ripple	Typical Application
AD1D12A10	5V ±20%	±12	±4	12mA (ea)	42mA (ea)	1000mW	70%	500mV	RS232 interface
AD1P12A10	5V ±20%	+12	±3	25mA	84mA	1000mV	70%	500mV	Auxiliary +12V Output
AD1P26A05	5V ±20%	+26	±3	7mA	20mA	500mW	75%	600mV	Programming EPROMS
AD1N12A10	5V ±20%	−12	±3	25mA	84mA	1000mW	70%	500mV	Memory Bias
AD4N250R30N	+12 ±5%	−250	±5	45mA	130mA	30W	75%	10V	Plasma Displays—50W peak

ASTEC
A BSR Company

ASTEC U.S.A. Limited
2880 San Tomas Expressway, Suite 200, Santa Clara, CA 95051 U.S.A Tel. (408) 748-1200, Telex: 474-5018 ASTEC UI, Fax (408)727-8281

These power supplies covered by one or more patents including U.S patent 4,323,961

ASTRON CORPORATION

2852 Walnut Ave., Unit E
Tustin, CA 92680
(714) 832-7770

INSIDE VIEW — RS-12A

ASTRON POWER SUPPLIES

• HEAVY DUTY • HIGH QUALITY • RUGGED • RELIABLE •

RS and VS SERIES

SPECIAL FEATURES

- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-4A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE
- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

PERFORMANCE SPECIFICATIONS

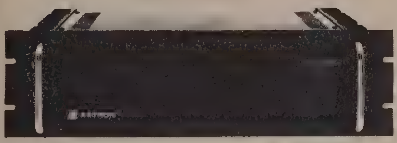
- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)

MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM-A SERIES



MODEL RM-35A

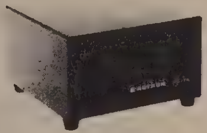
19" X 5¼ RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-35A	25	35	5¼ x 19 x 12½	38
RM-50A	37	50	5¼ x 19 x 12½	50

- Seperate Volt and Amp Meters

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM-35 M	25	35	5¼ x 19 x 12½	38
RM-50 M	37	50	5¼ x 19 x 12½	50

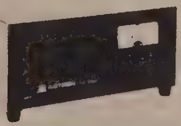
RS-A SERIES



MODEL RS-7A

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W X D	Shipping Wt. (lbs.)
RS-4A	3	4	3¾ x 6½ x 9	5
RS-7A	5	7	3¾ x 6½ x 9	9
RS-7B	5	7	4 x 7½ x 10¾	10
RS-10A	7.5	10	4 x 7½ x 10¾	11
RS-12A	9	12	4½ x 8 x 9	13
RS-20A	16	20	5 x 9 x 10½	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13¾ x 11	46

RS-M SERIES



MODEL RS-35M

- Switchable volt and Amp meter

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt (lbs)
RS-12M	9	12	4½ x 8 x 9	13
RS-20M	16	20	5 x 9 x 10½	18
RS-35M	25	35	5 x 11 x 11	27
RS-50M	37	50	6 x 13¾ x 11	46

VS-M SERIES

MODEL VS-20M

- Seperate Volt and Amp Meters
- Output Voltage adjustable from 2-15 volts
- Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H x W x D	Shipping Wt (lbs)
VS-20M	16	9	4	20	5 x 9 x 10½	20
VS-35M	25	15	7	35	5 x 11 x 11	29
VS-50M	37	22	10	50	6 x 13¾ x 11	46

RS-S SERIES

MODEL RS-12S

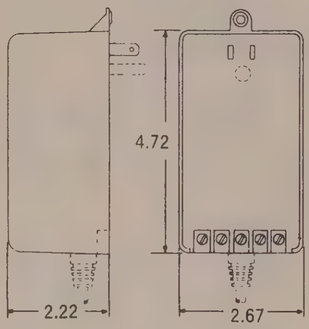
- Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H x W x D	Shipping Wt. (lbs.)
RS-7S	5	7	4 x 7½ x 10¾	10
RS-10S	7.5	10	4 x 7½ x 10¾	12
RS-10L (for LTR)	7.5	10	4 x 9 x 13	13
RS-12S	9	12	4½ x 8 x 9	13
RS-20S	16	20	5 x 9 x 10½	18

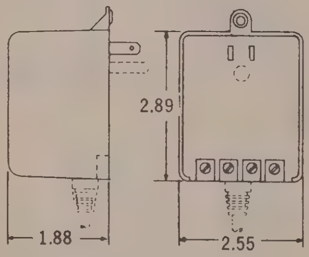
*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

AULT INCORPORATED
EXTERNAL POWER SOURCES

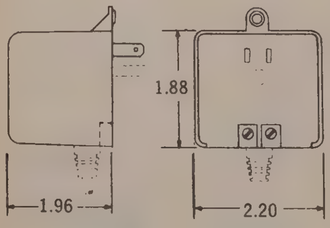
SWITCHER CASE SIZE 9
6.5" x 3.75" x 2.25"



CASE SIZE "7"



CASE SIZE "5"



CASE SIZE "3"

CONSIDER THE AULTERNATIVES

EXTERNAL SWITCHER SPECIFICATIONS

SINGLE OUTPUT

Model	Output		Regulation %	Max. Ripple	Minimum Load (Amps)
	VDC	Current (Amps)			
9305-000-401	5.2	5.0	±2	50 mV P-P	1
9306-000-401	6	4	±2	50 mV P-P	None
9312-000-401	12	2	2	50 mV P-P	None
9348-000-401	48	.5	±2	50 mV P-P <20d Brn on C Message Weighted Scale	None
9000-348-401	48	1	±.5	50 mV P-P <30d Brn on C Message Weighted Scale	None
MULTIPLE OUTPUT					
9712-000-401	±12	0.8 each	±5	50 mV P-P	None
9712-305-401	+5.1 +12 −12	3 .5 .2	±2 ±5 ±5	50 mV P-P 50 mV P-P 50 mV P-P	.6 None if +5 >1A .07A each if +5=.6A
9305-312-401	+5.1 +12	2.7 .8	±2 ±5	50 mV P-P 50 mV P-P	.6 None if +5 >1A .14A if +5=.6A
9715-305-401	+5.1 +15 −15	3 .350 .200	±2 ±5 ±5	50 mV P-P 50 mV P-P 50 mV P-P	.6 None if +5 >1A .55A each if +5=.6A

Input: 90-130 VAC/47 to 63 Hz
Operating Temperature: 0° to +50°C
Transient Response: 500 microseconds for 50% load change typical.
Protection: Overcurrent and short circuit protected, 5V overvoltage crowbar, automatic resetting from overcurrent.
EMI: Meets FCC Docket 20780 Class B.
Enclosure: High impact resistant molded lexan plastic.
Weight: 19 oz.
Hold-up Time: 16 MS min at 117 VAC
Storage Temperature: −55°C to +85°C
UL: Listed
Warranty: 1 year
Short Circuit Protection: Indefinite at 50°C
Relative Humidity: 5% to 80% non-condensing

External transformers, battery chargers, linear and switching power supplies provide several advantages over conventional built in power sources as listed below:

FEATURES

- Wall plug-in and desktop styles
- Single and multiple output models available
- Built to UL standards
- Impact resistant Lexan 141-701 thermoplastic enclosure
- AC blades zinc plated solid brass with tapered tip
- Available with input and/or output cord(s) and connector
- One year Warranty
- Sealed construction
- Private label hot stamping available
- Available with 230V/50 Hz input for European use
- UL 544 listable for patient connected medical products

BENEFITS

- Eliminate UL considerations because hazardous voltages are kept out of your product
- Increase space for other components in your product
- Increase aesthetic appearance and portability by reducing the size and weight of your product
- Keep power source heat out of your product for increased life
- Tamperproof power source
- Reduce design time for your product
- International uniformity of your product

EXTERNAL BATTERY CHARGERS

Battery chargers for Gel-Cel and Sealed Lead Acid batteries are available in 6, 12 and 24 volt charge models for fixed voltage (float) and automatic fast charge applications.

FLOAT STYLE

BATTERY VOLTAGE	MAXIMUM FAST CHARGE		VOLTAGE AT END OF CHARGE	RATED CURRENTS AVAILABLE		CASE SIZE** (SAME ORDER)
				UL 1310	UL 544	
6	None		6.9	.4, .6	.4, .5	3, 5, 3, 5
12	None		13.8	.3, .5	.3, .375	3, 5, 3, 5
24	None		27.6	.2	.2	3, 3
AUTOMATIC FAST CHARGE						
	TYPE 1*	TYPE 2*				
6	7.2	7.45	6.9	.4, .6, 1.5, 3.0	.4, .5	3, 5, 7, 7, 3, 5
12	14.4	14.9	13.8	.3, .5, 1.25, 2.75	.3, 3.75	3, 5, 7, 7, 3, 5
24	28.8	29.8	27.6	.25, .5, 1.5	.2	3, 7, 7, 3

* Type 1: For Gel Cell Batteries. Type II: For Sealed Lead Acid Batteries.
** Case sizes are listed in the same order as the rated currents.

AULT INCORPORATED
Dept. EM, 1600 Freeway Boulevard / Minneapolis, Minnesota 55430
Telephone: (612) 560-9300 / TWX: 910-576-3435

AULT INCORPORATED
EXTERNAL POWER SOURCES

CONSIDER THE AULTERNATIVES EXTERNAL POWER SOURCES

LINEAR DC POWER SUPPLIES

UL Listed, Input Voltage: 105-129 VAC, 60 Hz

Operating Temperature: 0° to +40°C
All UL Listed

SINGLE OUTPUT MODELS
10 MV RMS Ripple, ±5% Overall Reg.

MODEL	OUTPUT VDC	AMPS	CASE SIZE
3305-000-400	5	.3	3
5305-000-400	+5	.5	5
7305-000-400	5	1.25	7
7306-000-400	6	1.2	7
3312-000-400	12	.12	3
5312-000-400	12	.4	5
5316-000-000	16	.8	5
5323-000-000	23	.5	5
7323-000-000	23	1	7
7312-000-400	12	.8	7
5314-000-500	14.2	.5	5
5324-000-400	24	.25	5
7324-000-400	24	.5	7
5348-000-400	48	.1	5
7000-348-400	48	.25	7

MULTIPLE OUTPUT MODELS-LINEAR
10 MV RMS RIPPLE, ±5% Overall Reg.

MODEL	OUTPUT VDC	AMPS	CASE SIZE
5712-000-400	±12	.2 ea.	5
7712-000-400	±12	.4 ea.	7
5715-000-400	±15	.15 ea.	5
7324-199-400	24 100 VAC/ 30 Hz	.125 .020	7
5324-110-400	24 10 VAC	.2 .1	5
5712-305-401	+5 ±12	.5 .130 ea.	5
7712-305-401	+5 ±12	.6 .2 ea.	7
7612-305-401	+5 ±12	1.0 .2	7
9612-305-409	+5 ±12	2.0 .25 ea.	9

OPTIONS: Input cord, output cord, output connector, ground pin, hot stamping, 220 VAC/ 50 Hz.

SINGLE OUTPUT MODELS
Unregulated-Filtered/3.2 V.P.P. RIPPLE

MODEL	OUTPUT VDC	AMPS	CASE SIZE
3312-000-000	12	.35	3
5312-000-000	12	1.2	5
5323-000-000	23	.5	5

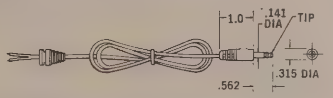
AC TRANSFORMERS — WALL PLUG-IN STYLES

The following are all available with optional input cord, output cord, connectors, earth ground, center tap and custom hot stamped with your company logo. Standard models have output screw terminals. All versions are UL 1310 listed.

VA	VOLTAGES AVAILABLE	CASE SIZE
7.5	24	3
9.6	24	3
10	6, 7, 10, 12, 14, 16, 18, 20, 22, 24	3
11.3	22.5	3

VA	VOLTAGES AVAILABLE	CASE SIZE
12	18.5	3
16	10, 12, 14, 16, 18, 20, 22, 24	3
20	12, 14, 16, 18, 22, 24	3
40	10, 12, 14, 16, 18, 20, 24, 26	5

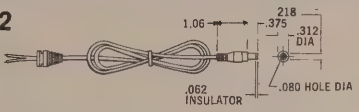
1


1.0
.141 DIA
TIP
.315 DIA
.562

DESCRIPTION: 22 GA., 6′, 2 cond. flexible cord, black, molded strain relief. Switchcraft 750 Style Plug

MATING CONNECTOR: Switchcraft No. 41

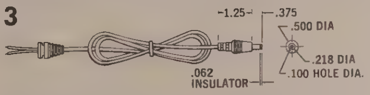
2


1.06
.375
218
.312 DIA
.080 HOLE DIA
.062 INSULATOR

DESCRIPTION: 22 GA., 8′, 2 cond. flexible cord, black, molded strain relief. Switchcraft S760 Style Plug

MATING CONNECTOR: Switchcraft PC722A, 722A

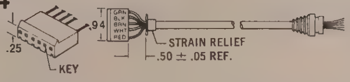
3


1.25
.375
.500 DIA
.218 DIA
.100 HOLE DIA.
.062 INSULATOR

DESCRIPTION: 20 GA., 8′, 2 cond. flexible cord, black, molded strain relief. Switchcraft 760 Style Plug

MATING CONNECTOR: Switchcraft PC712A, 712A

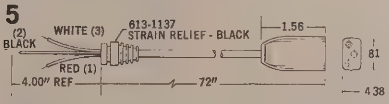
4


.94
GRN
BLK
BRN
WHT
RED
.25
KEY
STRAIN RELIEF
.50 ± .05 REF.

DESCRIPTION: 18-22 GA., 7′, 5 cond. flexible cable, gray, molded strain relief. Molex 09-50-3061 Pin No. 08-56-0105

MATING CONNECTOR: Several Styles Available From Molex

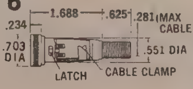
5


(2) BLACK
WHITE (3)
613-1137 STRAIN RELIEF - BLACK
1.56
RED (1)
4.00″ REF
72″
81
438

DESCRIPTION: 20 GA., 6′, 3 conductor flexible cord, black molded vinyl strain relief and plug.

MATING CONNECTOR: Tower 1000-1 Panel Mount

6

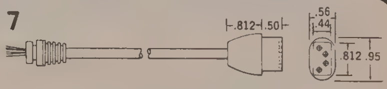

1.688
.625
.281 MAX CABLE DIA
.234
.703 DIA
.551 DIA
LATCH
CABLE CLAMP

Part No.	Contacts
SL-40-2F	2
SL-40-3F	3
SL-40-4F	4
SL-40-5F	5

DESCRIPTION: Non-reflective metal shell, coupling ring, Efficient cable clamp and strain relief. Switchcraft SLIM-LINE Series.

MATING CONNECTOR: Switchcraft SL10- * M Flange Mount; SL17- * M Rear Panel Mount; SL18- * M Front Panel Mount

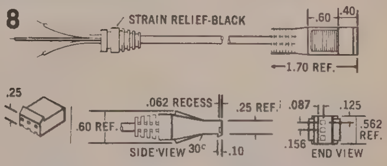
7


.812
.50
.56
.44
.812
.95

DESCRIPTION: 22 GA., 8′, 3 cond. (4 conductor available on special order). Molded vinyl strain relief and receptacle.

MATING CONNECTOR: Tower No. 1078-3.

8

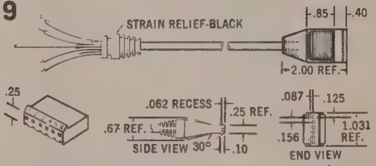

STRAIN RELIEF-BLACK
.60
.40
1.70 REF.
.25
.062 RECESS
.25 REF.
.087
.125
.60 REF.
.562 REF.
.156
SIDE VIEW
30°
.10
END VIEW

DESCRIPTION: 16-8 GA, 7′, 3 Conductor, black, molded vinyl strain relief and connector.

MATING CONNECTOR: Molex Series 2420, 2630.

Pin	Transformer	Power Supply
1	AC	+
2	GND or CT	Common
3	AC	Earth Ground

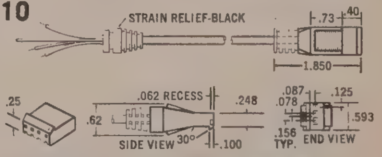
9


STRAIN RELIEF-BLACK
.85
.40
2.00 REF.
.25
.062 RECESS
.25 REF.
.087
.125
.67 REF.
1.031 REF.
.156
SIDE VIEW
30°
.10
END VIEW

DESCRIPTION: 22-18 GA, 7′, 5 conductor, black, molded vinyl strain relief and connector.

MATING CONNECTOR: Molex Series 2420, 2630.

10


STRAIN RELIEF-BLACK
.73
.40
1.850
.25
.062 RECESS
.248
.087
.078
.125
.62
.593
.156 TYP.
SIDE VIEW
30°
.100
END VIEW

DESCRIPTION: 22-18 GA, 7′, 4 conductor, black, molded vinyl strain relief and connector.

MATING CONNECTOR: Molex Series 2420, 2630.

Pin	Transformer	Power Supply
1	GND	DC
2	AC	Common
3	AC	DC
4	CT	GND

TYPICAL APPLICATIONS: Modems, Microprocessor Controlled Systems, Telecommunications, Operational Amplifiers, Computer Peripherals, Test Equipment, Security Systems, Multiplexers, Teller Terminals.

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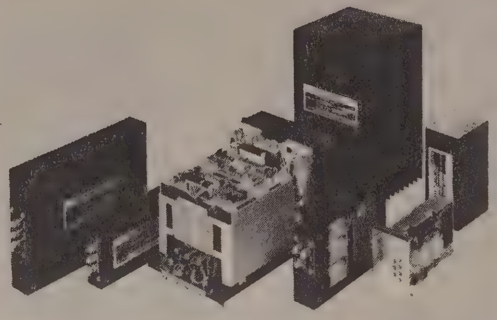


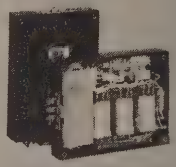
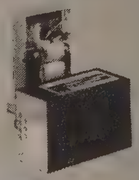
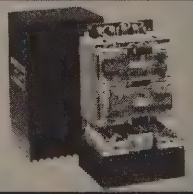
Send for further information or call the toll free number below.

Custom/Standard Supplies

The power supplies described below are typical of those designed and produced by Astrosystems. Modular design and plug-in circuitry facilitate special designs. Our engineering department will customize these units to your exact requirements. Send us your specs or call the toll free number below.

Programmable Power Supplies

Astrosystems also designs and manufactures programmable DC and AC power supplies. These precision power sources are programmable using an IEEE 488 bus and the latest version of CIIL language.

SERIES	Model #	Voltage (VDC)	Current (amps)	
SERIES **A** 5.5″ × 3.1″ × 1.25″ Single Voltage Dual Voltage	A7256 A7317 A7316 A7318	6 28 18 5 115-135 (adjustable)	1.0 2.0 0.5 2.5 0.4	
SERIES **B** 5.9″ × 3.8″ × 1.25″ Single Voltage	B7346 B7315 B7319 B7252 B7254	5 5 4-6 (adjustable) 15 12	5.0 6.0 6.0 2.0 2.0	
SERIES **C** 7.9″ × 5.9″ × 2.0″ Single Voltage	C7253 C7345 C7341 C7347 C7251	5 5 5.5 12 28	15.0 20.0 25.0 5.0 4.0	
SERIES **D** 3″ × 5″ × 2″ Dual Voltage	D7257	±12	0.6	
SERIES **E** 7.0″ × 8.8″ × 5″ Triple Voltage	E7255	18 5 28	0.5 6.0 3.0	

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eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

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PRECISION POWER SUPPLIES

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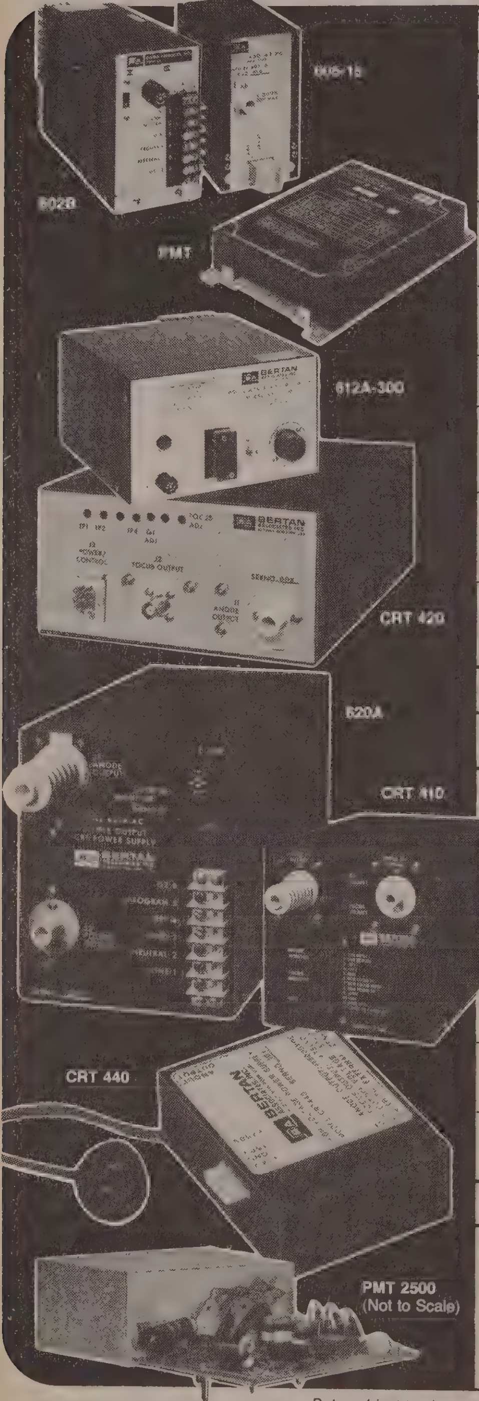

Model	Output Volts dc	Output mA	Regulation Line/Load%	Ripple mV p-p	Inches H × W × D	Input Power**
Single Output Modules						
602B-15P,N	0 to 1500*	10	0.001/0.002	15	5 × 3.1 × 8.6	A
602B-30P,N	0 to 3000*	5	0.001/0.002	30	5 × 3.1 × 8.6	A
602B-50P,N	0 to 5000*	2	0.001/0.002	50	5 × 3.1 × 8.6	A
602B-150P,N	0 to 15,000*	0.6	0.001/0.002	150	5 × 3.1 × 8.6	A
602B-200P,N	0 to 20,000*	0.4	0.005/0.005	800	5 × 4 × 8.6	A
603-15P,N	0 to 1500*	20	0.001/0.002	15	5 × 5.5 × 8.5	A
603-30P,N	0 to 3000*	10	0.001/0.002	30	5 × 5.5 × 8.5	A
603-50P,N	0 to 5000*	5	0.001/0.002	50	5 × 5.5 × 8.5	A
603-150P,N	0 to 15,000*	1.5	0.001/0.002	450	5 × 5.5 × 8.5	A
612A-200P,N	0 to 20,000*	1	0.001/0.002	200	4.9 × 8.8 × 8.4	A
612A-300P,N	0 to 30,000*	0.5	0.001/0.002	300	4.9 × 8.8 × 8.4	A
612A-500P,N	0 to 50,000*	0.3	0.001/0.002	800	4.9 × 8.8 × 8.4	A
PMT-1500P,N	0 to 1500*	1	0.005/0.005	25	1 × 2.6 × 3.5	+15V
PMT-2500P,N	0 to 2500*	0.5	0.005/0.005	25	1 × 2.6 × 3.5	+15V
PMT-05AP,N	0 to 500*	8	0.001/0.002	5	1.1 × 3.9 × 5.3	C,D
PMT-10AP,N	0 to 1000*	4	0.001/0.002	4	1.1 × 3.9 × 5.3	C,D
PMT-20AP,N	0 to 2000*	2	0.001/0.002	2	1.1 × 3.9 × 5.3	C,D
PMT-50AP,N	0 to 5000*	0.5	0.001/0.002	10	1.1 × 3.9 × 5.3	C,D
605A-15P,N	0 to 1500*	6	0.002/0.002	15	5 × 2.7 × 4.7	C
605A-30P,N	0 to 3000*	3	0.002/0.002	30	5 × 2.7 × 4.7	C
605A-75P,N	0 to 7500*	1	0.002/0.002	150	5 × 2.7 × 4.7	C
605A-150P,N	0 to 15,000*	0.4	0.002/0.002	750	5 × 2.7 × 4.7	C
606-15P,N	0 to 1500*	20	0.002/0.002	15	5 × 5.5 × 4.5	C
606-30P,N	0 to 3000*	10	0.002/0.002	30	5 × 5.5 × 4.5	C
606-75P,N	0 to 7500*	3	0.002/0.002	150	5 × 5.5 × 4.5	C
606-150P,N	0 to 15,000*	1.5	0.002/0.002	750	5 × 5.5 × 4.5	C
High Voltage Switching Modules						
HVS-505-10P,N	50 to 1000V*	700	0.05/0.05	500	6 × 12.5 × 14	A
HVS-505-50P,N	200 to 5000V*	150	0.05/0.05	2.5V	6 × 12.5 × 14	A
Multi-Output CRT Supplies						
CRT-410	Anode: +10 to 26kV	0.05	0.005/0.01	1V	6 × 6 × 10	E
	Focus: +2.5 to 7.5kV	0.5	0.01/0.05	3V		
	Dyn: +300V/30μsec.					
	G2: +300 to 1000V	0.1	0.01/0.02	100		
	G1: 0 to −100V	0.1	0.01/0.02	50		
CRT-420	Anode: +10kV	0.5	0.003/0.005	700	3.4 × 6.8 × 9.4	A
	Focus: +2 to +3.5kV	0.5	0.005/0.005	800		
	Dyn: +250V/125μsec.					
	G2: +300V	0.5	0.005/0.005	30		
	G1: −10 to −70V	0.1	0.005/0.005	30		
	Filament: 6.3V	750	0.1/1.0	30		
CRT-440	Anode: +5 to 15kV	0.25	0.05/0.05	7.5V	1.8 × 3.8 × 4.9	C
	Focus: +250 to 750V	1		400		
	G1: −150V	1				
CRT-30 TEST SET	Anode: 0 to +30kV Focus: 0 to +10kV G2: 0 to +1kV	Complete functional test set for cathode ray tubes. Options available include G1, filament and dynamic focus outputs and IEEE 488 programming of high voltage outputs				
X-Ray Source Supplies						
XR-30	Target Voltage: 0 to +30kV Target Current: 0 to 4.5mA	A complete X-Ray power supply and control system including filament power supply. Provides local or remote computer control of X-Ray source target voltage and current. IEEE 488 programming available.				
XR-50	Target Voltage: 0 to +50kV Target Current: 0 to 2.5mA					
XR-75	Target Voltage: 0 to +75kV Target Current: 0 to 2mA					

Data subject to change.

See EEM, Gold Book or EBG for Rep List

***Specify Output Polarity Suffix:** P-Positive, N-Negative, R-Reversible, X-One Positive and One Negative Output. (e.g. 205A-10P specifies 0 to + 10,000V).

****Input Power: A**-115/230V±10%, 50-400Hz, **B**-±12V±24Vdc input from NIM bin **C**-+28Vdc. (Other dc input available on special order.) **D**-±12 to ±18 or +24 to +30Vdc. **E**-±15Vdc and +24Vdc

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INSTRUMENTATION & TEST EQUIPMENT

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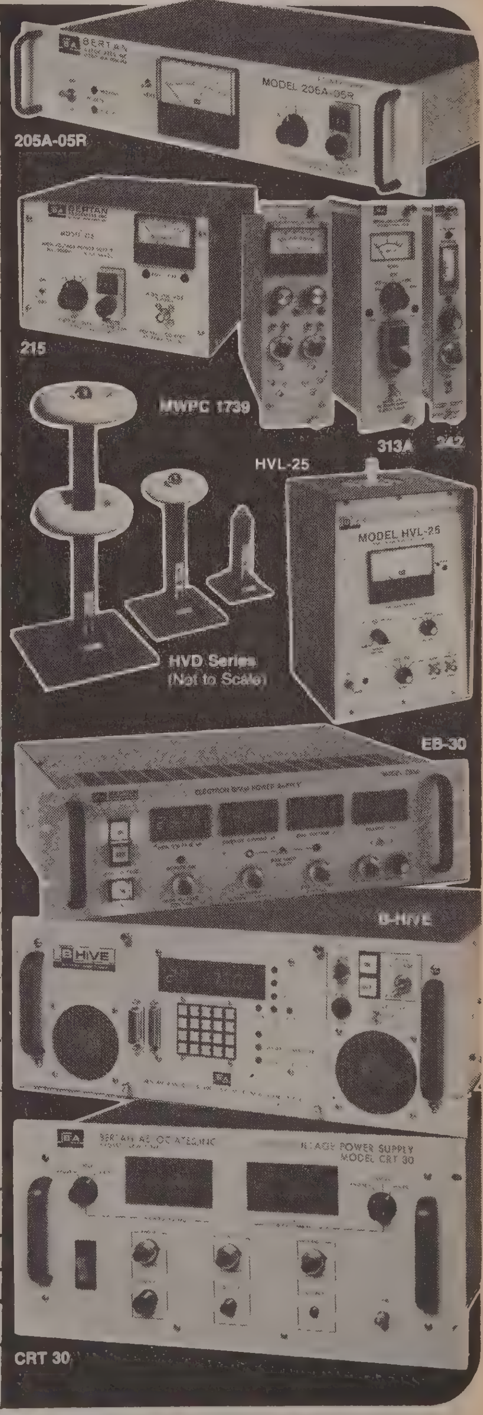
• Regulated • Short Circuit and Arc Protected • Standard or Custom Design

Model	Output Volts dc	Output mA	Regulation Line/Load%	Ripple mV p-p	Inches H × W × D	Input Power**
Laboratory Instruments						
214	0 to ± 1000	15	0.001/0.005	15	5.3 × 7.6 × 7.5	A
215	0 to ± 3000	5	0.001/0.005	15	5.3 × 7.6 × 7.5	A
205A-01R	0 to ± 1000	30	0.001/0.005	10	3.5 × 19 × 10	A
205A-03R	0 to ± 3000	10	0.001/0.005	30	3.5 × 19 × 10	A
205A-05R	0 to ± 5000	5	0.001/0.005	50	3.5 × 19 × 10	A
205A-10P,N,R	0 to 10,000*	2.5	0.001/0.005	100	3.5 × 19 × 10	A
205A-20P,N,R	0 to 20,000*	1	0.001/0.005	300	3.5 × 19 × 10	A
205A-30P,N,R	0 to 30,000*	0.5	0.001/0.005	400	5.3 × 19 × 15	A
205A-50P,N,R	0 to 50,000*	0.3	0.001/0.005	2V	5.3 × 19 × 15	A
210-01R	0 to ± 1000	225	0.001/0.005	50	5.3 × 19 × 15	A
210-03R	0 to ± 3000	75	0.001/0.005	100	5.3 × 19 × 15	A
210-05R	0 to ± 5000	40	0.001/0.005	200	5.3 × 19 × 15	A
210-10P,N,R	0 to 10,000*	15	0.001/0.005	500	5.3 × 19 × 15	A
210-20P,N,R	0 to 20,000*	7	0.001/0.005	1V	5.3 × 19 × 15	A
210-30P,N,R	0 to 30,000*	4.5	0.001/0.005	1.5V	5.3 × 19 × 15	A
210-50P,N,R	0 to 50,000*	2.5	0.001/0.005	5V	5.3 × 19 × 15	A
Series 205A/210 are available with analog, binary, BCD or IEEE-488 remote programming.						
Nuclear Instrumentation Modules						
NIM342	0 to ± 2000	1	0.001/0.002	2	Single NIM	B
NIM345	0 to ± 5000	0.3	0.001/0.002	5	Single NIM	B
NIM353	0 to ± 3000	2	0.001/0.002	5	Single NIM	A
NIM355	0 to ± 5000	1	0.001/0.002	10	Single NIM	A
NIM301	0 to ± 1000	3	0.001/0.002	1	Dual NIM	B
NIM303	0 to ± 3000	1	0.001/0.002	3	Dual NIM	B
NIM305	0 to ± 5000	0.5	0.001/0.002	5	Dual NIM	B
NIM310P,N	0 to 10,000*	250μA	0.001/0.002	20	Dual NIM	B
NIM313A	0 to ± 3000	10	0.001/0.002	10	Dual NIM	A
NIM315	0 to ± 5000	5	0.001/0.002	25	Dual NIM	A
NIM320P,N	0 to 10,000*	2	0.001/0.002	100	Dual NIM	A
NIM362	0 to 2000	Dual outputs in a single width NIM package. Independent polarity reversal, voltage control and output voltage metering.				B
NIM365	0 to 5000					B
MWPC-1755P,N,X*	0 to 5000	0.5	0.001/0.002	50	All Models: • Dual Independent Outputs • Dual NIM	B
MWPC-1739P,N,X*	0 to 7500	0.5	0.001/0.002	50		B
MWPC-1792P,N,X*	0 to 10,000	0.3	0.001/0.001	50		B
Electron Beam Power Supplies						
EB-30	Beam: 0 to −30kV Bias: 0 to −1kV Fil: 0 to 5V	These units provide 3 independently adjustable and highly stable power supplies for beam acceleration, bias and filament in an electron beam system. Optional IEEE 488 programming is available.				A
EB-50	Beam: 0 to −50kV Bias: 0 to −2kV Fil: 0 to 5V					A
Microprocessor Based Multi-Output System						
B-HIVE	Microprocessor controlled 32 output high voltage sytem with IEEE-488 and RS232C interfaces. For photomultiplier assemblies, multiwire proportional chambers and automatic test equipment. Can be used with any combination of 32 self contained plug in high voltage supplies, controllers for BERTAN Laboratory Supplies up to 75kV and/or controllers for other general purpose programmable and monitoring instrumentation.					

Test Equipment

Electronic Load	Applied Voltage	Load Current	Size	Input
HVL-25	+5kV to +25kV	0 to 3mA	12 × 9 × 8	A

Resistive Dividers	Maximum Applied Voltage	Divider Impedance	Accuracy	Temp. Coef.	Inches H × W × D
HVD-10	10kV	100meg.	± 0.2%	25ppm	11 × 6.3 × 6.3
HVD-30	30kV	300meg.	± 0.2%	25ppm	16.8 × 7 × 7
HVD-60	60kV	600meg.	± 0.2%	25ppm	29.6 × 12 × 12



Application Oriented Custom Designs

Bertan provides the widest range of standard *off-the-shelf* High Voltage Power Supplies available. If our Application Engineers cannot match a standard catalog unit to your requirement we will be pleased to quote to your exact specifications.

We produce hundreds of *different* custom designed units each year. Many designs incorporate custom interface, control and monitoring circuits (including IEEE-488) that can more economically and reliably be included in the High Voltage power supply.

Contact your local representative or call the factory directly. We can probably meet your special need with a quick, minor modification to one of our reliable, field proven designs. If not, we can design a new unit and deliver the first article in 120 days *or less*. Either way our Application Engineers will ensure that you obtain the best overall solution to your High Voltage power supply requirements.

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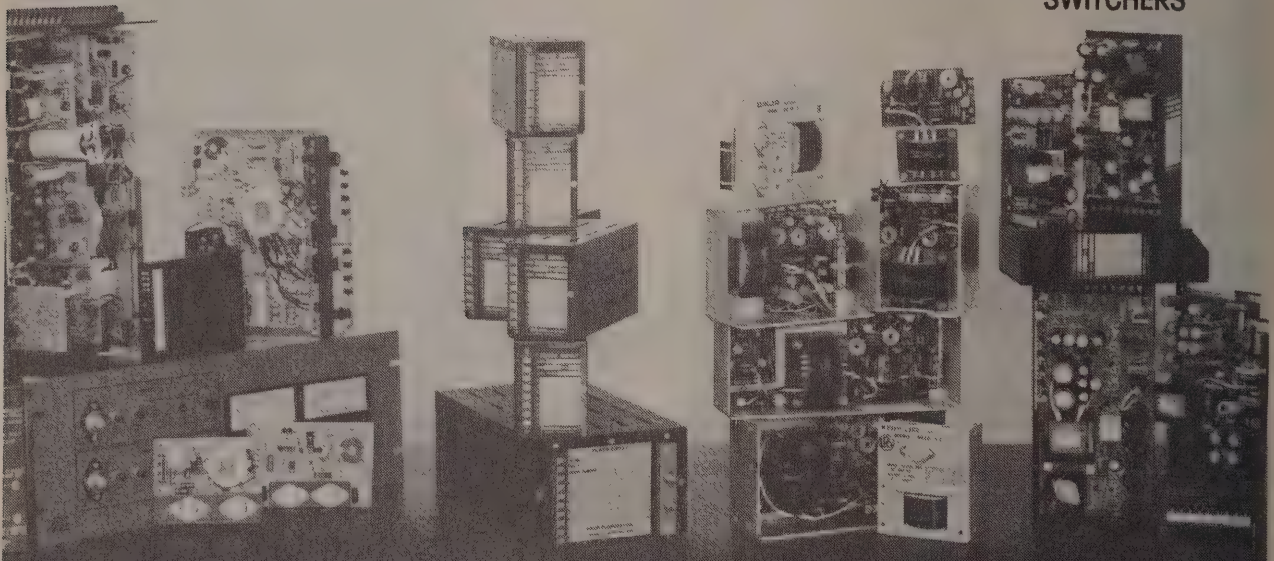
115/230VAC
OPEN-FRAME UNITS

30W—125W
90-130VAC &
180-260VAC
MULTI-OUTPUT
SWITCHERS



Drawing on more than 30 standard sub-assembly module designs and over a decade of specialized power conditioning expertise, BIKOR is in a position to provide customized solutions that best fit your particular requirements — even on fairly limited production runs — and it's done accurately, quickly and at economically attractive prices.

- **AC/DC Uninterruptable Power Systems — available with or without batteries and battery chargers.**
- **Broad range of standard enclosures and sub-modules result in lower costs.**
- **Configurations can range from miniature 6-Watt units, for use in flow control applications, all the way up to 3KW power control assemblies.**

For over 10 years, BIKOR has been systematically building up the most comprehensive line of modular systems in the power conditioning field. The result: You can now choose from hundreds of cost-consciously priced DC/DC and AC/DC models to best fit your particular application requirements.

- **Unregulated and regulated single and multi-output DC/DC units — 12Vdc; 24Vdc; 48Vdc; 110Vdc and 220Vdc input versions.**
- **115VAC or dual 115VAC/230VAC input, single and multiple output AC/DC line and load regulated types.**
- **Output voltages range from 2Vdc to 250Vdc. Currents from 100mA to 50A.**

Offering as standards those most sought after features normally only available as extra charge options with other brands, BIKOR's open-frame "L" Series will prove a boon for the discriminating seeker of peak-performance power supplies at bargain prices.

- **Single, dual, triple and multi-output types (ideal for micro-computer based equipment).**
- **115VAC/230VAC inputs.**
- **Tight regulation of both line and load.**
- **Reverse voltage, overvoltage, and overload protection.**
- **Built-in remote sensing.**
- **Meets UL and CSA standards.**
- **Wide range of case sizes and voltage/ current output combinations.**

These premium switching-mode units provide protection against brownouts. Their reliable peak-performance — yet small size and light weight — combine with cost-conscious price tags to provide best-buy solutions for most every application where weight, compactness, prime quality, and reliability are called for.

- **30, 40, 55, 75 and 125-Watt output versions — in PC board, "L" bracket and enclosed housings.**
- **Built to UL, CSA and VDE safety standards.**
- **Built-in protection against overvoltage, overloads and short circuits.**
- **90-130VAC and 180-260VAC input ranges.**

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BIKOR CORPORATION

1504 W. 228TH ST., TORRANCE, CA 90501 ☐ PHONE NO.: (213) 539-6320 ☐ TWX: 910-349-6667

B+K PRECISION DYNASCAN CORPORATION / POWER SUPPLIES

Dept. EM, 6460 West Cortland Avenue, Chicago, Illinois 60635 • (312) 889-9087 • Cable Address: BANDKO

LABORATORY POWER SUPPLIES

Model 1601 / $375.00

FEATURES

• Isolated 0-50 VDC, continuously variable; 02 A in four ranges • Fully automatic shutdown, adjustable current limit • Perfect for solid state servicing.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 60 Hz.

Output Voltage: 0-50 VDC, continuously variable; two ranges, 0-25 and 0-50 VDC.

Output Current: 02 A in four ranges — 0-50 mA, 0-0.2 A, 0-0.5 A, 0-2 A.

Load Regulation: Minimum, 0.05%; maximum, 0.1%; typical, 0.07%.

Line Regulation: 0.02% typical from 105 to 125 VAC with output of 50 VDC and 2 A.

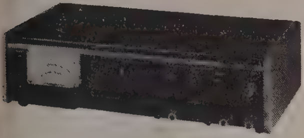
Ripple: 5 mV peak-to-peak.

Temperature Coefficient: .002% of output voltage per °C.

Size (HxWxD): 9.8 x 35 x 25 cm (3.8 x 14.13 x 10″).

Net Weight: 5 kg. (11 lbs.).

TRI-OUTPUT AUTO-TRACKING LAB POWER SUPPLY



Model 1650 / $399.00

FEATURES

• Functions as three separate power supplies • 5 VDC, 5 A fixed output • Two separate 0 to 25 VDC outputs at 0.5 A • Fully automatic, current-limited overload protection • Unique tracking circuit allows automatic tracking of variable DC outputs • + and — terminals of each output are fully isolated, even when in automatic tracking mode • All three outputs may be connected in series or parallel for higher voltage or current requirements.

Our Model 1650 tri-output power supply was designed for modern solid-state applications were both linear and digital circuits are encountered. In one package, this unit combines the features of a separate 5 VDC fixed-output supply and two 0-25 VDC variable supplies. The 5 volt output is rated at 5 amps, to satisfy power requirements of complex digital devices.

SPECIFICATIONS

Input Voltage: 105-125 VAC, 60 Hz.

OUTPUT VOLTAGES

5 Volt Supply: 5 Volts DC ±5%.

A Supply: 0 to 25 VDC.

B Supply: 0 to 25 VDC.

OUTPUT CURRENT

5 Volt Supply: 5 A max; A & B Supplies: 0.5 A current lim.

REGULATION

Load: 0.1% (25 mV) variation to full-load on 25 V supplies. 3% (150 mV) variation from 10 mA. to 5 A change in load current on 5-volt supply.

Line: 0.2% (50 mV) for a line voltage change of 20-volts on 25 V supplies. 0.4% (20 mV) for a line voltage change of 20 volts on 5 V supply.

NOISE RIPPLE

All supplies: 5 mV rms. (not applicable to "A" in track mode).

GENERAL

Current limiting: Limiting for each 0-25 V supply fixed slightly above rated current for short-circuit protection. The 0-5 V supply has automatic fold-back to 2.5 A short-circuit.

TRACKING

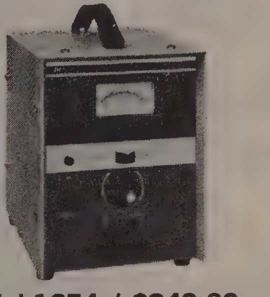
(0-25 V Supplies): "A" Supply Tracks "B" supply at a fixed or selected ratio. Applies whether the supplies are connected in series, back-to-back or are completely isolated.

Tracking Error: ±1% of rated voltage (±250 mV).

Size (HxWxD): 9.8 x 35 x 25 cm (3.88 x 14.13 x 10″).

Weight: 10 kg (22 lbs.) CSA listed.

LOW-VOLTAGE/HIGH-CURRENT POWER SUPPLY



Model 1654 / $349.00

FEATURES

• Continuously variable 2.0 to 6.0 volt output with Vernier control • Remote sensing feature eliminates regulation error by monitoring output directly at load • Complete overvoltage/overload protection circuitry • High-current 10 amp output capability.

APPLICATIONS

Power TTL logic circuitry . . . power microcomputer projects . . . drive low-voltage servo systems . . . power opto-electronic devices . . . general-purpose digital power applications.

The Model 1654 power supply has been designed especially to power a wide range of digital circuits. With reserve power to 10 amps, the 1654 is well suited for powering complex logic circuits; power microcomputer and peripheral circuitry.

The output is floating for flexibility of output connections and may be referenced to an external voltage or connected to chassis or earth ground. Two supplies can be paralleled.

SPECIFICATIONS

Input Voltage: 100, 120, 220, or 240 VAC ±10%, 50/60 Hz; 140 W max. at full rated load. External line voltage selection from rear panel. Output: 2.0 V (typical) to 6.0 VDC at 0 to 10 A. Cont. variable. Noise and Ripple: <15 mV rms, or 60 mV p-p, measured differentially across (+) and (−), outputs not shorted to SENSE terminals. Load Regulation, No Load to Full Load: 0.5%, measured at output. Line Regulation: 0.4%, for ±10% of 120 VAC.

Overvoltage Protection: SCR protection circuit set to crowbar between 6.5 and 7.0 VDC. Reverse Pol. Protection: Didoe protected. Current Limiting: at approx. 15 A if output is short circuited or overloaded. Output voltage drops to 0.18 V for short circuit.

GENERAL

Metering: Output voltage or current. 0-to-7 V and 0-to-11 A ranges. Operating Temperature: 0° to +40°C (32° to 104°F) at full rated load. Max current is derated 200 mA per degree C above +40°C to a max. temperature of 50°C. Size (HxWxD): 21.9 x 16.2 x 24.1 cm (8⅝ x 6⅜ x 9½″). Weight: 5.75 kg (12¾ lbs.).

Model 1654 includes power cord, fuse for alternate line voltage, instruction manual, schematic diagram and parts list.

OPTIONAL ACCESSORY

Rack Mounting Kit RM-16.

DUAL-OUTPUT LOW-VOLTAGE POWER SUPPLY

Model 1652 / $484.00

FEATURES

• More capabilities than two separate supplies • Automatic tracking of A and B outputs • Two 0 to 25 volt, 1.5 amp outputs • Outputs may be connected in series or parallel combination for added current or voltage • Complete overload and reverse polarity protection.

APPLICATIONS

Power linear or CMOS integrated circuits . . . engineering lab applications . . . production testing . . . service requirements . . . classroom and laboratory applications . . . microcomputer projects.

The Model 1652 provides two variable A and B, 0 to 25 volts outputs at 0 to 1.5 amps each. It's well suited for applications involving both analog and MOS digital circuits.

Both supplies can be operated independently or in a tracking mode. In the tracking mode, the B supply can be preset to any percentage of the A supply voltage from 0 to 100%.

SPECIFICATIONS

Input Power Requirements: 100, 120, 220, or 240 VAC ±10%, 50/60 Hz; 130 W max.

OUTPUTS

A Supply: 0-to-25 VDC at 0-to-1.5 amps. Cont. variable. B Supply: 0-to-25 VDC at 0-to-1.5 amps in indep. mode; 0 to 100% of A supply voltage at 0-to-1.5 amps in tracking mode. Cont. variable. Ripple Voltage: <2.5 mV rms. Regulation Load: Within ±0.1% or ±20 mV. Line: Output variation ±0.1% for line variation of ±10%. Current Limiting: Current limiting at approx. 1.8 amps.

GENERAL

Tracking: B supply voltage tracks A supply voltage at selected ratio, cont. variable, 0 to 100%. Tracking Error: Within ±1% ±250 mV in the 2-to-23 volt range. Reverse Pol. Protection: Diode protected. Isolation: Each supply may be floated independently, including tracking mode. Max. voltage diff. between supplies is 250 volts (DC-AC peak). Metering: Built-in meters for A supply and B supply. Switchable to voltage or current. 0-to-27 volt and 0-to-2.0 amp ranges. Operating Temp.: 0° to +40°C (32° to 104°F) at full rated load. Max. current is derated 50 mA per degree C above +40° to a max. operating temp. of 50°C. Series Operation: Outputs may be conn. in series for 0-to-50 volt, 0-to-1.5 amp DC output. Parallel Operation: Outputs may be conn. in parallel (cur. equalizing resistors req.) for 0-to-25 volt, 0-to-3 amp output. Dimensions (HxWxD): 219 x 162 x 241 mm (8⅝ x 6⅜ x 9½″). Weight: 5.75 kg (12¾ lbs.).

Model 1652 includes power cord, fuse for alternate line voltage, instruction manual, schematic diagram and parts list.

OPTIONAL ACCESSORY

Rack Mounting Kit RM-16.

NEW ISOLATED-VARIABLE AC POWER SUPPLY

Model 1655 / $350.00

FEATURES

• Power line leakage tester • Variable-isolated output — 0-150 VAC • 3 amp continuous, 4 amp intermittent output • Built-in solid state soldering iron temperature control • Expanded leakage scale • Circuit breaker overload protection • Display volts, amps, VA, leakage • Two volt-amp ranges (0-240, 0-480) for convenient load requirements.

DESCRIPTION

B&K-PRECISION MODEL 1655 is an isolated-variable (0-150V) AC power supply with a built-in isolation transformer. It includes a leakage test capability and a built-in solid state soldering iron temperature control.

APPLICATIONS

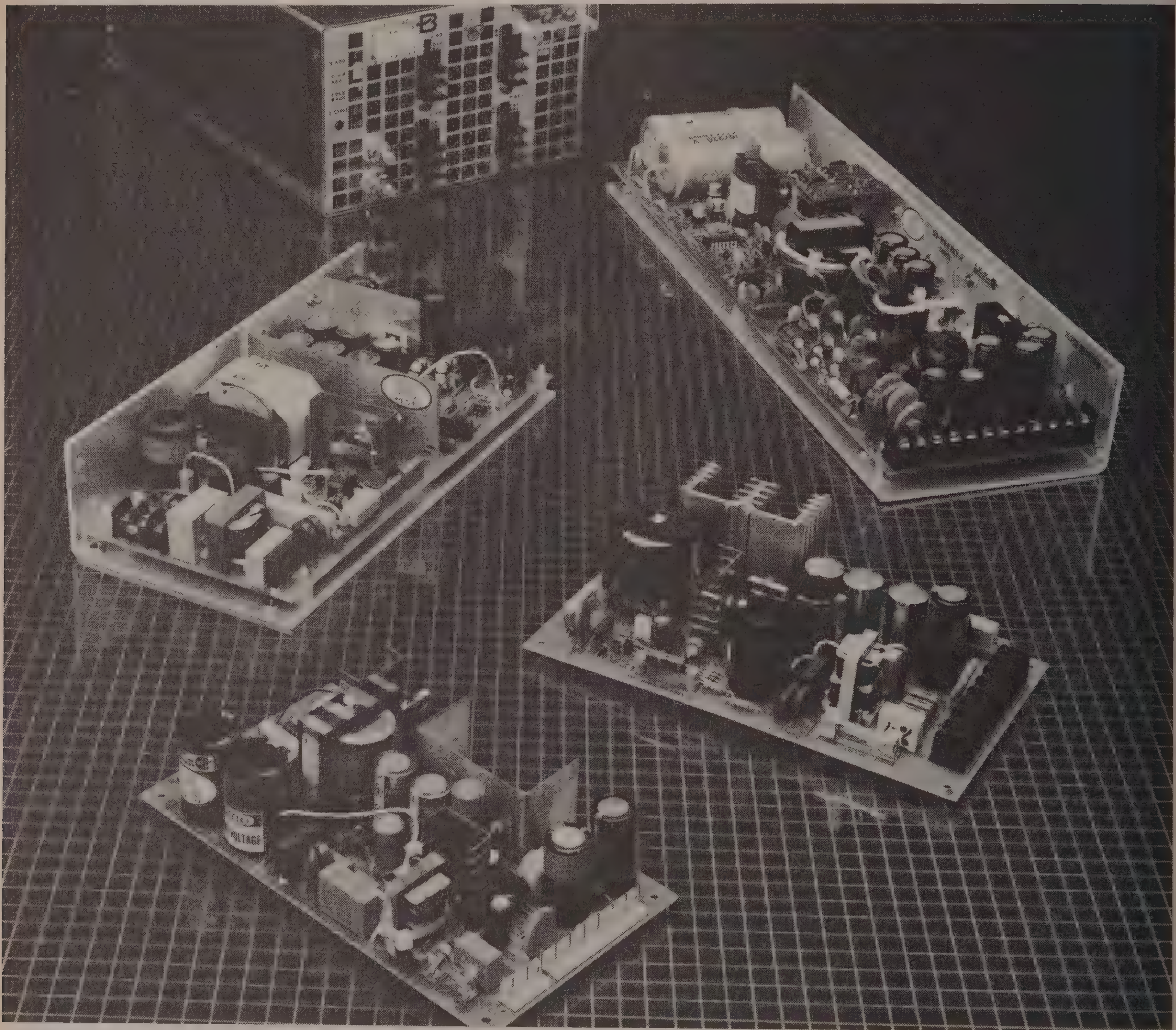
Power line to chassis leakage testing to verify compliance to OSHA, UL and CSA leakage requirements . . . locate dielectric breakdowns with leakage test. Ideal OEM and MRO instrument. Performance testing at normal, low and high line voltages . . . troubleshooting.

SPECIFICATIONS

Voltage Adjust. Range: 0-150 VAC, with input at 120 VAC. Output Isolation: Leakage <0.1 mA (25°C, 50% rel. humidity). Current Ranges: 0-2 A, 0-4 A. Max. Current (Isolated): 3 A cont., 4 A intermittent (0-130 V). Peak Current (Inrush): 30 A max. (inrush limited to one cycle at 30 A). Voltage/Current Sensing: Sinewave average, calibrated in rms. Volt-Amp Ranges: 0-240 VA, 0-480 VA (voltage set at 120). Leakage Range: 0 to 5,000 µA (expanded in 100-500 µA portion, compressed to 5 mA full scale). Solder Iron Temp. Control: 70%-99% of power line (100 W max.) Power: 120 VAC ±10%, 60 Hz, 600 VA at max. output. Dimensions (HxWxD): 30.5 x 15.2 x 28.0 cm (12 x 6 x 11″). Weight: 10 kg (22 lbs.).

SWITCHING POWER SELECTION GUIDE

Boschert Incorporated
384 Santa Trinita Avenue
Sunnyvale, CA 94086
(408) 732-2440
TWX 910-339-9241



- All Boschert products are designed to meet UL and CSA safety requirements.
- All XL and SL Boschert products are designed to meet IEC 380 VDE 0806 Safety, FCC Level B and VDE 0871 Level B EMI, and are available in versions designed to meet British Telecom Safety.
- All Boschert AC to DC products have user selectable 110/220 VAC inputs.
- Multiple Output and Single Output Switchers have a one-year warranty. High Power Products have a two-year warranty.

10TH
Anniversary
1974–1984
Boschert

SWITCHING POWER SELECTION GUIDE

Boschert

MULTIPLE OUTPUT SWITCHERS

Model Number	+ 5V	+ 5V	− 5V	+ 12V	+ 12V	− 12V	+ 15V	− 15V	+ 24V	Maximum Continuous Output Power
				Output Voltages and Maximum Current						
OL25-3001	[illegible]		[illegible]	[illegible]		0.5A				25W
XL40-3601	[illegible]			[illegible]		0.5A				40W
XL50-3601	[illegible]		[illegible]	[illegible]		[illegible]				60W
XL50-3602	[illegible]			[illegible]		[illegible]			2A	60W
XL50-3603	[illegible]			[illegible]	[illegible]	[illegible]				60W
XL50-3604	[illegible]		[illegible]				[illegible]	[illegible]		60W
XL50-3655	[illegible]			[illegible]	[illegible]	0.5A				65W
XL60-3601	[illegible]		[illegible]	[illegible]		[illegible]				70W
XL60-3602	[illegible]			[illegible]		[illegible]			2A	70W
XL60-3603	[illegible]			[illegible]	[illegible]	[illegible]				70W
XL65-3620	[illegible]		[illegible]	[illegible]		1.5A			1.2A	65W
XL100-3601	[illegible]		[illegible]	4A		[illegible]				100W
XL100-3602	[illegible]			4A		[illegible]			3A	100W
XL100-3603	10A			4A	1.5A	0.7A				100W
XL125-3601	[illegible]		[illegible]	5A		[illegible]				130W
XL125-3602	[illegible]			4A		[illegible]			4A	130W
XL125-3603	15A			4A	1.5A	[illegible]				130W
OL130-3001	[illegible]		[illegible]	3A		2A				130W
OL130-3022	[illegible]			3A		2A			2A	130W
OL200-3006	[illegible]		3A	3A**		3A**				200W
OL200-3024	[illegible]			3A**		3A**			4A	200W
XL200-3501	[illegible]		3A	4A		4A				200W
XL200-3504	[illegible]			4A		4A			3A	200W
OL301-3026*	[illegible]			4A		4A	4A	4A	4A	300W
OL400-3015*	15A		4A	10A		10A			4A	400W
OL400-3026*	[illegible]		4A				10A	10A	4A	400W

Shaded outputs are tightly regulated. *Requires fan + Fan required for 25A, no fan required for 20A. ** Fan required for 4A, no fan required 3A. Limited one year warranty

HIGH POWER PRODUCTS—MULTIPLE OUTPUT

Model Number	5V	5V	12V	12V	15V	15V	24V	24V	Maximum Continuous Output Power
				Output Voltages and Maximum Current					
XL750-4601	10-100A	0-10A	0-10A	0-6A					750W
XL750-4604	10-100A	0-10A			0-8A	0-8A			750W
XL750-4605	10-100A				0-8A	0-8A	0-4A		750W
XL750-4606	10-100A	0-10A	0-6A	0-6A			0-4A		750W
XL750-4607	10-100A		0-6A	0-6A			0-4A	0-4A	750W
XL750-4608	10-100A		0-10A	0-10A					750W
XL750-4609	10-100A				0-8A	0-8A			750W
XL750-4610	10-100A		0-10A				0-5A		750W

All XL750 outputs are floating and may be used with either polarity All outputs are well regulated. Limited two year warranty.

SINGLE OUTPUT SWITCHERS

Output Voltage	30W		60W		120W		220W	
	Model	Current	Model	Current	Model	Current	Model	Current
4.5V-5.5V	SL30-3605	6A	SL60-3605	12A	SL120-3605	20A	SL220-3605	44A
11.5V-18V	SL30-3612	2.5A	SL60-3612	5A	SL120-3612	10A	SL220-3612	20A
18V-30V	SL30-3624	1.25A	SL60-3624	2.5A	SL120-3624	5A	SL220-3624	10A

All the above SL models are designed to meet FCC RFI, VDE 0871 RFI, UL 478, CSA C22.2 and VDE0806 safety requirement

HIGH POWER PRODUCTS—SINGLE OUTPUT

Model Number	Output Adjustment Range	Rated Current at 50°C	Maximum Continuous Output Power
HL1000-4605	4.5V-5.5V	200A	1000W
HL1500-2001 AFI	1.8V-2.2V	300A	600W
HL1500-2001 RBFIE	4.5V-5.5V	300A	1500W

Limited two year warranty.

DC-DC SWITCHERS

Model Number	Description
3T12AP-6130	10V-60V input, output adjustable from 4.5V-30V @ 12A
3T20AP-6115	10V-60V input, output adjustable from 4.5V-15V @ 20A
3T5AN-4030	10V-40V input, output adjustable from −4.5V −30V @ 5A
3T5AN-6030	20V-60V input, output adjustable from −4.5V −30V @ 5A

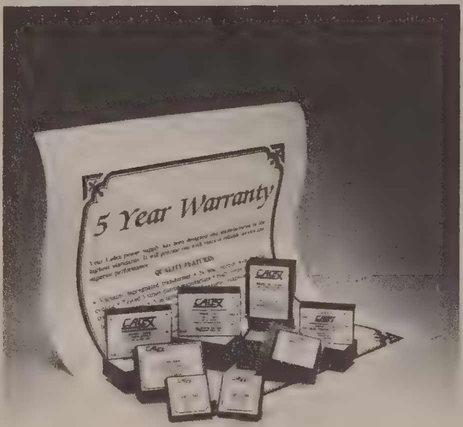
CALEX

CALEX MFG. CO., INC., 3355 Vincent Road, Pleasant Hill, CA 94523
Telephone: (415) 932-3911 Telex: 338 506

AC/DC LINEAR POWER SUPPLY

5 YEAR WARRANTY

SINGLE, DUAL & TRIPLE OUTPUT STANDARD 2.5" x 3.5"



	Output Voltage	Output Current	Voltage Accuracy	Line & Load Regulations	Noise & Ripple	Case Size	Model Number	Price (1-9)
Single Outputs	+5	500mA	±1%	±0.05%	1mVrms	B1	1.5.500	$66.00
	+5V	1000mA	±1%	±0.05%	1mVrms	B2	1.5.1000	$86.00
	**+5V	1000mA	±1%	±0.05%	1mVrms	B2	1.5.1000DV	$95.00
	*+5V	1000mA	±1%	±0.05%	1mVrms	B2	7009	$109.00
	+5V	2000mA	±1%	±0.05%	2mVrms	B3	1.5.2000	$109.00
	+9V	1000mA	±0.5%	±0.05%	2mVrms	B3	1.9.1000	$105.00
	+12V	480mA	±0.5%	±0.02%	2mVrms	B2	1.12.480	$86.00
	+12V	750mA	±0.5%	±0.02%	2mVrms	B3	1.12.750	$105.00
	+15V	400mA	±0.5%	±0.02%	2mVrms	B2	1.15.400	$86.00
	+15V	600mA	±0.5%	±0.02%	2mVrms	B3	1.15.600	$105.00
	+18V	500mA	±0.5%	±0.02%	2mVrms	B3	1.18.500	$105.00
	+24V	374mA	±0.5%	±0.02%	2mVrms	B3	1.24.375	$109.00
Dual Outputs	±12V	±120mA	±0.5%	±0.02%	1mVrms	B1	2.12.120	$66.00
	±12V	±240mA	±0.5%	±0.02%	1mVrms	B2	2.12.240	$86.00
	**±12V	±240mA	±0.5%	±0.02%	1mVrms	B2	2.12.240DV	$95.00
	±12V	±360mA	±0.5%	±0.02%	2mVrms	B3	2.12.360	$109.00
	±15V	±50mA	±0.5%	±0.02%	1mVrms	B1	2.15.50	$60.00
	±15V	±100mA	±0.5%	±0.02%	1mVrms	B1	2.15.100	$66.00
	±15V	±200mA	±0.5%	±0.02%	1mVrms	B2	2.15.200	$86.00
	**±15V	±200mA	±0.5%	±0.02%	1mVrms	B2	2.15.200DV	$95.00
	*±15V	±200mA	±0.5%	±0.02%	1mVrms	B2	7010	$122.00
	±15V	±300mA	±0.5%	±0.02%	2mVrms	B3	2 15.300	$109.00
Triple Outputs	±12V & +5V	+100mA 600mA	±1%	±0.05%	2mVrms	B2	3.12.5	$105.00
	±15V & +5V	+100mA 500mA	±1%	±0.05%	2mVrms	B2	3.15.5	$105.00
	±12V & +5V	+125mA 1A	±1%	±0.1%	2mVrms	B3	3.12.1000	$132.00
	±15V & +5V	+100mA 1A	±1%	±0.1%	2mVrms	B3	3.15.1000	$132.00

* UL 544 Approved
** Dual AC Input 115/230VAC

CALEX
MODEL 21 30
MODEL 22-40
±15V @ 50mA
MODEL 21 12
MODEL 22 100
DUAL POWER SUPPLY
AC

SUBMINIATURE SERIES

Output Voltage	Output Current	Voltage Accuracy	Line & Load Regulation	Noise & Ripple	Temperature Coefficient	Case Size	Model Number	Price (1-9)
+5V	300mA	±1%	±0.1%	2mVrms	±0.02%/°C	C	21-30	$55.00
+12V	120mA	±0.5%	±0.1%	2mVrms	±0.02%/°C	C	21-12	$55.00
+15V	200mA	±0.5%	±0.01%	2mVrms	±0.01%/°C	A	21-200	$75.00
±15V	+50mA	±0.5%	±0.01%	2mVrms	±0.02%/°C	C	22-40	$55.00
±15V	+100mA	±0.5%	±0.02%	2mVrms	±0.01%/°C	A	22-100	$75.00

CHASSIS MOUNT

CALEX
MODEL CM 3.15.5
TRIPLE POWER SUPPLY

	Output Voltage	Output Current	Voltage Accuracy	Line & Load Regulation	Noise & Ripple	Temperature Coefficient	Model Number	Price (1-9)
Single Outputs	+5V	500mA	±1%	±0.05%	1mVrms	±0.01%/°C	CM 1.5.500	$75.00
	+5V	1000mA	±1%	±0.05%	1mVrms	±0.02%/°C	CM 1.5.1000	$98.00
	+12V	500mA	±1%	±0.05%	1mVrms	±0.01%/°C	CM 1.12.500	$98.00
	+15V	400mA	±1%	±0.05%	1mVrms	±0.01%/°C	CM 1.15.400	$98.00
	+250V	30mA	±3%	±2%	1mVrms	±0.05%/°C	CM 1.250.30	$98.00
Dual	±12V	±120mA	±0.5%	±0.02%	1mVrms	±0.01%/°C	CM 2.12.120	$75.00
	±12V	±240mA	±0.5%	±0.02%	1mVrms	±0.01%/°C	CM 2.12.240	$98.00
	±15V	±50mA	±0.5%	±0.02%	1mVrms	±0.01%/°C	CM 2.15.50	$71.00
	±15V	±100mA	±0.5%	±0.02%	1mVrms	±0.01%/°C	CM 2.15.100	$75.00
	±15V	±200mA	±0.5%	±0.02%	1mVrms	±0.01%/°C	CM 2.15.200	$98.00
Triple	±15V & +5V	+15V @ 100mA +5V @ 500mA	±1%	±0.05%	2mVrms	±0.01%/°C	CM 3.15.5	$115.00
	±12V & +5V	+12V @ 100mA +5V @ 600mA	±1%	±0.05%	2mVrms	±0.01%/°C	CM 3.12.5	$115.00

CASE SIZES

- **A**- 3" x 2" x 1" (76.2mm x 50.8mm x 25.4mm)
- **B1**- 3.5" x 2.5" x .875" (88.9mm x 63.5mm x 22.2mm)
- **B2**- 3.5" x 2.5" x 1.25" (88.9mm x 63.5mm x 31.8mm)
- **B3**- 3.5" x 2.5" x 1.56" (88.9mm x 63.5mm x 39.6mm)
- **C**- 2.25" x 1.75" x 1" (57.15mm x 44.75mm x 25.4mm)
- **CM**- 4" x 2.7" x 1.4" (101.6mm x 68.6mm x 35.56mm)

COMMON SPECIFICATIONS FOR ALL SUPPLIES

Input Voltage:
115 ± 10VAC
100 ± 10VAC (add " - 100" to Model No.)
220 ± 20VAC (add " - 220" to Model No.)
230 ± 20VAC (add " - 230" to Model No.)
240 ± 20VAC (add " - 240" to Model No.)
(no additional charge)

Input Frequency Range:
50 to 60Hz
400 Hz Consult Factory

Isolation: 1250Vrms
Resistance: 50M min.
Capacitance: 250pF max.

Over Voltage Protection:
Standard on all B Case 5Volt Singles above 2Watts except 7009.

Temperature Coefficient:
±0.01%/°C

Storage Temperature:
−25°C to +85°C

Maximum Operating Case Temperature:
+71°C

Short Circuit Protection:
Foldback Current Limiting or Constant Current Limiting

DC/DC CONVERTERS

CALEX

The CALEX lines of 3, 6, and 12 Watt DC/DC Converters are designed for applications where analog voltages are needed in digital systems, when negative voltages are required, for field portable and battery operated equipment, and where isolated positive or negative voltage sources are necessary in instrumentation systems. These units cover input voltages from 5 to 48 volts, are low noise, and have efficiencies up to 80%. CALEX can also design custom OEM DC/DC units to fit your special needs. Contact the factory for details.

	OUTPUT VOLTAGE DC	OUTPUT CURRENT mA	CASE SIZE	MODEL NUMBER	PRICE (1-24)
5 VOLTS INPUT	±12	±85	C	5D12.085	$58.00
	±12	±125	A	5D12.125	$98.00
	±12	±185	A	5D12.185	$107.00
	±15	±60	C	5D15.060	$58.00
	±15	±100	A	5D15.100	$98.00
	±15	±150	A	5D15.150	$107.00

	OUTPUT VOLTAGE DC	OUTPUT CURRENT mA	CASE SIZE	MODEL NUMBER	PRICE (1-24)
12 VOLTS INPUT	5	600	A	12S5.600	$88.00
	5	1000	A	12S5.1000	$97.00
	5	2000	B	12S5.2000	$114.00
	12	250	A	12S12.250	$88.00
	12	500	A	12S12.500	$97.00
	12	1000	B	12S12.1000	$114.00
	15	200	A	12S15.200	$88.00
	15	400	A	12S15.400	$97.00
	15	800	B	12S15.800	$114.00
	±12	±125	A	12D12.125	$98.00
	±12	±250	A	12D12.250	$107.00
	±12	±500	B	12D12.500	$124.00
	±15	±100	A	12D15.100	$98.00
	±15	±200	A	12D15.200	$107.00
	±15	±400	B	12D15.400	$124.00

	OUTPUT VOLTAGE DC	OUTPUT CURRENT mA	CASE SIZE	MODEL NUMBER	PRICE (1-24)
24 VOLTS INPUT	5	600	A	24S5.600	$88.00
	5	1000	A	24S5.1000	$97.00
	5	2000	B	24S5.2000	$114.00
	12	250	A	24S12.250	$88.00
	12	500	A	24S12.500	$97.00
	12	1000	B	24S12.1000	$114.00
	15	200	A	24S15.200	$88.00
	15	400	A	24S15.400	$97.00
	15	800	B	24S15.800	$114.00
	±12	±125	A	24D12.125	$98.00
	±12	±250	A	24D12.250	$107.00
	±12	±500	B	24D12.500	$124.00
	±15	±100	A	24D15.100	$98.00
	±15	±200	A	24D15.200	$107.00
	±15	±400	B	24D15.400	$124.00

CASE SIZES

A- 2"x 2" x 0.375"
(50,8mm x 50,8mm x 9,525mm)

B- 2.5" x 3.5" x .875"
(63,5mm x 88,9mm x 22,225mm)

C- 1" x 2" x .375"
(25,4mm x 50,8mm x 9,525mm)

Quality Products Since 1962

CALEX
12S5.1000
DC-DC CONVERTER
24S12.500
DC-DC CONVERTER
48S15.400
DC-DC CONVERTER

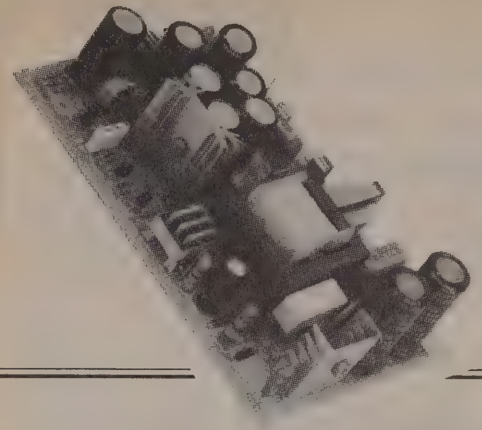
Features of CALEX DC/DC Converters

- 5 Year Warranty
- 6 sided shielded cases
- 100% burn-in & testing
- Input/output isolation
- Stock Delivery
- Very low input/output noise
- Low profile cases
- PI type input filters
- Dual tracking outputs
- Short circuit protection

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. FOR QUANTITY DISCOUNTS AND OEM CONTRACT DETAILS CONSULT CALEX SALES DEPT. (415) 932-3911 OR OUR REPRESENTATIVE IN YOUR AREA.

	OUTPUT VOLTAGE DC	OUTPUT CURRENT mA	CASE SIZE	MODEL NUMBER	PRICE (1-24)
28 VOLTS INPUT	5	600	A	28S5.600	$88.00
	5	1000	A	28S5.1000	$97.00
	5	2000	B	28S5.2000	$114.00
	12	250	A	28S12.250	$88.00
	12	500	A	28S12.500	$97.00
	12	1000	B	28S12.1000	$114.00
	15	200	A	28S15.200	$88.00
	15	400	A	28S15.400	$97.00
	15	800	B	28S15.800	$114.00
	±12	±125	A	28D12.125	$98.00
	±12	±250	A	28D12.250	$107.00
	±12	±500	B	28D12.500	$124.00
	±15	±100	A	28D15.100	$98.00
	±15	±200	A	28D15.200	$107.00
	±15	±400	B	28D15.400	$124.00

	OUTPUT VOLTAGE DC	OUTPUT CURRENT mA	CASE SIZE	MODEL NUMBER	PRICE (1-24)
48 VOLTS INPUT	5	600	A	48S5.600	$88.00
	5	1000	A	48S5.1000	$97.00
	5	2000	B	48S5.2000	$114.00
	12	250	A	48S12.250	$88.00
	12	500	A	48S12.500	$97.00
	12	1000	B	48S12.1000	$114.00
	15	200	A	48S15.200	$88.00
	15	400	A	48S15.400	$97.00
	15	800	B	24S15.800	$114.00
	±12	±125	A	48D12.125	$98.00
	±12	±250	A	48D12.250	$107.00
	±12	±500	B	48D12.500	$124.00
	±15	±100	A	48D15.100	$98.00
	±15	±200	A	48D15.200	$107.00
	±15	±400	B	48D15.400	$124.00



CALIFORNIA DC
Switching Power Supplies

LR4000
5V @ 4A, 12V @ 2.5A,
−12V @ .5A

LR SERIES MODEL DESCRIPTION

TOTAL POWER	MODEL NUMBER	OUTPUTS					DIMENSIONS L x W x H
		MAIN	AUX. #1	#1 SURGE	AUX. #2	AUX. #3	
20W	LR1025	5V @ 1.0A	+12V @ 1.2A	2.5A	——	——	5 x 3 x 2
33W	LR1029	5V @ 3.0A	+12V @ 1.5A	2.5A	——	——	5 x 3 x 2
30W	LR2400	5V @ 2.0A	+12V @ 1.5A	—	−12V @ 0.1A	——	4 x 2 x 1.8
40W	LR3500	5V @ 3.0A	+12V @ 2.0A	—	−12V @ 0.1A	——	5 x 3 x 2
40W	LR4000	5V @ 4.0A	+12V @ 2.5A	—	−12V @ 0.5A	——	6.3 x 3.9 x 2
65W	LR4300	5V @ 6.0A	+12V @ 2.5A	6.0A	−12V @ 0.6A	−5V @ 0.6A	6.3 x 3.9 x 2
65W	LR5300	5V @ 6.0A	+12V @ 3.0A	6.0A	−12V @ 0.6A	−5V @ 0.6A	8.25 x 4.25 x 2.2
65W	LR5301-08A	5V @ 6.0A	+12V @ 3.0A +24V @ 1.6A	6.0A	+12V @ 0.6A	−12V @ 0.6A	8.25 x 4.25 x 2.2
65W	LR5301-15	5V @ 6.0A	+12V @ 3.0A	6.0A	−12V @ 0.6A	——	8.25 x 4.25 x 2.2
65W	LR5301-16	5V @ 5.0A	+15V @ 0.5A	—	−15V @ 0.5A	−5V @ 0.5A	8.25 x 4.25 x 2.2
65W	LR5301-32	5V @ [illegible]A	+12V @ 2.5A	6.0A	+12V @ 1.5A	−12V @ 0.5A	8.25 x 4.25 x 2.2
65W	LR5301-34	5V @ 6.0A	+18V @ 1.0A	—	−18V @ 1.0A	——	8.25 x 4.25 x 2.2
65W	LR5301-36	5V @ 8.0A	+12V @ 2.5A	6.0A	——	−12V @ 0.5A	8.25 x 4.25 x 2.2
65W	LR5301-39	5V @ 9.0A	+12V @ 2.5A	6.0A	−12V @ 0.5A	——	8.25 x 4.25 x 2.2
100W	LR5401-01	5V @ 10.0A	+12V @ 4.0A	6.0A	——	−12V @ 0.5A	8.25 x 4.25 x 2.2
100W	LR5401-02	5V @ 10.0A	+12V @ 4.0A	6.0A	+12V @ 1.5A	−12V @ 0.5A	8.25 x 4.25 x 2.2
100W	LR5401-03	5V @ 10.0A	+12V @ 4.0A	6.0A	−12V @ 1.0A	−5V @ 0.5A	8.25 x 4.25 x 2.2
100W	LR5500	5V @ 10.0A	+12V @ 4.0A	6.0A	+12V @ 1.2A	−5V @ 0.6A	8.0 x 5.0 x 2.2
100W	LR5501-03	5V @ 10.0A	+12V @ 4.0A	6.0A	−12V @ 0.6A	−5V @ 0.5A	8.0 x 5.0 x 2.2
100W	LR5501-06	5V @ 10.0A	+12V @ 4.0A	6.0A	+12V @ 1.5A	−12V @ 0.5A	8.0 x 5.0 x 2.2
100W	LR5501-09	5V @ 10.0A	+24V @ 2.5A	—	+12V @ 1.5A	−12V @ 0.6A	8.0 x 5.0 x 2.2
150W	LR6500	5V @ 20.0A	+12V @ 4.0A	6.0A	+12V @ 1.5A	−12V @ 0.6A	10.0 x 5.0 x 2.2
250W	LR6700	5V @ 30.0A	+12V @ 7.0A	10.0A	−12V @ 0.5A	——	12.0 x 5.0 x 2.2

- Other main and auxiliary voltages can be specified and may be available. Please consult factory.
- All units designed to meet UL478, CSA C22.2-154, VDE 0806 (VDE 0730) and FCC Class A. Please consult factory for current status of agency approvals.

California DC offers a broad range of switching power supplies designed to provide reliable power under a variety of operating conditions. Hundreds of thousands of units in customer systems are powering TTL, CMOS, and ECL logic; removable and fixed media drives; CRT monitors; impact and non-impact printer mechanisms; and a number of additional applications. Let our experience work for you, whether your requirements demand off-the-shelf power supplies, custom designs, or modified standard products. Our applications and field support are second to none — dedicated to ensuring the best solution for your systems needs.

STANDARD FEATURES

- Cost effective, reliable designs
- Dual input voltage, jumper selectable
- ±20% line tolerance
- 20 msec hold up
- Overvoltage protection, main output
- Overpower limit
- 65% minimum efficiency at full load
- 1% peak-to-peak output ripple and noise
- Inrush current limit on turn-on
- 50°C full output

CALIFORNIA DC

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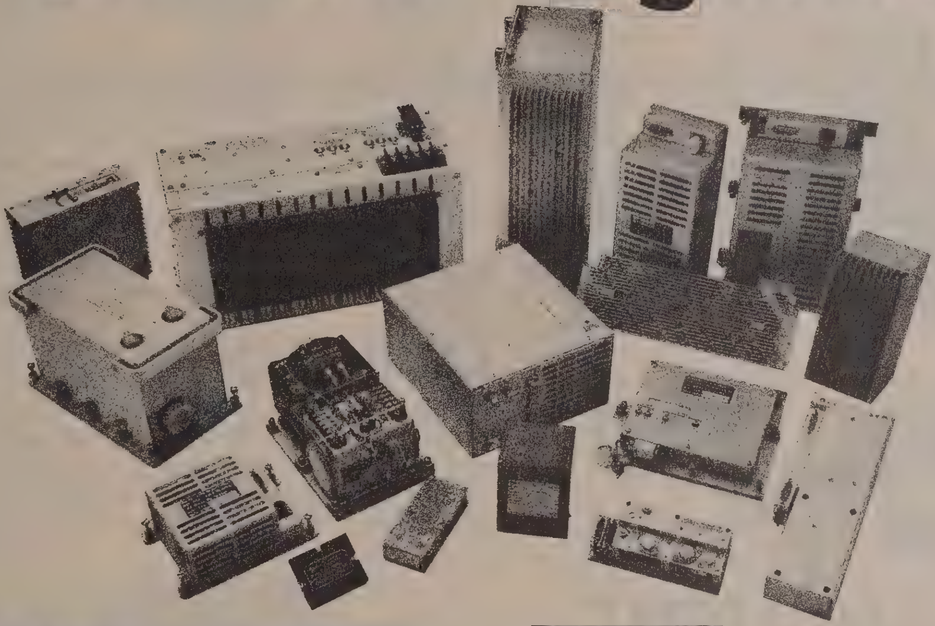
PHONE: (805) 499-3621 • MARKETING HOTLINE: (213) 706-8221

We are in the business of making products that are best forgotten.



Power supplies are memorable only for the wrong reasons.

You never remember the power supplies (or think about them) when they are working properly. It's when they fail, or provide undesired performance, that a power supply is utmost on your mind.

That's why CEA makes forgettable products. When you turn one on, it stays that way. We can say that for real reasons. Please read on.

Reason #1:

We have designed, developed and manufactured more than 2000 different custom power supplies. And we've done it for a wide variety of military and demanding industrial applications.

Reason #2:

We are, without question, a high-technology company. We have developed high-frequency MOSFET switcher technology. We are expert in Tempest techniques, nuclear survivability, critical military specifications, UL, CSA and VDE.

Reason #3:

CEA Program Management makes your project an efficient process, delivering finished supplies without surprises, failures, or restart of the whole process.

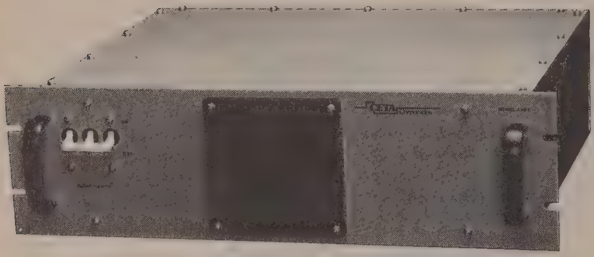
At CEA, you are assigned a professional program team. You are able to review preliminary designs on paper. Based on this review, you receive a fully-tested breadboard, followed by an engineering model for full spec and parts review, and only then into production units — with full performance and no surprises. Your involvement at critical design points assures it.

Let us tell you the whole story.

We would like to send you our new brochure with the full story. We hope you'll see why CEA is the **custom** power conversion specialist.

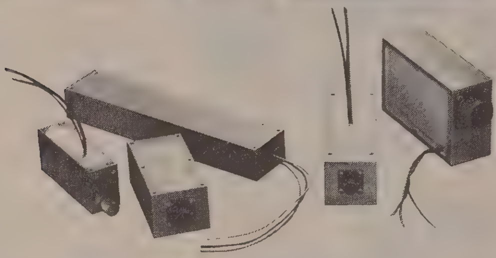
CEA, a division of Berkleonics, Inc., 1 Aerovista Park, San Luis Obispo, California 93401. (805) 544-5454. TWX 910-351-6705.

POWER



HIGH VOLTAGE

"SWITCHERS" up to 100 Kilovolts or up to 15 Kilowatts. Featuring variable output with typical regulation of less than 1%. High density packaging techniques, getting high voltage into 10 watt/cubic inch. 90% efficiency units can be paralleled.

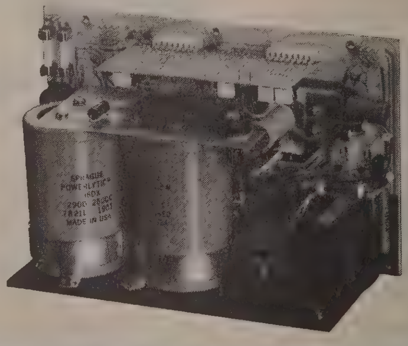


LOW VOLTAGE

Switchers, linears, and hybrid power supplies to meet the rigid demand for high efficiency in small packaging. Any number of outputs in combinations of regulated, unregulated, current limit, programmed or controlled are available.

INPUT/OUTPUT

Input configurations are available for the foreign and domestic, for EMI filtering, with undervoltage (brownout) protection and all the normal variations for frequency and voltage. Most any combination of single or multiple output. High voltage with low voltage to operate filaments, control circuits, etc., eliminating additional supplies.

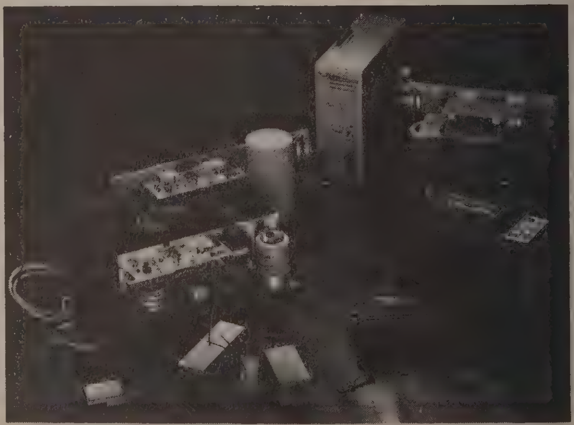


APPLICATIONS

- X-RAY
- LASERS
- TWT
- VIDEO
- MICROPROCESSORS
- DC to DC
- MICROWAVE
- INSTRUMENTATION
- POWER TUBE
- ELECTROSTATIC

CETA HAS IT . . . the custom designed power supply to fit your application that can't be found . . . except here.

Call or send us your specifications and we'll be glad to provide a quote.



CETA CORPORATION

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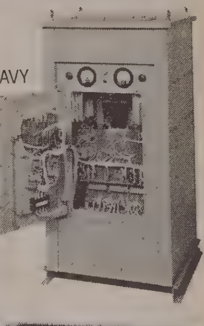
CHRISTIE HI-CURRENT DC POWER

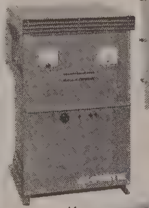
If you are looking for the most reliable high current DC power supplies, float and ultra-fast battery chargers, ni-cad battery packs or whole DC power systems—whether for industrial, military, or NASA-type applications—you need Christie. For 54 years, Christie has produced a wide range of high quality electrical products. Just call our 800 number for information and ordering.

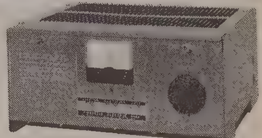
HIGH CURRENT DC POWER SUPPLIES

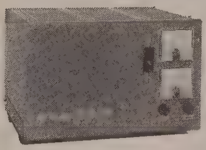
REGULATION TYPE	DC VOLTS	CONTINUOUS AMPS	INTERMITTENT AMPS (%)	BASIC MODEL NUMBER	TYPICAL VOLTAGE REG. (±)	TYPICAL RIPPLE	TYPICAL RESPONSE (MSEC)	AC INPUT PHASES	RELATIVE COST
Load	28	100, 200, 300	500	MH28- *	2%	1%	–	3	Low
		400, 600	500	H28- *	2%	1.5%	–	3	Low
		1000	500	A28- *	2%	1.5%	–	3	Low
Magamp	11-16	50, 100, 200, 300	500	MH16- *	0.5%	1%	100	3	Medium
	12-15	1000	500	1C15- *	0.5%	1%	100	3	Medium
	22-32	50, 100, 200, 300	500	MH32- *	0.25%	1%	50	3	Medium
	26-36	400, 500, 600	500	1C36- *	0.25%	1%	100	3	Medium
	26-36	800, 1000, 1200	500	2C36- *	0.25%	1%	100	3	Medium
	26-32	1500	500	2C32- *	0.25%	1%	140	3	Medium
	44-64	100	500	MH64- *	0.25%	1%	50	3	Medium
	44-64	200, 300	500	1C64- *	0.5%	1%	100	3	Medium
	110-135	40, 60	500	MH135- *	0.25%	1%	50	3	Medium
	110-135	100, 200	500	1C135- *	0.5%	1%	100	3	Medium
	110-135	300	500	2C135- *	0.5%	1%	100	3	Medium
	220-280	100	500	1C280- *	0.5%	1%	100	3	Medium
SCR	2-15	100	–	SC015- *	0.21%	1%	50	1	Low
	2-37	50	–	SC036- *	0.25%	1%	50	1	Low
	2-48	40	–	SC048- *	0.25%	1%	50	1	Low
	0-15	1000	–	1C015- *	0.2%	40 mv	100	3	Higher
	0-30	1500	–	2C030- *	0.1%	30 mv	50	3	Higher
	0-40	150	–	1R040- *	0.1%	30 mv	50	3	Higher
	0-40	300	–	3R040- *	0.1%	30 mv	50	3	Higher
	0-40	600	–	1C040- *	0.1%	30 mv	50	3	Higher
	0-31/62	700	–	1C031- *	0.1%	30 mv	50	3	Higher
	0-80	150	–	3R080- *	0.1%	320 mv	50	3	Higher
	0-135	150	–	1C0135- *	0.1%	100 mv	50	3	Higher
	0-135	300	–	2C0135- *	0.1%	100 mv	50	3	Higher

* Insert continuous amp rating to obtain model number (e.g.—MH28-300)









Christie also produces DC power supplies for xenon, mercury, xenon-mercury, and laser lights.

PRECISION CHARGERS FOR LEAD-ACID AND SILVER-ZINC BATTERIES

Nominal Battery Voltages	Current Ratings (amps)	Service	Regulation Type	Typical Regulation	Typical Ripple	A C Input
6, 12, 24	25, 50	Float or Charge	SCR	±0.25%	1%	Ratings with * are 3 phase. All others are 1 phase.
12, 24, 36	150*					
36, 48	25, 50, 60,* 130*					
72, 120	12, 25, 30,* 50, 60,* 100					

REFLEX-CHARGERS AND NI-CAD BATTERY PACKS

ReFLEX-20 Ultra Fast Charger

If you need ni-cad battery packs, full recharge in 20 minutes, DC-to-DC conversion, uninterruptible DC power for communications, missiles, medical or other applications—you need ReFLEX-20.

The patented Christie ReFLEX-20 "burping" charger-and-battery system fully recharges completely discharged Christie ReFLEX-20 nickel-cadmium batteries in only 20 minutes with 95 percent efficiency. The secret is the interjection of controlled negative discharge pulses during the charging process. This results in longer battery life, more actual ampere-hours, and greater reliability with less capacity fading ("memory"). And there's no battery overheating.

Use Christie long-life ni-cad battery packs with Christie ReFLEX or slow chargers.

REFLEX 20
CHRISTIE

ReFLEX Chargers For Aircraft Applications

The exclusive Christie "burping" principle is also employed for ground-charging vented aircraft 5 to 50 ampere-hour ni-cads fully in one hour...AND THE BATTERY STAYS COOL. The plane you fly on has probably been "burped"!

SPECIAL MILITARY/ NASA POWER SUPPLIES

NASA and most U.S. and many foreign military organizations rely on Christie DC ground power supplies and shipboard power for:

- Electronics equipment trucks (shelters)
- Missile testing
- Helicopter/aircraft starting
- Space Shuttle ground power
- Shipboard forklift chargers
- Radio power
- Automatic battery chargers
- Missile ground power

You Can Depend On Us!

Christie Electric Corp. also produces motion picture theatre projection and stereo sound equipment as well as a variety of battery chargers and testers for electrically driven vehicles and automotive service stations.

Christie gives you state-of-the-art engineering, outstanding quality control, complete in-house magnetic and sheet metal manufacturing capabilities, the latest production techniques, and unparalleled service before and after sales.

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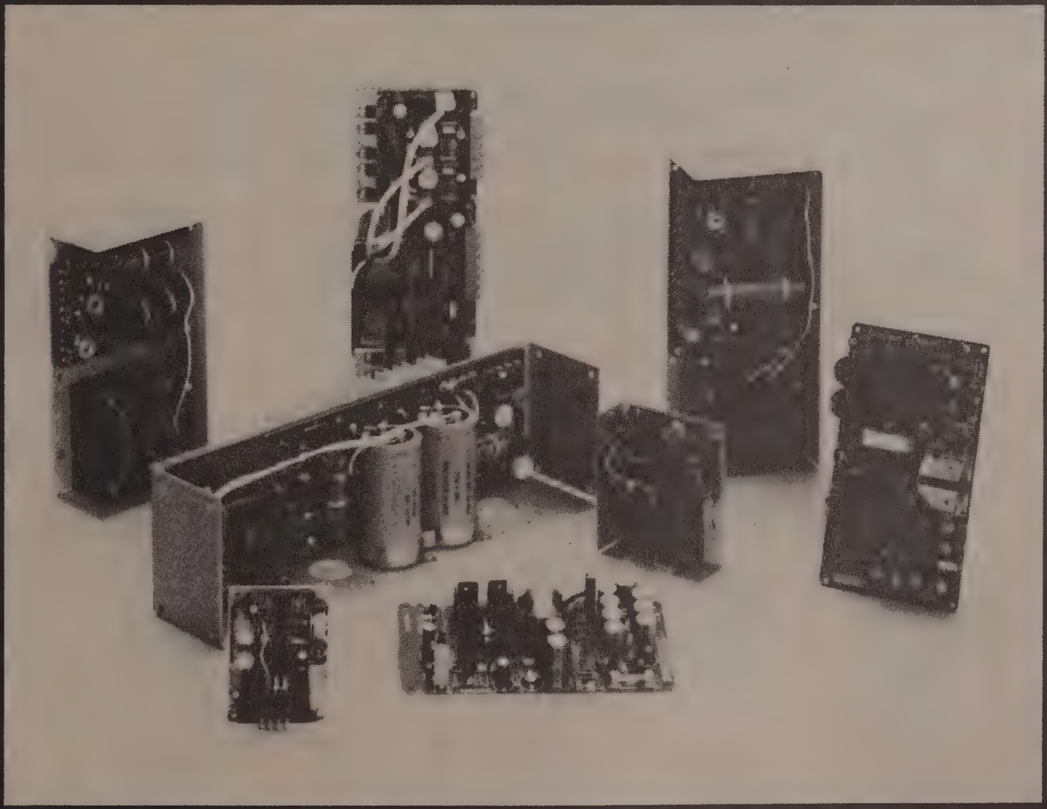
CONDOR INC.

The Open Frame Power Supply Company Whose Time Has Arrived



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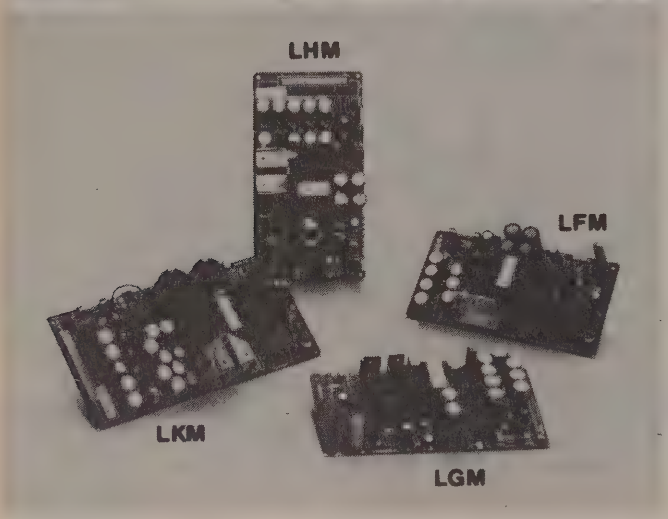
L SERIES SWITCHERS



The L series of low power, open frame multiple output power supplies are designed for small systems. Many of the popular microprocessor, CRT, mini-floppy and video game power requirements can be satisfied with these efficient power supplies.

FEATURES:

- PCB Construction (optional chassis)
- Short-Circuit Protection
- Input fusing included
- Overvoltage protection
- Input surge protection
- Input EMI filtering
- 16 ms holdup time
- 25 K Hz switching
- Brown-out rated

Consult factory for complete specifications and applications.

OUTPUT VOLTAGES AND MAXIMUM RATED LOADS

MODEL NUMBER	OUTPUT #1 VNOM IMAX	OUTPUT #2 VNOM IMAX	OUTPUT #3 VNOM IMAX	OUTPUT #4 VNOM IMAX	MAX CONTIN. OUTPUT POWER	PRICE EACH 1-9
STANDARDS:						
LFM 201	+5V @ 3A	+12V @ 4.5A	N/A	N/A	65WATTS	$ 86.00
LFM 302	+5V @ 6A	+12V @ 1A	−12V @ 1A	N/A	55WATTS	83.00
LFM 410	+5V @ 4A	+12V @ 2A	−12V @ 1A	−5V @ 1A	50WATTS	83.00
LFM 411	+5V @ 4A	+15V @ 2A	−15V @ 1A	−5V @ 1A	50WATTS	**
LFM 412	+5V @ 4A	+12V @ 1.5A	−12V @ 1.5A	N/A	50WATTS	83.00
LFM 413	+5V @ 4A	+15V @ 1.5A	−15V @ 1.5A	N/A	50WATTS	**
LFM 414	+5V @ 4A	+24V @ 2A	N/A	−5V @ 1A	50WATTS	83.00
LFM 415	+5V @ 4A	+12V @ 1.5A	−12V @ 1.5A	+24V @ 2A	50WATTS	83.00
LFM 416	+5V @ 8A	+12V @ 4/9/AP	N/A	N/A	85WATTS	92.00
LGM 410	+5V @ 6A	+12V @ 2.5A	−12V @ 2A	−5V @ 1A	65WATTS	86.00
LGM 411	+5V @ 6A	+15V @ 2.5A	−15V @ 2A	−5V @ 1A	65WATTS	**
LGM 412	+5V @ 6A	+12V @ 2.5A	−12V @ 2.5A	N/A	65WATTS	$86.00
LGM 413	+5V @ 6A	+15V @ 2.5A	−15V @ 2.5A	N/A	65WATTS	**
LGM 414	+5V @ 6A	+24V @ 2.0A	N/A	−5V @ 2A	65WATTS	86.00
LGM 415	+5V @ 6A	+12V @ 2.0A	−12V @ 2A	+24V @ 2A	65WATTS	86.00
LHM 410	+5V @ 8A	+12V @ 3.5A	−12V @ 2A	−5V @ 2A	85WATTS	92.00
LHM 411	+5V @ 8A	+15V @ 3.5A	−15V @ 2A	−5V @ 2A	85WATTS	**
LHM 412	+5V @ 8A	+12V @ 3A	−12V @ 2A	N/A	85WATTS	92.00
LHM 413	+5V @ 8A	+15V @ 3A	−15V @ 2A	N/A	85WATTS	**
LHM 414	+5V @ 8A	+24V @ 3A	N/A	−5V @ 2A	85WATTS	92.00
LHM 415	+5V @ 8A	+12V @ 3A	−12V @ 3A	+24V @ 2A	85WATTS	92.00
LHM 416	+5V @ 8A	+12V @ 3/6A	N/A	N/A	85WATTS	
LKM 410	+5V @ 15A	+12V @ 4A	−12V @ 2A	−5V @ 2A	125WATTS	109.00
LKM 411	+5V @ 15A	+15V @ 4A	−15V @ 2A	−5V @ 2A	125WATTS	**
LKM 412	+5V @ 15A	+12V @ 4A	−12V @ 2A	N/A	125WATTS	109.00
LKM 413	+5V @ 15A	+15V @ 4A	−15V @ 2A	N/A	125WATTS	**
LKM 414	+5V @ 15A	+24V @ 4A	N/A	−5V @ 2A	125WATTS	109.00
LKM 415	+5V @ 15A	+24V @ 4/6PK	−12V @ 2A	−5V @ 2A	125WATTS	109.00
OPTIONAL OUTPUTS:						
LFM-XXX	+5V @ 10A	* @ 4A	* @ 4A	* @ 2A	85WATTS	**
LGM-XXX	+5V @ 10A	* @ 4A	* @ 4A	* @ 2A	85WATTS	**
LHM-XXX	+5V @ 10A	* @ 4A	* @ 4A	* @ 2A	85WATTS	**
LKM-XXX	+5V @ 15A	* @ 4A	* @ 4A	* @ 2A	125WATTS	**

*USER SPECIFIED VOLTAGE

****NON STOCK:** Requires setup fee of $250 per release if less than 50 pieces. per order. No setup fee on orders over 50 pieces with 50 pieces minimum per release.

NOTES: Quantity discounts: 10-24 (5% off 1-9), 25-49 (10% off 1-9), 50-99 (15% off 1-9), 100-249 (20% off 1-9)

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CONDOR INC.

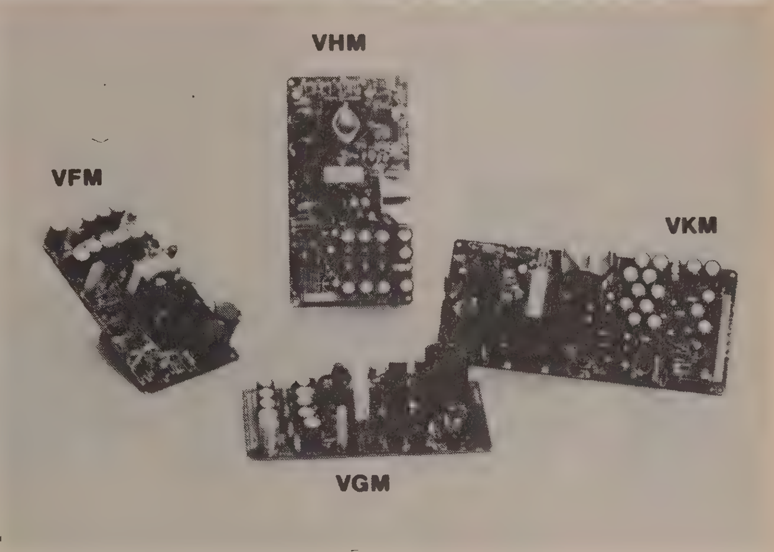
D.C. POWER SUPPLIES

V SERIES SWITCHERS

The "V" series switchers offer the same performance and specifications as the "L" series on the opposite page with the following added features:

- Designed to meet IEC/VDE safety requirements.
- Two of the outputs are isolated and may be paralleled (when same voltage) for increased current or used in series for higher voltage.

Consult factory for complete specifications and applications.



MODEL NUMBER	OUTPUT #1 ¶¶ VNOM IMAX	OUTPUT #2 ¶¶ VNOM IMAX	OUTPUT #3 ** VNOM IMAX	OUTPUT #4 ** VNOM IMAX	MAX CONTIN. OUTPUT POWER	PRICE EACH 1-9
			OUTPUT VOLTAGES AND MAXIMUM RATED LOADS			
STANDARDS:						
VFM 420	+5V @ 4A	+12V @ 2A	12V @ 2A	12V @ 2A	50WATTS	$ 99.00
VFM 421	+5V @ 4A	+12V @ 2A	12V @ 2A	¶ 5V @ 1A	50WATTS	99.00
VFM 422	+5V @ 4A	+15V @ 2A	15V @ 2A	15V @ 2A	50WATTS	99.00
VFM 423	+5V @ 4A	+15V @ 2A	15V @ 2A	¶ 5V @ 1A	50WATTS	99.00
VFM 424	+5V @ 8A	N/A	12V @ 2A/4.5PK	+12V @ 2A/4.5PK	85WATTS	110.00
VGM 420	+5V @ 6A	+12V @ 2.5A	12V @ 2.5A	12V @ 2.5A	65WATTS	104.00
VGM 421	+5V @ 6A	+12V @ 2.5A	12V @ 2.5A	¶ 5V @ 1A	65WATTS	104.00
VGM 422	+5V @ 6A	+15V @ 2.5A	15V @ 2.5A	15V @ 2.5A	65WATTS	104.00
VGM 423	+5V @ 6A	+15V @ 2.5A	15V @ 2.5A	¶ 5V @ 1A	65WATTS	104.00
VHM 420	+5V @ 10A	+12V @ 4A	12V @ 3A	12V @ 3A	85WATTS	110.00
VHM 421	+5V @ 10A	+12V @ 4A	12V @ 3A	¶ 5V @ 1A	85WATTS	110.00
VHM 422	+5V @ 10A	+15V @ 4A	15V @ 3A	15V @ 3A	85WATTS	110.00
VHM 423	+5V @ 10A	+15V @ 4A	15V @ 3A	¶ 5V @ 1A	85WATTS	110.00
VKM 420	+5V @ 15A	+12V @ 4A	12V @ 3A	12V @ 3A	125WATTS	130.00
VKM 421	+5V @ 15A	+12V @ 4A	12V @ 3A	¶ 5V @ 1A	125WATTS	130.00
VKM 422	+5V @ 15A	+15V @ 4A	15V @ 3A	15V @ 3A	125WATTS	130.00
VKM 423	+5V @ 15A	+15V @ 4A	15V @ 3A	¶ 5V @ 1A	125WATTS	130.00
OPTIONAL OUTPUTS:						***
VFM-XXX	+5V @ 10A	* @ 4A	* @ 4A	* @ 2A	85WATTS	***
VGM-XXX	+5V @ 10A	* @ 4A	* @ 4A	* @ 2A	85WATTS	***
VHM-XXX	+5V @ 10A	* @ 4A	* @ 4A	* @ 2A	85WATTS	***
VKM-XXX	+5V @ 15A	* @ 4A	* @ 4A	* @ 2A	125WATTS	***
			*USER SPECIFIED VOLTAGE			

**Outputs 3 & 4 are isolated. May be connected in series or parallel with other outputs for additional voltage or currents as required. (Parallel connection requires same voltages.)

¶ 3 Pin Regulator

¶¶ Outputs 1 & 2 have common return.

*****NON STOCK:** Requires setup fee of $250 per release if less than 50 pieces, per order. No setup fee on orders over 50 pieces with 50 pieces minimum per release

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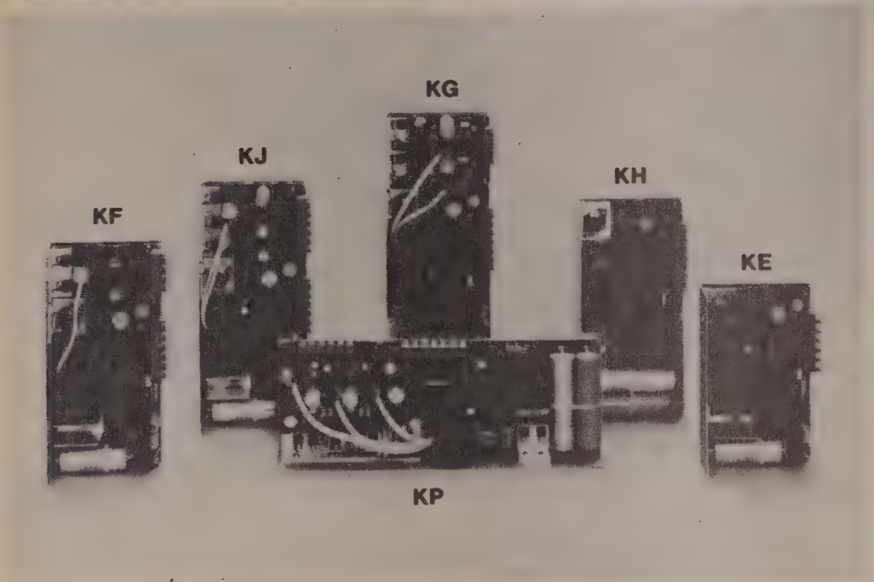
CONDOR INC.

D.C. POWER SUPPLIES

K SERIES SWITCHERS



CONDOR's "K" series switchers feature a wide range of inputs, low prices, plus CONDOR's advanced design and quality construction.

FEATURES;

- All outputs are isolated and independent
- Output regulation of 1% ±20% line tolerance
- Inrush limiting on turn-on
- Thermal protection
- Output ripple and noise ≤50 MV PK-PK
- Temperature 0 to 40°C
- 70% minimum efficiency at full load
- OVP optional on main output
- Current limit with automatic foldback

OUTPUT VOLTAGES AND MAXIMUM RATED LOADS

MODEL	INPUT	OUTPUT NO. 1	OUTPUT NO. 2	OUTPUT NO. 3	OUTPUT NO. 4	PRICE 1-9
KE5-15	115 VAC	5V @ 15A				$138.00
KE12-6-5	115 VAC	12V @ 6.5A				***
KE15-5	115 VAC	15V @ 5A				***
KFT301	115 VAC	5V @ 15A	12V @ 1A	12V @ 1A		170.00
KFT302	115 VAC	5V @ 15A	15V @ 1A	15V @ 1A		***
KFT303	115 VAC	5V @ 15A	5V @ 1A	12V @ 1A		***
KFT304	115 VAC	5V @ 15A	5V @ 1A	15V @ 1A		***
KGM401	115 VAC	5V @ 15A	5V @ 1A	12V @ 1A	12V @ 1A	***
KGM402	115 VAC	5V @ 15A	5V @ 1A	15V @ 1A	15V @ 1A	***
KH5-20	115/230 VAC	5V @ 20A				160.00
KH12-12-5	115/230 VAC	12V @ 12.5A				160.00
KH15-10	115/230 VAC	15V @ 10A				***
KJT301	115/230 VAC	5V @ 20A	12V @ 3A	12V @ 3A		276.00
KJT302	115/230 VAC	5V @ 20A	15V @ 2.4A	15V @ 2.4A		***
KJT303	115/230 VAC	5V @ 20A	5V @ 3A	12V @ 3A		***
KJT304	115/230 VAC	5V @ 20A	5V @ 3A	15V @ 2.4A		***
KJT305	115/230 VAC	5V @ 20A	5V @ 3A	24V @ 1.7A		***
KPT305	115/230 VAC	5V @ 20A	5V @ 1A	24V @ 1.7A		***
KPM401	115/230 VAC	5V @ 20A	5V @ 1A	12V @ 3A	12V @ 3A	287.00
KPM402	115/230 VAC	5V @ 20A	5V @ 1A	15V @ 2.4A	15V @ 2.4A	***

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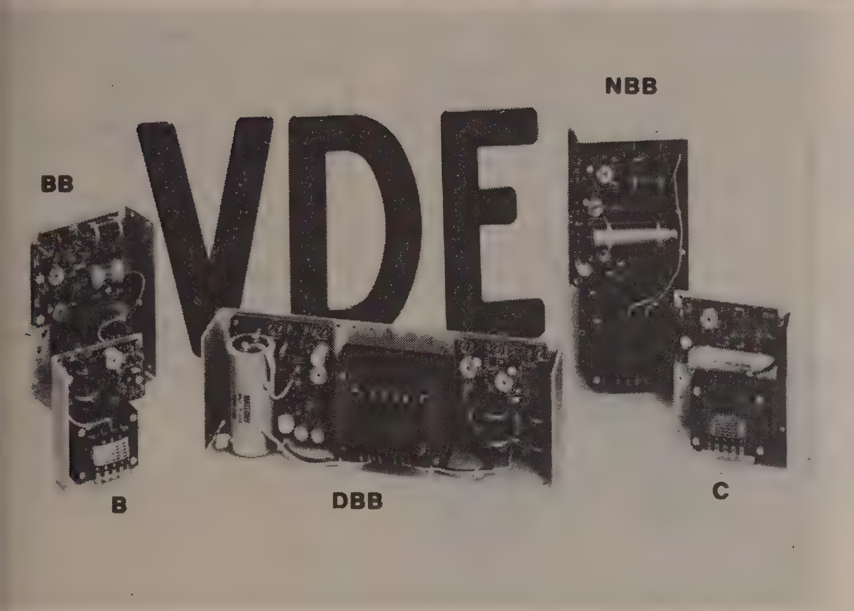
CONDOR INC.

D.C. POWER SUPPLIES

VDE LINEARS



Stop stocking one kind of open frame power supplies to meet domestic needs and another to meet the tough safety, reliability and operational standards of VDE. The forty four models in Condor's new **International Series** will take care of just about all your needs. And to save you more, Condor's new International Series is *priced lower than competition.* General specifications are at the top of the inside front cover. Here are more features:

A Model For Every Application

Twenty five singles, seven duals, six triples, six disc drive models, all with industry standard cases.

Meeting International Requirements

All are designed to meet requirements of IEC,VDE, BPO, CEE and ECMA. UL478/CSA C22.2.

Widest Choice Of Input Voltages And Frequencies

100, 120, 220, 230 and 240 Volt AC, 50-440 Hz, which enables them to be used for a wide variety of applications including aircraft and military ground support equipment.

Increased Reliability

50,000 hrs. MTBF, meet vibration per MIL-STD 810B (Method 514, Curve AB to 50 Hz) and shock to MIL-STD 810B (Method 516-Procedure V). In addition, all IC's are burned in to MIL 883 (Level B).

If you don't need international capability, take a look at the rest of this catalog. One of Condor's over 230 other open frame models will surely meet your needs. Call or write the factory, your local Condor representative or distributor (see back cover) for the whole story.

MODEL	+5V	+12V	+15V	+24V	+28V	CASE	PR 1-9
Single Output							
B5-3/OVP-A	3.0A					B	$ 32.00
B12-1.7-A		1.7A				B	32.00
B15-1.5-A			1.5A			B	32.00
B24-1.2-A				1.2A		B	32.00
B28-1-A					1.0A	B	32.00
C5-6/OVP-A	6.0A					C	54.00
C12-3.4-A		3.4A				C	49.00
C15-3-A			3.0A			C	49.00
C24-2.4-A				2.4A		C	49.00
C28-2-A					2.0A	C	49.00
N5-9/OVP-A	9.0A					N	74.00
N12-5.1-A		5.1A				N	69.00
N15-4.5-A			4.5A			N	69.00
N24-3.6-A				3.6A		N	69.00
N28-3-A					3.0A	N	69.00
D5-12/OVP-A	12.0A					D	84.00
D12-6.8-A		6.8A				D	79.00
D15-6-A			6.0A			D	79.00
D24-4.8-A				4.8A		D	79.00
D28-4-A					4.0A	D	79.00
E5-18/OVP-A	18.0A					E	119.00
E12-10.2-A		10.2A				E	109.00
E15-9-A			9.0A			E	109.00
E24-7.2A				7.2A		E	109.00
G5-50/OVP						F & G	215.00

MODEL	+5V	+12V	+15V	+24V	-5V	−12V	−15V	CASE	PRICE
Dual Outputs									
AA15-0.8-A		1.0A	or 0.8A		0.4A**	or 1.0	or 0.8A	AA	$ 42.00
BB15-1.5-A		1.7A	or 1.5A		0.7A**	or 1.7	or 1.5A	BB	$ 54.00
CC15-3-A		3.4A	or 3.0A			or 3.4	or 3.0A	CC	87.00
DD15-5/OVP-A		5.0A	or 5.0A			or 5.0	or 5.0A	E	138.00
AA512-A	**2.0A**	**0.5A***	**or 0.5A***					AA	49.00
BB512-A	3.0A	1.25A*	or 1.25*					BB	59.00
CC512-A	6.0A	2.5A*	or 2.5A*					CC	94.00
AA524-AIM65A	2.0A			.5(2.5PK)¶				AA	52.00
Triple Outputs									
TAA-16W-A	2.0A	**0.4A***	or **0.4***		**0.4****	or **0.4***	or **0.4A***	AA	54.00
BAA-40W-A	3.0A	1.0A	or 0.8A		0.4**	or 1.0	or 0.8A	BAA	75.00
CAA-60W-A	6.0A	**1.0A**	pr **1.0A**		**0.4****	or **1.0**	or **1.0A**	D	89.00
CBB-75W-A	6.0A	1.7A	or 1.5A		0.7**	or 1.7	or 1.5A	CBB	99.00
NBB-90-A	9.0A	1.7A	or 1.5A		0.7**	or 1.7	or 1.5A	NBB	129.00
DBB-105W-A	12.0A	1.7A	or 1.5A		0.7**	or 1.7	or 1.5A	DBB	134.00
DCC-140WA	12.0A	3.4A	or 3.0A			or 3.4A	or 3.0A	DBB	154.00
DCC-150WA	12.0A	3.4A	or 3.0A			or 3.4A	or 3.0A	DCC	154.00
Disk Drives									
FNBB-120-A	9.0A			3.5(5.5PK)	**1.2****	or **1.2A**		NBB	129.00
FBB512-A	**2.0A**	4.0A						BB	79.00
FBAA45W-A	**1.0A**			1.5(1.7PK)	**0.5A**			BAA	75.00
FCBB-90W-A	3.0A			3.0(3.4PK)	1.0A			CBB	99.00
FNBB-140W-A	3.0A			5.0(6.0PK)	1.0A			NBB	129.00

* 9 to 15V Floating Output **Requires jumper on PCB for −5V **Bold Face** output indicates no remote sense ¶ Unregulated

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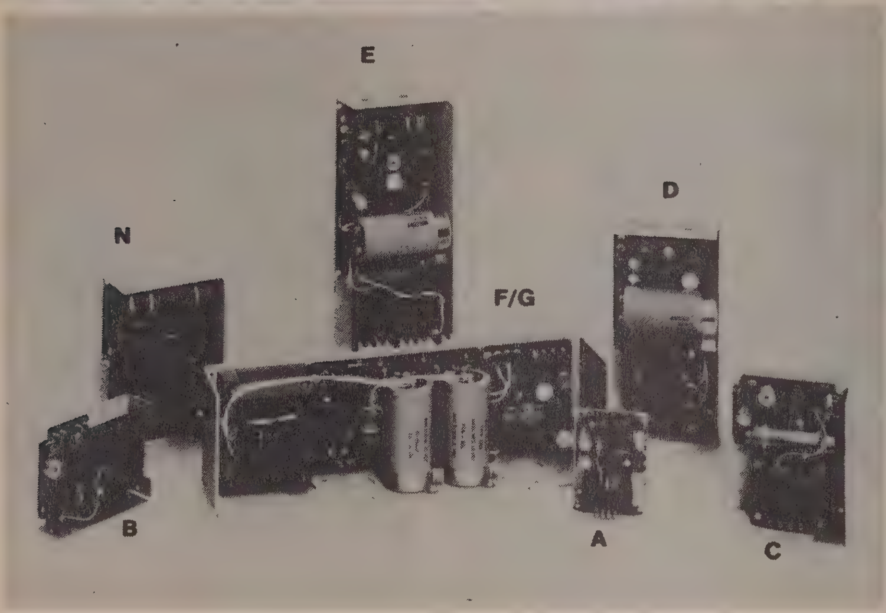
CONDOR INC.

D.C. POWER SUPPLIES

SINGLE OUTPUT



FEATURES — SINGLE OUTPUT

- 115/230 VAC INPUT
- OVP ON 5V OUTPUTS
- ±.05% REGULATION
- INDUSTRY STANDARD SIZE
- FOLDBACK CURRENT LIMIT
- FULL RATED TO 50°C
- I.C. REGULATED DESIGN
- 2 HOUR BURN-IN — ALL UNITS UNDERGO:
  1. Full function test
  2. Minimum 2 hr. burn-in
  3. Final full function test
- TWO YEAR WARRANTY
- UL478/CSA C22.2
- 60 MODELS

SPECIFICATIONS

AC Input:	115/230VAC ±10%, 47-440HZ. (Derate output current 10% for 50HZ operation)
DC Output:	See Voltage/Current Rating Chart. Adjustment range, ±5% minimum
Line Regulation:	±.05% for a 10% change.
Load Regulation:	±.05% for a 50% load change.
Output Ripple:	2 to 15V unit: 5.0 mV PK-PK maximum; 20 to 200V unit: .02% PK-PK maximum.
Transient Response:	30 μ seconds for 50% load change
Short Circuit & Overload Protection:	Automatic current limit/foldback.
Overvoltage Protection:	Built-in on all 5V models. Set at 6.2V ±.4V. Other models use optional overvoltage protection. Refer to back page for specs.
Remote Sensing:	Provided on all models, 3 amps and above, open sense lead protection built-in.
Stability:	±.05% for 24 hours after warm up.
Temperature Rating:	0°C to 50°C full rated, derated linearly to 40% at 70°C.
Temp. Coefficient:	±.01%/°C maximum.
Efficiency:	5V units: 45%, 12 & 15V units: 55%, 20 & 24V units: 60%.
Vibration:	Per Mil-Std-810B, Method 514, Procedure 1, curve AB (to 50HZ)
Shock:	Per Mil-Std-810B, Method 516, Procedure V.
Remote Programming:	Capability included on remote sense models.
Inhibit:	F & G units.

TWO YEAR WARRANTY

CONDOR will repair or replace any power supply of its manufacture that does not perform to published specifications as a result of defective materials or workmanship for a period of 2 years from the date of original purchase. No other obligations or liabilities are implied or expressed. Returns must be freight prepaid.

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CONDOR INC.

D.C. POWER SUPPLIES

SINGLE OUTPUT (Continued)

SINGLE OUTPUT MODELS — VOLTAGE/CURRENT RATING CHART

VOLTAGE	CURRENT	MODEL	CASE	PRICE 1-9 PC	VOLTAGE	CURRENT	MODEL	CASE	PRICE 1-9 PC
2V	1.2	A2-1.2	A	***	5V	1.2	A5-1.2/OVP	A	$ 24.00
	3	B2-3	B	***		3	B5-3/OVP	B	30.00
	6	C2-6	C	***		6	C5-6/OVP	C	52.00
	9	N2-9	N	***		9	N5-9/OVP	N	72.00
	12	D2-12	D	***		12	D5-12/OVP	D	82.00
	18	E2-18	E	***		15	RD5-15/OVP	D	105.00
						18	E5-18/OVP	E	117.00
						23	RE5-23/OVP	E	135.00
						25	F5-25/OVP	F	154.00
						35	G5-35/OVP	G	190.00
						40	RG5-40/OVP	G	200.00
						50	*G5-50/OVP	G	205.00

SINGLE OUTPUT MODELS — VOLTAGE/CURRENT RATING CHART

VOLTAGE	CURRENT	MODEL	CASE	PRICE 1-9 PC	VOLTAGE	CURRENT	MODEL	CASE	PRICE 1-9 PC
12V	.50	A12-0.5	A	24.00	28V	.25	A28-.20	A	24 00
	1.7	B12-1.7	B	30.00		1	B28-1	B	30.00
	3.4	C12-3.4	C	47.00		2	C28-2	C	47 00
	5.1	N12-5.1	N	67.00		3	N28-3	N	67 00
	6.8	D12-6.8	D	77.00		4	D28-4	D	77 00
	10.2	E12-10.2	E	107.00		6	E28-6	E	107 00
	16	F15-15	F	154.00		10	F24-12	F	154 00
15V	.5	A15-0.5	A	24 00	48V	5	B48-.5	B	34.00
	1.5	B15-1.5	B	.30 00		1	C48-1	C	54 00
	3	C15-3	C	47 00		3	D48-3	D	84 00
	4.5	N15-4.5	N	67.00		4	E48-4	E	114 00
	6	D15-6	D	77.00					
	9	E15-9	E	107.00	55V	2.5	D55-2.5	D	***
	15	F15-15	F	154.00					
					120V	.15	B120-.15	B	38 00
24V	.3	A24-.225	A	24.00					
	1.2	B24-1.2	B	30.00	150V	.15	B150-.15	B	38 00
	1.5	B24-1.5	B	32.00		5	C150-.5	C	***
	2.4	C24-2.4	C	47.00		1.0	D150-1.0	D	***
	3.6	N24-3.6	N	67.00		2 5	G150-2.5	G	***
	4.8	D24-4.8	D	77.00					
	7.2	E24-1.2	E	107.00	175-210V	.12	B200-.12	B	***
	12	F24-12	F	154.00					
					240-260V	.1	B250-.1	B	38 00
						.25	C250-.25	C	***
						5	D250-.5	D	***
						1.5	G250-1.5	G	***

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NOTES: Quantity discounts: 10-24 (5% off 1-9), 25-49 (10% off 1-9), 50-99 (15% off 1-9), 100-249 (20% off 1-9)

RETURN POLICY

Repairs:	Condor will expeditiously repair and return at no charge to our customers any units that do not meet specifications as a result of defects in materials or workmanship. A brief memo describing the problem will accompany each shipment.
No Defect:	Approximately 50% of the power supplies returned to Condor do not have a defect. Condor will test, burn-in, torque screws, hipot, and completely retest units in all production test parameters prior to reboxing for shipment. Condor will bill customer $15.00 minimum labor and handling for each **NO DEFECT** power supply, in addition to appropriate freight charges.
Customer Damaged Units:	Condor will submit repair estimates to the customer if these costs exceed 30% of the power supply value. When repair costs are 30% or less, repairs will be made and billed to customer without prior notice.
Return Freight:	Return Freight must be prepaid. Condor will refuse freight collect returns.

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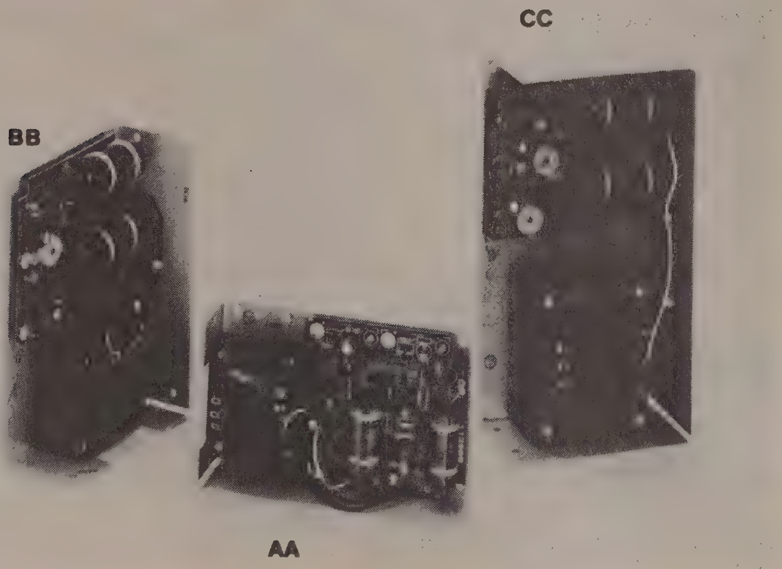
CONDOR INC.

D.C. POWER SUPPLIES

DUAL OUTPUT



FEATURES

- 115/230VAC INPUT
- OVP ON +5V OUTPUTS
- ±.05% REGULATION
- FOLDBACK CURRENT LIMIT
- I.C. REGULATED DESIGN
- 2 HOUR BURN-IN — ALL UNITS UNDERGO:
  1. Full function test
  2. Minimum 2 hr. burn-in
  3. Final full function test
- TWO YEAR WARRANTY
- UL478/CSA C22.2
- 14 DUAL OUTPUT MODELS

DESCRIPTION

CONDOR dual output power supplies are an excellent choice where multiple outputs are required. All 5V outputs have Built-in OVP and the 115/230 VAC input and remote sense features of Condor singles are generally retained.

SPECIFICATIONS

AC Input:	115/230VAC ±10%, 47-440HZ. (Derate output current 10% for 50HZ operation)
DC Output:	See Voltage/Current Rating Chart. Adjustment range, ±5% minimum except continuously variable 9V to 15V outputs.
Line Regulation:	±.05% for a 10% change.
Load Regulation:	±.05% for a 50% load change.
Output Ripple:	5.0 mV PK-PK maximum.
Overvoltage Protection:	Provided on ±5V outputs set at 6.2V ±0.4V. Other outputs use optional overvoltage protection. Refer to back page for OVP specifications.
Transient Response:	30µ seconds for 50% load change.
Short Circuit & Overload Protection:	Automatic current limit/foldback.
Remote Sensing:	Provided on all except TAA model and isolated duals, open sense lead protection built-in.
Stability:	±.05% for 24 hours after warm up.
Temperature Rating:	0°C to 50°C full rated, derated linearly to 40% at 70°C.
Temp. Coefficient:	±.01%/°C maximum.
Efficiency:	5V outputs: 45%, 12 & 15V outputs: 55%, 20 & 24V outputs: 60%
Vibration:	Per Mil-Std-810B, Method 514, Procedure 1, curve AB (to 50HZ)
Shock:	Per Mil-Std-810B, Method 516, Procedure V

DUAL OUTPUT — 14 MODELS

Output No. 1	Output No. 2	MODEL	Case	Price 1-9 pieces
5V @ 1.5A	5V @ 1.5A	AA5-1.5/OVP	AA	$ 50.00
3A	3A	BB5-3/OVP	BB	65.00
6A	6A	CC5-6/OVP	CC	92.00
5V @ 2A	9-15V	AA512	AA	47.00
3A	1.25A	BB512	BB	57.00
6A	2.5A	CC512	CC	92.00
5V @ 2A	18-24V @ .3A	AA524	AA	47.00
3A	.8A	BB524	BB	57.00
6A	2A	CC524	CC	92.00
5V @ 2A	24V unreg** @ .5A, 2.5A PK	AA524-AIM65	AA	47.00
+12V @ 1A or 15V @ .8A	−12V @ 1A or −15V @ .8*	AA15-.8	AA	41.00
+12V @ 1.7A or 15V @ 1.5A	−12V @ 1.7A or 15V @ 1.5*	BB15-1.5	BB	52.00
+12V @ 3.4A or 15V @ 3A	−12V @ 3.4A or −15V @ 3A*	CC15-3	CC	85.00
+18V @ .4A or 24V @ .6A	−18V @ .4A or −24V @ .6	AA24-.6	AA	132.00

*−12/15 useable at −5V, rate at ½ 15V current. ±12/15 and ±24 have common returns, all others are isolated outputs
**APPROVED FOR ROCKWELL AIM 65 MICROCOMPUTER WITH PRINTER

NOTES: Quantity discounts: 10-24 (5% off 1-9), 25-49 (10% off 1-9), 50-99 (15% off 1-9), 100-249 (20% off 1-9)

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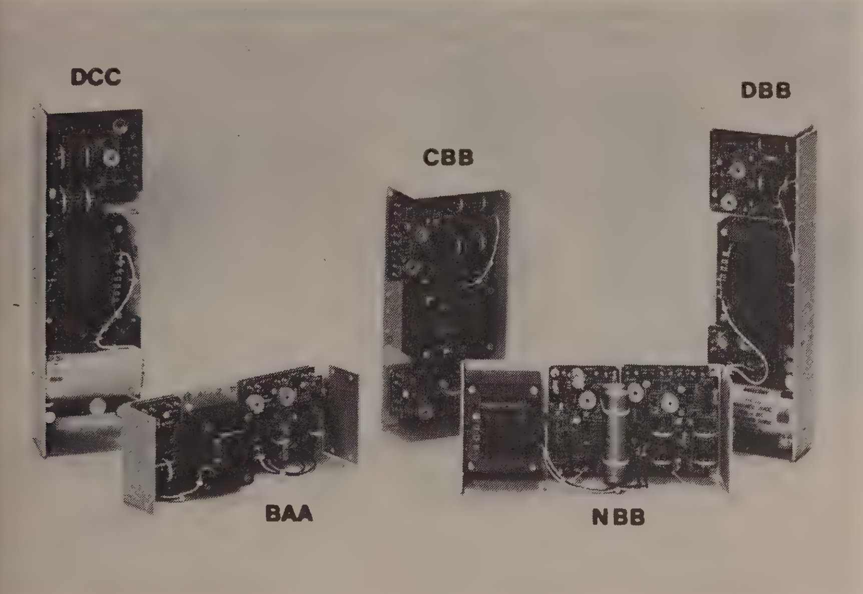
CONDOR INC.

D.C. POWER SUPPLIES

TRIPLE OUTPUT



FEATURES

- 115/230VAC INPUT
- OVP ON +5V OUTPUTS
- ±.05% REGULATION
- FOLDBACK CURRENT LIMIT
- I.C. REGULATED DESIGN
- 2 HOUR BURN-IN — ALL UNITS UNDERGO:
  1. Full function test
  2. Minimum 2 hr. burn-in
  3. Final full function test
- TWO YEAR WARRANTY
- UL478/CSA C22.2
- 9 TRIPLE OUTPUT MODELS

DESCRIPTION

CONDOR triple output power supplies are an excellent choice where multiple outputs are required. All 5V outputs have Built-in OVP and the 115/230 VAC input and remote sense features of Condor singles are generally retained.

SPECIFICATIONS

AC Input:	115/230VAC ±10%, 47-440HZ. (Derate output current 10% for 50HZ operation)
DC Output:	See Voltage/Current Rating Chart. Adjustment range, ±5% minimum except continuously variable 9V to 15V outputs.
Line Regulation:	±.05% for a 10% change.
Load Regulation:	±.05% for a 50% load change.
Output Ripple:	5.0 mV PK-PK maximum.
Overvoltage Protection:	Provided on ±5V outputs set at 6.2V ±0.4V. Other outputs use optional overvoltage protection. Refer to back page for OVP specifications.
Transient Response:	30μ seconds for 50% load change
Short Circuit & Overload Protection:	Automatic current limit/foldback.
Remote Sensing:	Provided on all except TAA model and isolated duals, open sense lead protection built-in.
Stability:	±.05% for 24 hours after warm up.
Temperature Rating:	0°C to 50°C full rated, derated linearly to 40% at 70°C.
Temp. Coefficient:	±.01%/°C maximum.
Efficiency:	5V outputs: 45%, 12 & 15V outputs: 55%, 20 & 24V outputs: 60%
Vibration:	Per Mil-Std-810B, Method 514, Procedure 1, curve AB (to 50HZ)
Shock:	Per Mil-Std-810B, Method 516, Procedure V

TRIPLE OUTPUT

Output No. 1 5V	Output No. 2 +12 to 15V	Output No. 3 −12 to 15V	Model	Case	Price 1-9 pieces
@ 2A	@ .4/.4A	@ .4/.4A	TAA-16W	AA	$ 52.00
3A	1/.8A	1/.8A	BAA-40W	BAA	73.00
3A	3.4/3.0A	3.4/3.0A	CBB-105W	CBB	97.00
6A	1/.8A	1/.8A	TD60W	D	87.00
6A	1.7/1.5A	1.7/1.5A	CBB-75W	CBB	97.00
9A	1.7/1.5A	1.7/1.5A	NBB-90W	NBB	127.00
12A	1.7/1.5A	1.7/1.5A	DBB-105W	DBB	132.00
12A	3.4/3A	3.4/3A	DCC-140W	DBB	152.00
12A	3.4/3A	3.4/3A	DCC-150W	DCC	152.00

No.3 output usable at −5V, rate at ½ 15V current rating

NOTES: Quantity discounts: 10-24 (5% off 1-9), 25-49 (10% off 1-9), 50-99 (15% off 1-9), 100-249 (20% off 1-9)

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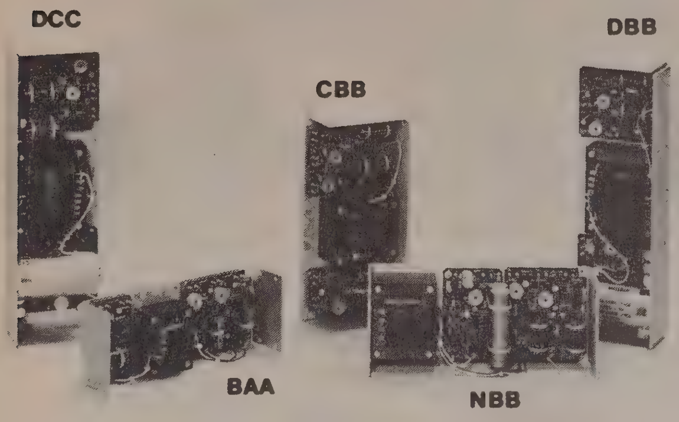
CONDOR INC.

D.C. POWER SUPPLIES

DISC DRIVE - PRINTER - 3 & 5 OUTPUT



DESCRIPTION

3 & 5 OUTPUT FIXED DISC SERIES

Seven new fixed disc supplies for Winchester, Shugart, Micropolis and other fixed disc memories. International transformer is standard.

DISC-DRIVE AND PRINTER SERIES

CONDOR offers 7 models of DISC-DRIVE Power Supplies with 3 of these Triple output and 4 Five output. They will power a variety of Single/Dual Drive and mini floppy uses. Our new printer supplies are designed for Hard-Disc applications or Printer Power requirements, and will deliver controlled power to severe overloads for long periods of time.

SPECIFICATIONS

AC Input:	
Printer Models:	115/230VAC ±10%, 47-440HZ.
Fixed Disc:	110/120/230/240VAC±10%, 47-440Hz
DC Output:	See Voltage/Current Rating Chart. Adjustment range, ±5% minimum.
Line Regulation:	±.05% for a 10% change.
Load Regulation:	±.05% for a 50% load change.
Output Ripple:	5.0 mV PK-PK maximum.
Overvoltage Protection:	Built-in 5V outputs. Other outputs use optional overvoltage protection. Refer to back page for OVP specifications.
Transient Response:	50u seconds for a 50% load change
Short Circuit & Overload Protection:	Automatic current limit/foldback.
Stability:	±.05% for 24 hours after warm up.
Temperature Rating:	Operating 0°C to 50°C at full current ratings; derated linearly to 40% at 71°C. Storage: −55°C to +85°C.
Temp. Coefficient:	±.01%/°C maximum.
Vibration:	Per Mil-Std-810B, Method 514, Procedure 1, curve AB (to 50HZ)
Shock:	Per Mil-Std-810B, Method 516, Procedure V
Burn-in:	Each unit undergoes a 2 hour burn-in and is fully retested before shipping.

FEATURES

- 115/230VAC INPUT
- OVP ON +5V OUTPUTS
- ±.05% REGULATION
- OVERLOAD PROTECTED
- I.C. REGULATED DESIGN
- 2 HOUR BURN-IN — ALL UNITS UNDERGO:
  1. Full function test
  2. Minimum 2 hr. burn-in
  3. Final full function test
- TWO YEAR WARRANTY
- UL478/CSA C22.2
- 10 DISC-DRIVE & PRINTER MODELS
- 7 THREE & FIVE OUTPUT FIXED DISC MODELS

DISC DRIVE AND PRINTER SERIES — 10 MODELS

Output No. 1	Output No. 2	Output No. 3	Model	Case	Price 1-9 pcs
24V, 1.5A(1.7PK)	5V, 2A	5V, 5A	FBAA-45W	BAA	$ 73.00
24V, 3A(3.5PK)	5V, 3A	5V, 1A	FCBB-90W	CBB	97.00
24V, 3A(3.5PK)	5V, 3A	12V, 1.7A	FCBB-512	CBB	97.00
24V, 5A(6APK)	5V, 3A	5V, 1A	FNBB-140W	NBB	127.00
12V, 1.1A(1.7APK)	5V, 7A	NA	FAA512	AA	41.00
12V, 4A W/OVP	5V, 2A	NA	FBB512	BB	77.00
24V, 2.4A(6APK)*	NA	NA	FC24-2.4	C	***
35V, 1.5A(6APK)*	NA	NA	FC35-1.5	C	***
24V, 4.2/5(.5APK)	12V, 1A	+5V, 6A	CP564	564	***
12V,5A(12 APK)	5V,6A	NA	FD-125	FD	127.00**

*6A Peak for 20 Seconds, 5% duty cycle at peak rating

3 & 5 OUTPUT FIXED DISC SERIES — 7 MODELS

Output No. 1	Output No. 2	Output No. 3	Output No. 4	Output No. 5	Model	Case	Price 1-9 pcs
+5V @ 15A	+24V @ 2/4.5APK	+12V @ .8A	−5V @ .8A	−12V @ 1A	FDBB-149	DBB	$174.00
+5V @ 9A	+24V @ 2/4.5APK	+12V @ .8A	−5V @ .8A	−12V @ 1A	FNBB-119	NBB	145.00
+5V @ 6A	+24V @ 1.5/4.5APK	+12V @ .8A	−5V @ .8A	−12V @ .8A	FCBB-89	CBB	***
+5V @ 15A	+24V @ 2/4.5APK	NA	NA	−5V or −12V @ 1.2A	FDBB-148	DBB	154.00
+5V @ 9A	+24V @ 3.5/5.5APK	NA	NA	−5V or −12V @ 1.2A	FNBB-120	NBB	127.00
+5V @ 9A	+24V @ 2/4.5APK	NA	NA	−5V or −12V @ 1.2A	FNBB-118	NBB	127.00
+5V @ 6A	+24V @ 1.5/4.5APK	NA	NA	−5V or −12V @ .8A	FCBB-88	CBB	***

*****NON STOCK:** Requires setup fee of $250 per release if less than 50 pieces. per order. No setup fee on orders over 50 pieces with 50 pieces minimum per release.

NOTES: Quantity discounts: 10-24 (5% off 1-9), 25-49 (10% off 1-9), 50-99 (15% off 1-9), 100-249 (20% off 1-9)

**Oper Temp: 30°C Ambient

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CONDOR INC.

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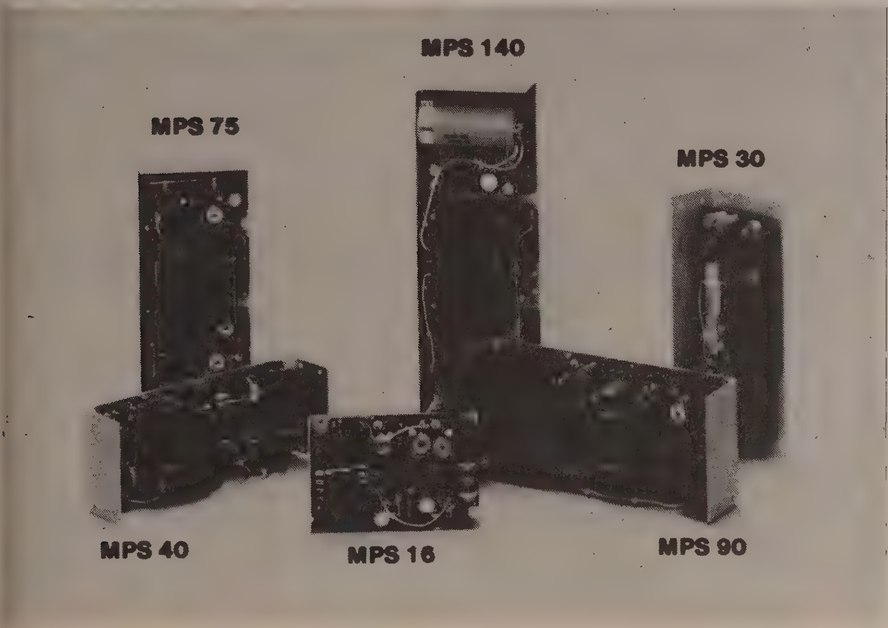
MICROPROCESSOR



FEATURES

- 115/230VAC INPUT
- OVP ON 5V OUTPUTS
- ±.05% REGULATION
- OVERLOAD PROTECTED
- I.C. REGULATED DESIGN
- 2 HOUR BURN-IN — ALL UNITS UNDERGO:
    1. Full function test
    2. Minimum 2 hr. burn-in
    3. Final full function test
- TWO YEAR WARRANTY
- UL478/CSA C22.2
- 7 MICRO PROCESSOR MODELS

DESCRIPTION

CONDOR Engineering has designed the first series of 4 output units in the standard "OEM" outline and mounting pattern. All units have 115/230 VAC Input, and most retain the remote sensing and Built-in OVP feature of our other products.

SPECIFICATIONS

AC Input:	115/230VAC ±10%, 47-440 HZ.
DC Output:	See Voltage/Current Rating Chart. Adjustment range, ±5% minimum.
Line Regulation:	±.05% for a 10% change.
Load Regulation:	±.05% for a 50% load change.
Output Ripple:	5.0mV PK-PK maximum.
Overvoltage Protection:	Built-in 5V outputs. Other outputs use optional overvoltage protection. Refer to back page for specifications.
Transient Response:	50µ seconds for a 50% load change.
Short Circuit & Overload Protection:	Automatic current limit/foldback.
Stability:	±.05% for 24 hours after warm up.
Temperature Rating:	Operating 0°C to 50°C at full current ratings; derated linearly to 40% at 71°C. Storage: −55°C to +85°C.
Temp. Coefficient:	±.01%/°C maximum.
Vibration:	Per Mil-Std-810B, Method 514, Procedure 1, curve AB (to 50 HZ)
Shock:	Per Mil-Std-810B, Method 516, Procedure V.
Burn-in:	Each unit undergoes a 2 hour burn-in and is fully retested before shipping.

MICROPROCESSOR SERIES - QUAD OUTPUT - 7 MODELS

Output No. 1 +5V @	Output No. 2 −5V @	Output No. 3 +12V @	Output No. 4 −12V @	Model	Case	Price 1-9 pieces
2A W/OVP	.4A*	.4A	.4A*	MPS-16W	AA	$ 65.00
3A W/OVP	.5A*	1.0A	1.0*	MPS-40W	BAA	85.00
4A	.5A	.5A	.2	MPS-30W	BAA**	***
6A W/OVP	.5A	1.7A W/OVP	1.2 W/OVP	MPS-75W	CBB	***
9A W/OVP	.5A	1.7 W/OVP	1.2 W/OVP	MPS-90W	NBB	***
15A W/OVP	.5A	3.4A W/OVP	2.5 W/OVP	MPS-140W	DBB	152.00
15A W/OVP	.5A	3.4A W/OVP	2.5 W.OVP	CP532	532	152.00

*Total current these outputs must be less than −12V rating. **Without end flanges, no OVP's on this unit.
OVP on 5V outputs @6.2 ±.4VDC. OVP on 12V outputs @15±.1VDC.

***NON-STOCK:** Requires setup fee of $250 per release if less than 50 pieces. per order. No setup fee on orders over 50 pieces with 50 pieces minimum per release.
QUANTITY DISCOUNTS: 10-24 (5% off 1-9), 25-49 (10% off 1-9), 50-99 (15% off 1-9), 100-249 (20% off 1-9).

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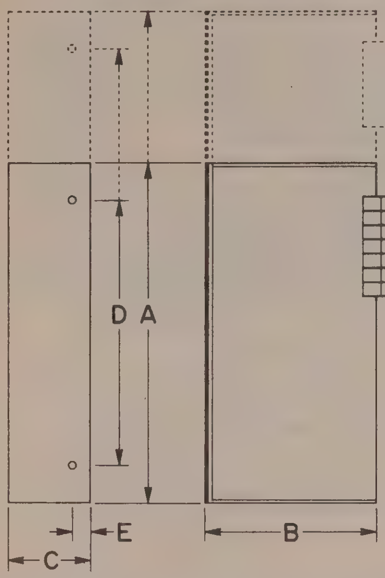
CONDOR INC.

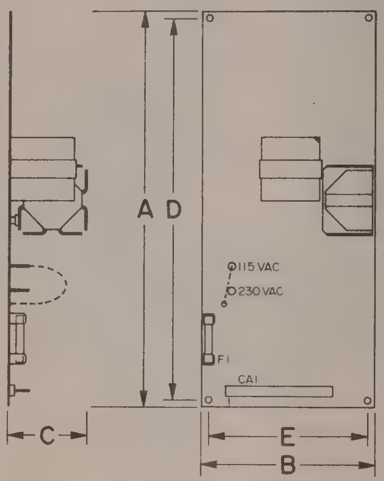
D.C. POWER SUPPLIES

MOUNTING DRAWINGS AND DIMENSIONS

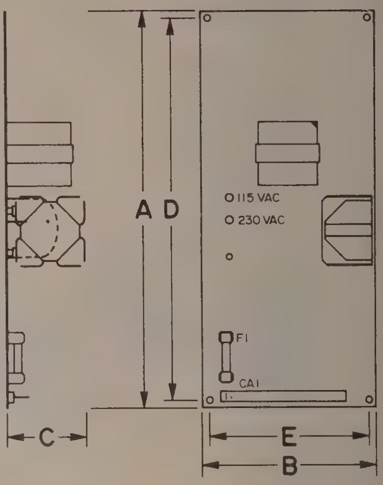
K SERIES SWITCHERS



L SERIES SWITCHERS

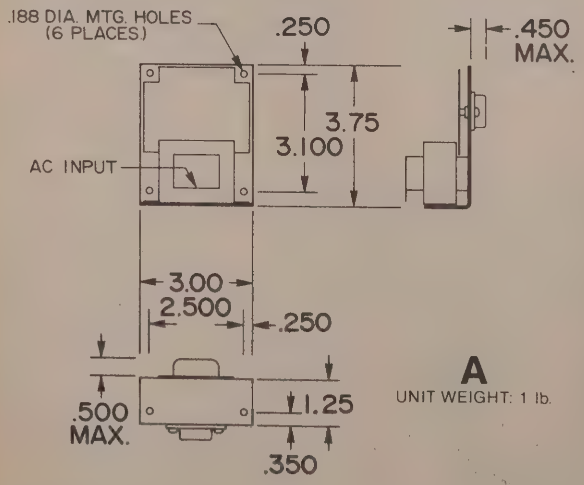

A
D
115 VAC
230 VAC
F1
CA1
C
E
B

V SERIES SWITCHERS


A
D
115 VAC
230 VAC
F1
CA1
C
E
B

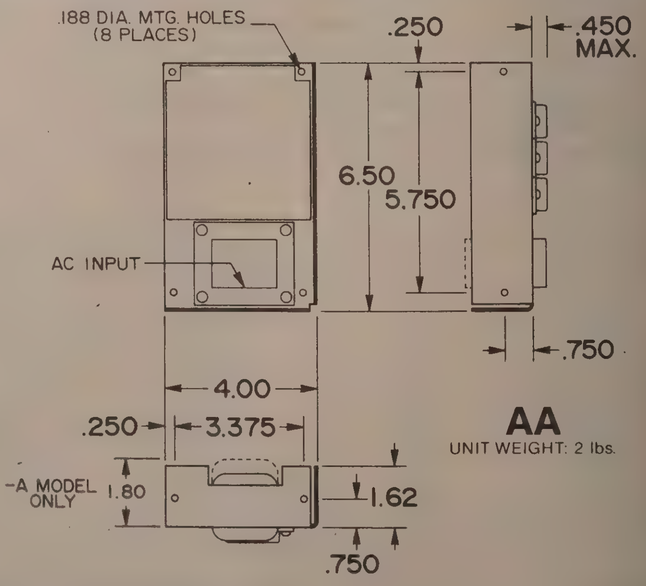
ALL DIMENSIONS IN INCHES

MODEL	A	B	C	D	E	MODEL	A	B	C	D	E	MODEL	A	B	C	D	E
KE	7.00	4.87	2.00	5.00	.50	LF	7.75	4.25	2.20	7.25	3.75	VF	7.75	4.25	2.20	7.25	3.75
KF	9.00	4.87	2.10	7.00	.50	LG	8.25	4.25	2.20	7.75	3.75	VG	8.25	4.25	2.20	7.75	3.75
KG	10.00	4.87	2.10	8.00	.50	LH	8.40	4.60	2.20	8.00	4.20	VH	8.40	4.60	2.20	8.00	4.20
KH	9.00	4.97	2.20	7.00	.50	LK	10.40	4.60	2.20	10.00	4.20	VK	10.40	4.60	2.20	10.00	4.20
KJ	12.00	4.97	2.20	10.00	.50												
KP	13.00	4.97	2.20	11.00	.50												


.188 DIA. MTG. HOLES
(6 PLACES)
.250
.450
MAX.
3.75
3.100
AC INPUT
3.00
2.500
.250
.500
MAX.
1.25
.350

A

UNIT WEIGHT: 1 lb.


.188 DIA. MTG. HOLES
(8 PLACES)
.250
.450
MAX.
6.50
5.750
AC INPUT
.750
4.00
.250
3.375
-A MODEL
ONLY
1.80
1.62
.750

AA

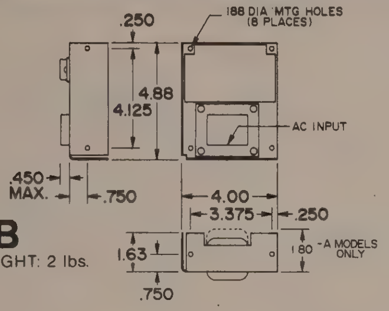
UNIT WEIGHT: 2 lbs.

NOTE: Internal dimensions ±0.010 inches. All other dimensions ±0.030 inches.

CONDOR INC.

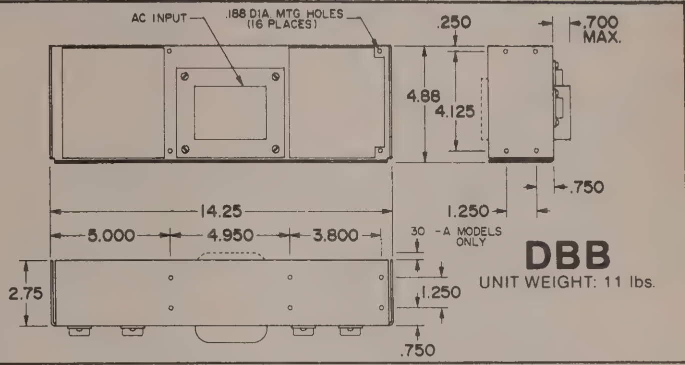
D.C. POWER SUPPLIES

MOUNTING DRAWINGS AND DIMENSIONS


188 DIA MTG HOLES (8 PLACES)
.250
4.88
4.125
AC INPUT
.450 MAX.
.750
4.00
3.375
.250
1.63
1.80
-A MODELS ONLY
.750

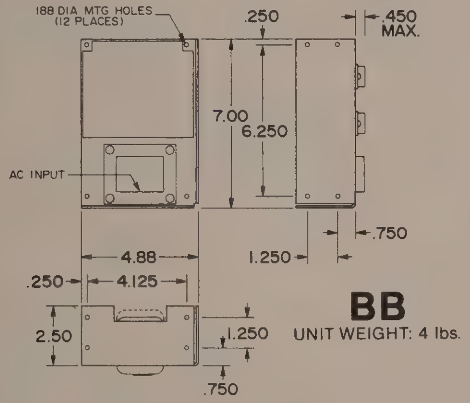
B

UNIT WEIGHT: 2 lbs.


AC INPUT
.188 DIA MTG HOLES (16 PLACES)
.250
.700 MAX.
4.88
4.125
.750
1.250
14.25
5.000
4.950
3.800
30 -A MODELS ONLY
2.75
1.250
.750

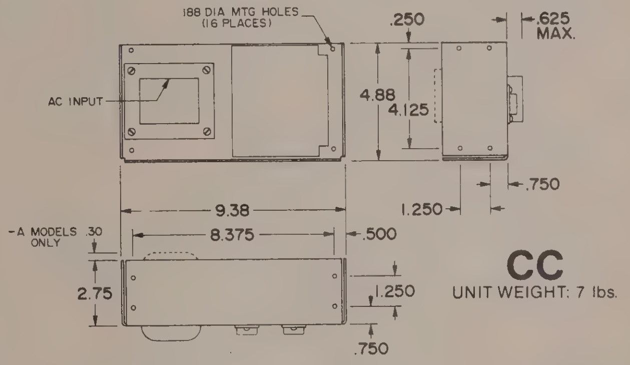
DBB

UNIT WEIGHT: 11 lbs.


188 DIA MTG HOLES (12 PLACES)
.250
.450 MAX.
7.00
6.250
AC INPUT
.750
4.88
1.250
.250
4.125
2.50
1.250
.750

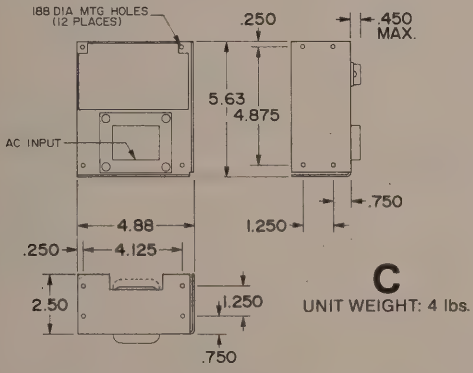
BB

UNIT WEIGHT: 4 lbs.


188 DIA MTG HOLES (16 PLACES)
.250
.625 MAX.
AC INPUT
4.88
4.125
.750
9.38
1.250
-A MODELS ONLY .30
8.375
.500
2.75
1.250
.750

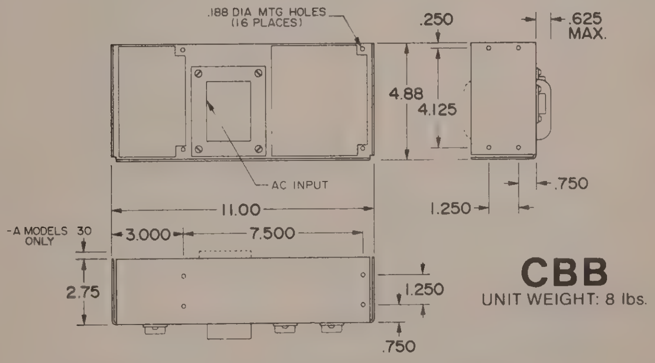
CC

UNIT WEIGHT: 7 lbs.


188 DIA MTG HOLES (12 PLACES)
.250
.450 MAX.
5.63
4.875
AC INPUT
.750
4.88
1.250
.250
4.125
2.50
1.250
.750

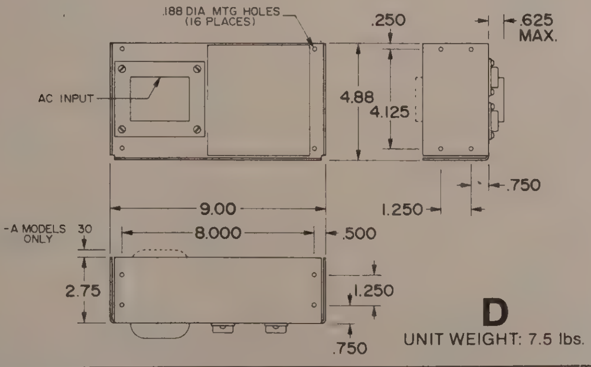
C

UNIT WEIGHT: 4 lbs.


.188 DIA MTG HOLES (16 PLACES)
.250
.625 MAX.
4.88
4.125
AC INPUT
.750
11.00
1.250
-A MODELS ONLY 30
3.000
7.500
2.75
1.250
.750

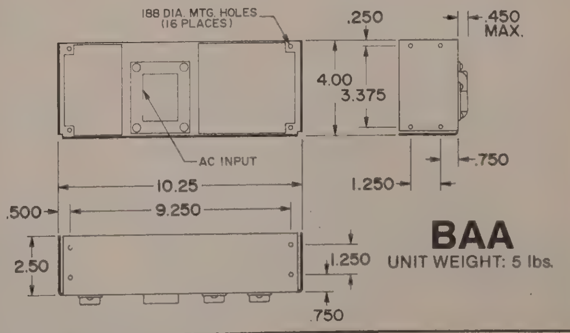
CBB

UNIT WEIGHT: 8 lbs.


.188 DIA MTG HOLES (16 PLACES)
.250
.625 MAX.
AC INPUT
4.88
4.125
.750
9.00
1.250
-A MODELS ONLY 30
8.000
.500
2.75
1.250
.750

D

UNIT WEIGHT: 7.5 lbs.


188 DIA MTG HOLES (16 PLACES)
.250
.450 MAX.
4.00
3.375
AC INPUT
.750
10.25
1.250
.500
9.250
2.50
1.250
.750

BAA

UNIT WEIGHT: 5 lbs.

NOTE: Internal dimensions ±0.010 inches. All other dimensions ±0.030 inches.

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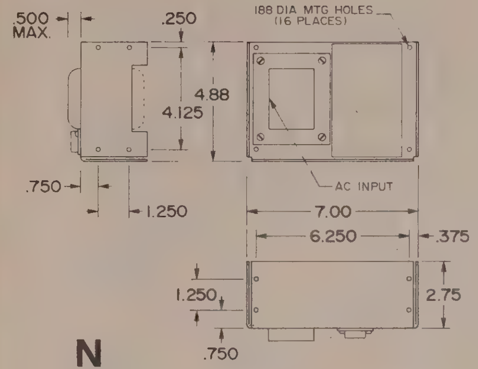
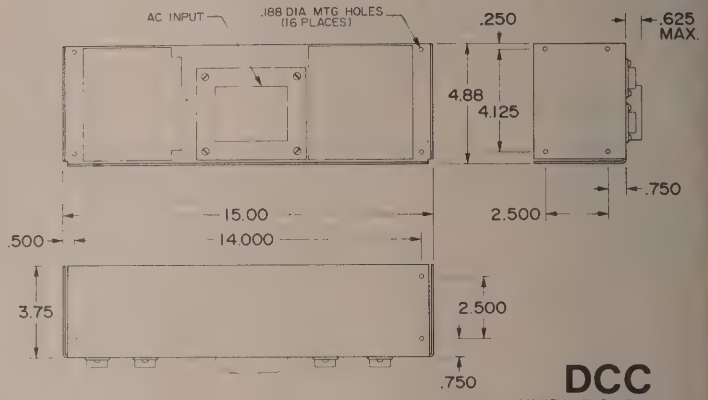
CONDOR INC.

D.C. POWER SUPPLIES

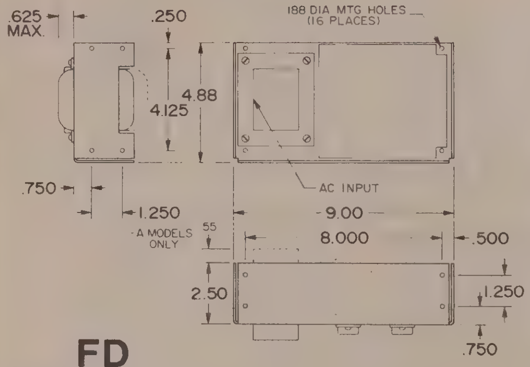
MOUNTING DRAWINGS AND DIMENSIONS


.500 MAX.
.250
.188 DIA MTG HOLES (16 PLACES)
4.88
4.125
.750
1.250
AC INPUT
7.00
6.250
.375
1.250
2.75
.750

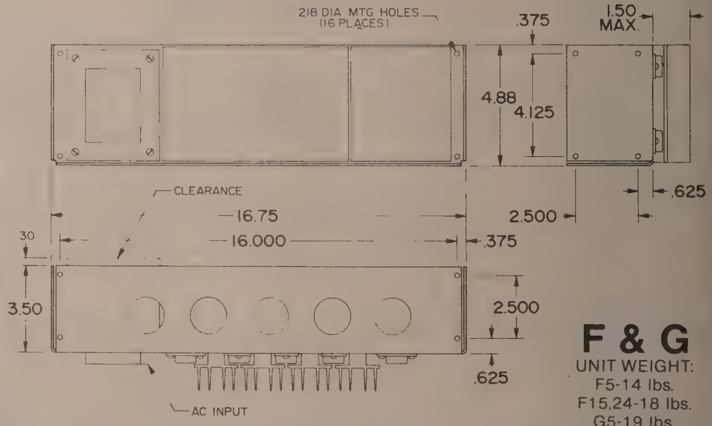
N
UNIT WEIGHT: 7 lbs.


AC INPUT
.188 DIA MTG HOLES (16 PLACES)
.250
.625 MAX.
4.88
4.125
.750
2.500
15.00
14.000
.500
3.75
2.500
.750

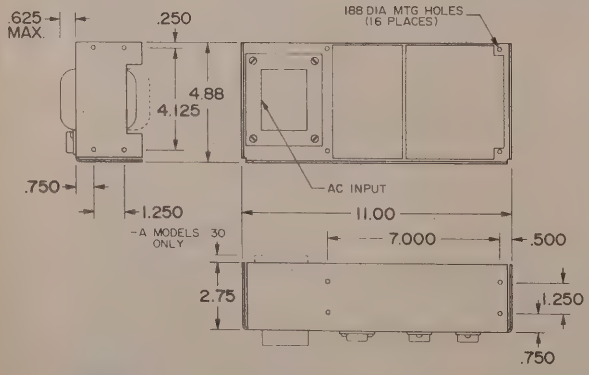
DCC
UNIT WEIGHT: 12 lbs.


.625 MAX.
.250
.188 DIA MTG HOLES (16 PLACES)
4.88
4.125
.750
1.250
AC INPUT
-A MODELS ONLY
.55
9.00
8.000
.500
2.50
1.250
.750

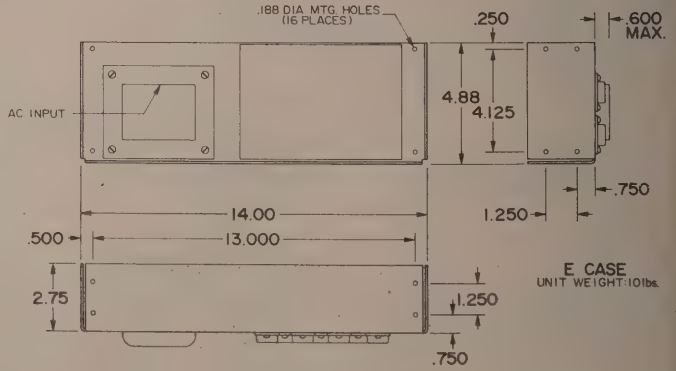
FD
UNIT WEIGHT: 7 lbs.


.218 DIA MTG HOLES (16 PLACES)
.375
1.50 MAX.
4.88
4.125
.625
CLEARANCE
16.75
16.000
2.500
.30
.375
3.50
2.500
.625
AC INPUT

F & G
UNIT WEIGHT:
F5-14 lbs.
F15,24-18 lbs.
G5-19 lbs.


.625 MAX.
.250
.188 DIA MTG HOLES (16 PLACES)
4.88
4.125
.750
1.250
AC INPUT
-A MODELS ONLY
.30
11.00
7.000
.500
2.75
1.250
.750

NBB
UNIT WEIGHT: 9 lbs.


.188 DIA. MTG. HOLES (16 PLACES)
.250
.600 MAX.
AC INPUT
4.88
4.125
.750
1.250
14.00
13.000
.500
2.75
1.250
.750
E CASE
UNIT WEIGHT:10lbs.

E
UNIT WEIGHT: 10 lbs.

NOTE: Internal dimensions ±0.010 inches. All other dimensions ±0.030 inches.

CONDOR INC.

THE OPEN FRAME POWER SUPPLY COMPANY WHOSE TIME HAS ARRIVED

Condor, Inc. was formed in February, 1979 with 3360 square feet of space and a goal: Take our innovative but field-proven ideas and produce better open frame power supplies than competition. And with better delivery and lower prices. Within six months we were shipping 80 models, all U.L. recognized.

We knew we were on the right track because we had to move into our second facility with 21,000 square feet just one year later in February, 1980. It's now bulging at the seams so we'll be moving into our third plant with over 100,000 square feet early in 1984.

We now produce linears, switchers and specials for microprocessors, mini's, micro's, terminals and all kinds of disc memories. Singles, duals, triples, and quads. Models for domestic use and models that meet international requirements. OVER 250 MODELS! THAT'S MORE MODELS OF OPEN FRAME POWER SUPPLIES THAN ANYONE!

Condor has gained a reputation for top quality, reliability and features. What's more, in almost every case, model for model, our specs, delivery and prices are STILL better than competition! Many of our customers have switched from other brands to Condor. What this all means is CONDOR IS THE OPEN FRAME POWER SUPPLY COMPANY WHOSE TIME HAS ARRIVED!

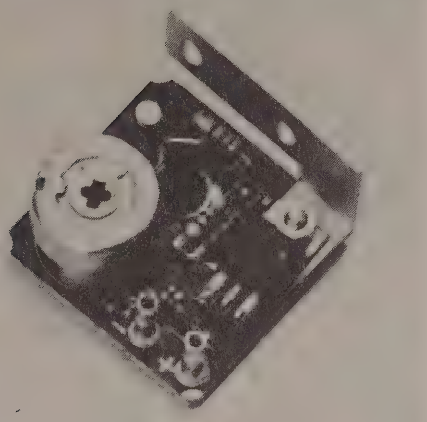
If you're buying open frame (or modular) D.C. power supplies, YOU'LL DO BETTER WITH CONDOR. Call our reps or distributors listed on the back cover or the factory for prices and delivery.

4880 Adohr Lane, Camarillo, CA 93010 / (805) 484-2851 / Outside CA (800) 235-5929 / TWX: 910-336-1140

CONDOR INC.

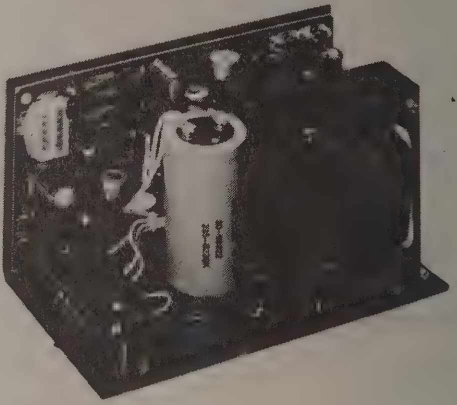
D.C. POWER SUPPLIES

SPECIAL PRODUCTS



OVERVOLTAGE PROTECTION — These OVP modules are available for use on any output not provided with Built-in OVP. Mounting holes are provided to accommodate these modules within the outline and mounting dimensions of each Power Supply.

OVP-24 is used on E and F Models, OVP-12 is used on all other units. One OVP-12 protects both outputs on ±12V and ±15V supplies.



CUSTOM DESIGNS AND MODIFIED STANDARDS

The CONDOR design team is ready to help solve your power supply problems with custom designs or modified standards. Call CONDOR or our local representatives for fast, expert assistance.

2 YEAR WARRANTY

CONDOR will repair or replace any power supply of its manufacture that does not perform to published specifications as a result of defective materials or workmanship for a period of 2 years from date of original purchase. No other obligations or liabilities are implied or expressed. Returns must be freight prepaid.

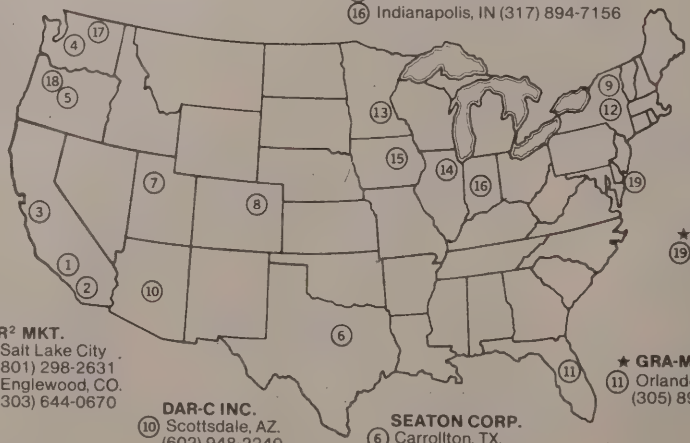
CONDOR DISTRIBUTORS & REPS.

★ ENGINEERING PRODUCTS
⑬ Edina, MN (612) 835-9022
⑭ Wheeling, IL (312) 537-4860
⑮ Iowa City, IO (319) 354-5344
⑯ Indianapolis, IN (317) 894-7156

ELTECH, INC.
④ Bellevue, WA
(206) 643-4330
⑤ Cornelius, OR
(506) 640-4320

★★ RADAR ELECT. DIST.
⑰ Seattle, WA
(206) 282-2571
⑱ Portland, OR
(503) 232-3404

★ BASIC SYSTEMS
① Inglewood, CA
(213) 673-4300
② San Diego, CA
(714) 268-8000
③ Santa Clara, CA
(408) 727-1800



★ PRECISION SALES
⑨ Liverpool, NY
(315) 451-3480

★ SONKIN ASSOC.
⑫ Mt. Vernon, NY
(914) 668-9809

★ BRIMBERG SALES INC.
⑲ Wheaton, MD
(301) 946-2670

★ GRA-MAR INC.
⑪ Orlando, FL
(305) 894-3351

R² MKT.
⑦ Salt Lake City
(801) 298-2631
⑧ Englewood, CO.
(303) 644-0670

DAR-C INC.
⑩ Scottsdale, AZ.
(602) 948-2240

SEATON CORP.
⑥ Carrollton, TX.
(214) 245-0279

Foreign

★ DUNCAN INST.
Weston, ONT. (416) 742-4448

★ AK ELECT. (France)
Paris (1) 573-53. 53

★ POWER CONCEPTS
United Kingdom
Ringwood, U.K. 04254-2916

Representitives
★ Rep / Distributors
★★ Distributors only

4880 Adohr Lane, Camarillo, CA 93010 / (805) 484-2851 / Outside CA (800) 235-5929 / TWX: 910-336-1140

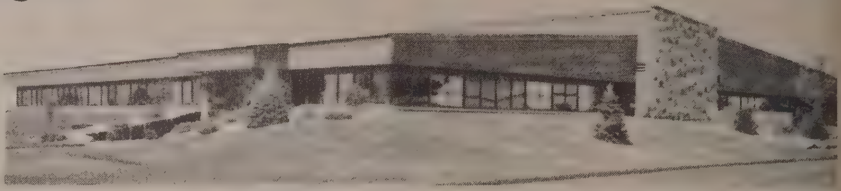
MINIGLOSSARIES FORMULAS • CHARTS PRODUCT SELECTION GUIDES FORMS CODES TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1•B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

CONVERTER CONCEPTS

15 to 165 Watt Switching Power Supplies with Ultra-Wide Input Ranges for all World Voltages



The Company and the Product

Converter Concepts specializes in switching power supplies with ultra-wide input ranges for worldwide use with microprocessors and microcomputers. Converter Concepts is unique in the area of power supplies since we devote our total efforts to answering the needs of the OEM for switching power supplies and uninterruptible power supplies (UPS). Our mission is to design and manufacture a product of utmost quality, efficiency, and reliability—a component in which you can have complete confidence.

Since 1976, Converter Concepts has been producing switching power supplies with up to 165 watts output. We are the **only** producer of 15 to 165 watt switching power supplies that operate **continuously** on any voltage worldwide from 90 to 265 VAC or 10 to 40 VDC and 20 to 60 VDC—**without the switches, jumpers, taps or other modifications needed by other switchers.** And we offer AC-to-DC and DC-to-DC converters in the same type of compact package.

Latest Converter Technology

Converter Concepts incorporates the latest electronic technology in the design of its converters. Our advanced switchers use a single transistor, single transformer flyback design with soft turn-on characteristics and short-circuit protection.

Other features of these compact and lightweight switchers include brownout protection to as low as 70 VAC, and convection cooling—no fans or blowers are needed. With our state-of-the-art flyback design, you get excellent regulation capability, less complexity, higher reliability and efficiency (up to 70% typical), and a cost that's competitive with that of linears.

Automatic Continuous Compensation

Converter Concepts' unique **Versatron** converter circuit automatically compensates for extremely wide input variations while maintaining constant output voltage. Input voltage variations as much as 5:1 can be accommodated by employing this versatile approach.

Series	Total Power	—	No. of Outputs	Output Range	Input	—	Package	Termination	/	Group 1 Options	Group 2 Options
X	X	—	X	X	X	—	X	X	/	X	X
VT standard VX heat sink (open frame only) VI International VF Failsafe	15 25 50 65 75 100 120 165		1 2 3 4	2 4 5 6 7 8 see output charts	1 2 3 *4 **5 see input charts *90-265 VAC and 20-60 VDC **90-265 VAC and 80-140 VDC		0-open frame 1-encl'sd 2-p.c. board	0-terminal bloc 1-square pin 2-wire holes only		A B C D E F G H I J K see group 1 chart	A B C D E F G see group 2 chart

Group 1 Options	Remote Sense	Logic Shut-down	Over Voltage Protection	Power Fail Detect
A	X			
B		X		
C			X	
D				X
E	X	X		
F	X		X	
G	X			X
H		X	X	
I		X		X
J	X	X	X	
K	X	X		X
X	NO OPTIONS			

Group 2 Options	Rug-gedized	Reverse Polarity Protection	Thermal Shutdown
A	X		
B		X	
C			X
D	X	X	
E	X		X
F		X	X
G	X	X	X
X	NO OPTIONS		

How to Order

Use this guide to select a power supply. Replace all "Xs" with numbers and letters derived from separate power supply listings and from options charts. Orders may be placed factory-direct or through Converter Concepts' sales representatives.

Sample Part Number

VT 100-241-10/EF

orders:

standard series,
100 watts,
dual output,
+5 V @ 2.4 - 12A,
+12 V @ .6 - 3A,
90 - 265 VAC input,
enclosed frame,
terminal bloc,

with these options,

remote sense,
logic shutdown,
reverse polarity protection,
thermal shutdown.

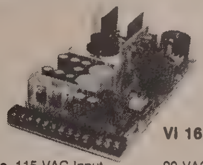
CONVERTER CONCEPTS INC.
Industrial Parkway, Pardeeville, WI 53954, Phone 608/429-2144, Twx 910-280-2630

CONVERTER CONCEPTS

15 to 165 Watt AC-to-DC and DC-to-DC Switching and UPS Power Supplies

VI 65/ VI 120/ VI 165

- **Open and Enclosed Package**
- **Meets International Safety Standards**
- **Ultra-Wide Input Range**
- **Up to Four Outputs**



	VI 65	**VI 120**	**VI 165**
Hold-up Time:	90 VAC Input (Low Line)-16m sec. 115 VAC Input (Nominal Line)-25m sec. 250 VAC Input-140m sec.	90 VAC Input (Low Line)-9m sec. 115 VAC Input (Nominal Line)-16m sec. 250 VAC Input-120m sec.	90 VAC Input (Low Line)-9m sec. 115 VAC Input (Nominal Line)-16m sec. 250 VAC Input-120m sec.
Efficiency AC Input:	80% Typical and 70% minimum for single output. 75% Typical and 65% minimum for multiple output	80% Typical and 70% minimum for single output. 75% Typical and 65% minimum for multiple output	80% Typical and 70% minimum for single output. 75% Typical and 65% minimum for multiple output
Turn-On Surge Current:	AC Input 5A Max.	AC Input 8A Max.	AC Input 10A Max.
Ripple:	All outputs 2X Line Frequency-15mV pk-pk max. 20kHz- 15mV pk-pk max.	All outputs 2X Line Frequency-15mV pk-pk max. 20kHz- 15mV pk-pk max.	All outputs 2X Line Frequency-15mV pk-pk max. 20kHz- 15mV pk-pk max.
Operating Temperature:	−20°C to +80°C-base plate full load, −20°C to +55°C free air full load, Derate linearly to 50% output at 80°C	−20°C to +80°C-base plate full load, −20°C to +45°C free air full load, Derate linearly to 50% output at 80°C	−20°C to +80°C-base plate full load, −20°C to +45°C free air full load, Derate linearly to 50% output at 80°C
Short Circuit Protection:	Current limited for overload and short circuit protection. Normal operation returns upon overload removal. Short circuit current factory adjustable	Current limited for overload and short circuit protection. Normal operation returns upon overload removal. Short circuit current factory adjustable	Current limited for overload and short circuit protection. Normal operation returns upon overload removal. Short circuit current factory adjustable
Safety Standards:	Meets UL478, 114, 1012 VDE0804, 0730	Meets UL478, 114, 1012 VDE0804, 0730	Meets UL478, 114, 1012 VDE0804, 0730
Weight:	2.7 lbs.	3.0 lbs.	3.5 lbs.
Size:	4.75″ x 9″ x 2.25″ 120.7 x 228.6 x 57.2mm	4.75″ x 9″ x 3″ 120.7 x 228.6 x 76.2mm	5.25″ x 10″ x 3″ 133.4 x 254 x 76.2mm

VI 65

Input	AC	DC	Freq. in Hz
1	90-265	100-380	44-440

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-12	+20 −5%
15	V1	+12	0-5	+20 −5%
16	V1	+15	0-4.5	+20 −5%
17	V1	+24	0-2.5	+20 −5%
18	V1	+48	0-1.5	+20 −5%
22	V1 V2	+5 −5	2.4-12 .05-1	+20 −5% ±5% Fixed
24	V1 V2	+5 +12	1.4-7 .05-2.5	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	.7-3.5 .05-1.5	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	.5-2.5 .05-1.5	+20 −5% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	1-5 .05-2.5 .05-1	+20 −5% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	1.6-8 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	1.6-8 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
45	V1 V2 V3 V4	+5 +24 +12 −12	1-5 .05-1 .05-.5 .05-.5	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed

VI 120

Input	AC	DC	Freq. in Hz
1	90-265	100-380	44-440

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-20	+20 −5%
15	V1	+12	0-10	+20 −5%
16	V1	+15	0-8	+20 −5%
17	V1	+24	0-5	+20 −5%
18	V1	+48	0-2.5	+20 −5%
24	V1 V2	+5 −12	2.4-12 .05-5	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	1-5 .05-5	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	.8-4 .05-4	+20 −5% ±5% Fixed
34	V1 V2 V3	+5 +12 −12	2.4-12 .05-2.5 .05-2.5	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	2.4-12 .05-2 .05-2	+20 −5% ±5% Fixed ±5% Fixed
44	V1 V2 V3 V4	+5 +12 −12 −5	2.4-12 .05-2.5 .05-1.5 .05-1.5	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
45	V1 V2 V3 V4	+5 +24 +12 −12	2-10 .05-2 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
46	V1 V2 V3 V4	+24 +5 +12 −12	.6-3 .05-3 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
47	V1 V2 V3 V4	+5 +24 +15 −15	2-10 .05-1.8 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
48	V1 V2 V3 V4	+48 +5 +12 −12	.3-1.5 .05-3 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed

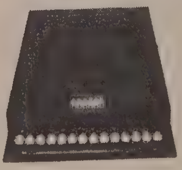
VI 165

Input	AC	DC	Freq. in Hz
1	90-265	100-380	44-440

Model Number	Output	Volts	Amps	Adjustment
24	V1 V2	+5 +12	4-20 .05-5	+20 −5% +20 −5%
25	V1 V2	+5 +15	4-20 .05-4	+20 −5% ±5% Fixed
26	V1 V2	+5 +24	4-20 .05-2.5	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	1.2-6 .05-5	+20 −5% ±5% Fixed
28	V1 V2	+12 −12	1.4-7 .05-7	+20 −5% ±5% Fixed
34	V1 V2 V3	+5 +12 −12	3-15 .05-5 .05-2.5	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	3-15 .05-3 .05-3	+20 −5% ±5% Fixed ±5% Fixed
44	V1 V2 V3 V4	+5 +24 −12 +12	2-10 .05-3 .05-1.5 .05-1.5	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
45	V1 V2 V3 V4	+5 +24 −12 +12	3-15 .05-2.5 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
47	V1 V2 V3 V4	+5 +24 −15 +15	3-15 .05-2.5 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
48	V1 V2 V3 V4	+48 +5 −12 +12	.4-2 .05-2.5 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed

VF 65/ VF 100

- **Open and Enclosed Package**
- **65 and 100 Watt Switching Fail Safe Power Supply**
- **Most Advanced Low Power UPS Available**
- **Ultra-Wide AC and DC Input Range**



Specifications shared by both VF units:

Efficiency AC Input:
80% Typical 70% Minimum - Single Output
75% Typical 65% Minimum - Multiple Output

Efficiency DC Input:
70% Typical 60% Minimum - Single Output
65% Typical 55% Minimum - Multiple Output

Turn-on Time: 200 m seconds

Ripple: All Outputs
2X Line Frequency 15mV pk-pk maximum
20kHz 15mV pk-pk maximum

Multiple Output Regulation Specifications:
Regulation: Line, All Outputs: 0.1%
Regulation: Load, Output No. 1: 0 Load - Full Load 2%
20% Load - Full Load 1%

NOTE: Output No. 1 must have a minimum load of 20% of full load for all other outputs to maintain regulation.

ALL OTHER OUTPUTS: 0 Load - Full Load 1.0% to 1.5A; greater than 1.5A, 2.0%

CONVERTER CONCEPTS INC
Industrial Parkway, Pardeeville, WI 53954, Phone 608/429-2144, Twx 910-280-2630

CONVERTER CONCEPTS

15 to 165 Watt AC-to-DC and DC-to-DC Switching and UPS Power Supplies

VF 65

Turn-on Surge Current: AC Input 5A maximum

Operating Time: Approx. 20 minutes @ 65W (5 A.H. Battery)

Weight: 2.5 lbs

Size: 6.35″ x 9″ x 2.2″
161.3 x 228.6 x 55.9mm

VF100

Turn-on Surge Current: AC Input 8A maximum

Operating Time: Approx. 12 minutes @ 100W (5 A.H. Battery)

Weight: 3.0 lbs.

Size: 6.35″ x 9″ x 2.9″
161.3 x 228.6 x 73.7mm

VF 65

Input	AC	External DC or Battery
4	90-265	20-60
5	90-265	80-140

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-12	+20 −5%
15	V1	+12	0-5	+20 −5%
16	V1	+15	0-4.5	+20 −5%
17	V1	+24	0-2.5	+20 −5%
18	V1	+48	0-1.5	+20 −5%
22	V1 V2	+5 −5	2.4-12 .05-1	+20 −5% ±5% Fixed
24	V1 V2	+5 +12	1.4-7 .05-2.5	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	.7-3.5 .05-1.5	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	.5-2.5 .05-1.5	+20 −5% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	1-5 .05-2.5 .05-1	+20 −5% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	1.6-8 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	1.6-8 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
44	V1 V2 V3 V4	+5 +12 −12 −5	1.4-7 .05-1 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
45	V1 V2 V3 V4	+5 +24 +12 −12	1-5 .05-1 05-5 .05-.5	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed

VF 100

Input	AC	External DC or Battery
4	90-265	20-60
5	90-265	80-140

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-20	+20 −5%
16	V1	+12	0-8	+20 −5%
17	V1	+15	0-6	+20 −5%
18	V1	+24	0-4	+20 −5%
24	V1 V2	+5 +12	2 4-12 .05-3	+20 −5% ±5% Fixed
26	V1 V2	+12 +12	1-5 .05-3	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	1-4 05-2	+20 −5% ±5% Fixed
34	V1 V2 V3	+5 +12 −12	2.8-14 05-1 5 .05-1	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	2.8-14 05-1.5 .05-1	+20 −5% ±5% Fixed ±5% Fixed
44	V1 V2 V3 V4	+5 +12 −12 −5	2-10 .05-2.5 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
45	V1 V2 V3 V4	+5 +24 +12 −12	2-10 .05-1 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed

Specifications

Common to VT and VX Series

Efficiency AC Input:
80% Typical 70% Minimum Single Output
75% Typical 65% Minimum Multiple Output

Efficiency DC Input:
75% Typical 55% Minimum Single Output
70% Typical 50% Minimum Multiple Output

Turn-On Surge Current: AC Input 5A max.

Turn-On Time: 200m sec.

Ripple: All Outputs
2X Line Frequency 10mV pk-pk max
20kHz 10mV pk-pk max

Switching Noise:
2MHz @ 20kH Rep. Rate, 50mV pk-pk max

Transient Response: 0.5V excursion for a 50% to 100% or 100% to 50% load change with return to regulation in 2m sec. load change 1 A/ μ sec.

Operating Temp:
−20°C to +80°C Base Plate Full Load
−20°C to +55°C Free Air Full Load
Derate Linearly to 50% output at 80°C

Insulation: Input to output or input to case 1.5 kV min. AC input, 250V min. DC output to case

Insulation: Output to case: 250VDC Floating output enables plus or minus operation of the output voltage

Short Circuit Protection: Current limited for overload and short circuit protection. Normal operation returns upon overload removal

Multiple Output Regulation Specifications:
Regulation: Line, All Outputs: 0.1%
Regulation: Load, Output No. 1: 0 Load - Full Load 2%
20% Load - Full Load 0.5 %

NOTE: Output No. 1 must have a minimum load of 20% of full load for all other outputs to maintain regulation.

ALL OTHER OUTPUTS: 0 Load - Full Load 1.0% to 1.5A: greater than 1.5A, 2.0%

VT 15/ VX 15

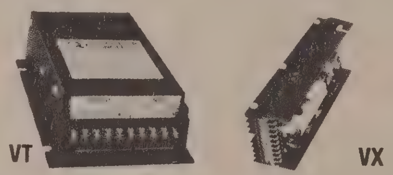
- **15 Watt Switching Power Supply**
- **3 Input Options Available**
- **Single, Dual, and Triple Outputs**
- **Low Cost in a Compact and Lightweight Package**

Hold-up Time:
90 VAC Input (Low Line) -9m sec.
115 VAC Input (Nominal Line) -16m sec.
250 VAC Input - 104m sec.

Weight: 1.3 lbs.

Size:
VT 15- 1 937″ x 4.187″ x 4.562″
49 20 x 106 35 x 115 87mm

VX 15- 2.125″ x 3.58″ x 4.5″
54 x 91 x 114.3mm



Input Voltage Range

Input Option	Input Voltage Range AC	DC	Frequency in hz.	Fusing
1	90-265	100-380	44-440	5A Slow Blow
2		10-40		5A Slow Blow
3		20-60		3A Slow Blow

Output Chart

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-3	+20 −5%
16	V1	+12	0-1.5	+20 −5%
17	V1	+15	0-1	+20 −5%
18	V1	+28	0-.5	+20 −5%
22	V1 V2	+5 −5	5-2.5 05-.5	+20 −5% ±5% Fixed
24	V1 V2	+5 +12	4-2 05-.25	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	2-1 .05-.25	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	15- 75 05- 25	+20 −5% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	4-2 05-.25 05- 25	+20 −5% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	4-2 .05-.25 .05-.25	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	4-2 05-.25 05-.25	+20 −5% ±5% Fixed ±5% Fixed

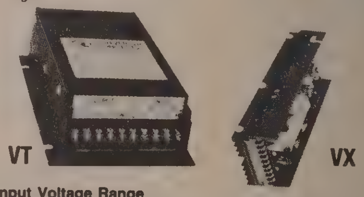
VT 25/ VX 25

- **25 Watt Switching Power Supply**
- **Single, Dual, and Triple Outputs**
- **3 Input Power Options Available**
- **AC to DC, DC to DC in Same Compact Package**
- **Excellent Thermal Transfer; No Degradation at 20%**

Hold-up Time:
90 VAC Input (Low Line) -14m sec.
115 VAC Input (Nominal Line) -25m sec.
250 VAC Input -150m sec

Weight: 1 8 lbs

Size:
VT 25- 2 063″ x 4.187″ x 6 062″
52 40 x 106.35 x 153.97mm
VX 25- 2.125″ x 3 581″ x 6 000″
54 x 91 x 152 4mm



Input Voltage Range

Input Option	Input Voltage Range AC	DC	Frequency in hz.	Fusing
1	90-265	100-380	44-440	75A Slow Blow
2		10-40		6A Slow Blow
3		20-60		3A Slow Blow

Output Chart

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-5	+20 −5%
16	V1	+12	0-2 5	+20 −5%
17	V1	+15	0-2	+20 −5%
18	V1	+28	0-1	+20 −5%
22	V1 V2	+5 −5	8-4 .05- 5	+20 −5% ±5% Fixed
24	V1 V2	+5 +12	.8-4 .05-1	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	3-1.5 05- 5	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	2-1 .05-.5	+20 −5% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	.8-4 .05-.5 .05-.5	+20 −5% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	.8-4 .05- 5 .05-.5	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	.8-4 05- 5 .05-.5	+20 −5% ±5% Fixed ±5% Fixed

CONVERTER CONCEPTS INC
Industrial Parkway, Pardeeville, WI 53954, Phone 608/429-2144, Twx 910-280-2630

CONVERTER CONCEPTS

15 to 165 Watt AC-to-DC and DC-to-DC Switching and UPS Power Supplies

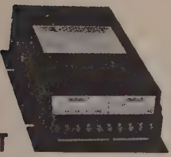
VT 50/ VX 50

- **50 Watt Switching Power Supply**
- **3 Input Power Options Available**
- **Single, Dual, and Triple Outputs**
- **Best Low DC Input - High Power Output Ratio**

Hold-up Time:
90 VAC Input (Low Line) -12m sec.
115 VAC Input (Nominal Line) -20 m Sec.
250 VAC Input -180m sec.

Weight: 2.2 lbs.

Size:
VT 50- 2.063″ x 4.187″ x 8.062″
52.40 x 106.35 x 204.77mm
VX 50- 2.125″ x 3.581″ x 8″
54 x 91 x 203.2mm


VT

VX

Input Voltage Range

Input Option	Input Voltage Range		Frequency in hz.	Fusing
	AC	DC		
1	90-265	100-380	44-440	1A Slow Blow
2		10-40		10A Slow Blow
3		20-60		5A Slow Blow

Output Chart

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-10	+20 −5%
16	V1	+12	0-5	+20 −5%
17	V1	+15	0-4	+20 −5%
18	V1	+28	0-2	+20 −5%
22	V1 V2	+5 −5	1.8-9 .05-1	+20 −5% ±5% Fixed
24	V1 V2	+5 +12	1.6-8 .05-1	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	.6-3 .05-1	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	.4-2 .05-1	+20 −5% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	1.2-6 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	1-5 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	1-5 .05-.8 .05-.8	+20 −5% ±5% Fixed ±5% Fixed

VT 75/ VX 75

- **75 Watt Switching Power Supply**
- **2 Input Power Options Available**
- **Single, Dual, and Triple Outputs**
- **Highest Output Power to Size Ratio**

Hold-up Time:
90 VAC Input (Low Line) -9m sec.
115 VAC Input (Nominal Line) -16m sec.
250 VAC Input -100m sec.

Weight: 2.2 lbs.

Size:
VT 75- 2.063″ x 4.187″ x 8.062″
52.40 x 106.35 x 204.77mm
VX 75- 2.125″ x 3.581″ x 8″
54 x 91 x 203.2mm

VT

VX

Input Voltage Range

Input Option	Input Voltage Range		Frequency in hz.	Fusing
	AC	DC		
1	90-265	100-380	44-440	1.5A Slow Blow
3		20-60		6A Slow Blow

Output Chart

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-15	+20 −5%
16	V1	+12	0-6	+20 −5%
17	V1	+15	0-5	+20 −5%
18	V1	+28	0-3	+20 −5%
22	V1 V2	+5 −5	2.8-14 .05-1	+20 −5% ±5% Fixed
24	V1 V2	+5 +12	1.6-8 .05-3	+20 −5% ±5% Fixed
26	V1 V2	+12 −12	1-5 .05-1	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	.8-4 .05-1	+20 −5% ±5% Fixed
32	V1 V2 V3	+5 +12 −5	1-5 .05-3 .05-1	+20 −5% ±5% Fixed ±5% Fixed
34	V1 V2 V3	+5 +12 −12	2-10 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	2-10 .05-.8 .05-.8	+20 −5% ±5% Fixed ±5% Fixed

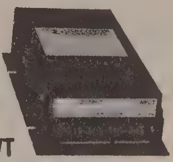
VT 100/ VX 100

- **100 Watt Switching Power Supply**
- **2 Input Power Options Available**
- **Up to Four Outputs**
- **High Efficiency/Low Heat**
- **Single Transistor Flyback Design**

Hold-up Time:
90 VAC Input (Low Line) -5m sec
115 VAC Input (Nominal Line) -15m sec.
250 VAC Input -130 m sec.

Weight: 3 lbs.

Size:
VT 100- 2.063″ x 4.187″ x 10.062″
52.40 x 106.35 x 255.57mm
VX 100- 2.125″ x 3.581″ x 10″
54 x 91 x 254.2mm


VT

VX

Input Voltage Range

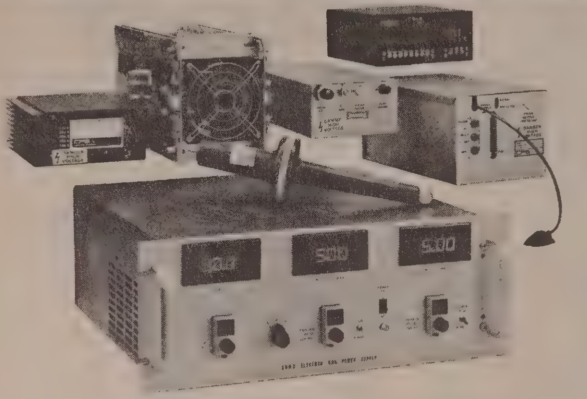
Input Option	Input Voltage Range		Frequency in hz.	Fusing
	AC	DC		
1	90-265	100-380	44-440	2A Slow Blow
3		20-60		10A Slow Blow

Output Chart

Model Number	Output	Volts	Amps	Adjustment
14	V1	+5	0-20	+20 −5%
16	V1	+12	0-8	+20 −5%
17	V1	+15	0-6	+20 −5%
18	V1	+24	0-4	+20 −5%
24	V1 V2	+5 +12	2.4-12 .05-3	+20 −5% ±5% Fixed
26	V1 V2	+12 +12	1-5 .05-3	+20 −5% ±5% Fixed
27	V1 V2	+15 −15	1-4 .05-2	+20 −5% ±5% Fixed
34	V1 V2 V3	+5 +12 −12	2.8-14 .05-1.5 .05-1	+20 −5% ±5% Fixed ±5% Fixed
37	V1 V2 V3	+5 +15 −15	2.8-14 .05-1.5 .05-1	+20 −5% ±5% Fixed ±5% Fixed
44	V1 V2 V3 V4	+5 +12 −12 −5	2-10 .05-2.5 05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed
45	V1 V2 V3 V4	+5 +24 +12 −12	2-10 .05-1 .05-1 .05-1	+20 −5% ±5% Fixed ±5% Fixed ±5% Fixed

CONVERTER CONCEPTS INC
Industrial Parkway, Pardeeville, WI 53954, Phone 608/429-2144. Twx 910-280-2630

High Voltage - High Precision POWER SUPPLIES from CPS



CRT • SEM • Radiographics • Beam-Penetration • Optics • PMT • X-Ray • Lithography • COM • LAB • Phototypeset.

FEATURES • Output voltages to 50 kV • Low ripple, precision regulation—high stability • Remote programming and metering models • Short circuit and arc protection • Self restoring • Multiple output voltage options • Solid state design • UL approved.

CPS offers a full range of standard and custom high voltage power supplies for commercial, industrial and mil-spec OEM's having applications requiring high-precision control of an electron beam. All power supply designs feature state-of-the-art production-proven techniques. Many years of experience in encapsulation of high voltage components provide compact packaging without compromise of performance reliability. All designs incorporate short-circuit and arc protection.

GENERAL PURPOSE—PRECISION & ULTRA PRECISION HIGH VOLTAGE POWER SUPPLIES

Series*	Output Voltage	Output Current	Regulation (±%) Line	Regulation (±%) Load	Ripple (P-P)	Stability (%) 1-Hour	Stability (%) 8-Hour	Temp. Coeff.** PPM/°C	Input Power	Operating Temperature Range (°C)	Features	Size (Inches) H W D
100	1 to 30kV	500 μA	0.001	0.001	200mV	0.005	0.01	25	115/220 Vac 47-65 Hz	0 to +50	Single and bipolar output versions; output voltage programmable remotely; output metering. Model 100R—Reversible polarity.	4-21/32 x 8 x 10-3/4
100R	1 to 30kV	1.0 mA	0.001	0.001	200mV	0.005	0.01	25				5-1/4 x 19 x 13-9/16
101	1 to 50kV	500 μA	0.001	0.001	500mV	0.005	0.01	25				5-1/4 x 19 x 13-9/16
130	1 to 30kV	500 μA	0.001	0.001	200mV	0.005	0.01	25				4-19/32 x 8 x 10-3/32
131	1 to 50kV	500 μA	0.001	0.001	500mV	0.005	0.01	25				5-1/4 x 19 x 13-9/16
132	1 to 30kV	500 μA	0.01	0.01	3V	0.05	0.1	250				4-19/32 x 8 x 10-3/32
133	1 to 50kV	500 μA	0.01	0.01	5V	0.05	0.1	250				5-1/4 x 19 x 13-9/16
136	1 to 30kV	500 μA	0.0002	0.0002	60mV	0.0002	—	5				5-1/4 x 19 x 13-9/16
5001A-2	1 to 2.0kV	5.0 mA	0.01	0.01	200mV	0.01	0.02	250	100/115/220 Vac, 47 to 440 Hz	0 to +50	Output voltage programmable remotely. UL approved.	2-11/16 x 5-1/2 x 9
5001A-5	1 to 5.0kV	2.0 mA	0.01	0.01	500mV	0.01	0.02	250				
5001A-10	1 to 10.0kV	1.0 mA	0.01	0.01	1V	0.01	0.02	250				
5001A-20	1 to 20.0kV	250 μA	0.01	0.01	2V	0.01	0.02	250				
5003A-DC	1V to 2kV	5.0 mA, 20 mA, 10 mA,	0.01	0.01	5mV	0.01	0.02	100	24-28 Vdc @ 900 mA	0 to +60	Output voltage programmable remotely. UL approved.	4-1/2 x 2-1/2 x 7-1/2
5003A-AC	1V to 2kV	5.0 mA, 10 mA,	0.01	0.01	5mV	0.01	0.02	100	100/115/220 Vac, 47 to 65 Hz			7 x 3-3/8 x 7-1/2

*Above items available in positive or negative versions.

MULTIPLE OUTPUT—HIGH VOLTAGE POWER SUPPLIES FOR COMMERCIAL & MILITARY APPLICATIONS

1487 (Anode) (Focus) (G2)	+15kV to ±5% 3.2 to 5.3 +500V ±5%	30μA 300μA 50μA	.01 .01 01	.01 .01 01	.1 .1 .1	.1 .1 .1	— — —	100 100 100	+28 Vdc ±10%	-54°C to +71°C	Full MIL Spec, Airborne application	3.83 x 4 x 6
1617 (Anode) (Focus) (G-2)	+20kV +3 to 5.5kV +300V	200 μA 500 μA 1.0 mA	0.03 0.03 0.05	0.03 0.03 0.05	5V 5V 1V	0.01 0.01 0.01	0.02 0.02 0.02	100 100 100	+28 Vdc	0 to +70	Output voltage programmable remotely; HV output monitor; can be dynamically modulated; static focus externally programmable.	2-3/4 x 6-1/4 x 9
1786 (Anode) (Focus)	+19kV +4 to 5.25kV	250 μA 2 mA	0.02 0 01	0.005 0 005	2V 500 mV	0.01 0 01	0.02 0 02	250 250	115 Vac ± 15 Vac	0 to +50	Provision for dynamic focus.	6-1/2 x 7 x 9-1/2
1805 (Anode) (Focus) (G-1) (G-2)	+18kV +2 to 5kV -110V +300 to +500V	400 μA 400 μA 1 mA 100 μA	0.02 2.0V† 0.1 † 1.0 †	0.03† 1.0 † 0.3 † 3 0 †	3V 8V < 50 mV 0 1%†	— — - —	0.2 0.2 0 2 1 0	200 200 200 1000	± 15 Vdc ± 2% @ 1.0 amp	0 to +50	Dynamic focus 0 to +300V. Replaceable modules.	5 x 6 x 10
1871 (Anode) (Focus) (G2)	+18kV +2.8 to 3.9 +180 to +550	500μA 5μA 5μA	.01 .01 .01	.01 .01 01	.1 .1 1	.01 .001	— — —	100	+25 Vdc ±15%	-55°C to 75°C	Hybrids Processed to MIL 883, Airborne application	4.85 x 4.65 x 1.6
6001 (Anode) (Filament)	-1kV to -30kV 0 to +8V	500 μA 5 A	0 001 —	0 001 -	200mV 0.25% rms	0 005 0 005	0 01 0 01	25 25	115/220 Vac, 47-440 Hz	0 to +50	Self-biasing, regulated grid and unregulated cathode. (Option 1405: unregulated grid, regulated cathode.)	5-1/4 x 19 x 16
6002 (Anode) (Filament)	-1kV to -50kV 0 to +8V	500 μA 5 A	0.001	0 001 -	500 mV 0 25% rms	0.005 0.005	0.01 0 01	25 25	115/220 Vac, 47-440 Hz	0 to +50	Self-biasing, regulated grid and unregulated cathode. (Option 1405: unregulated grid, regulated cathode.)	5-1/4 x 19 x 16
6004 (Anode) (Filament)	-1kV to -30kV 0 to 5.0V	500 μA 5 A	200mV < 1%	· 50V	200 mV 250 mV	0.005	0.01 400 mV	25 —	115/220 Vac, 47-440 Hz; 220 Vac opt	0 to +50	Closed loop emission current regulation.	7 x 19 x 16

SLEWING HIGH VOLTAGE POWER SUPPLIES FOR BEAM PENETRATION CRT APPLICATIONS

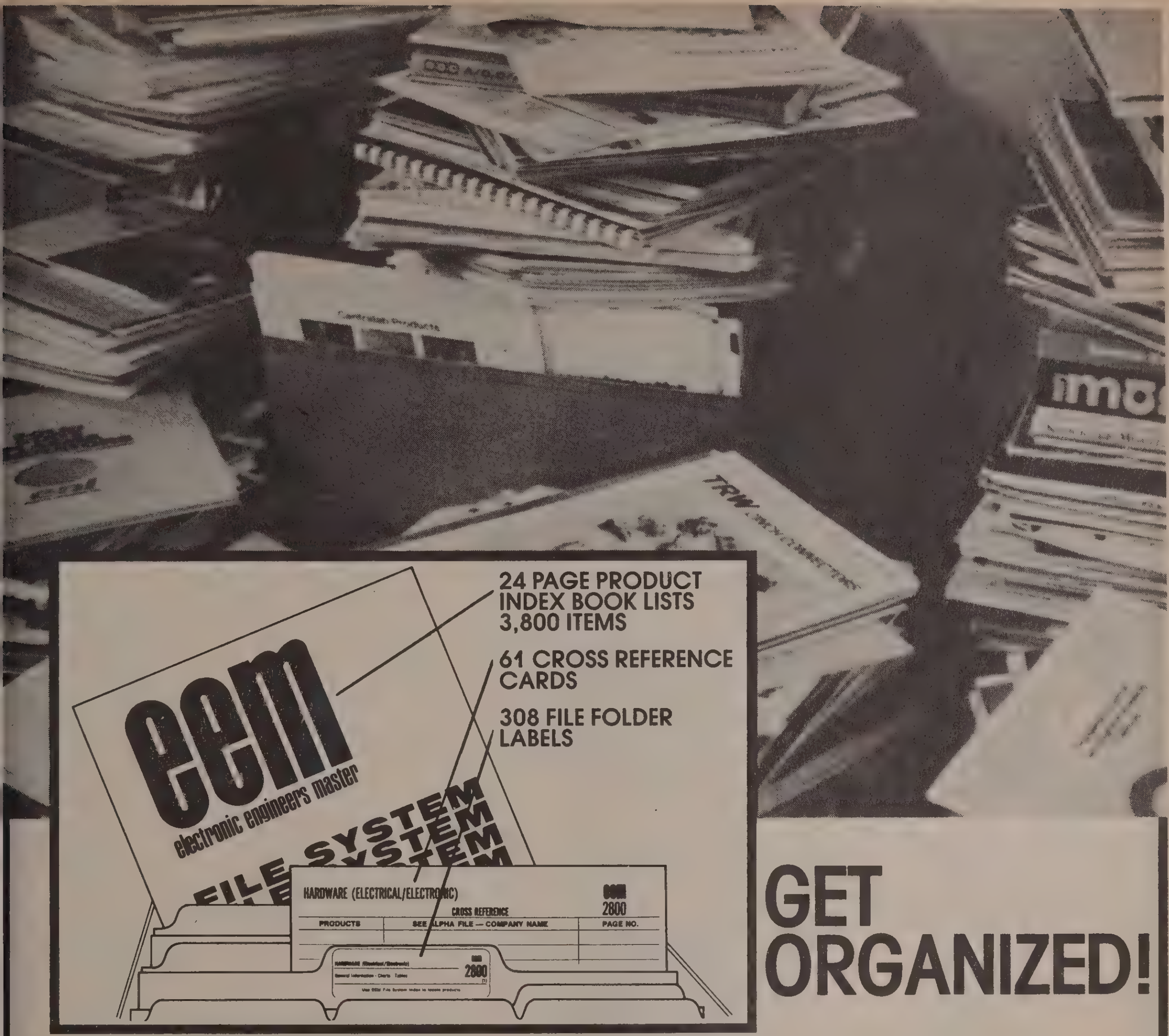
Series	Output Voltage	Output Current	Regulation (±%) Line	Regulation (±%) Load	Ripple (P-P)	Stability (%) 1-Hour	Stability (%) 8-Hour	Temp. Coeff.** PPM/°C	Input Power	Operating Temperature Range (°C)	Slewing Time (μ sec)	Output Load (capacitance)	Size (Inches) H W D
7010 7011*!	+8kV to +18kV	500μA	0.01	0.1	0.1%	0.1	0.2	100	+28 Vdc ±10% @ 2.0 amp	0 to +50	200	700 pf	3 x 5-3/4 x 7-7/8
7020 (Anode) (Focus) (G2)	+9kV to +18kV +2.4kV to +3.4kV +720V to +1080V	1mA 25μA 50μA	0 01 0 01 0 01	0 1 0 1 0.1	0 1% 0 1% 0 1%	0.1 —	0 2 —	100 100 —	+28 Vdc ±10% @ 2.0 amp	0 to +50	200 200	500 pf 10 pf	4-1/2 x 5-29/32 x 6
7030 (Anode #1) (Anode #2) (Focus) (G1) (G2)	+15kV ±5% +9kV to +18kV +2.2kV to +3.5kV -55V +350V to +700V	250μA 750μA 300μA† 25μA 25μA	0.05 0.05 0.05 0 1 0 1	0.1 0.1 0.1 0.1 0.6	0.05% 0.1% 0.1% 0.3% 0.3%	0.1 0.05 — - —	0.2 0.05 — —	200 100 200 — —	±24 Vdc ±10% @ 2.5 amp	0 to +50	— 300 — — —	— 500 pf — — —	.7 x 5-7/16 x 11-7/8

**Specifications apply after 30 minute warm-up. †Maximum *! Mil-spec *† Over Maximum Switching Range

CPS
A Division of Vector General, Inc.

For complete information and applications assistance, contact the precision high voltage power supply specialists at:

110 Wolfe Road • Sunnyvale, California 94086 • Phone (408) 738-0530 Telex 357-450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GET ORGANIZED!

Are your catalog files organized? Can you find any given catalog in a matter of seconds? If your answer is "Yes," you probably already have the EEM File System. But, if you said "No," you really ought to look into this simple system. It will save hours of time and tons of aggravation.

The EEM File System was invented over twenty-five years ago to help people who specify, buy, or work with electronic products and equipment. It is upgraded on a constant basis to reflect the current state of the art. It's easy to use and easy to customize to your particular needs.

You say you want to file catalogs by type of product? That's easy to do with The System. But, what are you going to do when there are multiple products in one catalog? Take Mallory for example. There are all kinds of products in the Mallory Short Form Catalog. With the EEM File System all you do is file the catalog under "M" for Mallory and refer to it on all of the cross reference cards that apply.

There are thousands of EEM File Systems in everyday use in engineering and procurement offices all over the world. Shouldn't you be using this proven system?

The EEM File System is shipped in one neat package. The package contains everything you need to set up your very own filing system. Best of all, it's easy to get and very affordable. Send a check or money order for $25.00 and EEM will pay the postage and sales tax. If you must use a purchase order, please add $5.00 for postage and handling. An invoice will accompany your System.

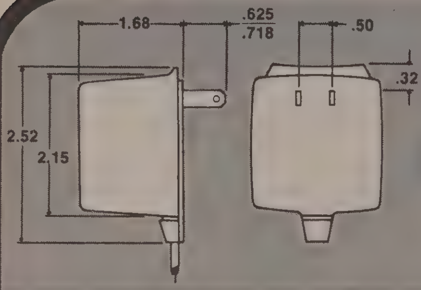
Don't waste any more time. Get organized now!

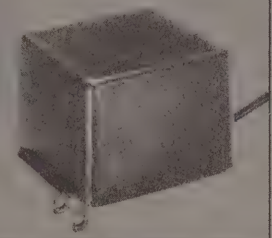
EEM FILE SYSTEM,
645 stewart ave., garden city, ny 11530

D & B POWER, INC.

Wall Plug-in Power Sources

'C' SIZE

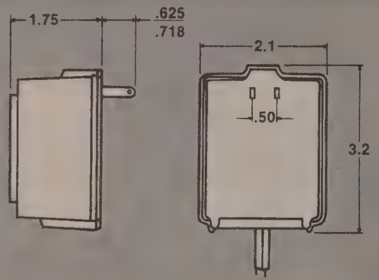


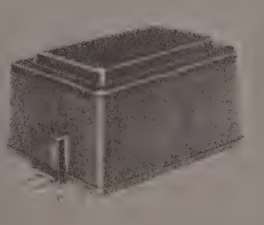


SPECIFICATIONS

AC/AC RANGE: 6 VA to 12 VA
AC/DC FILTERED RANGE: 4 Watts (Filtered) to 9 Watts (Unfiltered)
REGULATED RANGE: 5 VDC-24 VDC up to 150 ma.
LEAD-ACID (CYCLIC): 2 V-6V (11 V.N.L.) 8V-12V (21V.N.L.) up to 9 Watts
LEAD-ACID (REGULATED): 2.35V/cell No load; Average: 150 ma. up to 4 Watts
NICAD: AA-up to 25 cells Sub C — up to 20 cells, C — up to 20 cells D — up to 16 cells, F - up to 9 cells

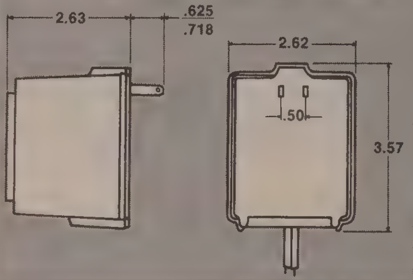
'D₂' SIZE





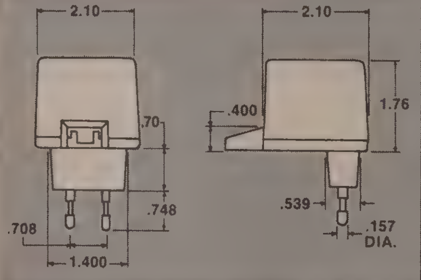
AC/AC RANGE: 6 VA, 12 VA, 20 VA
AC/DC FILTERED RANGE: 4 Watts, 9 Watts, 13 Watts, all available with filter
REGULATED RANGE: 5 VDC — 24 VDC up to 250 ma.
LEAD-ACID (CYCLIC): 2V — 6V (11 V.N.L), 8V — 12V (21 V.N.L.) Average: 250 ma. up to 9 Watts
LEAD-ACID (REGULATED): 2.35 V/cell, no load Average: 250 ma. up to 9 Watts
NICAD: AA — up to 25 cells, Sub C - up to 20 cells, C — up to 20 cells, D — up to 18 cells, F — up to 8 cells

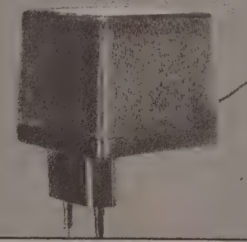
'E' SIZE



AC/AC RANGE: 20 VA, 30 VA, 37 VA, 56 VA
AC/DC FILTERED RANGE: 13 Watts, 19 Watts 35 Watts filtered
REGULATED RANGE: 5 VDC — 12 VDC up to 1 amp., 15 VDC — 24 VDC @750 ma. 25 VDC — 35 VDC up to 500 ma., 35 VDC — 50 VDC up to 350 ma.
LEAD-ACID (CYCLIC): 2V — 12V up to 35 Watts, 20% N.L. — full-load regulation
LEAD-ACID (REGULATED): 2.35V/Cell N.L. up to 35 Watts
NICAD: AA — N/A, Sub C — N/A, C — N/A, D — any, F — up to 20 cells

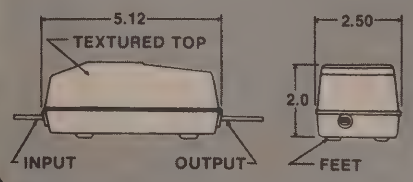
'C' EURO WALL STYLE

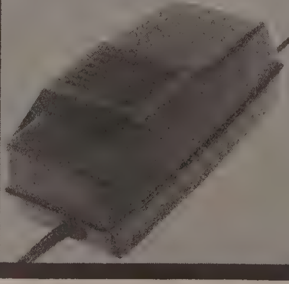




AC/AC RANGE: Up to 12 VA
AC/DC FILTERED RANGE: Up to 4 Watts filtered, up to 9 Watts unfiltered
REGULATED RANGE: Up to 150 ma. at specified voltage not to exceed 4 Watts
LEAD-ACID (CYCLIC): 2V — 6V (11 V.N.L.) up to 9 Watts, 8V — 12V (21 V.N.L.) up to 9 Watts
LEAD-ACID (REGULATED): 2.35 V/cell N.L., Average 150 ma. up to 4 Watts
NICAD: AA — up to 25 cells, Sub C — up to 20 cells, C — up to 12 cells, D — up to 6 cells

DPC DESK TOP





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LEAD-ACID (REGULATED): 2.35 V/cell, no load Average: 250 ma. up to 9 Watts
NICAD: AA — up to 25 cells, Sub C - up to 20 cells, C — up to 20 cells, D — up to 18 cells, F — up to 8 cells

D & B POWER, INC.

☐ Converters AC-AC/AC-DC

☐ Regulated DC Supplies

☐ Battery Chargers

ELECTRICAL AND MECHANICAL SPECIFICATIONS

ELECTRICAL

INPUT
120 VAC 60 Hz (Standard); 240 VAC 50/60 Hz & 120/240 VAC 50/60 Hz Switchable available as options.

OUTPUT
± .5 VDC Typical except regulated

REGULATED UNITS
± 3% standard line and load regulation

STANDARD CHARGE RATE
C/10, C/5 & C/1 available

MECHANICAL

HOUSING MATERIAL
Black ABS-KJB, except E case molded in Noryl

OUTPUT CORDS
All industry standard miniature molded cordsets are stocked at D and B Power.

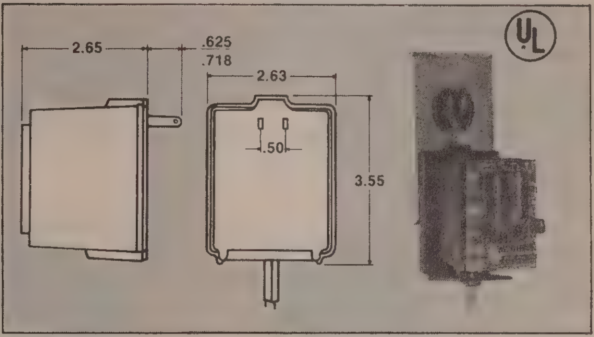
OPTIONS

1. L.E.D. charge or power-on indicator light
2. Ground pin — can be carried through secondary
3. Center-tapped secondary on AC/AC
4. European Input desk-top for D_2 and E power
5. Japanese or other World-Wide input voltages and frequencies
6. Switchable 120 VAC/240 VAC 50/60 Hz available in all case sizes
7. ± DC non-regulated and regulated outputs
8. Ink-stamp for quick delivery, custom Hot-Stamping facilities
9. UL and CSA designs
10. UL and/or CSA submittals upon request
11. Custom designs to meet your exact requirements are available on request
12. D & B Power qualified to MIL STD MIL-C-4566A and MIL-I-45208

Custom Products

MPPS 512

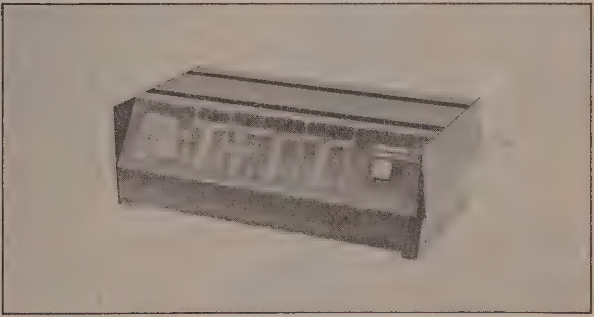
REGULATED, MULTIPLE OUTPUT MICRO PROCESSOR POWER SUPPLY



MECHANICAL DATA: Wall plug-in with ground pin and five (5) conductor output cord.

ELECTRICAL DATA: Input: 117 VAC ± 10%, 60 Hz. Output: 1) + 5 VDC @ 750 ma., Line Regulation 0.1% Load Regulation 2%, 10 MV RMS MAX Ripple. 2) + 12 VDC @ 150 ma., Line Regulation 0.1%, Load Regulation 0.5%, 1 MV RMS MAX Ripple. 3) – 12 VDC @ 150 ma., Line Regulation 0.1% Load Regulation 0.5%, 1 MV RMS MAX Ripple. 4) UL Approved.

DUAL STAGE NICAD AND DUAL STAGE LEAD-ACID



NICAD: Fast charge @ C/5 or C/1, float at C/10 Discharge circuit available

LEAD-ACID: 2.45V/cell fast charge, 2.30V/cell float

BOTH UNITS: L.E.D. indicator, nominal input voltage = 117 VAC 60 Hz ± 10%, 230 VAC 50 Hz. available

D & B POWER, INC.

204 N. FEHR WAY, BAY SHORE, NEW YORK 11706
TWX 510-222-1045
(516) 586-5955

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

POWER SUPPLIES AND DC-DC CONVERTERS

DATEL
DUAL OUTPUT POWER SUPPLY
BPM-15/300

LINE OPERATED MODULES
BPM-15/300
±15VDC at 300mA
0.05% Load Regulation
3.5 x 2.5 x 1.56 Inches
9 OTHER MODELS AVAILABLE

DATEL
SINGLE OUTPUT POWER SUPPLY
UCM-5/2000

CHASSIS MOUNT MODULES
UCM-5/2000
5VDC at 2.0A
0.1% Load Regulation
3.5 x 2.5 x 2.00 Inches
8 OTHER MODELS AVAILABLE

DATEL
DC/DC CONVERTER
BPM 15/165 D48

48V DC-DC CONVERTERS
BPM-15/165-D48
48VDC Input
±15VDC at 165mA Output
0.05% Load Regulation
23 OTHER MODELS AVAILABLE

DATEL
DUAL OUTPUT POWER SUPPLY
BPM-120/25
DATEL
BPM-150/20

HIGH VOLTAGE DUAL OUTPUT
±120V/25mA Out
±150V/20mA Out
±180V/16mA Out

DATEL
SWITCHING POWER SUPPLY SINGLE OUTPUT
USM-5/3
DATEL
SWITCHING POWER SUPPLY SINGLE OUTPUT
USM-5/5

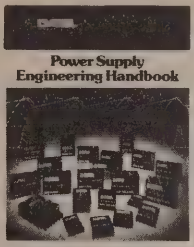
MODULAR SWITCHING SUPPLIES
5V/3A Out
5V/5A Out
PC or Chassis Mount
80% Efficiency

DATEL
DC/DC CONVERTER
BPM-15/100-D5

1, 3 AND 4.5 WATT DC-DC CONVERTERS
BPM-15/100-D5
5VDC Input ±10%
±15VDC at 100mA Output
0.05% Load Regulation
67 OTHER MODELS AVAILABLE

DATEL
TRIPLE OUTPUT POWER SUPPLY
TPM-15/150-5/1000

TRIPLE OUTPUT MODELS
TPM-15/150-5/1000
±15VDC at 150mA & 5VDC at 1.0A
0.05% and 0.1% Load Regulation
3.5 x 2.5 x 1.56 Inches
5 OTHER MODELS AVAILABLE


DATEL
Power Supply Engineering Handbook

For complete information on our wide selection of Power Supply products, please send for our new 40 page Engineering Power Supply Handbook or call our literature Hot-Line at (617) 339-9341, Ext. 100

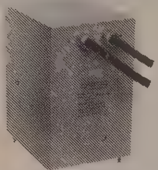
DATEL
AC/DC POWER ADAPTER
UPA-5/500

LOW COST, REGULATED PLUG-IN POWER ADAPTERS
UPA-5/500
115 VAC ±10% Input
+4.8 — +5.3 VDC @ 500 mA Out
0.3% Load Regulation
2 OTHER MODELS AVAILABLE

AC MODELS ALSO AVAILABLE WITH 230VAC IN (E SUFFIX) OR 100VAC IN (J SUFFIX)

DATEL
11 CABOT BOULEVARD, MANSFIELD, MA 02048/TEL. (617)339-9341/TWX 710-346-1953/TLX 951340
- Santa Ana, CA (714) 835-2751 • Sunnyvale, CA (408) 733-2424 • Los Angeles, CA (213) 933-7256
- OVERSEAS: DATEL (UNITED KINGDOM) TEL. BASINGSTOKE (256)69085 • DATEL (FRANCE) TEL. 602 57 11
- DATEL (GERMANY) TEL. (89) 530741 • DATEL (JAPAN) TOKYO TEL. 793-1031 • DATEL (JAPAN) OSAKA TEL. 06-3542025

Unregulated Modules Compact High Voltage—Series "S"

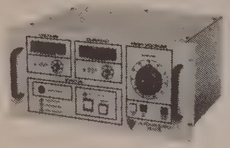


- ▼ Output: Two shielded poly-ethylene cables insulated for reversible polarity
- ▼ Construction: Solid state rectifiers, all units hermetically sealed in epoxy, vacuum filled, metal case

Input: 0-115-125V, 50/60Hz
400 Hz available upon request
Output: Variable with input ac line

Output Range (kV)	Current (mA)	Ripple %rms/mA @ 60Hz
0 to 2.5-60	1	0.25
0 to 1-30	5	0.25
0 to 1-40	10	0.15

Rack Mounted Power Supplies RIU Series 875 and 1400

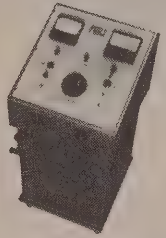


- ▼ Easy to read 3 digit DPM for voltage and current
- ▼ Adjustable overcurrent and overvoltage
- ▼ All solid state technology
- ▼ Low RMS ripple
- ▼ External and HV interlock
- ▼ Zero start interlock and bypass
- ▼ Polarity reversible (Below 60KVDC)

Input: 105-125VAC 50/60 Hz
Output: Continuously adjustable 0-100%

Output Voltage	Output Current
0-1KVDC	25-1500MADC
0-2.5KVDC	10-1000MADC
0-5KVDC	10-300MADC
0-10KVDC	10-100MADC
0-20KVDC	5-75MADC
0-30KVDC	5-10MADC
0-40KVDC	3MADC
0-60KVDC	1MADC
0-90KVDC	1MADC

High Pot Testers—Series "TC"



- ▼ Multi-purpose power supplies fully instrumented and protected. Ratings up to 80,000 volts dc
- ▼ Solid State
- ▼ Oil insulated

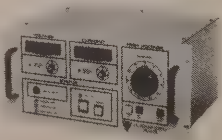
Input: 105-125V, 50/60 Hz
Output: Continuously adjustable

F. L. Voltage (kV)	Current Range (mA)	Ripple Type %rms/mA @ 60Hz
0 to 30	5, 20	0.4
0 to 40	5, 20	0.4
0 to 50	5, 10	0.4
0 to 60	5, 10	0.4
0 to 70	5	0.4
0 to 80	5	0.4

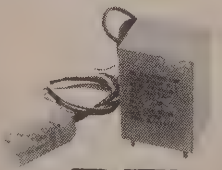
High Voltage DC Supplies Series "HVOU"

- ▼ Input, 120 & 208VAC, 50/60Hz
- ▼ Front Panel DPM's
- ▼ Adjustable overcurrent and overvoltage
- ▼ Continuously adjustable 0-100%
- ▼ Remote polarity reversible
- ▼ Fully instrumented
- ▼ Fully interlocked

Standard Voltage & Currents	
Output Voltage (KV)	Output Current (MA)
0-40	10 to 250
0-50	8 to 200
0-75	5.5 to 130
0-100	4 to 100
0-150	2.5 to 66



DC-DC Proportional Converters for Photomultiplier Tube—Series "PMS"



- ▼ Reverse polarity protected
- ▼ Output isolated
- ▼ Momentary short circuit protected
- ▼ Small size
- ▼ Low cost

Model Number	Input Range (dc volts)	Output Range (dc volts)	Size D&L
PMS 1-1	3 to 15	300 to 1500@1mA	1 X 2¼
PMS 1-4	3 to 19	300 to 2000@1mA	1 X 2¼
PMS 1-6	3 to 15	400 to 2500@0.5mA	1 X 2¼
PMS 1-7-7	4 to 12	500 to 1500@0.5mA	2.4 X 1.5 X 0.812
PMSB 2-.025	3 to 12	300 to 2000@0.025mA	1 X 2¼
PMS 3-.5	3 to 15	300 to 3000@0.5mA	1¼ X 2⅜
PMS 5-.5	3 to 15	500 to 5000@0.5mA	1⁷⁄₁₆ X 3⅛
PMS 10-.025*	3 to 10	3kV to 10kV@0.025mA	2.07 X 2.32 X 3.13

*Specify positive or negative output

DEL

DEL ELECTRONICS CORPORATION

250 East Sandford Boulevard, Mount Vernon, New York 10550
Phone 914/699 2000 TWX 710 562 0130

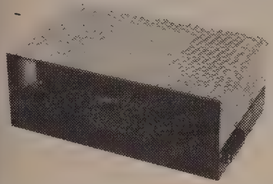
Highly Regulated Adjustable Hermetic Sealed, Epoxy Filled Series "CARDE"

- ▼ Adjustable output (50 to 100%) (Resistance programmed)
- ▼ Short circuit proof—foldback
- ▼ Designed to meet environmental requirements of MIL-E-16400

Input: 115V ±10%, 47-420Hz
Output: Line and load regulation ±0.005%
Ripple: 0.03% rms
Temp. coeff: 0.02%/°C
Temp. range: −25°C to 65°C
Polarity: specify pos. or neg.

Outputs			
Voltage Range (dc)	**Current Max.**	**Voltage Range (dc)**	**Current Max.**
600V to 1200V	8mA	5.0kV to 10kV	1mA
1200V to 2500V	4mA	7.5kV to 15kV	0.6mA
2.5kV to 5.0kV	2mA	10kV to 20kV	0.5mA
3.5kV to 7.0kV	1.4mA		

Highly Regulated Adjustable Industrial Grade—Series "HARD"

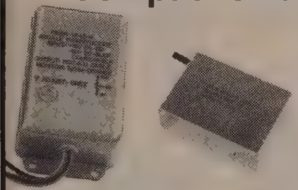


- ▼ High frequency design
  Low energy storage
- ▼ Adjustable output (50 to 100%) (Resistance programmed)
- ▼ Short circuit proof

Input: 115V ±10%, 50/400Hz
Output: Line and load regulation: ±0.005%
Temp. coeff: ±0.02%/°C
Temp. range: −20°C to 55°C
Polarity: specify pos. or neg.
Ripple: 0.03% rms

Outputs			
Voltage Max.	**Current Max.**	**Voltage Max.**	**Current Max.**
1200V	2,10,20mA	15kV	0.25, 0.5, 1mA
2500V	1, 4, 8mA	20kV	0.2, 0.5, 1mA
5000V	0.5, 2, 4mA	30kV	0.75mA
10kV	0.25, 1, 2mA	40kV	0.5mA

Highly Regulated Adjustable Compact Size—Series "PMSR"

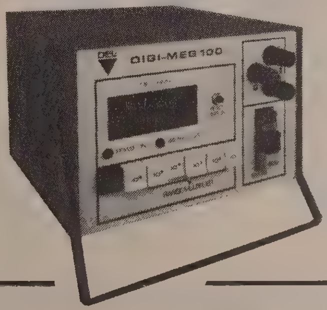


- ▼ DC-DC converter
- ▼ Adjustable output (Resistance programmed)
- ▼ Short circuit proof

Input: ±15V dc
Output: Regulation: line and load ±0.002%
Temp. coeff: 100ppm/°C
Temp. range: 0 to 60°C
Ripple: 25mV, peak to peak max.

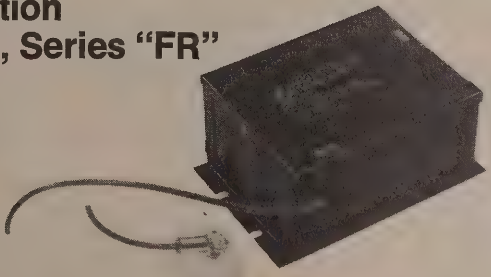
Outputs			
Voltage (+)	**Current**	**Size (in.)**	**Construction**
600 to 1400V	0 to 1.5mA	1.25 X 2.5 X 4.0	A metal case
600 to 1400V	0 to 1.5mA	1.25 X 2.5 X 3.5	B plastic case
300 to 1500V	0 to 2mA	1.25 X 2.5 X 4.0	A metal case

Digi-Meg 100 Digital Megohmeter



- ▼ Solid state LED panel meter
- ▼ Ranges to 10,000,000 Megohms in 6 ranges
- ▼ 50/500VDC test voltages
- ▼ Short circuit proof
- ▼ Optional battery pack available
- ▼ Size: 7½" W x 5" H x 10" D

Ferro-Resonant HV Line Regulation Power Supplies, Series "FR"



- ▼ Simple reliable design
- ▼ Low cost
- ▼ 1% line regulation
- ▼ Short circuit proof

Input: 115VAC + 10%, 50 or 60 Hz
Output: Models to 20KVDC & 600 Watts
Line Regulation: ±1%
Load Regulation: ±10% NL to FL.

DEL

DEL ELECTRONICS CORPORATION
250 East Sandford Boulevard, Mount Vernon, New York 10550
Phone 914/699-2000 TWX 710-562-0130

EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

enclosures · capacitors · circuit boards · coils,
chokes, inductors · connectors, electronic · sockets/
terminals · crystals · oscillators · crystal filters
delay lines · panel hardware · displays · lamps/
lights · cooling equipment · filters · generators ·
multimeters · panel meters · oscilloscopes · gra
phic recorde nections · microwave
components tors/
drives · ba power
supplies, ac · relays ·
solenoids · resistors · potentiometers/trimmers
controls/rhe ·
switches · transducers/en
coders · transformers · wire & cable · enclosures
capacitors · circuit boards · coils, chokes, induc
tors · connectors, electronic · sockets,/terminals

Digi-power has all the power you'll ever need in OEM power supplies

(Custom or standard)

Select from a complete line of compact power supplies, 50 to 500 watts. Each unit is burned-in for a full 12 hours at 100% rated load before final testing and packaging for shipment. Reliability is assured with a one year warranty. Digi-power has the size you need for your microprocessor, mini-computer Winchester-type modules or peripheral equipment.

Units are available open-frame or enclosed to meet your specific requirements. Standard or optional features include brown-out protection, short circuit protection, power-fail option, over-temperature protection, and OVP for all outputs. Each Digi-power component is EMI filtered and constructed of tested and proven quality materials. All units deliver up to 80% efficiency. UL recognized.

Custom designs are available for OEM customers requiring special electrical, mechanical or physical parameters. A staff of service personnel and off-the-shelf replacement parts can be readily accessed should the need arise. Call or write for informative booklet and specification sheets.

Single/Dual Output Supplies

OUTPUT TERMINAL SINGLE	I,J A
DS 150-105	5V @ 30A
112	12V @ 12A
115	15V @ 10A
124	24V @ 6A
128	28V @ 5A
148	48V @ 3A

TERMINAL OUTPUT SINGLE	I,J A
DU 250-105	5V @ 40A
112	12V @ 20A
115	15V @ 16A
124	24V @ 10A
128	28V @ 9A
148	48V @ 5A

OUTPUT TERMINAL DUAL	D AUX. B	I,J A
DS 150-201	+12V @ 4A	+5V @ 30A
202	-28V @ 3A	+28V @ 3A
203	-5V @ 1A	+5V @ 24A
204	-12V @ 4A	+12V @ 8A
207	-5V @ 5A	5V @ 25A
208	24V @ 1.5A	12V @ 10A
209	-18V @ 3A	18V @ 3A
211	-15V @ 3A	15V @ 3A

OUTPUT TERMINAL DUAL	D AUX. B	I,J A
DU 250-201	+12V @ 4A	+5V @ 40A
202	-28V @ 4A	+28V @ 4A
203	-5V @ 5A	+5V @ 40A
204	-12V @ 4A	+12V @ 15A

Triple Output Supplies

OUTPUT TERMINAL TRIPLE	D AUX. B	E AUX. C	I,J A
DS 150-301	12V @ 4A	-12V @ 1A	5V @ 24A
302	12V @ 3A	-12V @ 3A	5V @ 24A
304	15V @ 3A	-15V @ 3A	5V @ 24A
310	+12V @ 5A	-5V @ 2A	5V @ 15A
315	28V @ 2.5A	-5V @ 2A	5V @ 15A
316	16.5V @ 3A	-16.5V @ 3A	5V @ 24A
321	12V @ 3A	+24V @ 3A	5V @ 20A
322	-28V @ 2.5A	-5V @ 2A	5V @ 15A

TERMINAL OUTPUT-TRIPLE	D AUX. B	E AUX. C	I,J A
DU 250-301	12V @ 5A	-12V @ 5A	+5V @ 40A
303	15V @ 4A	-15V @ 4A	+5V @ 40A
310	12V @ 5A	-5V @ 5A	+5V @ 40A

Four or More Output Supplies

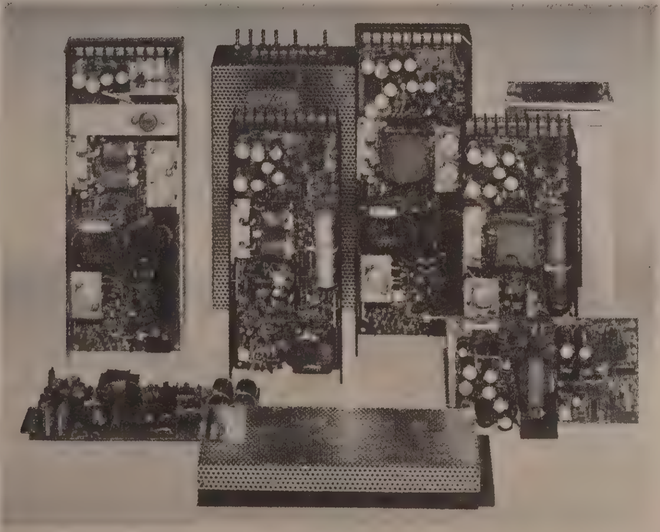
OUTPUT TERMINAL OUTPUT	D AUX. B	E AUX. C	F AUX. D	G,H COM.	I,J A
DS 160-401	+12V @ 4A	-12V @ 4A	-5V @ 1A		+5V @ 25A
403	+12V @ 4A	-12V @ 3A	+15V @ 2A		+5V @ 25A
404	+12V @ 4A	-12V @3A	+24V @ 4A		+5V @ 25A
405	+15V @ 4A	-15V @ 4A	-5V @ 1A		+5V @ 25A
406	+15V @ 4A	-15V @ 3A	+12V @ 2A		+5V @ 25A
408	+15V @ 4A	-15V @ 3A	+24V @ 4A		+5V @ 25A
409	+15V @ 1A	+15V @ 1A	+28V @ 2A		+5V @ 10A

OUTPUT TERMINAL OUTPUT	D AUX. B	E AUX. C	F AUX. D	G,H COM.	I,J A
DU 260-401	+12V @ 4A	-12V @ 4A	-5V @ 1A		+5V @ 40A
403	+12V @ 4A	-12V @ 4A	+15V @ 2A		+5V @ 40A
404	+12V @ 4A	-12V @ 4A	+24V @ 4A		+5V @ 40A
405	+15V @ 4A	-15V @ 4A	-5V @ 1A		+5V @ 40A
406	+15V @ 4A	-15V @ 4A	+12V @ 2A		+5V @ 40A
408	+15V @ 4A	-15V @ 4A	+24V @ 4A		+5V @ 40A

	OUTPUT CONFIGURATION							
MODEL	A	B	C	D	E	F	G,H	I,J
HU200-401	P.F.	P F RET.	-5V @ 1A	RET.	-12V @ 4A	+12V @ 4A	RET	+5V @ 25A
402	P.F.	P.F. RET.	-12V @ 2A	RET.	-12V @ 3A	+12V @ 4A	RET.	+5V @ 25A
403	P.F.	P.F. RET	+15V @ 2A	RET.	-12V @ 3A	+12V @ 4A	RET.	+5V @ 25A
404	P.F.	P.F. RET.	+24V @ 4A	RET.	-12V @ 3A	+12V @ 4A	RET.	+5V @ 25A
405	P.F.	P.F RET.	-5V @ 1A	RET.	-15V @ 4A	+15V @ 4A	RET	+5V @ 25A
406	P.F.	P.F. RET.	+12V @ 2A	RET	-15V @ 3A	+15V @ 4A	RET.	+5V @ 25A
407	P.F.	P.F RET.	+15V @ 2A	RET.	-15V @ 3A	+15V @ 4A	RET.	+5V @ 25A
408	P.F.	P F. RET.	-15V @ 1.5A	RET.	-15V @ 3A	+15V @ 4A	RET	+5V @ 25A

Floppy/Winchester Drive Supplies

OUTPUT NUMBER OUTPUT TERMINAL	AUX. A I,J	AUX. B F	AUX C E	AUX. D C	AUX. F B
DS150-206	+5V @ -18A	-12V @ 5A			
HU200-217	+5V @ 10A	+24V @ 6A*			
325	-5V @ 10A	+24V @ 6A*	-5V @ 1A		
326	-5V @ 30A	+12V @ 5A**	-12V @ 3A		
329	+5V @ 7A	+24V @ 8A*	-12V @ 6A		
334	+5V @ 10A	+24V @ 6A*	-12V @ 4A		
335	+5V @ 10A	+12V @ 4 5A*	-12V @ 4A	+24V @ 6A*	
412	+5V @ 10A	-5V @ 2.5A	-12V @ 4A	+24V @ 6A	
SP523	+5V @ 35A	+12V @ 5A**	-12V @ 3A	+24V @ 6A	



Electrical Specifications

AC Input: 90-132/180-264 VAC at 47-63 Hz
Line Regulation: 0.1% for a 15% AC input change
Load Regulation: A) Main output +0.2% for a 10-100% load change
B) Auxiliaries with post regulation +0.5% for a 10-100% load change
C) Auxiliaries without post regulation typical +5% for a 20-100% load change
Stability: 0.05% for 24 hours after warm up
Output Ripple: 100 mv for +5 volts. other outputs 1% maximum
Remote Sense: Standard on most models
Temperature Rating: Operating 0 C to 50 C. derate linearly to 50% at 70 C
Short Circuit and Overload Protection: Self restoring current limiting (foldback type)
Overvoltage Protection: OVP is standard on all outputs
Efficiency: 65% minimum
Input Surge: Cold start. 115VAC 10A max.. 230VAC 20A max
Holdup Time: 10 m s. minimum
Options: Power Fail. Battery Charger. Battery Backup. Clock Circuitry. Remote Shutoff

digi-power

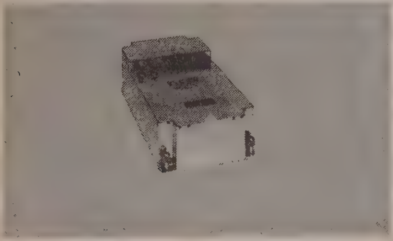
686 E. Gish Road, San Jose, CA 95112
(408) 288-5600, TWX 910-338-0579

EG&G ALMOND INSTRUMENTS

MIL-Q-9858A

LEADERSHIP IN MILITARY POWER SUPPLIES

REPRESENTATIVE CUSTOM DESIGNS



SHIPBOARD SWITCHING POWER SUPPLY

P/N 2-12150-01

Input Power: 115VAC, 60Hz, 3ϕ per MIL-STD-1399, Sec. 103, Type I

Outputs	Reg.	Noise
+5VDC @ 70a	±1%	50mV
−5VDC @ 1a	±1%	50mV
+12VDC @ 1a	±1%	120mv
−12VDC @ 2a	±1%	120mv

Size: 10 x 6.25 x 3 inches

Weight: 12 pounds

Environment: (MIL-E-16400):
Temp: 0 to 75°C
Humidity: to 95%
Fungus: Per MIL-STD-16400
Vibration: MIL-STD-167
Shock: 75g's

Cooling: Convection/Conduction

Efficiency: 66%

EMI: MIL-STD-461 Notice I

MTBF: 40,000 hours

SHIPBOARD POWER SUPPLY

P/N 2-10703

Input Power: 115VAC, 400Hz, 3ϕ per MIL-STD-1399 Sec. 103 Type I Power

Outputs	Reg.	Noise
+15VDC @ 7a	±0.15	20mv
−15VDC @ 7a	±0.15	20mv

Size: 9 x 6 x 4.75 inches

Weight: 9.8 pounds

Environment:
Temp: −40°C to +65°C
Shock: MIL-STD-202 Method 213A Test Condition A
Vibration: MIL-STD-167 Table I (increased by a factor of 2)

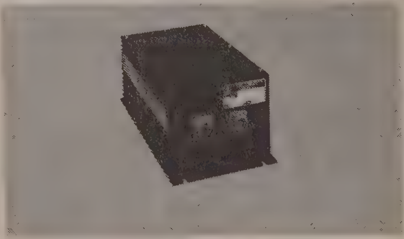
Noise: MIL-STD-740

Cooling: Cold plate conduction

Efficiency: 60%

EMI: MIL-STD-461, Type D

MTBF: 40,000 hours



MILITARY POWER SUPPLY

P/N 2-10568

Input Power: 115 ±10VAC, 47-420, 1ϕ

Output	Reg.	Noise
+28VDC @ 14a	±0.5%	50mv

Size: 11.5 x 6 x 5 in. (incl. mfg. flanges)

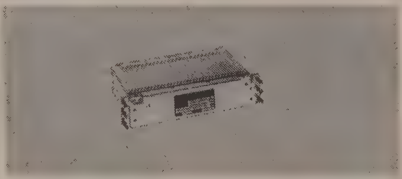
Weight: 14 pounds

Environment:
Temp: −20°C to +55°C
Magnetic Radiation — Less than 0.5 gauss
Magnetic Radiation — Less than 0.5 gauss one inch from top surface

Cooling: Circulating air

Efficiency: 60%

Provides power for military magnetic tape recorders which are used in military programs — for ship, ground and aircraft applications.



AIRBORNE POWER SUPPLY

P/N 2-11470

Input Power: +28 VDC per MIL-STD-704

Outputs	Reg.	Noise
+20VDC @ .69a	±5%	100mv
+12VDC @ .975a	±5%	100mv
+5VDC @ 11.28a	±5%	100mv
−14.7VDC @ 2.3a	±2%	100mv

Size: 7.63 x 5.6 x 1.69 (incl. mounting flanges)

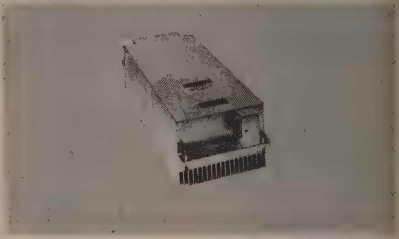
Weight: 4 pounds

Environment:
Temp: −65°F to +212°F
Altitude: 0.506 to 15.5 psia
Acceleration: ±10g's, all aids
Vibration: MIL-E-5400, Curve IV
Shock: MIL-T-5422, 30g's
Explosive Atmosphere: MIL-E-5400
Humidity: MIL-T-5422, Para. 4.4
Salt Spray: MIL-T-5422, Para. 4.5
Sand & Dust: MIL-T-5422, Para. 4.7
Fungus: MIL-T-5422, Para. 4.8

Cooling: Conduction through mounting flanges

EMI: MIL-STD-461A (CE01, CE03, RS02, RS03, RE02, CS01, CS02)

MTBF: 27,000 hours



SHIPBOARD SWITCHING POWER SUPPLY

P/N 2-12090-01

Input Power: 115VAC, 60Hz 3ϕ per MIL-STD-1399, Sec. 103, Type I

Outputs	Reg.	Noise
+5.15VDC @ 1.5a	±1%	100mv
−5VDC @ 1.5a	±1%	100mv
+12VDC @ 1a	±1%	60mv
−12VDC @ 0.3a	±1%	60mv
+15VDC @ 7a	±0.5%	40mv
−15VDC @ 2a	±0.5%	75mv
+55VDC @ 0.1a	±0.1%	55mv

Size: 14 x 6 x 2.89 inches

Weight: 15 pounds

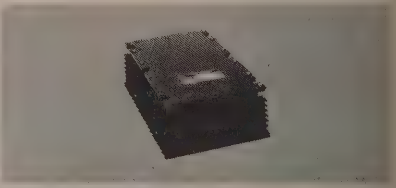
Environment:
Temp: 0 to +75°C
Humidity: to 95%
Fungus: Per MIL-STD-16400
Vibration: MIL-STD-167
Shock: 75g's

Cooling: Convection

Efficiency: 56%

EMI: MIL-STD-461 Notice I

MTBF: 35.000 hours



SHIPBOARD POWER SUPPLY

P/N 2-10500

Input Power: 115VAC, 400Hz, 3ϕ per MIL-STD-761 Type I Power

Output	Reg.	Noise
5VDC @ 15a	±2%	28mv

Size: 9.9 x 6 x 3 inches

Weight: 14 pounds

Environment:
Temp: −40°C to +80°C
Humidity: 0 to 95%
Shock: MIL-S-901 Grade A Class I
Vibration: MIL-STD-740
Noise: MIL-STD-740

Cooling: Combination convection & cold plate

Efficiency: 45%

EMI: MIL-STD-461

MTBF: 70,000 hours

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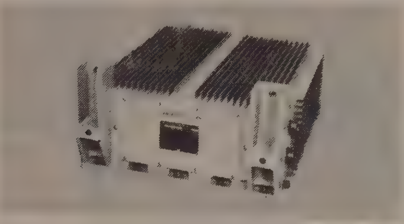
EG&G ALMOND INSTRUMENTS

LEADERSHIP IN MILITARY POWER SUPPLIES

MIL-Q-9858A

REPRESENTATIVE CUSTOM DESIGNS



SHIPBOARD SWITCHING POWER SUPPLY

P/N 5498058

Input Power: 115VAC, 60 or 400Hz, 3 φ
per MIL-STD-1399, Sec. 103, Type I

Outputs	Reg.	Noise
+20VDC @ 2.5a	±1%	3% max.
−20VDC @ 2.5a	±1%	3% max.
+28.5VDC @ 10a	±1%	3% max.
−28.5VDC @ 10a	±1%	3% max.
+30VDC @ 10a	±1.5%	3% max.
−30VDC @ 10a	±1.5%	3% max.
+33VDC @ 10a	±1%	3% max.
+33VDC @ 10a	±1%	3% max.
−33VDC @ 10a	±1%	3% max.

Size: 26 x 21.6 x 9.1 inches

Weight: 185 pounds

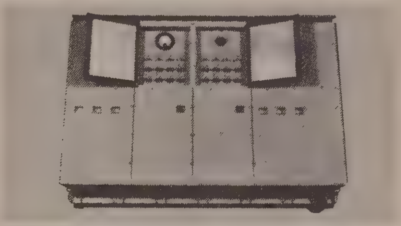
Environment: (MIL-E-16400G(1))
Temp: 0° to 50°C
Humidity: 0 to 95%
Vibration: MIL-STD-167-1
Shock: MIL-STD-901C(1)

Cooling: Conduction/Convection

Efficiency: 75%

EMI: MIL-STD-461A(1)

MTBF: 8,200 hours per MIL-HDBK-217C
(75,000 to 110,000 hours each regulator)



SUBMARINE SWITCHING POWER SUPPLY

P/N 2-14400-01

Input Power: 115VAC, 60Hz, 3φ
per MIL-STD-1399, Sec. 103, Type I

Outputs	Reg.	Noise
5V @ 0 to 80a	±0.1%	75mv
5V @ 0 to 80a	±0.1%	75mv
−28V @ 0 to 2a	±0.4%	300mv
−28V @ 0 to 2a	±0.4%	300mv
+15V @ 0 to 4a	±0.4%	150mv
+15V @ 0 to 4a	±0.4%	150mv
−15V @ 0 to 4a	±0.4%	150mv
−15V @ 0 to 4a	±0.4%	150mv

Size: 49.5 x 35 x 8 inches

Weight: 320 pounds

Environment: (MIL-E-16400)
Temp: −20 to +70°C
Humidity: MIL-STD-810
Vibration: MIL-STD-167-1
Shock: MIL-STD-901C, Class I

Cooling: Conduction/Convection

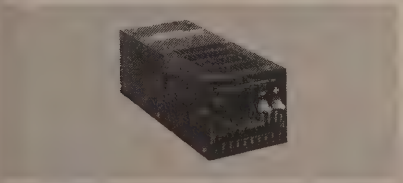
Efficiency: 70%

EMI: MIL-STD-461

MTBF: 20,000 hours per MIL-HDBK-217C
(80,000 hours each regulator)

MTTR: <15 min.

INDUSTRIAL — COMPUTER GRADE — MARINE APPLICATIONS



SINGLE OUTPUT SWITCHING POWER SUPPLY

Input Power: 115/230VAC, 47-63 Hz, 1 φ

Output Power: 5, 12, 15, 18, 24, & 28VDC
(Mainframe output 375 watts)

Size: 12 x 5 x 4.18 inches

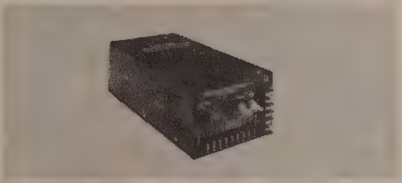
Weight: 8.5 pounds

Environment:
Temp: −10°C to +60°C (No derating)
Vibration: MIL-STD-167 Type I
Shock: MIL-STD-202, Method 213, Cond. A
Non-corrosive construction

Cooling: Internal blower

Efficiency: To 83%

MTBF: Greater than 40,000 hours
Listed under UL-478



DUAL OUTPUT SWITCHING POWER SUPPLY

Input Power: 115/230VAC, 47-63 Hz, 1 φ

Output Power: 5, 12, 15, 18, 24, & 28VDC
(Mainframe output 375 watts)

Size: 12 x 6.12 x 4.18 inches

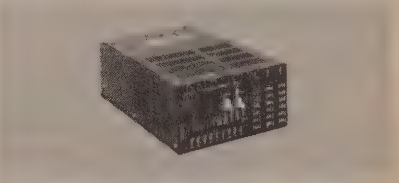
Weight: 10 pounds

Environment:
Temp: −10°C to +60°C (No derating)
Vibration: MIL-STD-167 Type I
Shock: MIL-STD-202, Method 213, Cond. A
Non-corrosive construction

Cooling: Internal blower

Efficiency: To 70%+

MTBF: Greater than 40,000 hours
Listed under UL-478



TRIPLE OR QUAD OUTPUT SWITCHING POWER SUPPLY

Input Power: 115/230VAC. 47-63 Hz, 1 φ

Output Power: 5, 12, 15, 18, 24, & 28VDC
(Mainframe output 375 watts)

Size: 12 x 8.12 x 4.18 inches

Weight: 11.7 pounds

Environment:
Temp: −10°C to +60°C (No derating)
Vibration: MIL-STD-167 Type I
Shock: MIL-STD-202, Method 213, Cond. A
Non-corrosive construction

Cooling: Internal blower

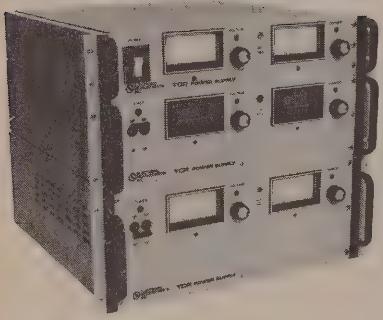
Efficiency: To 70%+

MTBF: Greater than 40,000 hours
Listed under UL-478

1330 E. Cypress St., Covina, CA 91724 • (818) 967-9521 • TWX 910-584-1320

SCR-REGULATED DC POWER SUPPLIES

TCR SERIES SINGLE-PHASE MODELS



MAJOR SPECIFICATIONS

AC input voltage:
105-130V, 47-63 Hz (600, 1000 and 1800W Models)
190-253V, 47-63 Hz (2800W Model) 190-253V
Input options available on 600, 1000 and 1800W Models.

DC output:
Zero to value shown in model designation (volts-phase-amps. See chart.) Regulation 0.1%.

Options:
Over voltage protection $75 (600-1000W units); $95 (1800W unit); $110 (2800W unit); 190-253 volt input (600 and 1000W units) $40; (1800W units) $60. Digital panel meters available at no additional cost.

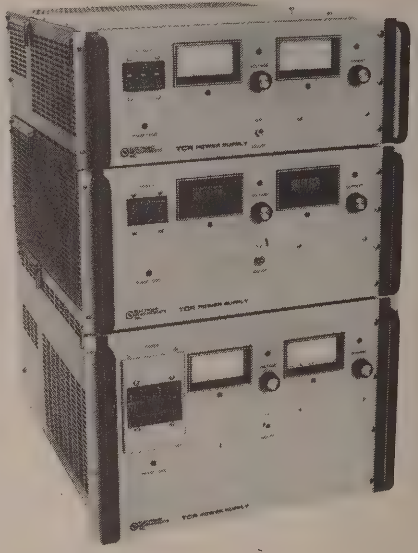
Sizes:
600 and 1000 watt: 3½″ High, 19″ rack by 18½″ Deep
1800 watt: 5¼″ High, 19″ rack by 18½″ Deep
2800 watt: 7″ High, 10″ rack by 18½″ Deep

Model	Ripple mV RMS	* Price
TCR 7.5S70	80	$ 785
TCR 7.5S115	80	985
TCR 7.5S200	80	1350
TCR 7.5S300	80	1650
TCR 10S50	80	785
TCR 10S90	80	985
TCR 10S165	80	1350
TCR 10S240	80	1650
TCR 20S30	80	785
TCR 20S50	80	985
TCR 20S90	80	1350
TCR 20S135	80	1650
TCR 40S15	100	785
TCR 40S25	75	985
TCR 40S45	100	1350
TCR 40S70	100	1650

Model	Ripple mV RMS	* Price
TCR 60S10	120	$ 785
TCR 60S18	75	985
TCR 60S30	90	1350
TCR 60S45	90	1650
TCR 80S8	150	785
TCR 80S13	80	985
TCR 80S23	120	1350
TCR 80S34	100	1650
TCR 150S4	300	785
TCR 150S7	150	985
TCR 150S12	200	1350
TCR 150S18	200	1650
TCR 300S2	500	785
TCR 300S3	250	985
TCR 300S6	300	1350
TCR 300S9	300	1650
TCR 600S1	1000	785
TCR 600S1.6	700	985
TCR 600S3	700	1350
TCR 600S4.5	750	1650

*** ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE**

TCR SERIES THREE-PHASE MODELS



MAJOR SPECIFICATIONS

AC input voltage:
188-242 VAC 3φ 50/60 Hz Standard. Optional nominal inputs 200V, 380V, 415V 440/460/480.

DC output:
Zero to value shown in model designation (volts-phase-amps). See chart. Regulation 0.1%.

Options:
Over voltage protection $190. Optional inputs $200 except 380V, no charge. Digital panel meters available at no additional cost.

Sizes:
2.5 KW: 7″ High, 19″ rack by 23.25 (includes output terminal)
5.0 KW: 8.75″ High, 19″ rack by 23.25 (includes output terminal)
10.0 KW: 12.25″ High, 19″ rack by 24.25 (includes output terminal)

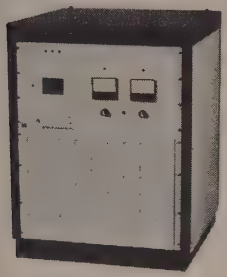
Model	Ripple CV (mV RMS)	* Price
TCR 7.5T300	30	$2295
TCR 6T600	30	2800
TCR 6T900	30	3890
TCR 10T250	35	2295
TCR 10T500	35	2800
TCR 10T750	35	3890
TCR 20T125	20	2295
TCR 20T250	20	2800
TCR 20T500	20	3890
TCR 30T100	15	2295
TCR 30T200	15	2800
TCR 40T60	15	2295
TCR 40T125	15	2800
TCR 40T250	15	3890
TCR 50T200	18	3890

Model	Ripple CV (mV RMS)	* Price
TCR 80T30	25	$2295
TCR 80T60	25	2800
TCR 100T100	40	3890
TCR 120T20	40	2295
TCR 120T40	40	2800
TCR 160T15	60	2295
TCR 160T30	60	2800
TCR 160T60	60	3890
TCR 250T10	90	2295
TCR 250T20	90	2800
TCR 250T40	90	3890
TCR 500T5	125	2295
TCR 500T10	125	2800
TCR 500T20	125	3890

CALL TOLL-FREE: 800-631-4298*

**ELECTRONIC
MEASUREMENTS
INC.**
405 Essex Road, Neptune, New Jersey 07753, Dept. EM
* In NJ, HI, AL and Canada, telephone: 201-922-9300
TELEX: 132-424

EMHP SERIES THREE-PHASE MODELS 20, 30, 60 KILOWATTS



APPLICATIONS

- Electromagnets
- Magnetic beam bending
- Cryogenic magnets
- Precision electroplating
- DC motor power
- Large relay systems
- Inverter power source
- High energy electronic systems
- Electrochemical processes
- High-power illumination systems
- Thermodynamic and thermonuclear research
- Battery charging
- Industrial DC power

FEATURES

- Low cost
- Quick delivery time
- High efficiency
- High performance

MAJOR SPECIFICATIONS

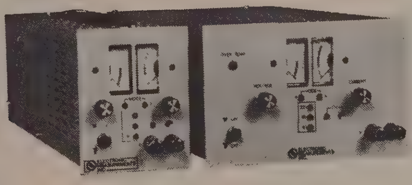
AC Input Voltage: 460 VAC ±10%, 60 Hz. Optional inputs available.

DC Output: Regulation, 0.1%; stability, 0.05%.
Size 1: 30″H x 22¼″W x 27¾″D
Size 2: 34⅝″H x 27½″W x 29¼″D
Size 3: 44½″H x 27½″W x 33¼″D

Model	Voltage (V)	Current (A)	Voltage Ripple (mV rms)	Current Ripple (mA rms)	Typical Price ($)*
SIZE 1 (20 KW maximum)					
EMHP 10-1000	0-10	0-1000	50	5	5750
EMHP 20-750	0-20	0-750	60	2.25	5750
EMHP 30-600	0-30	0-600	70	1.4	5750
EMHP 40-450	0-40	0-450	80	0.9	5750
EMHP 60-300	0-60	0-300	100	0.5	5750
EMHP 80-250	0-80	0-250	120	0.4	5750
EMHP 150-130	0-150	0-130	180	0.2	5750
EMHP 300-60	0-300	0-60	300	0.06	5750
EMHP 600-30	0-600	0-30	400	0.02	5750
SIZE 2 (30 KW maximum)					
EMHP 10-1500	0-10	0-1500	50	7.5	7500
EMHP 20-1000	0-20	0-1000	60	3.0	7500
EMHP 30-800	0-30	0-800	70	2.0	7500
EMHP 40-600	0-40	0-600	80	1.2	7900
EMHP 60-500	0-60	0-300	100	0.8	7900
EMHP 80-375	0-80	0-375	120	0.6	7900
EMHP 150-200	0-150	0-200	180	0.25	7900
EMHP 300-100	0-300	0-100	300	0.10	7900
EMHP 600-50	0-600	0-50	400	0.03	7900
SIZE 3 (60 KW maximum)					
EMHP 10-3000	0-10	0-3000	50	15	13000
EMHP 20-1500	0-20	0-1500	60	4.5	13000
EMHP 30-1250	0-30	0-1250	70	3.0	13000
EMHP 40-1000	0-40	0-1000	80	2.0	13000
EMHP 60-750	0-60	0-750	100	1.3	13000
EMHP 80-600	0-80	0-600	120	0.9	13000
EMHP 150-350	0-150	0-350	180	0.42	14000
EMHP 300-200	0-300	0-200	300	0.20	14000
EMHP 600-100	0-600	0-100	400	0.07	14000

* Each application is priced at time of order. Please consult factory for complete details.

ATR SERIES LINEAR POWER SUPPLIES



ATR-100

ATR-250

FEATURES:

ATR-100 and ATR-250 are 100 and 250 watt, wide range, linear, DC power supplies. Through a unique switching circuit these units produce essentially a constant power output capability at 8V, 18V and 32V outputs so that as the output voltage requirement is lower the available current output is higher. The units are fully metered, programmable and have a self contained OVP circuit.

MAJOR SPECIFICATIONS

AC Input: 105-125V, 47-63 Hz (Optional inputs)

DC Output:	**ATR-100**	**ATR-250**
	0-8V, 0-10A	0-8V, 0-25A
	0-18V, 0-5A	0-18V, 0-13A
	0-32V, 0-3A	0-32V, 0-7A
REGULATION:	**Line**	**Load**
Constant Voltage:	0.01% +2mV	0.01% +3mV
Constant Current:	0.01% +2mA	0.01% +3mA
Ripple:	**Constant Voltage**	**Constant Current**
	1mV RMS	5mA RMS
	5mV P/P	—

Temp Coefficient: 0.02% +400 microV/°C

Operating Temp: 0°C to +40°C at full rating

Storage Temp: −40°C to +85°C

Over Voltage Protection: Adjustable from 2.5V to 36V

Cooling: Fan cooled, thermostatically-protected

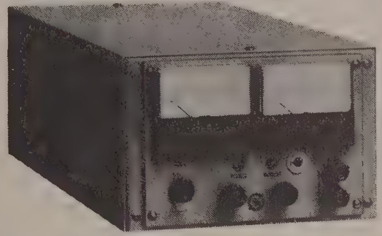
Weight: 18 lbs. (ATR-100); 32 lbs. (ATR-250)

Size: 4″Wx5″Hx18″D (ATR-100); 8″Wx5″Hx18″D (ATR-250)

Rack adapter systems available.

ATR-100: $495* ATR-250: $695*

HCR SERIES DC MODELS — 250 WATTS



MAJOR SPECIFICATIONS

AC Input Voltage: 105-130V, 47-63 Hz or 190-253V, 47-63 Hz. Optional inputs available.

DC Output: Regulation, voltage mode—±0.1%; regulation, current mode — ±0.25%, 8 hours; temperature coefficient — 0.02%/°C.

Weight: 45 lbs.

Size: 5″H x 7⅝″W x 18½″D

Rack Adaptors: Available for 1 & 2 units. Price: $495*

Output Voltage (V)	Output Current (A)	Voltage Ripple (mV rms)	Current Ripple (mA rms)	Model	Price* ($)
0-7.5	0-30	80	450	HCR 7.5-30	495
0-10	0-25	80	275	HCR 10-25	495
0-20	0-13	80	55	HCR 20-13	495
0-30	0-8	90	45	HCR 30-8	495
0-40	0-6	100	27	HCR 40-6	495
0-60	0-4	120	15	HCR 60-4	495
0-80	0-3	150	9	HCR 80-3	495
0-150	0-2	300	3	HCR 150-2	495
0-300	0-0.9	500	1.5	HCR 300-0.9	495

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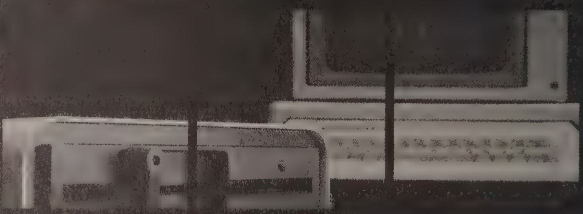
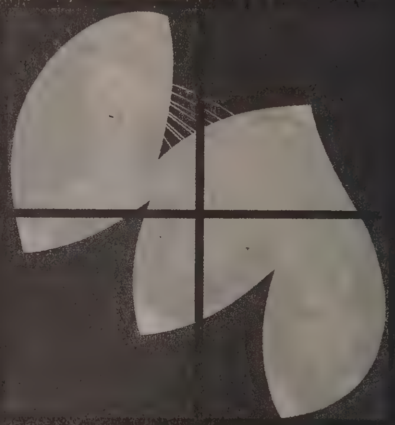
SERVICING YOUR POWER SUPPLY APPLICATIONS WITH A "FREEDOM OF CHOICE"

MASS SERIES



ELPAC



For over 25 years, Elpac has been following the fast-paced technical innovations of the electronic industry by providing components to fit those needs. By constantly evaluating the directions of the marketplace, Elpac has established a wide variety of standard power supplies to fit a multitude of applications, giving the design engineer a "Freedom of Choice."

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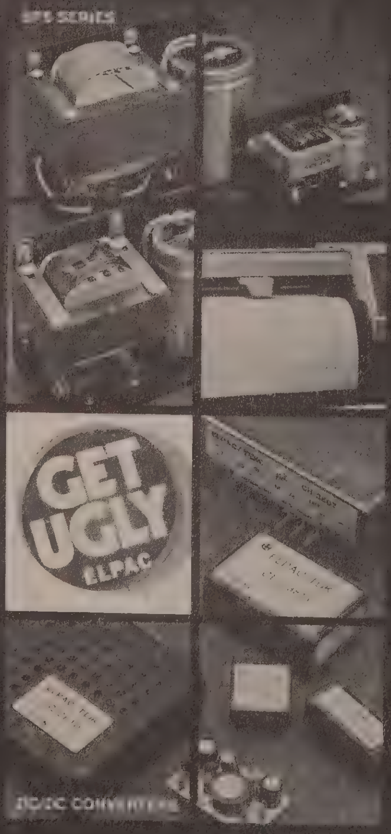
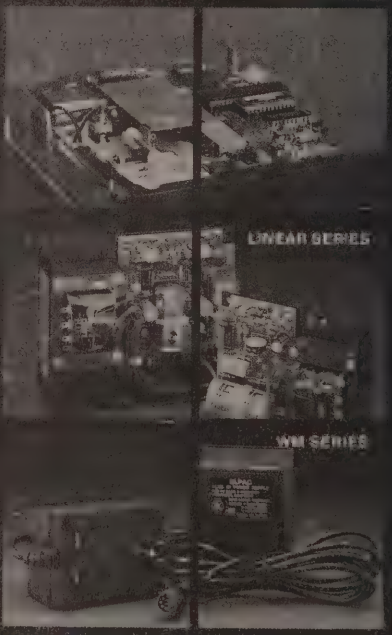
POWER RANGE (WATTS)

PRODUCTS	0-10	10-25	25-50	50-100	100-150	150-200	200-300	300-500	[illegible]
MASS MAGNETIC AMPLIFIER SWITCHER SERIES							●	●	●
ES MODULAR SWITCH-MODE POWER SUPPLIES					●	●	●		●
EL OPEN FRAME SWITCHING POWER SUPPLIES			●	●	●	●			●
TT TABLE TOP LINEARS	●	●							●
WM WALL MOUNT LINEARS	●	●							●
FD DISK POWER SUPPLIES		●	●	●	●				●
MPS MICRO PROCESSOR POWER SUPPLIES		●	●	●	●				●
SOLV SLIM OPEN-FRAME POWER SUPPLIES	●	●	●	●					●
ELV ENCLOSED LOW VOLTAGE POWER SUPPLIES			●	●	●		●		●
OLV OPEN FRAME POWER SUPPLIES		●	●	●	●		●		●
BFS BRUTE FORCE POWER SUPPLIES		●	●	●	●	●	●	●	●
DC/DC CONVERTERS	●								





ELPAC POWER SYSTEMS
A DIVISION OF ELPAC ELECTRONICS, INC.
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Santa Ana, CA 92705
(714) 979-4440 TWX 910-595-1513

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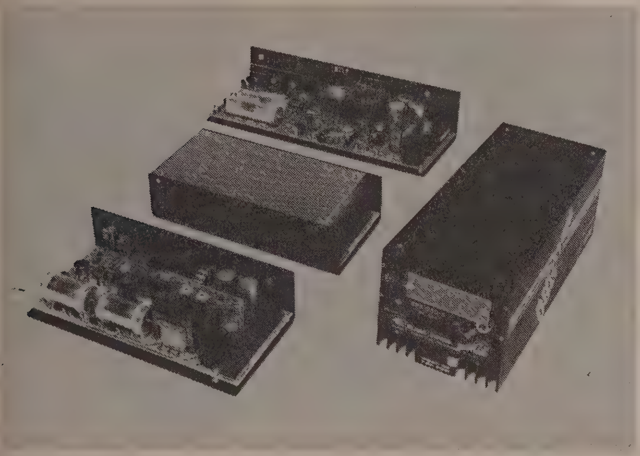
ANOTHER UGLY
Where the beauty is service & performance

ES SERIES SINGLE & MULTIPLE OUTPUT SWITCHERS

ELPAC



FEATURES

- 20KHz Switch Rate
- Soft Start Circuitry
- Low Noise Design
- All Outputs Fully Regulated
- Standard Overvoltage Regulation
- ±0.2% Line & Load Output Regulation on the Main Output

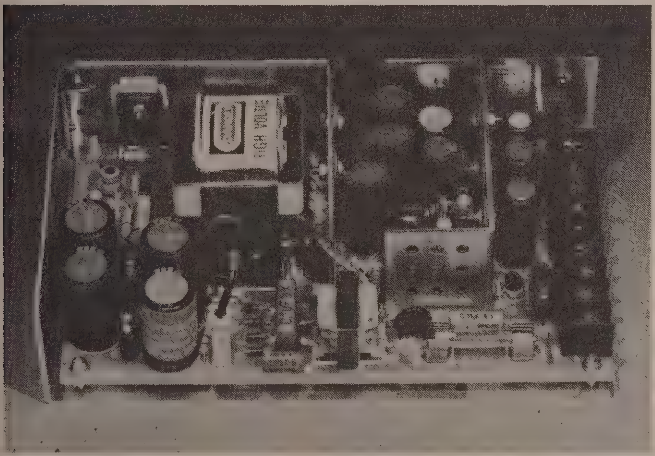
SINGLE OUTPUT

PART NO.	OUTPUT RATING			
	5	12	15	24
ES 100	5v/20A	12v/8A	15v/6.5A	24v/4A
ES 150	5v/30A	12v/12.5A	15v/10A	24v/6A
ES 200	5v/40A	12v/16.5A	15v/13A	24v/8A
EPS 250	5v/50A	12v/20A	15v/16A	24v/10A

MULTIPLE OUTPUTS

PART NO.	OUTPUTS			
	1	2	3	4
ES 130	5v/20A	12v/1.5A	12v/1.5A	5v/0.5A
ES 130	5v/20A	15v/1.2A	15/1.2A	5v/0.5A
ES 260	5v/35A	12v/4A	12/4A	5v/1A
ES 260	5v/35A	15v/3A	15/3A	5v/1A

EL SERIES OPEN FRAME MULTIPLE OUTPUT SWITCHERS



FEATURES

- Disk Based Power
- Power for Winchester Add-on
- Microprocessor Power
- Overload Protection
- Short Circuit Protection on all Outputs
- Rugged Construction
- Full Safety Agency Compatibility

PART NO.	OUTPUTS					POWER (MAX)
	1	2	3	4	5	
EL 30401	5v/2.5A	12v/2A	– 12v/0.1A	—	—	40W
EL 40501	5v/6A	12v/2.5A	– 5v/.5A	– 12v/1.5A	—	50W
EL 40503	5v/6A	12v/2.5A	12v/1A	– 12v/0.5A	—	50W
EL 50751	5v/5A	– 5v/0.5A	12v/2.5A	12v/2A	– 12v/0.5A	75W

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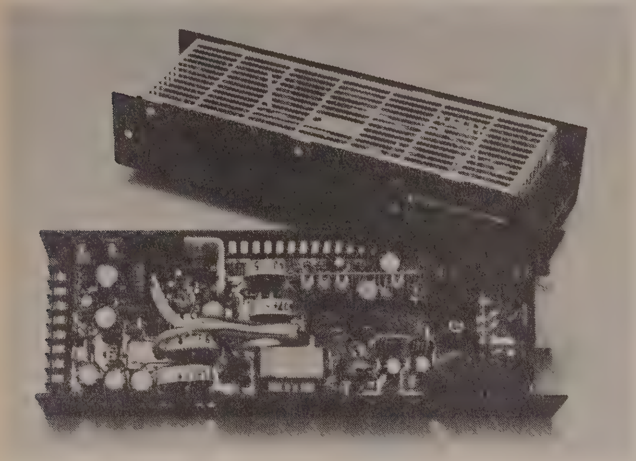
MASS MAGNETIC AMPLIFIER SWITCHER SERIES



ELPAC

FEATURES

- Over 80% Efficiency
- All Outputs Regulated
- Steady State or Peak Power Capability

MASS 300

PART NO.	OUTPUTS				
	1	2	3	4	5
MASS 300-1	5v/25A (30APk)	12v/4A (6APk)	– 12v/4A (6APk)	24v/4A (6APk)	—
MASS 300-2	5v/24A (30APk)	12v/4A (6APk)	– 12v/4A (6APk)	24v/4A (6APk)	– 5v/0.5A
MASS 300-3	5v/25A (30APk)	15v/4A (6APk)	– 15v/4A (6APk)	24v/4A (6APk)	—
MASS 300-4	5v/25A (30APk)	15v/4A (6APk)	– 15v/4A (6APk)	—	—
MASS 300-5	5v/25A (30APk)	12v/4A (6APk)	– 12v/4A (6APk)	28v/4A (6APk)	—
MASS 300-6	5v/35A	12v/6A (8APk)	– 12v/4A (6APk)	SEE NOTE	

NOTE: Minimum Air Flow 50 CFM

MASS 210

PART NO.	OUTPUTS			
	1	2	3	4
MASS 210-1*	5v/15A (20A)**	12v/6A (8APk)	– 12v/1A (1.5A)**	—
MASS 210-2*	5v/15A (20A)**	12v/6A (8APk)	– 12v/1A (1.5A)**	24v/4A (6APk)
MASS 210-3*	5v/15A (20A)**	12v/6A (8APk)	– 12v/1A (1.5A)**	– 5v/.5A (.75A)
MASS 210-4*	5v/15A (20A)**	12v/6A (8APk)	– 12v/1A (1.5A)**	28v/3A (5APk)
MASS 210-5*	5v/15A (20A)**	12v/6A (8APk)	– 12v/1A (1.5A)**	12v/4A (6APk)

* Total Power Available 210 Watts with 50 CFM Air Flow
** Represents Maximum Available Current

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LINEAR REGULATED POWER SUPPLIES

SINGLE & MULTIPLE OUTPUTS OPEN OR ENCLOSED FRAME

ELPAC

FEATURES

- Low Cost
- Remote Voltage Sensing
- Reverse Voltage Protection
- Industry Standard Package
- Overvoltage Protection
- Electrostatically-Shielded Transformer

SINGLE OUTPUT OLV SERIES (OPEN FRAME)

PART NO.	OUTPUT RATING			
	5	12	15	24
OLV 15	5v/3A	12v/1.5A	15v/1.2A	24v/0.75A
OLV 30	5v/6A	12v/4A	15v/3.3A	24v/2A
OLV 60	5v/12A	12v/8A	15v/6.6A	24v/4A
OLV 90	5v/18A	12v/12A	15v/9.8A	24v/8A
OLV 120	5v/24A	12v/16A	15v/13A	24v/8A

SINGLE OUTPUT SOLV SERIES (OPEN FRAME)

PART NO.	OUTPUT RATING				
	5	12	15	24	48
SOLV 6	5v/1.2A	12v/0.6A	15v/0.5A	—	—
SOLV 15	5v/3A	12v/1.5A	15v/1.2A	24v/0.75A	—
SOLV 30	5v/6A	12v/4A	15v/3.3A	24v/2A	48v/1A
SOLV 45	5v/9A	12v/6A	15v/5A	24v/3A	—
SOLV 60	5v/12A	12v/8A	15v/6.6A	24v/4A	48v/2A

SINGLE OUTPUT ELV SERIES (ENCLOSED)

PART NO.	OUTPUT RATING		
	5	12	24
ELV 25	5v/5A	12v/2.6A	24v/1.5A
ELV 75	5v/15A	12v/7A	24v/4A

PART NO.	OUTPUT RATING		
	5	12	24
ELV 125	5v/25A	12v/12A	24v/6A
ELV 250	5v/50A	12v/20A	24v/10.4A

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LINEAR REGULATED POWER SUPPLIES

SINGLE & MULTIPLE OUTPUTS OPEN OR ENCLOSED FRAME

ELPAC

DUAL OUTPUT μPS SERIES (OPEN FRAME)

μPS 14		μPS 18		μPS 21		μPS 30		μPS 60	
OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS	
Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps
5/5	.8/.8	12/12	.7/.7	5/5	3/.8	5/5	3/3	5/12	6/4
5/12	.8/.5	15/15	.5/.5	5/12	3/.5	5/12	3/1.5	12/12	4/4
5/15	.8/.5			5/15	3/.5	5/15	3/1.2	15/15	3.3/3.3
5/24	.8/.25			5/24	3/.25	5/24	3/7.5		
12/12	.5/.5			12/12	1.5/.5	12/12	1.5/1.5		
12/15	.5/.5			12/15	1.5/.5	12/15	1.5/1.2		
15/15	.5/.5			15/15	1.2/.5	15/15	1.2/1.2		

TRIPLE OUTPUT μPS SERIES (OPEN FRAME)

μPS 35/μPS 27		μPS 45		μPS 65		μPS 90		μPS 110	
OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS	
Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps
5/5/12	3/.8/.5	5/5/12	3/3/1.5	5/9/12	6/2/1.5	5/9/12	12/2.0/1.5	5/9/12	18/2.0/1.5
5/12/12	3/.5/.5	5/9/12	3/2/1.5	5/12/12	6/1.5/1.5	5/12/12	12/1.5/1.5	5/12/12	18/1.5/1.5
5/12/15	3/.5/.5	5/12/12	3/1.5/1.5	5/12/15	6/1.5/1.2	5/12/15	12/1.5/1.2	5/12/15	18/1.5/1.2
5/12/24	3/.5/.25	5/12/15	3/1.5/1.2	5/12/24	6/1.5/.75	5/12/24	12/1.5/.75	5/12/24	18/1.5/.75
5/15/15	3/.5/.5	5/12/24	3/1.5/.75	5/15/15	6/1.2/1.2	5/15/15	12/1.2/1.2	5/15/15	18/1.2/1.2

FD SERIES (DISK POWER SUPPLIES)

APPLICATION/ PART NO.		OUTPUTS			
		1	2	3	4
Winchester	FD384	5v/9A	−5vor −12v 0.8A	24v/0.7A (4.5APk)	—
5¼″ Floppy	FD340	5v/0.5A (0.7APk)	12v/0.9A (1.8APk)	—	—
Hard Disk	FD323	5v/2A	12v/4A	—	—
	FD60	5v/6A	12v/3.5A (4.5APk)	—	—

APPLICATION/ PART NO.		OUTPUTS			
		1	2	3	4
8″ Floppy	FD205	5v/1A	−5v/0.5A	24v/1.5A (1.7APk)	—
	FD206	5v/2.5A	−5v/0.5A	24v/3A (3.4APk)	—
	FD162	5v/3A	−5v/0.6A	24v/5A (6APk)	—
PERSCI	FD272	5v/1.7A (2.2APk)	−5v/0.15A (0.2APk)	24v/0.2A (3APk)	7-10v Unreg. (1.2A-10APk)

DC/DC CONVERTERS

CC SERIES (250 MW)		
5 Volt Input		
	OUTPUT CURRENT	
CC3801	+12V	21ma
CC3802	+15V	17ma
CC3852	−12V	21ma
CC3853	−15V	17ma

CA SERIES (200 MW)					
+3 to 7 Volts Input			−3 to 7 Volts Input		
	OUTPUT CURRENT			OUTPUT CURRENT	
CA3708	+12V	15ma	CA3722	−12V	15ma
CA3709	+15V	13ma	CA3725	−15V	13ma

CB SERIES (300 MW)		
5 Volt Input		
	OUTPUT CURRENT	
CB3801	+12V	25ma
CB3811	−12V	25ma
CB3802	+15V	20ma
CB3812	−15V	20ma

CL SERIES (1.5 Watt)		
5 Volt Input		
	OUTPUT CURRENT	
CL3801	+12V	125ma
CL3811	−12V	125ma
CL3802	+15V	100ma
CL3812	−15V	100ma

CP SERIES (1.5 Watt)		
5 Volt Input		
	OUTPUT CURRENT	
CP3601	5V	250ma
CP3607	12V	150ma

CK SERIES (3 Watt)		
5 Volt Input		
	OUTPUT CURRENT	
CK3601	5V	600ma
CK3607	12V	250ma
CK3610	15V	200ma

CP SERIES (Dual 1.5 Watt)		
5 Volt Input		
	OUTPUT CURRENT	
CP4601	±12V	2×60ma
CP4604	±15V	2×50ma

GET UGLY ELPAC

ELPAC POWER SYSTEMS • 714/979-4440

3131 S. STANDARD AV. / SANTA ANA, CA. 92705 / (714) 979-4440 / TWX 910-595-1513

ELPAC

WM SERIES
LOW POWER MULTIPLE OUTPUT WALL MOUNT LINEAR POWER SUPPLIES

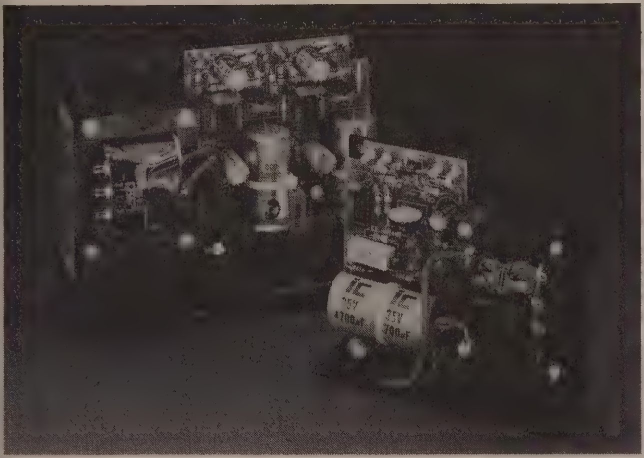
FEATURES

- Compatible with Microprocessor Requirements
- UL 1310 Listed
- Includes 6-foot DC output Cable
- 20 Millivolts (max) Output Ripple
- Din Type Output Connector (optional panel mount or PCB mount)

PART NO.	OUTPUTS		
	1	2	3
WM053	5v/380MA	– 5v/180MA	12v/180MA
WM063	5v/380MA	– 12v/180MA	12v/180MA
WMO93	5v/860MA	– 5v/300MA	12v/300MA

PART NO.	OUTPUTS		
	1	2	3
WM113	5v/860MA	– 12v/300MA	12v/300MA
WM220	5v/2A	12v/0.5A	– 12v/0.5A

BFS SERIES UNREGULATED POWER SUPPLIES



FEATURES

- Isolated Outputs for Positive or Negative Operation
- Full Rated Output from 0 to + 55 C
- Standard BFS has 104-125 VAC/47-440 Hz Input
- New Universal BFS Series has 100/110/120/200/220/230 & 240 VAC Inputs
- All have an Electrostatically Shielded Transformer

SINGLE OUTPUT (FOR THE UNIVERSAL BFS ADD U TO THE PART NUMBER)

BFS 15		BFS 30		BFS 60		BFS 100		BFS 200		BFS 500	
OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS		OUTPUT RATINGS	
Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps	Volts	Amps
7	1.8	7	3.0	7	6.0	7	10.0	7	20.0		
12	1.2	12	2.4	12	4.8	12	7.0	12	15.0		
16	0.9	16	1.8	16	3.6	16	6.0	16	12.5		
24	0.6	24	1.2	24	2.4	24	3.5	24	7.5	24	20
48	0.3	48	0.6	48	1.2	48	1.8	48	4.0	48	10

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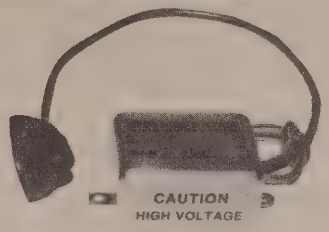
EMCO High Voltage Co.

POWER SUPPLIES CUSTOM / STANDARD

MINIATURE C.R.T. 12,000 VOLTS

$45.00

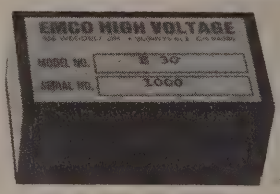


HIGH VOLTAGE OUTPUT: +12.000 Volts DC @ 50 UA
OUTPUT NO. 2: +400 Volts @ 500UA (±10%)
OUTPUT NO. 3: −100 Volts @ 500UA (±10%)
REGULATION: Output Tracks Input Voltage (5% @ 5UA)
RIPPLE: 0.05% CL=500PF
INPUT VOLTAGE: +15 Volts DC
SIZE 1.25" X 2.0" X 2.5"
* OTHER INPUTS AND OUTPUTS ARE AVAILABLE

MODEL 350

P.C. MOUNT DC/DC CONVERTERS

$33.00



INPUT VOLTAGE: 4 thru 12 Volts DC
OUTPUT VOLTAGE: 500 thru 1.500 Volts DC @ 2MA
RIPPLE: .05% PK to PK
REGULATION: Output Proportional to Input
* PLUS and MINUS INUPT/OUTPUT
* INPUT/OUTPUT ISOLATION: 3.500 Volts
* RFI FILTERING
* SHORT CIRCUIT PROTECTION
* FLOATING INPUT/OUTPUT
SIZE: 2.5" X 1.5" X .85"

MODEL E15

PRECISION COLOR CRT

$125.00

HIGH VOLTAGE OUTPUT: +25.000 Volts DC @ 1.5MA
Adjustment Range: ±300 Volts
REGULATION: Line — .05%
Load — (Static) 0.1%
Load — (Dynamic) 0.1%/100UA
RIPPLE: 0.1% (P-P) CL=1000PF
TEMP. COEFFICIENT: 200 PPM/°C
FOCUS VOLTAGE: Adjustable from 22% to 36% of Anode Voltage @ ±20UA
G1 VOLTAGE: Fixed — 120 Volts DC ±10% @ 1MA
G2 VOLTAGE: Adjustable from 0 to 750 Volts DC ±10% @ ±20UA
INPUT VOLTAGE: +28 Volts DC ±10%
SIZE: 5.1" X 4.2" X 1.7"
* SHORT CIRCUIT PROTECTION
* ARC OVER AND OVER VOLTAGE PROTECTED
* EXCELLENT DYNAMIC RESPONSE AND STABLE PERFORMANCE

MODEL EHV

REGULATED 18,000 VOLTS

$59.00

HIGH VOLTAGE

OUTPUT VOLTAGE: +18.000 Volts DC @ 500UA
(Adjustable ±5%)
REGULATION: Line — .05%
Load (Static) — .05%
Load (Dynamic) — 5 Volts @ 100UA
RIPPLE: .05% (P-P) CL=1000PF
OUTPUT NO. 2: +1.000 Volts DC @ 1MA
OUTPUT NO. 3: −100 Volts DC @ 5MA
INPUT VOLTAGE: +24 Volts DC
INPUT REGULATION: .005%
SIZE: 4.2" X 3.1" X 1.2"
* OVERVOLTAGE PROTECTION
* SHUTDOWN CONTROL CIRCUIT
* FULLY ENCAPSULATED

MODEL EHT

APPLICATIONS

X-Ray
Photomultiplier
Video
Computer
Capacitor Charging
Electronic Accelerator
Sem-ion Sources
Image Intensifiers
Cad/Cam
Shadow Mask
CRT
Laser
Medical
Airborne Navigation
Marine Navigation
Military Equipment
Energy Storage

CAPABILITIES

OUTPUTS: +5 Volts thru +30,000 Volts DC

CURRENT: Up to 10 AMPS

INPUTS: +5 to +40 Volts DC
110/220 Volts AC 50-400 HZ

REGULATION, RIPPLE & NOISE: .001%

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Custom Designs with your Custom Specifications

One Year Warranty/Full Technical Service Department

EMCO • 556 Weddell Dr. • Sunnyvale • CA 94089 • (408) 734-9123

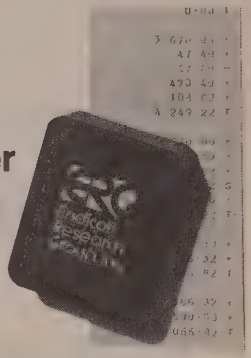
ALL PRICES SHOWN ARE FOR O.E.M. QTY.

DC-DC Converters

for power on the P.C. board up to 25W

ERG inc.
E1200 Series
ERG inc.
E900 Series
ERG inc.
E1600 Series
ERG inc.
E700R Series
ERG inc.
E700U Series
ERG inc.
E500 Series
Made in U.S.A.

ERG converter savings add up!



Ideal for any end-use where up to 25W is needed from battery or other low-voltage source. No reason to design "special" multiple output power supplies for your unique application! Mount up to 4.2W per cu. in. on your P.C. board. Operating efficiencies to 85%. For as little as $1/W! We'll **transform** the way you look at DC-DC conversion!

- Adapts single output on main DC switched mode power supply into additional outputs as needed–no more than you need, no less than you want.
- Eliminates extensive bussing of alternate voltages throughout main frame of the end-product.
- Easily added on to existing designs when new capabilities and new voltage needs are anticipated.
- You don't pay for regulation when you don't need it.
- The **flexibility** of custom with the **economy** of standard.

Match our converter to your power need

Your Power Requirements	ERG Converter Series	Options	Input	Output†	Size	Weight	Package
Up to 3W	E700	Single, center tap (± voltages) Unregulated, regulated (single output only)	5,9,12,15 V DC standard (to 48 available)	5-1000 V DC (your choice)	unregulated: 1.1" (27.94 mm) × 1.2" (30.48 mm) × .91" (23.11 mm) high regulated: 1.43" (36.32 mm) × 1.50" (38.10 mm) × 1.03" (26.16 mm) high	30 gms. unregulated 40 gms. regulated	Plastic
	E500*	Single, center tap (± voltages)	5,9,12,15 V DC standard (to 48 available)	5-500 V DC (your choice)	1.00" (25.40 mm) × 1.38" (35.05 mm) × 0.70" (17.78 mm) high	20 gms.	Plastic
Up to 6W	E1600	Center tap (± voltages) available	5,9,12,15 V DC standard (to 48 available)	5-500 V DC (your choice)	1.30" (33.02 mm) × 1.88" (47.75 mm) × .82" (20.83 mm) high	44 gms.	Plastic
Up to 12W	E900	Dual output	5,12,15 V DC standard (to 48 available)	5-500 V DC (your choice)	2" (50.80 mm) × 2.5" (63.50 mm) × .95" (24.13 mm) high	122 gms.	Aluminum
Up to 25W	E1200	Single output only	12,15 V DC standard (others available)	5-500 V DC (your choice)	2" (50.80 mm) × 2.5" (63.50 mm) × 1.19" (30.23 mm)	185 gms.	Aluminum

*For high-volume requirements, E500 delivers same performance as E700 at significantly lower unit cost!
Mounting: P.C. board standard
Encapsulation: All ERG converters are fully encapsulated
Isolation (in/out): 600V RMS (60 Hz. breakdown for 1 min.) standard
Temperature: 0–70° C. standard. Wider ranges available. 85° C. case max. 25° C. temp. rise typical for E1200
†Output power may be derated up to 50%, dependent on output voltage, output current and temperature.
All specifications subject to change without notice.

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INSIDE THE BACK COVER OF
VOLUMES 1A, 1B & 2

EPSCO

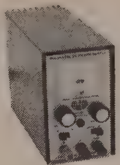
REGULATED & SEMI-REGULATED POWER SUPPLIES

Ruggedly-constructed, low voltage D.C. power supplies for use in design, development, testing of transistor circuitry . . . for servicing and operating auto, aircraft, marine-craft radio, electronic equipment . . . for production line testing, industrial and educational laboratory work and many other applications.

Precision made and engineered to give unequalled performance life per dollar. Features include: Voltage regulation, AC ripple filtering, adjustable output voltage, large easy-to-read meters, isolated output terminals, 1-year warranty.

INPUT—*Regulated Models:* 105-125 V. AC. 60 Hz *Industrial and General Purpose Models:* 117 V. AC 60 Hz. Models available to fit W.E. and EIA racks. Custom-design or modification of standard units to your specs.

INVERTER — Transistorized. Converts 12 V. DC to 117 V. AC, 60 Hz to operate equipment from car, truck or boat battery, or other 12 V. DC source for camping, traveling, boating. Reverse polarity and short circuit protection.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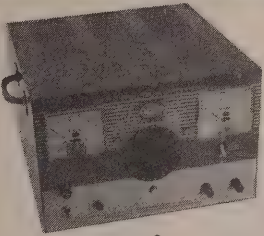
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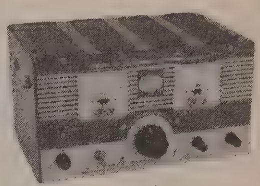
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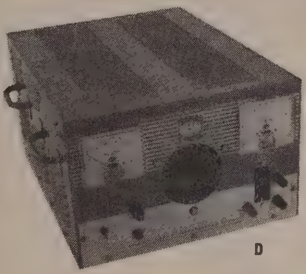
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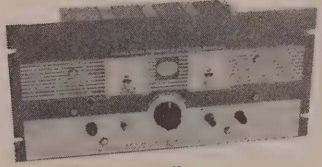
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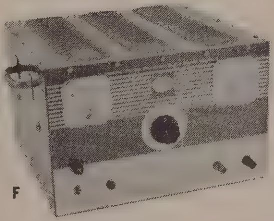
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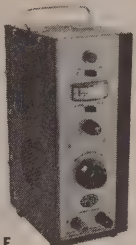
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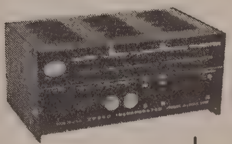
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REGULATED

Model	Figure	Output		Line Reg.**	Load Reg.*	Max. Ripple, RMS	Meters††	DC Imp. Ohms*	Size (H x W x C)	Wt. Lbs.	Net Price
		DC Volts	Current								
PSR-12-25	A	0-25	0-500mA	0.01% +2mV	0.01%	100μV	0-30V/600mA	.006	5¼ x 3⅛ x 9⅛	6	$214.50
PSR-12-50	A	0-50	0-250mA	0.01% +2mV	0.01%	100μV	0-60V/300mA	.02	5¼ x 3⅛ x 9⅛	6	214.50

INDUSTRIAL

Model	Figure	Output		Load Regulation* (V/A)†	Max. Ripple %	Meters††	DC Impedance Ohms*	Size (H x W x D)	Wt. Lbs.	Net Price
		DC Voltage	Amps.							
EF	B	0-28 0-14	0-5 0-5	0.9 (1-5A) 0.6 (1-5A)	1.0 1.0	0-50V, 0-6A	0.9 (1-5A) 0.6 (1-5A)	7 x 12 x 8½	21	$272.50
EFB	B	0-32 0-16	0-4 0-8	1.25 1.0	0.1 0.1	0-40/20V, 0-10A	1.25 1.0	7 x 12 x 8½	26	309.50
EFBR‡		0-32 0-16	0-4 0-8	1.25 1.0	0.1 0.1	0-40/20V, 0-10A	1.25 1.0	8¾ x 19 x 8½	34	355.50
GFL	C	0-125	0-5	1.5	0.5	0-150V, 0-5A	1.5	9¾ x 14¼ x 14¼	88	669.50
GFLR‡	H	0-125	0-5	1.5	0.5	0-150V, 0-5A	1.5	10½ x 19 x 14¼	100	729.50
NFB	C	0-32	0-15	0.4	0.75	0-50V, 0-25A	0.4	9¾ x 14¼ x 14¼	84	619.50
NFBR‡	H	0-32	0-15	0.4	0.75	0-50V, 0-25A	0.4	10½ x 19 x 14¼	97	659.50
PS-5	C	0-55	0-10	0.8	0.5	0-75V, 0-15A	0.7	9¾ x 14¼ x 14¼	70	589.50
PS-5R‡	H	0-55	0-10	0.8	0.5	0-75V, 0-15A	0.7	10½ x 19 x 14¼	89	639.50
PS-1000-32	D	0-32	0-30	0.2	0.75	0-50V, 0-30A	0.2	9¾ x 14¼ x 19¼	113	869.50
PS-1000-55	D	0-55	0-20	0.5	0.5	0-75V, 0-30A	0.5	9¾ x 14¼ x 19¼	113	869.50
PS-1000-125	D	0-125	0-8A	1.0	Less than 1%	0-150V, 0-10A	1.0	9¾ x 14¼ x 19¼	113	869.50

GENERAL PURPOSE

D-612T	B	0-16 0-8	0-10 0-10	0.44 (3-10A) 0.3 (3-10A)	0.5 @ 5A 2 @ 10A	0-20V, 0-10A	0.44 (3-10A) 0.3 (3-10A)	7 x 12 x 8½	20	$208.50
H	B	12 (adj.) 6 (adj.)	0-10 0-20	0.23 (3-10A) 0.15 (3-20A)	5 5	0-20V, 0-30A	0.23 (3-10A) 0.15 (3-20A)	7 x 12 x 8½	30	232.50
EC-1	E	12 (adj.)	0-5	1.4	0.5	None	1.4	10¾ x 4⅜ x 6½	11	98.50
EC-2	E	0-16	0-5	1.8	0.5	0-20V, 10A	1.8	10¾ x 4⅜ x 6½	11	155.50
PS-30	F	12 (adj.)	0-30	0.12 (6-30A)	1	0-20V, 0-50A	0.27	9¾ x 14¼ x 14¼	68	465.50
PS-50	F	12 (adj.)	0-50	0.17	0.5	0-20V, 0-50A	0.17	9¾ x 14¼ x 19¼	106	629.50
3301		0-16 DC 0-20 AC	0-3 0-3	1.8 (1-3A)	.5	0-20V, 0-3A DC 0-20V, 0-3A AC	1.8 DC 0.5 AC	4¾ x 10¾ x 6½	12	179.50

INVERTER

TI250B	J	**Input:** 12 vdc. **Output:** 117 vac, 60 Hz, 250 **VA** max. **Voltage Regulation:** 15% max. no load to full load constant battery voltage. **Frequency Regulation:** 4 Hz max. no load to full load.	4½ x 10 x 7½	13	$174 50

‡Rack mounted version.
*No-load to full-load unless otherwise specified.

†Output voltage change for each ampere of output current change, except on regulated units, % applies for either line or load.
††All 2% accuracy except 5% for general purpose units. Rectifiers: Selenium and Silicon ("avalanche" characteristics on Industrial units).
**From 105-125 VAC.

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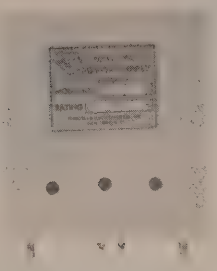
FIXED VOLTAGE MODULES — REGULATED



HV-250
250V @ 40ma
Case: 3 1/16"x2⅝"x3½"
Price $75

Input volts — 115 v.a.c.; single d.c. reg. output voltage; MIL-T-27 case; 4-pin connector; hooked pins; studs for fastening to chassis.

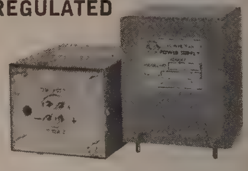
Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
ML-5	5	150	.5	.2	EB	$40
E-5	5	250	.3	.01	FB	45
EH-5	5	500	.5	.1	GB	50
EHC-5	5	1a	.5	.2	HB	65
ELC-5	5	2a	.5	.2	JB	70
EMC-5	5	3a	.8	.8	JB	75
ML-6	6	125	.5	.1	EB	40
E-6	6	200	.3	.01	FB	45
EH-6	6	450	.3	.1	GB	50
EHC-6	6	900	.5	.2	HB	65
ELC-6	6	1.8a	.5	.2	JB	70
EMC-6	6	2.5	1.0	.3	JB	75
ML-10	10	100	.5	.1	EB	45
E-10	10	175	.2	.1	FB	50
EH-10	10	350	.2	.3	GB	55
EHC-10	10	600	.5	.2	HB	67
ELC-10	10	1.2a	.5	.2	JB	72
EMC-10	10	1.6	1.0	.3	JB	75
ML-12	12	100	.5	.2	EB	40
E-12	12	150	.2	.2	FB	45
EH-12	12	325	.2	.1	GB	50
EHC-12	12	550	.5	.2	HB	65
ELC-12	12	1.1a	.5	.2	JB	70
EMC-12	12	1.5	1.0	.3	JB	75
ML-15	15	80	1.0	.2	EB	40
E-15	15	150	.2	.05	FB	45
EH-15	15	300	.2	.1	GB	50
EHC-15	15	500	.5	.2	HB	65
ELC-15	15	1.0a	.5	.2	JB	75
ML-20	20	75	1.0	.2	EB	45
E-20	20	120	.2	.1	FB	50
EH-20	20	250	.2	.1	GB	55
EHC-20	20	450	.5	.2	HB	67
ELC-20	20	900	.5	.2	JB	72
ML-24	24	65	1.0	.2	EB	40
E-24	24	120	.2	.1	FB	45
EH-24	24	225	.2	.1	GB	50
EHC-24	24	400	.2	.1	HB	65
ELC-24	24	800	.5	.2	JB	75
ML-28	28	50	1.0	.2	EB	45
E-28	28	120	.2	.1	FB	50
EH-28	28	200	.2	.1	GB	55
EHC-28	28	300	.2	.1	HB	67
ELC-28	28	700	.5	.1	JB	72

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
ML-30	30	50ma	1.0	.1	EB	$45
E-30	30	100	.3	.01	GB	50
EH-30	30	200	.2	.1	GB	55
EHC-30	30	275	.2	.1	HB	67
ELC-30	30	600	.5	.1	JB	72
M-35	35	40	1.5	.15	EB	50
M-40	40	40	1.5	.22	EB	50
M-45	45	35	1.5	.2	EB	50
MC-45	45	100	1.5	.1	HB	60
M-50	50	40	1.5	.2	EB	50
HV-50	50	100	1.5	.2	GB	60
M-60	60	35	1.5	.2	EB	50
HV-60	60	80	1.5	.15	GB	60
HVA-60	60	120	1.5	.20	JB	75
M-75	75	30	1.5	.2	EB	50
HV-75	75	60	1.3	.1	GB	65
M-100	100	4	1.5	.1	EB	50
HM-100	100	10	1	.05	GB	60
HV-100	100	60	1.5	.1	GB	70
HVA-100	100	100	1.5	.20	JB	80
HM-120	120	10	1.5	.1	GB	65
HV-120	120	55	1.3	.12	HB	75
HM-150	150	8	1	.05	GB	60
HV-150	150	40	1	.1	HB	75
HVA-150	150	80	1.5	.2	JB	85
HM-175	175	10	1.5	.1	GB	65
HV-175	175	40	1.2	.12	HB	75
M-200	200	2	1.5	.1	EB	50
HM-200	200	10	1.0	.01	GB	60
HV-200	200	40	1.3	.12	HB	75
HVA-200	200	100	1.5	.20	JB	90
HM-250	250	6	1	.05	GB	60
HV-250	250	40	1.5	.05	JB	75
HV-250A	250	40	1.6	.05	HA	76
HVA-250	250	80	1.5	.20	JB	90
HM-300	300	5	1	.05	GB	60
HV-300	300	35	1.5	.1	JB	80
HV-300A	300	35	1.6	.2	HB	81
HVA-300	300	70	1.5	.2	JB	90
HM-400	400	4	1	.05	GB	65
HV-400	400	20	1.5	.2	JB	80
HV-400A	400	20	1.5	.2	HB	81
HVA-400	400	40	1.5	.2	JB	90
HM-500	500	4	1	.05	GB	65
HV-500	500	15	1.5	.2	JB	85
HV-500A	500	15	1.6	.3	HA	86
HVA-500	500	30	1.5	.2	JB	90
HM-750	750	2	1	.1	HB	75
HV-750	750	8.5	1.2	.3	JB	95
HVE-750	750	12	1.2	.3	JB	100
HM-1000	1000	1	1	.1	HB	75
HV-1000	1000	5	1.3	.3	JB	95
HVE-1000	1000	8	1.3	.3	JB	110

Units with voltage values in between those shown above are available. Add $5 to the prices shown above. Units with 220VAC inputs are available for an additional charge of $10.

ADJUSTABLE OUTPUT MODULES

REGULATED



MV-12
11 to 13V
@ 200ma
2¾"x2⅜"x2 13/16"
$65 ea.

Input volts — 115VAC; adjustable output voltage thru control on stud side of case; 4-pin connector.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
MV-5	4.5-5.5	200ma	.7	.1	GB	$72
MCS-5	4.5-5.5	450	.8	.1	HB	77
HCV-5	4.5-5.5	1a	.4	.2	JB	82
MV-6	5.8-7	200	.6	.2	GB	65
MCS-6	5.8-7	450	.8	.3	HB	70
HCV-6	5.5-6.8	1a	.4	.2	JB	75
MV-10	9-12	200	.4	.03	GB	65
MCS-10	9-11	450	.5	.1	HB	70
HCV-10	8.5-11.8	1a	.4	.1	JB	75
MV-12	11-13	200	.2	.025	GB	65
MCS-12	11-13	400	.5	.05	HB	70
HCV-12	11-14	1a	.4	.05	JB	75
MV-15	14-16	200	.5	.03	GB	65
MCS-15	14-16	350	.5	.05	HB	70
HCV-15	14-18	800	.4	.1	JB	75
MV-20	19-22	180	.5	.03	HB	65
MCS-20	19-22	350	.5	.05	HB	70
HCV-20	18-22	700	.4	.3	JB	75
MV-24	23-26	180	.5	.04	GB	68
MCS-24	23-26	350	.5	.05	HB	72
HCV-24	23-26	700	.4	.3	JB	76
MV-28	27-29	150	.5	.04	GB	68
MCS-28	27-29	300	.4	.04	HB	72
HCV-28	26.5-29	600	.25	.3	JB	76
MV-30	28-32	150	.5	.04	GB	68
MCS-30	28-32	300	.4	.04	HB	72
HCV-30	29-31	500	.3	.3	JB	76
MCV-50	45-55	15	.8	.3	HB	75
MCV-100	95-105	14	.8	.3	HB	80
MCV-150	147-154	12	.8	.3	HB	80
MCV-200	195-204	10	.8	.3	HB	85

MIL-SPEC MODULES

Meets MIL-E-5272C; Temperature −65°C to +75°C. All power supplies described on this page may be militarized. Below are representative units.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
ME-5	5	250ma	.5	.01	FB	$150
MEH-12	12	325	.3	1	GB	140
MAS-15	15, 15	15	.6	0.1	GB	100
MSM-24	24	10	.4	0.06	SMF	110
MELC-28	28	.6a	.4	.6	JB	190

CASE DIMENSIONS

	L	W	H		L	W	H
EB	1 15/16	1 13/16	2 7/16	HA	3 1/16	2⅝	4¼
FB	2 5/16	2 1/16	2½	HB	3 1/16	2⅝	3 3/16
GA	2¾	2⅜	2 13/16	JA	3 9/16	3 1/16	4⅞
GB	2¾	2⅜	2 13/16	JB	3 9/16	3 1/16	3⅞

ALL LINEAR POWER SUPPLIES — NO NOISE — NO EMI — STABLE FOR YEARS & YEARS

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OUR 26th YEAR MAKING FINE POWER SUPPLIES

FERROTRAN

SOLID STATE POWER SUPPLY MODULES

AC TO DC REGULATED POWERTRAN POWER SUPPLY MODULES GUARANTEED FOR 3 YEARS.

FERROTRAN SUBMINIATURE MODELS

SML & SMF SERIES

SML-15
15V @ 60ma
Case: 3″x1¼″x1³⁄₁₆″
$50 ea.

115VAC In 220VAC In

Input volts — 115VAC; 4-pin connector; fastens to chassis with 2 ea. 4-40 screws going into 2 ea. blind inserts.

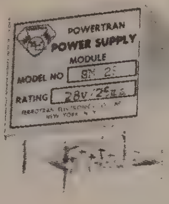
Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Price
SML-5	5	125ma	.5	.10	$50
SML-6	6	100	.5	.10	50
SML-10	10	80	.5	.20	55
SML-12	12	65	.5	.20	50
SML-15	15	60	.8	.20	50
SML-20	20	55	.5	.20	55
SML-24	24	50	.8	.30	50
SML-28	28	45	.8	.30	55
SML-30	30	40	.8	.30	55
SMF-50	50	15	1.5	.20	55
SMF-70	70	10	1.2	.10	55
SMF-100	100	4	1.5	.20	58
SMF-150	150	3	1.0	.10	58
SMF-200	200	3	1.0	.10	58
SMF-250	250	3	1.0	.10	60
SMF-300	300	3	1.0	.10	60
SMF-400	400	3	1	.1	65
SMF-500	500	3	1	.1	70
SMF-750	750	2	1	.1	70
SMF-1000	1000	1	1	.1	75

SMF-400, SMF-500 } 3″x1¼″x1½″ SMF-750, SMF-1000 } 2⅜″x1¹⁵⁄₁₆″x1⅞″

This series also available with a 220VAC input case: 3″ x 1¼″ x 1½″. Add $10 to prices shown above. Order as SML-5-2, SML-6-2, etc.

Available with printed circuit pins. Order as SML-5-PC, SML-6-PC, etc. No additional charge.

SM SERIES



SM-28
$55

Case; 1⅝″ x 1⅞″ x 1⅝″; Mounts on a chassis with 4 ea. 6-32 studs. ⅝″ diam. connector in cover. 4 pin connector. Input volts — 115VAC.

Specifications and prices are the same as for SML and SMF units. i.e.; SM-28 corresponds to SML-28; price $55.; only difference is case style.

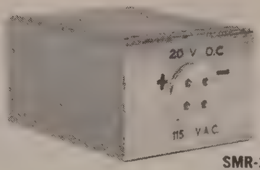
NEW!!

SMR — DUAL OUTPUT

Same case style as SMR units but with 2 ea. isolated outputs which are floating; input volts — 115VAC.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Price
SMMR-5	5, 5	150	.5	.2	$65
SMMR-6	6, 6	140	.4	.2	65
SMMR-10	10, 10	130	.3	.3	70
SMMR-12	12, 12	120	.3	.2	65
SMMR-15	15, 15	100	.3	.1	65
SMMR-20	20, 20	80	.3	.1	70
SMMR-24	24, 24	80	.3	.1	65
SMMR-28	28, 28	75	1.0	.1	70
SMMR-30	30, 30	75	1.0	.1	70

SMR — SERIES



SMR-20
$60

NEW!!

Input volts — 115VAC; mounts on a chassis with 2 ea. 4-40 screws going into 2 ea. blind inserts. Case: 2⁷⁄₁₆″ x 1¹⁵⁄₁₆″ x 1⅜″; 4 pin connector.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Price
SMR-5	5	300 ma	1.4	.2	$55
SMR-6	6	300	1.4	.2	55
SMR-10	10	275	1.3	.2	60
SMR-12	12	250	1.2	.1	55
SMR-15	15	225	1.2	.1	55
SMR-20	20	200	1.2	.1	60
SMR-24	24	175	1.4	.1	55
SMR-28	28	150	1.3	.1	60
SMR-30	30	140	1.4	.1	60
SMR-50	50	50	1.5	.1	60
SMR-100	100	20	1.5	.1	60
SMR-150	150	15	1.5	.1	65
SMR-200	200	12	1.5	.1	65
SMR-250	250	10	1.5	.1	65
SMR-300	300	8	1.5	.1	65

NEW!! MINIATURE MODULES

Input volts — 115VAC; single DC regulated output voltage; 4-pin connector; hooked pins; fastened to chassis with 2 blind inserts;

Model	DC Volts	DC Current	% Reg.	% Rip.	Price
EJ-5	5	500ma	1.0	.3	$60
EJ-6	6	400	1.0	.3	60
EJ-10	10	350	1.0	.2	64
EJ-12	12	300	1.0	.2	60
EJ-1	15	250	1.0	.2	60
EJ-20	20	225	1.0	.2	64
EJ-24	24	200	1.0	.2	60

Case Size: 2⅜″x 1¹⁵⁄₁₆″x11⅞″. Case similar in shape to SMF units shown above.

Model	DC Volts	DC Current	% Reg.	% Rip.	Price
EJ-28	28	175ma	1.0	.2	$60
EJ-30	30	160	1.0	.2	60
EJ-40	40	120	1.2	.3	65
EJ-50	50	80	1.5	.4	65
EJ-75	75	50	1.5	.2	70
EJ-100	100	25	2.0	.25	70
EJ-120	120	22	2.0	.25	70
EJ-150	150	20	2.5	.25	70
EJ-175	175	20	2.0	.25	70
EJ-200	200	20	2.0	.25	70

UNREGULATED MODULES:

Input volts — 115VAC; MIL-T-27 case; 4 pin connector.

Model	D.C. Volts	D.C. Current	Case	Price
SU-100	100	.2	HA	$40
SU-120A	120	.2	HA	40
SU-150	150	.1	HA	34
SU-200A	200	.09	HB	40
SU-250	250	.065	HB	40
SU-300	300	.06	HB	55
SU-400	400	.06	HB	55
SU-500	500	.05	JB	65
SU-750	750	.03	JB	70
SU-1000	1000	.02	JB	70
SU-1400	1400	5	JB	70
SU-2000	2000	2	JB	70

DUAL OUTPUT MODULES:

Input volts — 115VAC; matched regulated D.C. outputs; current shown available from each tap; 6-pin hooked connector. All-steel MIL-T-27 cases; screw type studs for fastening to the chassis; grey paint.

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
EE-5	5, 5	150ma	.5	.10	FB	$55
EEH-5	5, 5	300	.3	.01	GB	65
EEC-5	5, 5	1a	.2	.05	JB	90
EE-6	6, 6	150	.4	.10	FB	55
EEH-6	6, 6	300	.3	.01	GB	65
EEC-6	6, 6	750	.2	.05	JB	90
EEH-10	10, 10	250	.3	.01	GB	65
EEC-10	10, 10	400	.3	.05	JB	90
EE-12	12, 12	120	.3	.05	FB	55
EEH-12	12, 12	225	.3	.01	GB	65
EEC-12	12, 12	400	.2	.05	JB	90

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
MM-15	15, 15	55ma	1	.006	GB	$60
EE-15	15, 15	100	.3	.04	FB	55
EEH-15	15, 15	200	.3	.01	GB	65
EEC-15	15, 15	350	.2	.05	JB	90
EEH-20	20, 20	150	.3	.01	GB	65
EEC-20	20, 20	250	.3	.05	JB	90
EE-24	24, 24	100	.3	.05	FB	55
EEH-24	24, 24	150	.3	.01	GB	65
EEC-24	24, 24	220	.3	.05	JB	90
EE-28	28, 28	80	1	.01	FB	60
EEC-28	28, 28	200	3	.05	JB	90

Model	D.C. Volts	D.C. Current	% Reg.	% Rip.	Case	Price
EE-30	30, 30	75ma	1	.01	FB	$60
EEH-30	30, 30	100	2	.04	GB	65
HMC-45	45, 45	80	1.5	.15	HB	65
HHV-50	50, 50	40	1	.2	HB	65
HHV-60	60, 60	40	1	.2	JB	75
HHV-70	70, 70	40	1	.2	JB	80
HHV-100	100, 100	30	1	.08	JB	82
HHV-120	120, 120	25	1	.05	JB	82
HHV-150	150, 150	20	1	.05	JB	85
HHV-200	200, 200	18	1.2	.05	JB	85
HHV-300	300, 300	15	1.2	.05	JB	85

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INCOM

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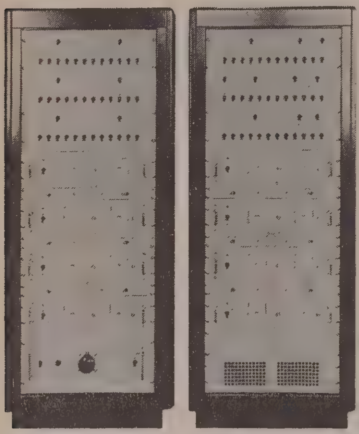
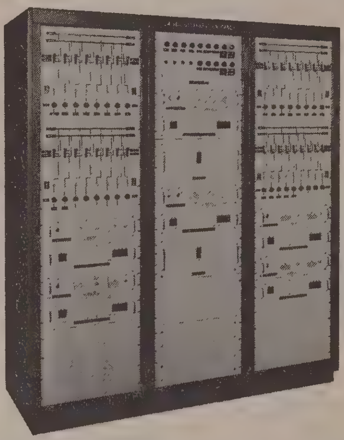
(717) 757-4641

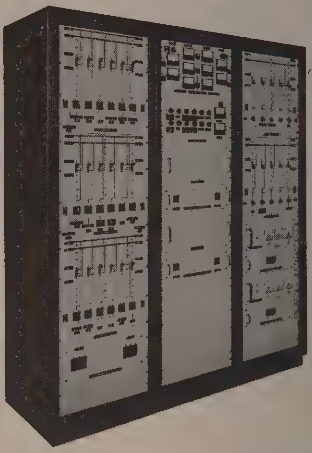
Custom Power Supplies and Systems



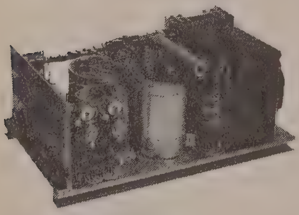
Regulated, no-break, redundant power distribution system with battery back-up for petroleum processing industry.



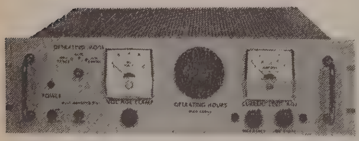
Double redundant regulated DC power distribution system for process industry. Features no break transfer and battery backup.



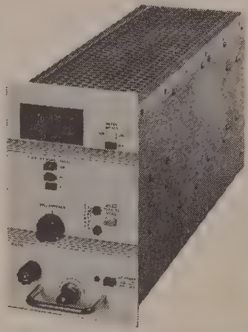
Redundant regulated DC & AC power system used for process control in oil refining complex.



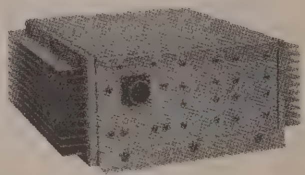
Regulated multi-output power supply for computer.



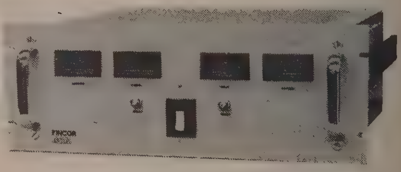
Automatic constant current battery charger with automatic range selection based on battery temperature and voltage level.



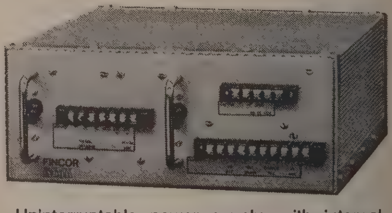
Zero-1200 volt, 200 milliampere constant current power supply for semi-conductor testing and burn-in.



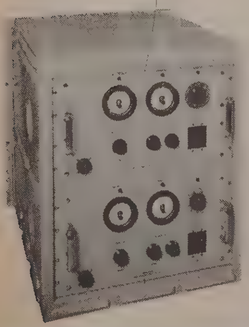
Mil Spec 4 output regulated power supply.



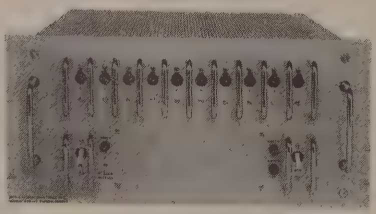
Two-channel linear regulated power supply for semi-conductor testing and burn-in.



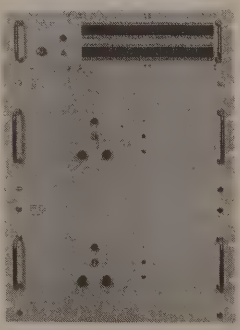
Uninterruptable power supply, with internal battery charger, used for avionics instrumentation.



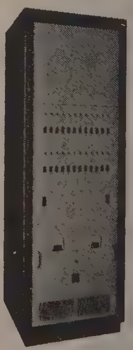
High power, 150-Volt, constant current/constant voltage, shipboard-qualified power supply.



Regulated no-break, redundant 24-volt dc, 15-ampere, 10-channel power distribution system for television studios.



Regulated no-break, redundant power distribution system for military application.



Regulated dc distribution system for computer controlled petroleum processing unit.

NOTE: Not pictured are these special devices: (a) Power supply for CW lasers; (b) Redundant power systems for military telephone communications systems; (c) Xenon lamp power supplies; (d) True RMS regulated ac power supplies; and (e) High current dc power supply for automotive production line testing.

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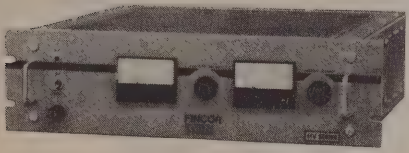
HV Constant High Voltage Supplies

FEATURES
- All Solid State
- Adjustable Current Limit
- < 1 Millivolt Ripple
- 10-Turn Voltage Adjustments
- Remote Programming
- Remote Sensing

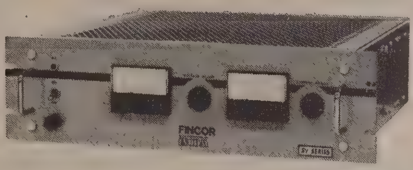


APPLICATION
The HV is a versatile series of constant voltage units adjustable from zero to full rated voltage. Adjustable solid state current limiting is a feature. Options provide for either systems or laboratory use. Crossover from constant voltage to current limiting is automatic solid state and noninterrupting. Units may be operated in parallel for increased current capacity.

Model Number	Output		Regulation		Size	Price
	Volts	Amps	Line %	Load %		
HV 350-1	0-350	1	0.005	0.01	3½ x 19 x 16½	$2225.
HV 350-2	0-350	2	0.005	0.01	5¼ x 19 x 16½	2650.
HV 350-3	0-350	3	0.005	0.01	7 x 19 x 16½	2970.
HV 350-5	0-350	5	0.005	0.01	7 x 19 x 16½	3390.

SV Constant High Voltage Power Supplies

FEATURES
- All Solid State
- Adjustable Current Limit
- 1 Millivolt Ripple
- 0.01% Regulation
- 10-Turn Voltage Adjustments
- Remote Programming
- Remote Sensing
- Meters

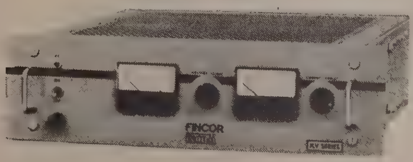


APPLICATION
The SV is a versatile series of constant voltage units adjustable from 0 to full rated voltage. Options provide either systems or laboratory use. Crossover from constant voltage to current limiting is automatic solid state and noninterrupting. Units may be operated in parallel for increased current capacity.

Model Number	Output		RMS Ripple	Regulation		Size	Price
	Volts	Amps		Line %	Load %		
SV 600-0.5	0-600	0-0.5	<3mv	0.01	0.01	3½ x 19 x 16½	$2600.
SV 600-1	0-600	0-1	<3mv	0.01	0.01	5¼ x 19 16½	3150.
SV 600-2	0-600	0-2	<3mv	0.01	0.01	7 x 19 x 16½	3950.

KV1000 High Voltage Power Supplies

FEATURES
- Output 100 to 1000 VDC
- Voltage Regulated 0.5%
- Current Regulated 0.5%
- Voltmeter and Ammeter
- Ripple 0.5% RMS



APPLICATION
The KV1000 Series of Power Supplies are constant voltage/constant current units with automatic crossover. Models are available with up to 2 ampere current capacity over the full voltage range. Options such as remote voltage and current programming, remote turn on and turn off make the unit a versatile piece of equipment for laboratory or manufacturing operations.

Model Number	Output		Regulation		Panel Height	Price
	Volts	Amps	Current %	Volts %		
KV 1000-0.5	100-1000	0-0.5	0.5	0.5	5¼″	$2545.
KV 1000-1	100-1000	0-1	0.5	0.5	7″	3150.
KV 1000-2	100-1000	0-2	0.5	0.5	10½″	5400.

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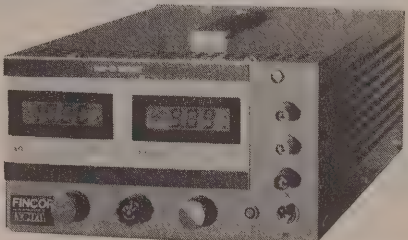
HWD Constant Voltage/Constant Current Supplies

FEATURES

- Digital Ammeter/Voltmeter
- Remotely Programmable
- Remote Sensing
- Series and Parallel Operation
- 500 µ Volts Ripple
- .01% Load Regulation
- .01% Line Regulation
- Separate Voltmeter and Ammeter
- Models to 200 Volts
- Half Rack Size or Bench Mounting



APPLICATION

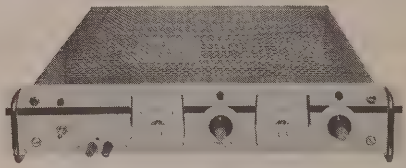
The HWD Series power supplies are designed to be used in the lab bench or for system application. The use of digital meters provides accurate readings of output voltage and current without the need of external DVM'S.

Model Number	Output		Regulation				Price
	Volts	Amps	Line % CV	Line % CC	Load % CV	Load % CC	
HWD 6-20A	0-6	0-20	0.01	0.1	0.01 or 1 mv	0.5	$825.
HWD 10-15A	0-10	0-15	0.01	0.1	0.01 or 1 mv	0.5	810.
HWD 20-10A	0-20	0-10	0.01	0.1	0.01 or 1 mv	0.5	810.
HWD 40-5A	0-40	0-5	0.01	0.1	0.01 or 1 mv	0.5	$810.
HWD 100-2A	0-100	0-2	0.01	0.1	0.01 or 1 mv	0.5	895.
HWD 200-1A	0-200	0-1	0.01	0.1	0.01 or 1 mv	0.5	975.

PR Constant Voltage/Current Silicon Supplies

FEATURES

- High Power — Small Size
- Remotely Programmable
- All Silicon Semiconductors
- Mode Lites
- Low Ripple
- .01% Regulation
- Constant Voltage/Constant Current
- Parallel Operation



APPLICATION

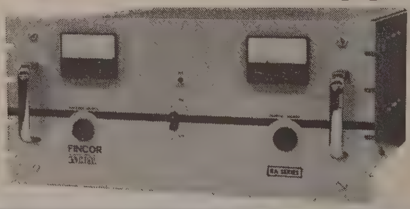
The PR Series find application in the laboratory and in systems where both versatility of operation and a high degree of regulation is required. Both 3½" 5 ¼" models are available. The voltage to current crossover point may be set anywhere within the limits of zero to full rated output voltage and zero to full rated output current.

Model Number	Output		Regulation				Panel Ht.	Price
	Volts	Amps	Line % CV	Line % CC	Load % CV	Load % CC		
PR 20-15A	0-20	0-15	0.01	0.01	0.01	0.25	3½"	$1475.
PR 40-10A	0-40	0-10	0.01	0.01	0.01	0.25	3½"	1435.
PR 60-7A	0-60	0-7	0.01	0.01	0.01	0.25	3½"	1530.
PR 125-3.2A	0-125	0-3.2	0.01	0.01	0.01	0.25	3½"	1745.
PR 20-25A	0-20	0-25	0.01	0.01	0.01	0.25	5¼"	1695.
PR 40-20A	0-40	0-20	0.01	0.01	0.01	0.25	5¼"	$1640.
PR 60-14A	0-60	0-14	0.01	0.01	0.01	0.25	5¼"	1750.
PR 125-6.5A	0-125	0-6.5	0.01	0.01	0.01	0.25	5¼"	1910.
PR 125-10A	0-125	0-10	0.01	0.01	0.01	0.25	5¼"	2625.

RA Constant Voltage Silicon Supplies

FEATURES

- High Power — Small Size
- Remotely Programmable
- Low Ripple
- Parallel Operation
- .01% Regulation
- All Silicon Semiconductors



APPLICATION

The RA Series are all silicon, relatively high in power, and tightly regulated. They find application in the laboratory and in systems where both versatility of operation and a high degree of regulation is required. Adjustable solid state current limiting provides load protection.

Model Number	Output		Regulation		Panel Ht.	Price
	Volts	Amps	Line %	Load %		
RA 20-15A	0-20	0-15	0.01	0.01	3½"	$1340.
RA 40-10A	0-40	0-10	0.01	0.01	3½"	1340
RA 60-7A	0-60	0-7	0.01	0.01	3½"	1340.
RA 125-3.2A	0-125	0-3.2	0.01	0.01	3½"	1365.
RA 20-25A	0-20	0-25	0.01	0.01	5½"	1525.
RA 40-20A	0-40	0-20	0.01	0.01	5½"	1475.
RA 60-14A	0-60	0-14	0.01	0.01	5½"	1525.
RA 125-6.5A	0-125	0-6.5	0.01	0.01	5½"	$1720.
RA 40-30A	0-40	0-30	0.01	0.01	7"	2020.
RA 60-20A	0-60	0-20	0.01	0.01	7"	2130.
RA 125-10A	0-125	0-10	0.01	0.01	7"	2395.
RA 40-50A	0-40	0-50	0.01	0.01	7"	3180.
RA 60-30A	0-60	0-30	0.01	0.01	7"	3280.
RA 250-10A	0-250	0-10	0.01	0.01	8¾"	4240.

Options include: meters, overvoltage, 10-turn potentiometers, and special input voltages.

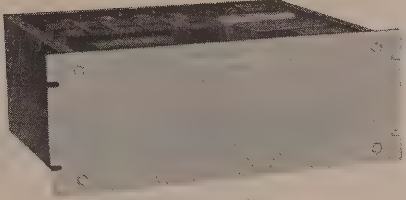
FINCOR
INCOM INTERNATIONAL INC
INCOM

3750 East Market Street
York, Pennsylvania 17402
(717) 757-4641

MS High Power System Component Power Supplies

FEATURES

- Most Complete Coverage
  - Up to 600 Volts
  - Up to 1200 Amperes
  - 139 Standard Models
- Low Cost
- All Solid State
- Extreme Reliability
- 10 Year Guarantee



APPLICATION

Strictly designed for incorporation into systems, these supplies are considered as components. They are of exceptionally high reliability; yield the highest power at lowest cost; and provide complete coverage of all possible needs.

Model Number	Height in Inches
MS 9-600	48⅝
MS 9-1200	67⅞
MS 12-40	5¼
MS 12-60	8¾
MS 12-100	12¼
MS 12-150	17½
MS 12-225	24
MS 12-400	67⅞
MS 13.5-40	5¼
MS 13.5-60	8¾
MS 13.5-100	12¼
MS 13.5-150	17½
MS 13.5-225	24
MS 13.5-400	67⅞
MS 17-30	5¼
MS 17-45	8¾
MS 17-80	12¼
MS 17-120	17½
MS 17-180	24
MS 17-400	67⅞

Model Number	Height in Inches
MS 20-30	5¼
MS 20-45	8¾
MS 20-80	12¼
MS 20-120	17½
MS 20-180	24
MS 20-400	67⅞
MS 25-25	5¼
MS 25-37	8¾
MS 25-60	12¼
MS 25-90	17½
MS 25-140	24
MS 25-200	48⅝
MS 25-400	67⅞
MS 29-25	5¼
MS 29-37	8¾
MS 29-60	12¼
MS 29-90	17½
MS 29-140	24
MS 29-200	48⅝
MS 29-400	67⅞

Model Number	Height in Inches
MS 34-20	5¼
MS 34-30	8¾
MS 34-50	12¼
MS 34-75	17½
MS 34-125	24
MS 34-300	67⅞
MS 38-20	5¼
MS 38-30	8¾
MS 38-50	12¼
MS 38-75	17½
MS 38-125	24
MS 38-300	67⅞
MS 46-15	5¼
MS 46-22	8¾
MS-46-40	12¼
MS 46-60	17½
MS 46-90	24
MS 46-120	48⅝
MS 46-240	67⅞

Model Number	Height in Inches
MS 65-10	5¼
MS 65-15	8¾
MS 65-25	12¼
MS 65-35	17½
MS 65-50	24
MS 65-75	48⅝
MS 65-150	67⅞
MS 77-10	5¼
MS 77-15	8¾
MS 77-25	12¼
MS 77-35	17½
MS 77-50	24
MS 77-75	48⅝
MS 77-150	67⅞
MS 109-6	5¼
MS 109-10	8¾
MS 109-15	12¼
MS 109-24	17½
MS-109-35	24
MS 109-45	48⅝
MS 109-90	67⅞

Model Number	Height in Inches
MS 128-6	5¼
MS 128-10	8¾
MS 128-15	12¼
MS 128-24	17½
MS 128-35	24
MS 128-45	48⅝
MS 128-90	67⅞
MS 240-.75	3½
MS 240-3	5¼
MS 240-5	8¾
MS 240-7	12¼
MS 240-10	17½
MS 240-15	24
MS 240-40	67⅞
MS 273-.75	3½
MS 273-3	5¼
MS 273-5	8¾
MS 273-7	12¼
MS 273-10	17½
MS 273-15	24
MS 273-40	67⅞

Model Number	Height in Inches
MS 350-1.5	5¼
MS 350-3	8¾
MS 350-5	12¼
MS 350-7	17½
MS 350-10	24
MS 350-30	67⅞
MS 410-1.5	5¼
MS 410-3	8¾
MS 410-5	12¼
MS 410-7	17½
MS 410-10	24
MS 410-30	67⅞
MS 470-2	8¾
MS 470-3	12¼
MS 470-5	17½
MS 470-7	24
MS 470-10	48⅝
MS 470-20	67⅞
MS 545-2	8¾
MS 545-3	12¼
MS 545-5	17½
MS 545-7	24
MS 545-10	48⅝
MS 545-20	67⅞

NOTE: The digits of the Model Number indicate the output voltage and current in amps. Example: MS9-600 has an output of 9 volts, current of 600 amps. MS9-1200 has an output of 9 volts at 1200 amps. **Consult factory for prices.**

SM High Power Switching Supplies

FEATURES

- Soft-Start • No Parallel Transistors
- 1.8 Watts/Cu. In.
- Overvoltage Protection
- Current Limit • Remote Shut Down
- Over Temperature Protection
- 47-400 Hz AC Input
- Convection Cooled
- Fully Enclosed
- −20° to +50°C Ambient
- Low Profile • Lightweight

APPLICATION

SMs are fully enclosed, convection cooled designs providing 300 or 600 watts of output power. With power densities of 1.8 watts/cubic inch, SMs are attractive for 400 Hz AC input applications. Standard units are available with single outputs from 5 to 15 volts.

Model	Nominal Output Voltage	Output Adjustment Min.	Output Adjustment Max.	Output Current	Price
SM 5-120	5	4.5	5.5	120	$675.
SM 6-100	6	5.4	6.6	100	675.
SM 12-50	12	10.8	13.2	50	675.
SM 15-40	15	13.5	16.5	40	675.

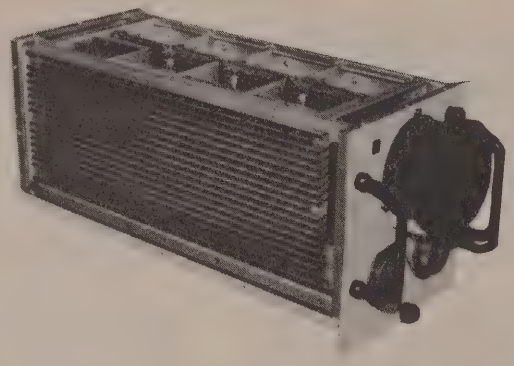
Model	Nominal Output Voltage	Output Adjustment Min.	Output Adjustment Max.	Output Current	Price
SM 5-60	5	4.5	5.5	60	$475.
SM 6-50	6	5.4	6.6	50	475.
SM 12-25	12	10.8	13.2	25	475.
SM 15-20	15	13.5	16.5	20	475.

MILITARY

AIRBORNE

HELIONETICS, INC.

21 Output Aircraft DC Power Supply



MODEL 61188: Designed for use on military aircraft for multi-output power supply applications.

- MEETS MIL-E-5400, CLASS-I
- QA: MIL-STD-9858A
- EMI: MIL-STD-461
- RELIABILITY: MIL-HDBK-217
- EFFICIENCY: 80%
- OVERVOLTAGE/CURRENT PROTECTION
- MODULAR CONSTRUCTION FOR EASE OF SERVICE

INPUT
Voltage: 200 VAC, 3-Phase
Frequency: 400 Hz per MIL-STD-704

21 OUTPUTS
7 Outputs: +28 VDC at 5 Amps
7 Outputs: +15 VDC at 3 Amps
7 Outputs: −15 VDC at 1 Amp
Voltage Regulation: ±0.59 VDC

TEMP. RANGE: −54°C to +55°C

SIZE: 7.6"W x 8.5"H x 20.25"D

WEIGHT: 45 lbs.

ALTITUDE: 50,000 ft.

Surveillance Aircraft Multi-Output DC Power Supply

Model 6117: Designed for use on the CP-140, the Canadian version of the Lockheed P3-A, this unit supplies power to an onboard computer.

INPUT
Voltage: 115/200 VAC; 3-Phase
Frequency: 400 Hz

OUTPUTS
Output 1: +5 VDC at 3 Amps
Output 2: +23 VDC at 3.7 Amps
Output 3: −23 VDC at 3.7 Amps
Regulation: ±2%
Ripple: ±1% for 102 VAC Input or Higher
Impedance: 0.02 Ohms; 0-12 kHz
Power Density: 3 Watts per Cubic Inch

TEMP RANGE: −54°C to +85°C

SIZE: 4.03"W x 2.29"H x 7.15"D

WEIGHT: 3.75 lbs.

ALTITUDE: 30,000 ft.

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**

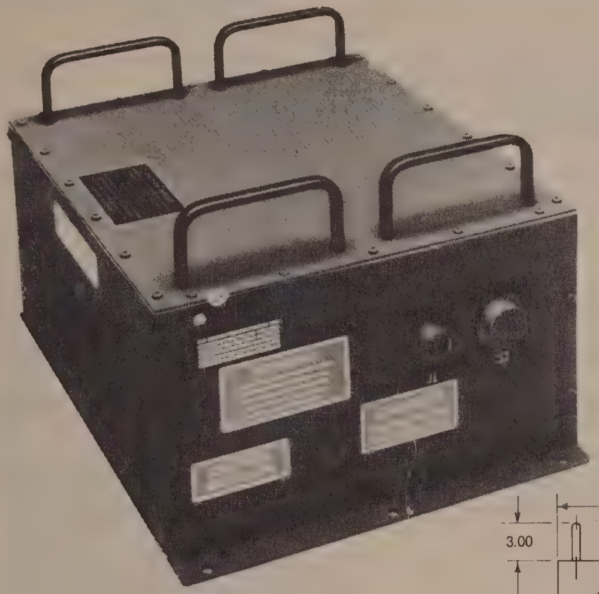
SPECIALISTS IN POWER CONVERSION EQUIPMENT

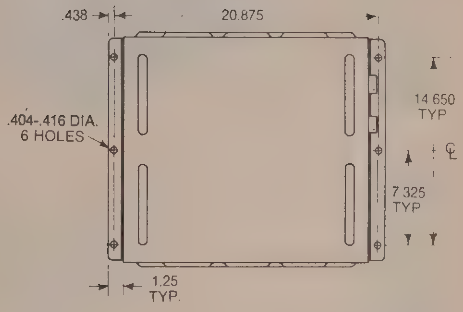
MILITARY

GROUND

HELIONETICS, INC.

28VDC Power Supply Ground Support Equipment





.438
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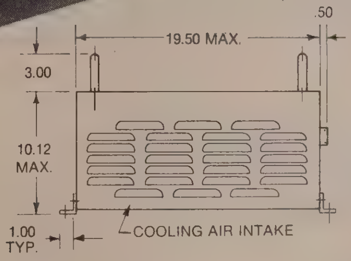

.50
19.50 MAX.
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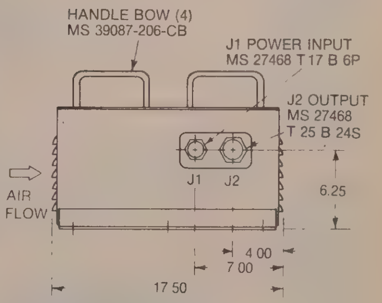
COOLING AIR INTAKE



HANDLE BOW (4)
MS 39087-206-CB
J1 POWER INPUT
MS 27468 T 17 B 6P
J2 OUTPUT
MS 27468
T 25 B 24S
AIR
FLOW
J1
J2
6.25
4 00
7 00
17 50

MODEL 61305

- OVERVOLTAGE AND SHORT CIRCUIT PROTECTION
- 50,000 HOURS MTBF PER MIL-HDBK-217D
- 30G SHOCK
- 8G VIBRATION
- REMOTE SENSING
- MEETS MIL-STD-461A, NOTICE 4, EMI REQUIREMENTS

INPUT

Voltage: 120/208 VAC; 3-Phase
Tolerance: +5%, −10%
Transient: +15% for 0.5 Sec., −30% for 0.7 Sec.
Frequency: 50-60 Hz, ±5%

OUTPUT

Voltage: 28 VDC
Power: 3500 Watts
Ripple & Noise: 250 mV or less above 50 Amps, 125 mV or less below 50 Amps
Voltage Regulation: ±1.4V at Full Power

TEMP RANGE: −25°F to +125°F

HUMIDITY: 100% w/Condensation

COOLING: Non-Impingement Forced Air

SIZE: 19½″ x 17½″ x 10″ (13″ w/Handles)

WEIGHT: 87 lbs.

EFFICIENCY: Exceeds 80%

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

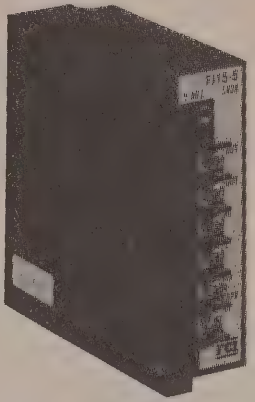
INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**

SPECIALISTS IN POWER CONVERSION EQUIPMENT

FCI SWITCHING POWER SUPPLIES

SINGLE OUTPUT

Models FJ15, 30, 50, 100 and H300*



Specifications

Input	Voltage: AC85 ~ 132V 1ϕ, or DC 110 ~ 170V Frequency: 48 ~ 440Hz or DC
Output	Regulation, Line: 0.3% max (J30, J50, J100) 0.5% (J15) Regulation, Load: 0.6% max Ripple: 80mVp-p max (5V) 120mVp-p max (12V, 15V, 24V) Noise: 110mVp-p max (5V) 150mVp-p max (12V, 15V, 24V) Temperature Coefficient: 2% max 0 ~ + 50°C Rise Time: 150mS max
Protection Circuit	Over Current Protection: Fold Back
Electrically Isolated	Input-E, Output: AC1500V for 1 minu, DC500V 50MΩ mini Output-E: AC 500V for 1 minu, DC500V 50MΩ mini
Environment	Operating Range: 0 ~ + 50°C, 10 ~ 90% RH Storage Range: −20 ~ +75°C, 10 ~ 90% RH

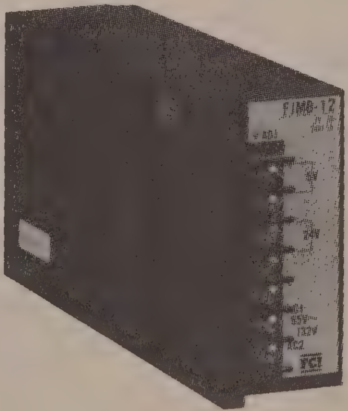
Selection Guide

	VOLTAGE				CASE SIZE AND WEIGHT			
MODEL NO.	5V	12V	15V	24V	H (mm)	D (mm)	W (mm)	Wt (kg)
FJ15	3A	1.3A	1A	0.65A	97	117	35	0.35
FJ30	6A	2.5A	2A	1.3A	97	201	45	0.6
FJ50	10A	4.5A	3.7A	2.5A	97	201	45	0.8
FJ100	20A	8.5A	7A	4.5A	97	241	70	1.2
FH300	60A	26A	20A	13A	110	220	182	3.6

***Ask us about direct equivalents for Lambda switching power supplies.**

DUAL OUTPUT

Models FJMB11, 12, 21 and 22



Specifications

Input	Voltage: AC85 ~ 132V 1ϕ, or DC 110 ~ 170V Frequency: 48 ~ 440Hz or DC
Output	Regulation, Line: 0.3% max Regulation, Load: 0.6% max (+5V), 0.6% max (+V) Ripple: 80mV p-p (+5V), 120mV p-p (+V) Noise: 110mV p-p (+5V), 150mV p-p (+V) Temperature Coefficient: 2% max 0 ~ + 50°C Rise Time: 150mS max
Protection Circuit	Over Current Protection: Fold Back Over Voltage Protection: Works over 115% of rating
Electrically Isolated	Input-E, Output: AC1500V for 1 minu, DC500V 50MΩ mini Output-E: AC 500V for 1 minu, DC500V 50MΩ mini
Environment	Operating Range: 0 ~ + 50°C, 10 ~ 90% RH Storage Range: −20 ~ +75°C, 10 ~ 90% RH

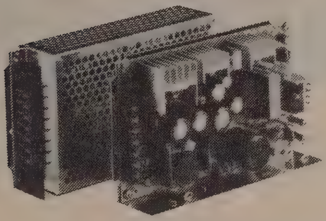
Selection Guide

	VOLTAGE			CASE SIZE AND WEIGHT			
MODEL NO.	+5V	+12V	+24V	H (mm)	D (mm)	W (mm)	Wt (kg)
FJMB11	3A	3A	—	97	198	50	0.7
FJMB12	3A	—	1.5A	97	198	50	0.7
FJMB21	6A	5A	—	97	241	70	0.95
FJMB22	6A	—	2.4A	97	241	70	0.95

All FCI power supplies are designed to meet UL and CSA specifications; some meet VDE specifications as well.

TRIPLE OUTPUT-Open Frame

Models FKMC15 and 30*



Specifications

Input	Voltage: AC85 ~ 132 or DC 110 ~ 170V Frequency: 48 ~ 440Hz or DC
Protection Circuit	Over Current Protection

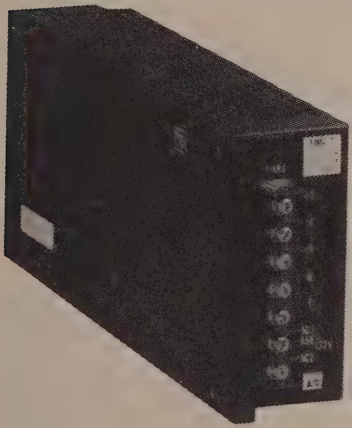
Selection Guide

	VOLTAGE			CASE SIZE AND WEIGHT			
MODEL NO.	**5V**	**+12V**	**−12V**	**H (mm)**	**D (mm)**	**W (mm)**	**Wt (kg)**
FKMC15	.5-2A	.3A	.2A	92	120.5	33.5	.4
FKMC30	.7-3A	1.2A	.3A	97	161.5	40.5	.5

*Cover Optional.

TRIPLE OUTPUT-Enclosed

Models FJMC1, 2 and 3



Specifications

Input	Voltage: AC85 ~ 132V 1Φ, or DC110 ~ 170V Frequency: 48 ~ 440Hz or DC
Output	Regulation, Line: 0.3% max Regulation, Load: 0.5% max (+5V) 0.3% max (±V) Ripple: 50mVp-p max Noise: 100mVp-p max (+5V) 120mVp-p max (±V) Temperature Coefficient: 1.6% max 0 ~ + 40°C Rise Time: 150mS max
Protection Circuit	Over Current Protection: Fold Back Over Voltage Protection: Works over 115% of rating (only 5V)
Electrically Isolated	Input-E, Output: AC1500V for 1 minu, DC500V 50M Ω mini Output-E: AC 500V for 1 minu, DC500V 50M Ω mini
Environment	Operating Range: 0 ~ + 40°C, 20 ~ 90% RH Storage Range: −20 ~ +75°C, 20 ~ 90% RH

Selection Guide

	VOLTAGE			CASE SIZE AND WEIGHT			
MODEL NO.	**+5V**	**+V**	**−V**	**H (mm)**	**D (mm)**	**W (mm)**	**Wt (kg)**
FJMC1	5A	+12V1A	−12V0.5A	97	198	50	0.7
FJMC2	5A	+15V0.8A	−15V0.4A	97	198	50	0.7
FJMC3	5A	+12V1A	−5V0.5A	97	198	50	0.7

FCI

Frederick Components International
20806 Plummer Street
Chatsworth, California 91311
(818) 882-0868

Toll Free
Outside California
(800) 354-0660

FCI SWITCHING POWER SUPPLIES

GAMMA HIGH VOLTAGE RESEARCH INC.

Designers/Manufacturers—High Voltage Power Supplies

152 SOUTH MacQUESTEN PKWY., MT. VERNON, NY 10550 • TEL. 914 667-5050

HIGH VOLTAGE POWER SUPPLIES MODULAR

SERIES MC

3 Models Covering the range of 50VDC to 3000VDC

ELECTRICAL CHARACTERISTICS:

Input Voltage:	1.75 to 12VDC
Input Current:	400mA
Output Voltage:	Proportional to Input (see table)
Output Current:	3 Watts maximum (see table)
Load Regulation:	5% (½ load to full load)
Ripple:	1% p-p (typical)
Insulation Strength:	3000V Input/Output

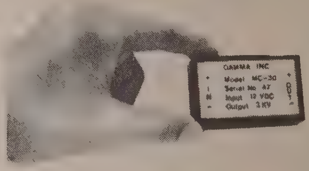
PHYSICAL CHARACTERISTICS:

Dimensions:	1.5″ x 2.5″ x 0.75″
Volume:	2.8 cu. in.
Weight:	4 oz.
Packaging:	Solid encapsulation
Terminations*:	4 P.C. Pins (.043 Dia holes)

ENVIRONMENTAL CHARACTERISTICS:

Temperature Range: −20°C to +60°C

MINIATURE HIGH VOLTAGE POWER SUPPLIES



MODEL GUIDE:

MODEL	OUTPUT VOLTAGE RANGE	OUTPUT CURRENT
MC-5	50VDC to 500VDC	6mA
MC-15	150VDC to 1500VDC	2mA
MC-30	300VDC to 3000VDC	1mA

SERIES RC

7 Models Covering the range of 0-3KV to 0-30KV at 10 Watts

ELECTRICAL CHARACTERISTICS:

Input Voltage:	+28VDC ±10%
Output Voltage:	Programmable from zero to maximum rated voltage from either an external 5K ohm potentiometer or a zero to +10 volt low voltage ground referenced source
Output Current:	10 Watts maximum
Line Regulation:	0.01% maximum
Load Regulation:	0.01% maximum
Ripple:	0.05% maximum
Temp. Coefficient:	0.01%/°C
Stability:	0.01%/8 hours
Monitor Outputs:	1) Voltage Monitor (Optional) 2) Current Monitor (Optional)
Programming:	
Method 1.	Resistance: External 5K ohm potentiometer
Method 2.	Voltage: Zero to +10 Volts

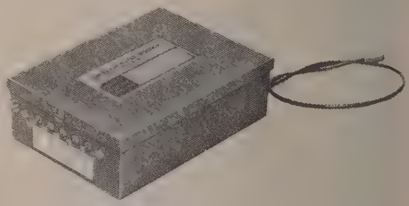
PHYSICAL CHARACTERISTICS:

Dimensions:	3½″ x 5⅛″ x 1¹³⁄₁₆″ (up to 15KV) 3¾″ x 6″ x 2¾″ (20 & 30KV)
Weight:	2½ lbs (up to 15KV) 3½ lbs (20 & 30KV)
Packaging:	Solid encapsulation, metal case with metal inserts in base
Input Connector:	Terminal strip.
Output Termination:	12″ flying lead

ENVIRONMENTAL CHARACTERISTICS:

Temperature Range: 0 to 50°C

REGULATED DC/DC HIGH VOLTAGE POWER SUPPLIES



MODEL GUIDE:

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT
RC10-3	0-3KV	3.3mA
RC10-5	0-5KV	2.0mA
RC10-10	0-10KV	1.0mA
RC10-15	0-15KV	0.66mA
RC10-20	0-20KV	0.5mA
RC10-25	0-25KV	0.4mA
RC10-30	0-30KV	0.33mA

All units are available in positive or negative polarity. Add P or N as suffix to Model Number to indicate polarity desired.

SERIES UC

7 Models Covering the range of 0-3KV to 0-30KV at 5 Watts

ELECTRICAL CHARACTERISTICS:

Input Voltage:	+24VDC ±10%
Input Current:	400mA maximum
Output Voltage:	Adjustable from zero to rated voltage by adjustment of DC input voltage
Output Current:	5 Watts maximum (see table)
Load Regulation:	20% maximum (½ load to full load)
Ripple:	0.1% per watt

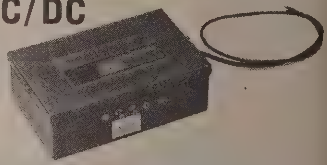
PHYSICAL CHARACTERISTICS:

Dimensions:	2¾″ x 4½″ x 1¾₁₆″
Weight:	1½ lbs.
Packaging:	Solid encapsulation, metal case with metal inserts in base
Terminations:	Two terminals for DC input. 12″ flying lead for H.V. output

ENVIRONMENTAL CHARACTERISTICS:

Temperature Range: 0 to 50°C

PROPORTIONAL DC/DC HIGH VOLTAGE POWER SUPPLIES



MODEL GUIDE:

MODEL	OUTPUT VOLTAGE	OUTPUT CURRENT
UC5-3	0-3KV *	1.6mA
UC5-5	0-5KV *	1.0mA
UC5-10	0-10KV*	0.5mA
UC5-15	0-15KV	0.33mA
UC5-20	0-20KV	0.25mA
UC5-25	0-25KV	0.2mA
UC5-30	0-30KV	0.166mA

All Models available in positive or negative polarity. Add P or N as suffix to Model Number to indicate polarity desired. * 3KV, 5KV and 10KV Models can be provided with reversible polarity (consult factory).

GAMMA HIGH VOLTAGE RESEARCH INC.

Designers/Manufacturers—High Voltage Power Supplies

152 SOUTH MacQUESTEN PKWY., MT. VERNON, NY 10550 • TEL. 914 667-5050

HIGH VOLTAGE POWER SUPPLIES REGULATED CONSTANT VOLTAGE CONSTANT CURRENT

SPECIFICATIONS

Input Voltage: 105-125V RMS at 5 Amps maximum (50 to 60Hz)

Output Voltage: Continuously adjustable from zero to maximum output voltage rating of power supply. See Model selection guide.

Voltage Regulation*: Line: Better than ±0.005% over specified input range.
Load: 0.005% for full load change

Current Regulation*: Line: Better than ±0.005% over specified input range.
Load: Better than 75µA for a 75% change in compliance voltage.

Ripple: 60 and 150 Watt units: 0.02%
300 Watt units: 0.05%

Temp. Coefficient*: 100ppm/°C over the range of 0 to 60°C

Stability*: 0.01%/hour. 0.03%/8 hours.

* For voltage range from 10% to 100% of rated output.

Controls:
1. Power (HV ON)
2. Output Voltage (10-turn potentiometer)
3. Output Current: (10-turn potentiometer)

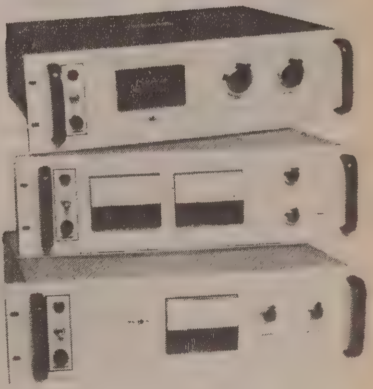
Indicators:
1. Power (HV ON)
2. Output Voltage (meter ±2% of full scale)
3. Output Current (meter ±2% of full scale)

Connectors:
1. High Voltage: All models are provided with 6 feet of shielded high voltage cable. The cables are fitted with bushings to mate with a re-entrant receptacle.
2. Input: 3-wire line cord
3. Low Voltage: Rear mounted barrier terminal block for:
   a) External Interlock
   b) Voltage Programming
   c) Current Programming
   d) V/I monitors

Size/Weight:

Fixed Polarity:		Reversible Polarity:	
Up to 60KV: 5¼″H x 16″D x 19″W	35 lbs.	Up to 40KV: 5¼″H x 16″D x 19″W	35 lbs.
80 and 100KV: 10½″H x 16″D x 19″W	75 lbs.	50 to 100 KV: 10½″H x 16″D x 19″W	75 lbs.

SERIES RR



FEATURES

LOW STORED ENERGY: The use of high frequency (>20KHz), high voltage power supply techniques allows stored energy to be minimized thus insuring maximum safety to operating personnel and sensitive loads.

PROGRAMMING OUTPUT VOLTAGE & OUTPUT CURRENT: This feature allows output voltage or output current to be remotely programmed from either an external voltage source or with external potentiometers from the internal reference voltage. A zero to +5V voltage source is required for full scale programming. Internal circuitry insures that the output voltage and output current cannot be externally programmed beyond the maximum settings of the front panel controls.

CONSTANT VOLTAGE/CONSTANT CURRENT WITH AUTOMATIC CROSSOVER: Dual control loops allow either voltage or current to be precisely regulated. Each parameter is controlled and limited by a ten-turn potentiometer on the front panel. The constant voltage/constant current automatic crossover feature allows the power supply to be used as a voltage regulated current limited system or as a current regulated voltage limited system. Thus, both output voltage and output current are totally under operator control under all load conditions, including overload and arc-over conditions.

OVERLOAD, ARC-OVER & SHORT CIRCUIT PROTECTION: Full protection against any overload condition is inherent in the constant voltage/constant current design concept. This is augmented by the liberal use of surge limiting resistors and reactive limiting.

VOLTAGE REGULATION: Line and load regulation is better than 0.005%.

CURRENT REGULATION: Current regulation is better than 75µA.

RIPPLE: At 150 watts ripple of 0.02%. At 300 watts ripple of 0.05%.

EFFICIENCY: Efficiency is typically greater than 75% at full load.

EXTERNAL POLARITY REVERSAL (Reversible Units Only): A reversing switch mechanism located at the rear of the power supply facilitates polarity reversal.

EXTERNAL INTERLOCK/OUTPUT INHIBIT: Circuitry is provided so that the user can, if desired, inhibit output voltage. External contact closure located on the rear terminal strip will enable the power supply. Open contacts will inhibit the power supply.

FLOATING GROUND: This feature allows the low end return of the power supply to be isolated with respect to chassis ground.

REMOTE OUTPUT VOLTAGE & CURRENT MONITORING: Voltage monitoring and true output current monitoring signals are provided at the rear terminal strip.

MODULAR CONSTRUCTION: Modular construction techniques are used throughout this design thus reducing downtime in critical applications.

OPTIONS

ZERO VOLTAGE START INTERLOCK (ZVS): To prevent accidental damage to loads, the output voltage control must be set to zero before the high voltage can be applied.

VARIABLE OVERVOLTAGE PROTECTION (VOV): This option causes the power supply to shut down when the output voltage exceeds the setting of the overvoltage control potentiometer located at the rear of the power supply (adjustable from 20% to 110% of maximum rated output voltage.)

VARIABLE OVERLOAD TRIPOUT (VOL): This opion causes the power supply to shut down when the output current equals the setting of the front panel current control (adjustable from 20% to 110% of maximum output current of the power supply.)

DIGITAL PANEL METER: SINGLE METER (SDPM) — TWO METERS (DDPM): A single 3½ digit meter reading both voltage and current is available. This meter replaces the two analog meters normally provided. Two 3½ digit meters can also be provided in place of the two analog meters normally provided.

SLOW START (SS): The slow start option enables the output voltage of the power supply to ramp to its maximum output voltage setting at a linear rate. This rate can be factory set from one to fifteen seconds.

SLAVED BI-POLAR OPERATION (SBP): Any two power supplies of the same voltage rating may be operated as a Bi-Polar pair. One power supply acting as the master controller will control both power supplies from zero to maximum rated output voltage. The output voltages of both power supplies will track each other within 2% from 10% to maximum rated output voltage. Each power supply is also capable of operating independently.

PARALLEL OPERATION (PO): Any two supplies of the same voltage rating, current rating and polarity may be paralleled. The supplies may also be operated independently.

AUXILIARY OUTPUT/FOCUS TAP (FT): This option provides an independent auxiliary output which is variable from zero to maximum rated voltage up to 15KV at 300µA maximum. Control is achieved via front panel mounted potentiometer. For other voltages and power levels consult factory. Multiple auxiliary outputs are also available. Consult factory.

REMOTE CONTROL PANEL (RCP): Any standard model can be supplied with a control panel remote from the basic power supply. 20 feet of appropriately shielded interconnection is provided. This remote control panel replaces the front panel normally provided on standard units.

220 VOLT INPUT — 50/60 Hz (220): 220 volt, 50-60 Hz input is available.

BENCH CABINET (BC): A deluxe style cabinet is available for all models.

ORDERING INFORMATION: ADD LETTERS IN PARENTHESIS AS SUFFIX TO MODEL NUMBER.

MODEL SELECTOR GUIDE*

OUTPUT VOLTAGE (kV)	60 WATT MODELS		150 WATT MODELS		300 WATT MODELS	
	MODEL	(mA) RATING	MODEL	(mA) RATING	MODEL	(mA) RATING
0-1.5	RR1.5-40	40	RR1.5-100	100	——	——
0-3	RR3-20	20	RR3-50	50	RR3-100	100
0-5	RR5-12	12	RR5-30	30	RR5-60	60
0-10	RR10-6	6	RR10-15	15	RR10-30	30
0-15	RR15-4	4	RR15-10	10	RR15-20	20
0-20	RR20-3	3	RR20-7.5	7.5	RR20-15	15
0-30	RR30-2	2	RR30-5	5	RR30-10	10
0-40	RR40-1.5	1.5	RR40-3.75	3.75	RR40-7.5	7.5
0-50	RR50-1.25	1.25	RR50-3	3	RR50-6	6
0-60	RR60-1	1	RR60-2.5	2.5	RR60-5	5
0-80	RR80-.75	0.75	RR80-1.8	1.8	RR80-3.75	3.75
0-100	RR100-.6	0.6	RR100-1.5	1.5	RR100-3	3

All units are available in positive, negative or reversible polarity. Add P, N or R as suffix to Model Number to indicate polarity desired.

* Lower and higher power models are available. Consult factory.

GAMMA HIGH VOLTAGE RESEARCH INC. SPECIALIZES IN THE DESIGN AND MANUFACTURE OF HIGH VOLTAGE POWER SUPPLIES TO MEET SPECIAL APPLICATIONS. WE WELCOME INQUIRIES ON YOUR CUSTOM HIGH VOLTAGE POWER SUPPLY REQUIREMENTS.

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms 1A•1137, 1B•1035, 2•1014, 3•1014
ASCII Code 3•1103
Batteries, Product Selection Guide 3•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide 2•1003
Capacitors, Basic Formulas 1A•1093
Capacitors, Miniglossary 1A•1069
Capacitors, Product Selection Guide 1A•1003
Circuit Boards (Printed), Product Selection Guide 2•1089
Coils, Chokes, & Inductors, Product Selection Guide 1A•1219
Connectors, Miniglossary 2•1264
Connectors, Terminals, & Sockets, Product Selection Guide 2•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide 1A•1309
Delay Lines, Product Selection Guide 1A•1445
Discrete Semiconductors, Product Selection Guide 1A•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide 1B•1021
EBCDIC Code 3•1153
Encapsulation, Miniglossary 2•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide 2•1801
Filters, Product Selection Guide 1A•1577
Instruments, Graphic Recording, Product Selection Guide 3•1381
Instruments, Panel Meters, Product Selection Guide 3•1321
Instruments, Test & Measuring, Product Selection Guide 3•1182
Interconnection Systems, Product Selection Guide 2•1873
Keyboards & Keypads, Product Selection Guide 1B•1759
Microwave Components, Product Selection Guide 1A•1685
Military Qualified Products Lists 1B•1003
Motors, Drives, & Rotating Components, Product Selection Guide 1B•1121
Opto Semiconductors, Miniglossary 1B•1218
Oscilloscopes, Product Selection Guide 3•1361
Panel Hardware, Product Selection Guide 2•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide 1A•2017
Power Supplies, Miniglossary 3•1455
Power Supplies, AC, Product Selection Guide 3•1815
Power Supplies, DC, Product Selection Guide 3•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide 1B•1255
Relay Contact Forms 1B•1317
Relays, Electromechanical, Miniglossary 1•B1292
Relays, Product Selection Guide 1B•1289
Resistor Color Codes 1A•1791
Resistors, Product Selection Guide 1A•1789
Servo Components, Miniglossary 3•1935
Solenoids, Product Selection Guide 1B•1481
Switches, Product Selection Guide 1B•1499
Thyristors/High Power Diodes, Miniglossary 1A•1652
Transducers & Encoders, Product Selection Guide 1B•1827
Transformers, Product Selection Guide 1A•2115
Wire & Cable, Product Selection Guide 2•1935

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SPECS?
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AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
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SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
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LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
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AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

Lightweight, Compact, Air-insulated, High Voltage DC Power Supplies. Hundreds of Standard Models from 0-5KV @ 1 Watt to 0-400KV @ 5000 Watts

Advantages of "RF" Based Designs

High voltage regulated DC power supplies which utilize circuit designs based on radio frequency (RF) high voltage generators have several significant advantages over power supplies based on line frequency operation. These include simplicity of regulating circuitry, greater efficiency and economy, reduced packaging size and weight, and most importantly, lower amounts of stored energy.

Stored Energy

Simply put, in an RF design, for a given ripple requirement, the amount of capacitance required is on the order of 1/500 of that required for the same ripple in a 60 cycle power supply. This is derived from the fact that ripple is inversely proportional to generator frequency; in Glassman Power Supplies, the 30K Hz operating frequency is approximately 500 times line frequency. Since stored energy is directly proportional to capacitance, it follows that the stored energy in Glassman Supplies (with the same ripple factor as a 60 cycle supply) is less by a factor of 500. This ratio of stored energy is huge, resulting in significant reduction of hazardous conditions for personnel and equipment.

Regulation

The high frequency of the RF supply simplifies the closed loop regulator design, and response time in the order of 1 millisecond is relatively easy to achieve when compared to servo regulators and/or phase controlled SCR primary regulators. The degree of regulation and speed of response is considerably better in the RF supplies than in line frequency based regulator circuits.

Efficiency, Size, and Weight

Only the series regulator is capable of achieving comparable regulation characteristics to the RF designs. These circuits, however, are notoriously inefficient. In regard to weight and size, we have already pointed out how filter capacitors are much smaller at the higher frequencies of the RF design. The same applies to inductive elements such as the high voltage transformer. Lighter, smaller components reflect in reduced package size and, obviously more economical equipment.

Typical Specifications

Voltage Regulation: Load, better than 0.005% for full load variation; line better than ±0.005% over specified input range.**

Current Regulation: Load, better than 100 microamperes from short circuit to rated voltage at any load condition. Line, better than ±0.005% over specified input range.**

Ripple: 0.1% rms of rated voltage at full load. Ripple voltage is proportional to load current and decreases linearly to 0.01% rms of rated voltage at no load.**

Stability: 0.01% per hour after ½-hour warm-up. 0.05% per 8 hours.**

Temperature Coefficient: 0.01%/°C.*

Ambient Temperature: −20°C to +60°C, operating; −40°C to +85°C, storage.

Protection: Automatic current regulation protects power supply against all overload conditions, including arcs and short circuits.

* Some specifications vary on particular models. Check factory or individual product data sheet.
** Or ±1 volt, whichever is greater.

Features/Options		MG	MX	EG	LG	WG	PG	PH
Remote Voltage Program		S	S	N/A	S	S	S	S
Remote Voltage Monitor		S	S	N/A	S	S	S	S
Remote Current Program		N/A	S	N/A	S	S	S	S
Remote Current Monitor		S	S	N/A	S	S	S	S
True Load Monitor		N/A	S	N/A	S	S	S	S
Current Adjust		N/A	N/A	N/A	O	S	S	S
Ten-Turn Counting Dials	Voltage	N/A	N/A	O	S	S	S	S
	Current	N/A	N/A	N/A	N/A	S	S	S
Shielded High Voltage Output Cable (8′)		S	S	S	S	S	S	S
Panel Meters		N/A	N/A	S	S	S	S	S
External Interlock Terminals		N/A	S	N/A	S	S	S	S

S = Standard O = Optional N/A = Not Available

STANDARD CATALOG PRODUCTS

		OUTPUT VOLTAGE - KV																
MODEL LINES	KV	3	5	10	15	20	25	30	35	40	50	60	80	100		150	200	250	300
MG SERIES	μA		200	200	200	100	100	100	100	100	50								
MX SERIES	MA		10	5	3	2.5	2	1.5	1.5	1.5	1	0.8							
EG SERIES	MA		6	3	2	1.5		1		0.75	0.6	0.5							
LG SERIES	MA		20	15		7.5		5		3.5	3	2.5	1.5	1		3			
WG SERIES	MA		60	30		15		10		7.5	6	5							
PG SERIES	MA	250	100	50 100		25 50		16 32		12 25	10 20	8 16	6 12	4 7.5	5 10	6 20	2.5 5	2 4	1 2
PH SERIES	MA	1,000	600	300	200	150		100		75	60	50	35	25			15		10

MOST MODELS CAN BE TAILORED TO MEET YOUR REQUIREMENTS IF THE STANDARD PRODUCT LINE DOES NOT MEET YOUR NEEDS.

GLASSMAN HIGH VOLTAGE INC.

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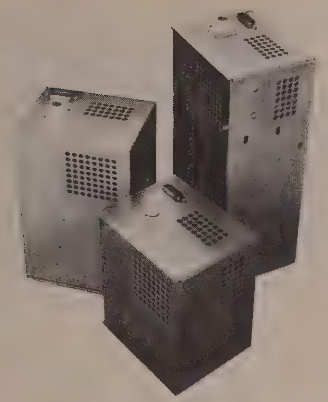
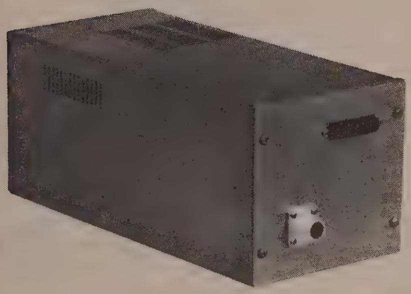
MG SERIES MODELS



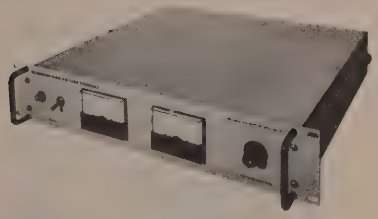
Positive Polarity Model	Negative Polarity Model	Output Voltage	Output Current	Case Size (inches)
MG5P200	MG5N200	0-5 KV	200uA	4 x 5 x 6
MG10P200	MG10N200	0-10KV	200uA	4 x 5 x 8
MG15P200	MG15N200	0-15KV	200uA	4 x 5 x 8
MG20P100	MG20N100	0-20KV	100uA	4 x 5 x 8
MG25P100	MG25N100	0-25KV	100uA	4 x 5 x 8
MG30P100	MG30N100	0-30KV	100uA	4 x 5 x 11
MG35P100	MG35N100	0-35KV	100uA	4 x 5 x 11
MG40P100	MG40N100	0-40KV	100uA	4 x 5 x 11
MG50P50	MG50N50	0-50KV	50uA	4 x 5 x 11

MX SERIES MODELS



Positive Polarity Model	Negative Polarity Model	Output Voltage	Output Current	Size (Inches)
MX5P10	MX5N10	0-5 KV	10 mA	4¾ x 5 3/16 x 11
MX10P5	MX10N5	0-10KV	5 mA	4¾ x 5 3/16 x 11
MX15P3	MX15N3	0-15KV	3 mA	4¾ x 5 3/16 x 11
MX20P2.5	MX20N2.5	0-20KV	2.5mA	4¾ x 5 3/16 x 11
MX25P2	MX25N2	0-25KV	2 mA	4¾ x 5 3/16 x 11
MX30P1.5	MX30N1.5	0-30KV	1.5mA	4¾ x 5 3/16 x 11
MX35P1.5	MX35N1.5	0-35KV	1.5mA	4¾ x 5 3/16 x 11
MX40P1.2	MX40N1.2	0-40KV	1.2mA	4¾ x 5 3/16 x 11
MX50P1	MX50N1	0-50KV	1 mA	4¾ x 5 3/16 x 11
MX60P.8	MX60N.8	0-60KV	.8mA	4¾ x 5 3/16 x 11

EG SERIES MODELS



Reversible Polarity Model	Positive Polarity Model	Negative Polarity Model	Output Voltage	Output Current	Panel Height
EG5R6	EG5P6	EG5N6	0-5 KV	6.0 mA	3½″
EG10R3	EG10P3	EG10N3	0-10KV	3.0 mA	3½″
EG15R2	EG15P2	EG15N2	0-15KV	2.0 mA	3½″
EG20R1.5	EG20P1.5	EG20N1.5	0-20KV	1.5mA	3½″
EG30R1	EG30P1	EG30N1	0-30KV	1.0 mA	3½″
EG40R0.75	EG40P0.75	EG40N0.75	0-40KV	0.75mA	3½″
EG50R0.6	EG50P0.6	EG50N0.6	0-50KV	0.6 mA	3½″
EG60R0.5	EG60P0.5	EG60N0.5	0-60KV	0.5 mA	3½″

EG Series Options

Symbol	Description
220	220 Volt Input
100	100 Volt Input

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LG SERIES MODELS

Reversible Polarity Model	Positive Polarity Model	Negative Polarity Model	Output Voltage	Current Output	Panel Height
LG5R20	LG5P20	LG5N20	0-5 KV	20.0mA	5¼″
LG10R15	LG10P15	LG10N15	0-10 KV	15.0mA	5¼″
LG20R7.5	LG20P7.5	LG20N7.5	0-20 KV	7.5mA	5¼″
LG30R5	LG30P5	LG30N5	0-30 KV	5.0mA	5¼″
LG40R3.5	LG40P3.5	LG40N3.5	0-40 KV	3.5mA	5¼″
LG50R3	LG50P3	LG50N3	0-50 KV	3.0mA	5¼″
LG60R2.5	LG60P2.5	LG60N2.5	0-60 KV	2.5mA	5¼″
LG80R1.5	LG80P1.5	LG80N1.5	0-80 KV	1.5mA	8¾″
LG100R1	LG100P1	LG100N1	0-100KV	1.0mA	8¾″

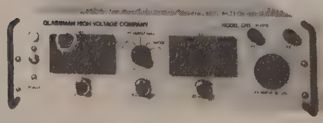
LG Series Options

Symbol	Description
220	220 Volt Input
100	100 Volt Input
B	Bi-Polar Operation (Requires 2 power supplies)
C	Cabinet
CA	Current Adjust (rear)
CC	Current Control
CT	Current Trip
P	Parallel Operation (Requires 2 power supplies)

WG SERIES MODELS

Reversible Polarity Model	Positive Polarity Model	Negative Polarity Model	Output Voltage	Output Current	Panel Height
WG5R60	WG5P60	WG5N60	0-5 KV	60 mA	5¼″
WG10R30	WG10P30	WG10N30	0-10 KV	30 mA	5¼″
WG20R15	WG20P15	WG20N15	0-20 KV	15 mA	5¼″
WG30R10	WG30P10	WG30N10	0-30 KV	10 mA	5¼″
WG40R7.5	WG40P7.5	WG40N7.5	0-40 KV	7.5mA	5¼″
WG50R6	WG50P6	WG50N6	0-50 KV	6 mA	5¼″
WG60R5	WG60P5	WG60N5	0-60 KV	5 mA	5¼″
WG80R3.5	WG80P3.5	WG80N3.5	0-80 KV	3.5mA	5¼″
WG100R3	WG100P3	WG100N3	0-100KV	3 mA	5¼″

PRECISION TEST EQUIPMENT



MODEL CRT-HVPS
MODEL RD50A
MODEL RD100A
MODEL RD200A

GLASSMAN HIGH VOLTAGE INC.

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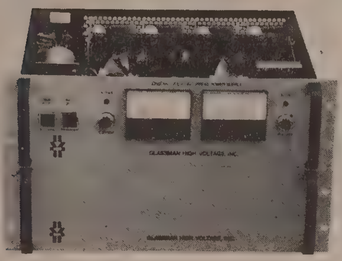
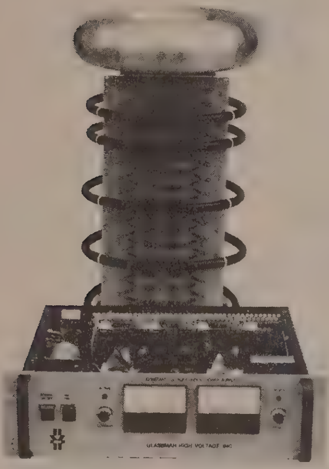
PG SERIES MODELS





Reversible Polarity Model	Positive Polarity Model	Negative Polarity Model	Output Voltage	Output Current	Panel Height
FULLY ENCLOSED MODELS					
PG5R100	PG5P100	PG5N100	0-5 KV	100 mA	10½″
PG10R50	PG10P50	PG10N50	0-10 KV	50 mA	10½″
PG10R100	PG10P100	PG10N100	0-10 KV	100 mA	10½″
PG20R25	PG20P25	PG20N25	0-20 KV	25 mA	10½″
PG20R50	PG20P50	PG20N50	0-20 KV	50 mA	10½″
PG30R16	PG30P16	PG30N16	0-30 KV	16 mA	10½″
PG30R32	PG30P32	PG30N32	0-30 KV	32 mA	10½″
PG40R12	PG40P12	PG40N12	0-40 KV	12 mA	10½″
PG40R25	PG40P25	PG40N25	0-40 KV	25 mA	10½″
PG50R10	PG50P10	PG50N10	0-50 KV	10 mA	10½″
PG50R20	PG50P20	PG60N5	0-50 KV	20 mA	10½″
PG60R8	PG60P8	PG60N8	0-60 KV	8 mA	10½″
PG60R16	PG60P16	PG60N16	0-60 KV	16 mA	10½″
PG80R6	PG80P6	PG80N6	0-80 KV	6 mA	10½″
PG80R12	PG80P12	PG80N12	0-80 KV	12 mA	10½″
PG100R4	PG100P4	PG100N4	0-100KV	4 mA	10½″
PG100R7.5	PG100P7.5	PG100N7.5	0-100KV	7.5 mA	10½″
OPEN STACK MODELS					
PG100R5	PG100P5	PG100N5	0-100KV	5 mA	5¼″
PG100R10	PG100P10	PG100N10	0-100KV	10 mA	5¼″
PG150R3	PG150P3	PG150N3	0-150KV	3 mA	5¼″
PG150R6	PG150P6	PG150N6	0-150KV	6 mA	5¼″
PG200R2.5	PG200P2.5	PG200N2.5	0-200KV	2.5mA	5¼″
PG200R5	PG200P5	PG200N5	0-200KV	5 mA	5¼″
PG250R2	PG250P2	PG250N2	0-250KV	2 mA	5¼″
PG250R4	PG250P4	PG250N4	0-250KV	4 mA	5¼″
PG300R2	PG300P2	PG300N2	0-300KV	2 mA	5¼″

PG - WG Series Options

Symbol	Description	Symbol	Description
220	220 Volt Input	400 HZ	400 Hz INPUT
100	100 Volt Input	DM	Digital Volt Meters
B	Bi-Polar Operation (Requires 2 power supplies)	DP	Digital Programming
		TTL	Compatible "enable" line
CT	Current Trip	P	Parallel Operation

PH SERIES MODELS

Reversible Polarity Model	Positive Polarity Model	Negative Polarity Model	Output Voltage	Output Current	Panel Height
PH10R300	PH10P300	PH10N300	0-10 KV	300mA	21″
PH15R200	PH15P200	PH15N200	0-15 KV	200mA	21″
PH20R150	PH20P150	PH20N150	0-20 KV	150mA	21″
PH30R100	PH30P100	PH30N100	0-30 KV	100mA	21″
PH40R75	PH40P75	PH40N75	0-40 KV	75mA	21″
PH50R60	PH50P60	PH50N60	0-50 KV	60mA	21″
PH60R50	PH60P50	PH60N50	0-60 KV	50mA	21″
PH80R35	PH80P35	PH80N35	0-80 KV	35mA	21″
PH100R25	PH100P25	PH100N25	0-100KV	25mA	21″

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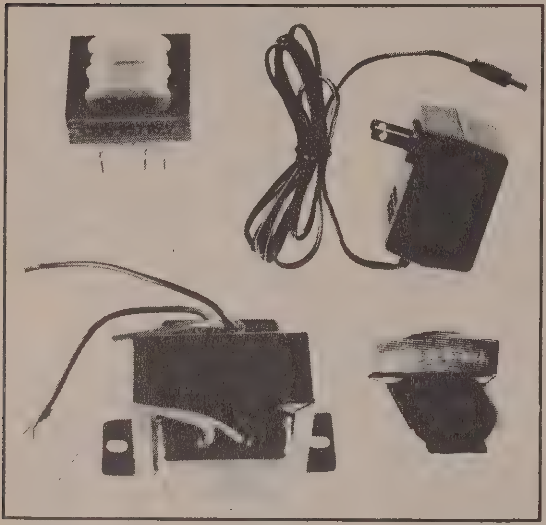
GPE

YOUR O.E.M. SUPPLIER SOURCE for Electronic Power Components.

- POWER TRANSFORMERS
- AC / DC ADAPTORS
- LINEAR Wall Mount or Desk Top POWER SUPPLIES
- SWITCHING POWER SUPPLIES 20 Watt to 200 Watt.



• POWER TRANSFORMERS

- Meets UL (UL 1411, 506), CSA and International Standards.
- Sizes up to 500 VA.
- PC Mount, Split Bobbin design.

• AC/DC ADAPTORS

- Single or Multiple Outputs
- Meets UL 1310 & CSA Standards.

• LINEAR Wall Mount POWER SUPPLIES

- Meets UL 1012.
- Regulated Multiple Outputs.
- Microprocessor Compatible
- Shielded DC Output Cable.
- DESKTOP version available.

• SWITCHING POWER SUPPLIES

- 20 Watt to 200 Watt.
- 115V/220V Inputs selectable.
- Input surge protected.
- Over-Voltage, Short Circuit protected.
- Typical Efficiency 70% minimum.
- 0° - 50° C Non-derated operation.
- Meet UL & CSA Safety Standards.
- Comply with FCC Part 15, Subpart J, Class B.

Series 04, 06, 07 models available for OEM application design evaluation.

Custom Design to O.E.M. Specifications.

FOR FURTHER DETAIL INFORMATION CONTACT: GPE SALES DEPARTMENT

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GPE INT'L ORGE

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ORANGE, CA 92667

(714) 538-9752
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VDE type Flyback Switchers

These 50 to 130 watt Flyback Switchers use fewer parts than conventional switching power supplies. This means smaller, lighter, less costly supplies per watt. All GFC/Hammond Flyback Switchers are designed to meet UL478, CSA 22.2 No. 154, VDE 0804 0806 0871, IEC 380, and FCC 20780 sub. J class A. for highest reliability.

Features

- Molex type quick disconnect connectors.
- Minimum 25kHZ switching frequency.
- PCB mount
- Separate AC and DC terminals.
- 2 year Warranty.

GFC
HAMMOND

1690 Walden Ave., Buffalo,
New York 14225 (716) 894-5710

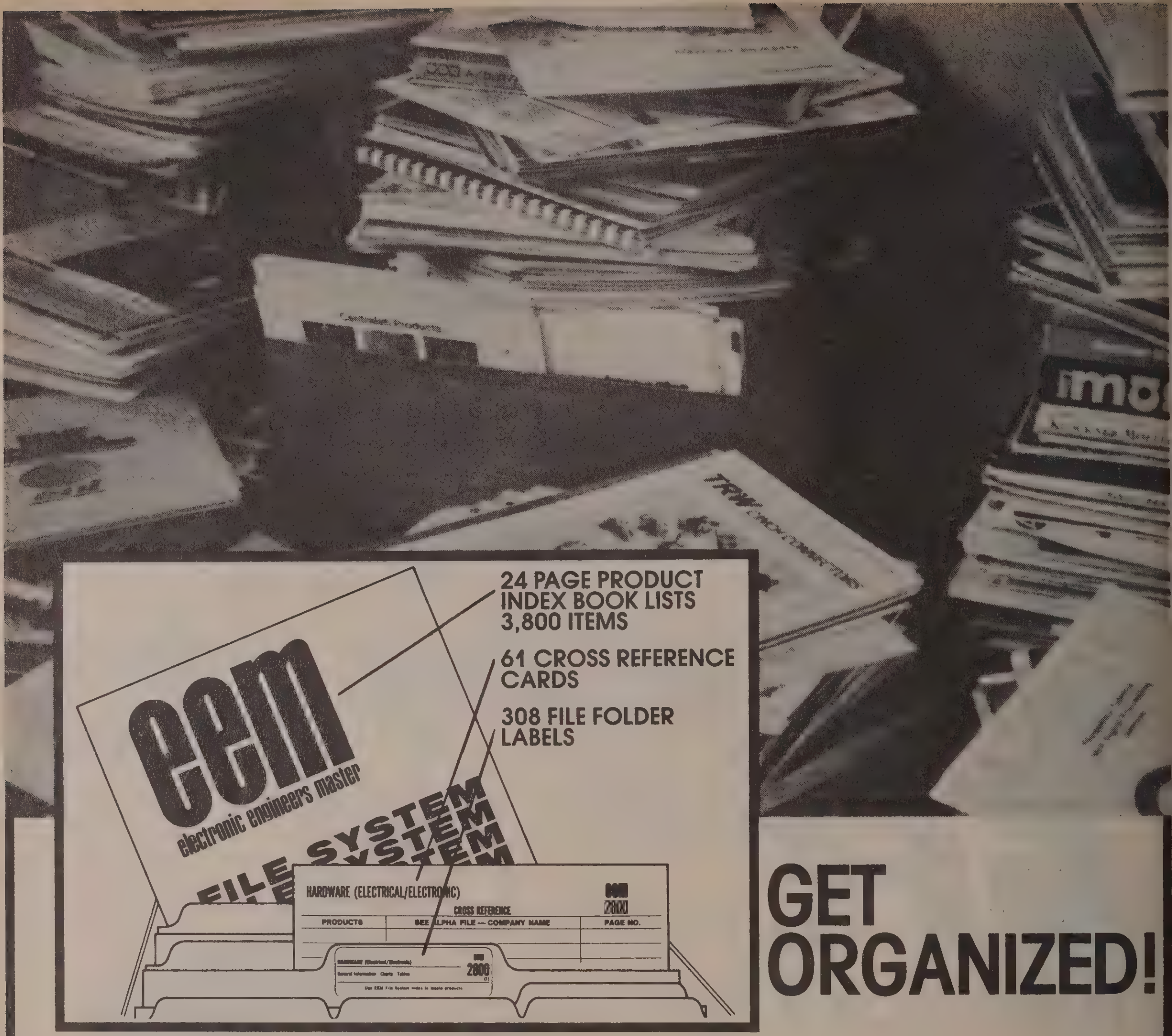
599 North Mathilda Ave., Sunnyvale,
California. (408) 720-8020

Price I-9

- GFXL 50 watt series $99.00
- GFXL 75 watt series $139.00
- GFXL 100 watt series $179.00
- GFXL 130 watt series $199.00

Model	Output 1	Output 2	Output 3	Output 4	Output 5	Size
GFXL 50-00	+5V@6A	+12V@2.5/4Apk	-12V@1A	-5V@0.5A	Is isolated from other outputs	L = 7.75 in. W = 4.25 in. H = 1.75 in.
GFXL 50-01	+5V@6A	+15V@2.5/4Apk	-15V@1A	-5V@0.5A		
GFXL 50-02	+5V@6A	+12V@2.5/4Apk	-12V@1A	+12V@1A		
GFXL 75-00	+5V@8A	+12V@2.5/4Apk	-12V@1A	-5V@1A		
GFXL 75-01	+5V@8A	+15V@2.5/4Apk	-15V@1A	-5V@1A		
GFXL 75-02	+5V@8A	+12V@2.5/4Apk	-12V@2A	+12V@1A		
GFXL 100-00	+5V@10A	+12V@3/4.5Apk	-12V@2A	-5V@1A	+24V@2/4Apk	L = 8.50 in. W = 4.75 in. H = 2.00 in.
GFXL 100-01	+5V@10A	+15V@3/4.5Apk	-15V@2A	-5V@1A	+24V@2/4Apk	
GFXL 100-02	+5V@10A	+12V@3/4.5Apk	-12V@2A	-5V@1A	+12V@4/6Apk	
GFXL 130-00	+5V@15A	+12V@3/4.5Apk	-12V@2A	-5V@1A	+24V@2/4Apk	L = 9.50 in. W = 5.00 in. H = 2.50 in.
GFXL 130-01	+5V@15A	+15V@3/4.5Apk	-15V@2A	-5V@1A	+24V@2/4Apk	
GFXL 130-02	+5V@15A	+12V@3/4.5Apk	-12V@2A	-5V@1A	+12V@4/6Apk	

- Load regulation in shaded area 0.2%, unshaded 2.5%.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HEWLETT PACKARD

The Choice in DC Power Supplies

- *Low-Cost Lab Supplies*
- *General Purpose Lab & System Supplies*
- *Autoranging Power Supplies*
- *High-Power, High-Efficiency Supplies*
- *OEM Modular Power Supplies*
- *Custom Power Systems*
- *Bipolar Power Supply/Amplifiers*
- *Precision Voltage & Current Sources*
- *High Voltage Power Supplies*
- *Power Supply Programmers*
- *Digitally Controlled Power Sources*
- *Multiprogrammers*
- *HP-IB (IEEE 488) System Power Supplies*

Power Supplies for the Lab or System

Hewlett-Packard power supplies are available in many types, sizes, and ratings. You can choose from bench-type supplies for circuit testing and development, modular supplies to power systems, high-power supplies used in industrial processes, and many special purpose supplies ranging from bipolar power supply/amplifiers to digital power sources. Most are covered briefly in this short-form listing and in much greater detail in the 128-page DC Power Supply Catalog which can be obtained free of cost from your local HP Field Engineer.

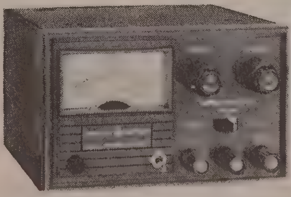
In selecting the best power supply for a given job, one usually looks to satisfy all the physical and electrical criteria first: voltage and current ratings, performance specifications, size, and operating features. However, there are other less tangible factors which affect the usability and long-range performance of a power supply. Reliability, for example, is closely related to design thoroughness and the use of quality parts. Service assistance in the form of helpful advice, excellent operating and service manuals, and worldwide availability of spare parts can help return a failed instrument to service in a minimum of time. These factors do not appear on a data sheet, but are closely related to a company's capability and responsibility towards its customers. When you purchase a power supply from Hewlett-Packard, you receive guaranteed product performance plus all the intangibles that add up to long-term value — and it usually costs no more.

Ordering Information

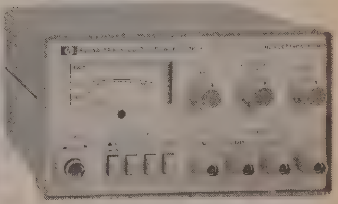
Although Hewlett-Packard products are manufactured throughout the world, the Hewlett-Packard field office or distributor in your area is best equipped to handle all your needs concerning products described in this catalog, and for parts and service on Hewlett-Packard products you already own. A listing of field offices current at the time of publication, can be found on the back page of this section.

10-Watt General Purpose Bench Supplies

- Single, Dual & Triple Output Models
- Short-Circuit Proof
- Compact Packages
- Impact-Resistant Case



6212B, 6214B
6216B, 6218B



6235A Triple Output
6234A Dual Output

Ratings—Single, Dual & Triple Outputs

Volts	Amps	Model	Load Effect	Source Effect	PARD Rms/p-p	Price
0-6	1.0	Triple 6235A	10mV	15mV	1mV/5mV	$355
0to+18	0.2					
0to−18	0.2					
0-25	0.2	Dual 6234A	4mV	4mV	200μV/1mV	$380
0-25	0.2					
0-10	0-1	6214B	4mV	4mV	200μ/1mV	$300
0-25	0-0.4	6216B	4mV	4mV	200μ/1mV	$300
0-50	0-0.2	6218B	4mV	4mV	200μ/1mV	$300
0-100	0-0.1	6212B	8mV	4mV	200μ/1mV	$355

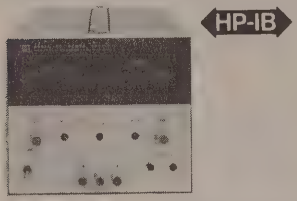
These popular low-cost bench supplies are designed for general laboratory use. All models have front-panel voltage controls, a combination volt/ammeter, and output binding posts. Output voltage is continuously variable from 0V to 15% above the maximum rated output of the supply. A meter function switch selects either output voltage or current for display on the panel meter. Models 6212B-6218B are Constant Voltage/Constant Current (CV/CC)-type supplies and have concentric coarse and fine current controls which allow the current limit point to be set to any value within the current rating. They can also be operated as constant current sources with 500μA load regulation.

HEWLETT PACKARD

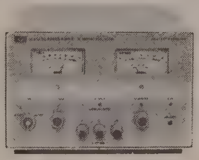
20-200 Watt Lab/System Supplies

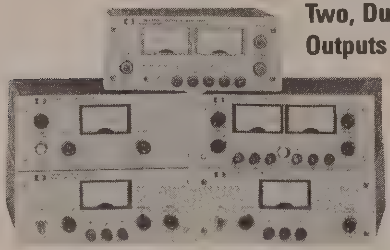
- Constant Voltage/Constant Current Operation
- Auto-Series, - Parallel, - Tracking
- Remote Programming and Sensing
- Single -, Dual -, Triple - Output Models
- Autoranging Models

6002A Autoranging



6024A Autoranging





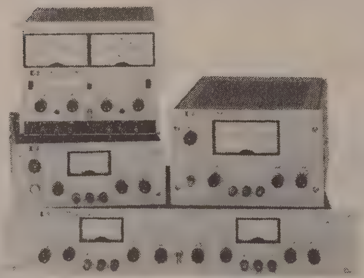
6236B, 6237B CV/CL Triple Output

6205C CV/CL Two, Dual Range Outputs

6384A CV/CL

6206B

6200B-6203B, 6207B, 6209B CV/CC



6227B, 6228B

6281A, 6284A, 6289A, 6294A, 6299A

6282A, 6286A, 6291A, 6296A

6253A, 6255A

This series of low and medium-power Constant Voltage/Constant Current power supplies includes both single and dual output models. All supplies have separate front-panel voltage/current controls that allow the voltage and current outputs to be varied from zero to the maximum rated values. Crossover from constant voltage to constant current operation occurs automatically when the load current exceeds the value established by the current control setting.

The dual-output supplies each contain two identical, independently-adjustable supplies. By combining the versatility of a dual power supply with the flexibility of auto-series and auto-parallel operation, twice the maximum rated output voltage or current of each section can be obtained from the one supply. In addition, using the autotracking capability, opposite-polarity voltages can be obtained.

Autoranging supplies employ a regulation control that automatically yields a continuous span of voltage and current ratings within the basic power rating boundry. More current is available at lower voltages, and higher voltages are available at a given current level. Autoranging supplies have features for system applications and have the flexibility for multi-application or multi-user situations. The 6002A has a maximum 200 watts output from 20V to 50V, the 6024A and 6034A from 20V to 60V. Model 6012A has 1000 watts output from 20V to 60V.

Ratings for Autoranging Supplies

Volts	Amps	Model	Load Effect	Source Effect	PARD Rms/p-p	Price
0-50	0-10	6002A	.01% +1mV	.01% +1mV	1mV/10mV	$1,675*
0-60	0-10	6024A	.01%	.01%	3mV/30mV	$1,115
0-60	0-10	6034A	.01%	.01%	3mV/30mV	$2,740
0-60	0-50	6012A	+5mV	+3mV	5mV/50mV	$1,875

*HP-IB (IEEE 488) control for Model 6002A is optional; add $560

Ratings for Lab/System Supplies

Volts	Amps	Model	Load Effect	Source Effect	PARD Rms/p-p	Price
4.4-5.5	8	6384A	2mV	2mV	1mV/5mV	$590
0-6/0±20 0-18/0±20	2.5/.5 1/.5	6236B 6237B	0.01% +2mV	0.01% +2mV	0.35mV/ 1.5mV	$590
0-7.5	0-3	6203B	5mV	3mV	200μV/1mV	$560
0-7.5	0-5	6281A	5mV	0.01% +2mV	200μV/1mV	$660
0-10	0-10	6282A	0.01% +1mV	0.01% +1mV	500μV/25mV	$860
0-20/0-40	0-1.5/ 0-0.75	6200B	0.01% +4mV	0.01% +4mV	200μV/1mV	$505
0-20/0-40 0-20/0-40	0.6/0.3 0.6/0.3	6205C	0.01% +4mV	0.01% +4mV	.2mV/1mV	$560
0-20 0-20	0-3 0-3	6253A	0.01% +4mV	0.02% +2mV	200μV/1mV	$1,115
0-20	0-3	6284A	0.01% +4mV	0.01% +2mV	200μV/1mV	$585
0-20	0-10	6286A	0.01% +1mV	0.01% +1mV	500μV/25mV	$915
0-25 0-25	0-2 0-2	6227B	0.01% +1mV	1mV	250μV/4mV	$1,420
0-30/0-60	1/0.5	6206B	0.01% +4mV	0.01% +4mV	.2mV/1mV	$505
0-40 0-40	0-1.5 0-1.5	6255A	0.01% +2mV	0.01% +2mV	200μV/1mV	$1,115
0-40	0-1.5	6289A	0.01% +2mV	0.01% +2mV	200μV/1mV	$585
0-40	0-5	6291A	0.01% +1mV	0.01% +1mV	500μV/25mV	$915
0-50 0-50	0-1 0-1	6228B	0.01% +1mV	1mV	250μV/4mV	$1,420
0-60	0-1	6294A	0.01% +2mV	0.01% +2mV	200μV/1mV	$610
0-60	0-3	6296A	0.01% +1mV	0.01% +1mV	500μV/25mV	$915
0-100	0-750mA	6299A	0.01% +2mV	0.01% +2mV	200μV/1mV	$635
0-160	0-0.2	6207B	0.02% +2mV	0.02% +2mV	5mV/40mV	$635
0-320	0-0.1	6209B	0.02% +2mV	0.02% +2mV	1mV/40mV	$635

HEWLETT PACKARD

200-2,000 Watt High-Performance Supplies for Systems or the Lab

- Constant Voltage/Constant Current Operation
- Built-in Overvoltage Protection
- Auto-Series, - Parallel, - Tracking

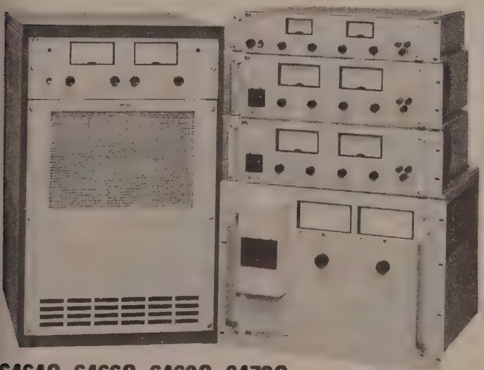
6259B,6260B
6268B,6269B
6264B
6267B,6274B
6263B,6266B,6271B

All models in this series employ a transistor series-regulator/triac preregulator circuit to achieve high efficiency, excellent regulation, low ripple and noise, and moderate programming speeds in a compact full-rack width package.

Separate coarse and fine voltage and current controls allow the voltage and current outputs to be varied from zero to the maximum rated value.

300-11,000 Watt High-Power, High-Efficiency Supplies

- Constant Voltage/Constant Current Operation
- Low Cost/Watt
- Up to 75% Efficiency
- Auto-Series, -Parallel, -Tracking



6464C, 6466C, 6469C, 6472C, 6475C, 6477C, 6479C, 6483C

This series of SCR-regulated power supplies is designed for high-power applications requiring a fixed or variable DC source with moderate regulation and ripple. Typical applications include battery charging and discharging, computer mainframe and memory system power, life testing and aging of large quantities of components, etc.

Ratings for High-Efficiency Supplies

Volts	Amps	Model	Load Effect	Source Effect	PARD Rms/p-p	Price
0-10	0-50	6259B	0.01% +200μV	0.01% +200μV	500μV/ 5mV	$1,675
0-10	0-100	6260B	0.01% +200μV	0.01% +200μV	500μV/ 5mV	$1,925
0-20	0-10	6263B	0.01% +200μV	0.01% +200μV	200μV/ 10mV	$1,165
0-20	0-20	6264B	0.01% +200μV	0.01% +200μV	200μV/ 10mV	$1,215
0-20	0-50	6261B	0.01% +200μV	0.01% +200μV	500μV/ 5mV	$1,725
0-40	0-5	6266B	0.01% +200μV	0.01% +200μV	200μV/ 10mV	$1,165
0-40	0-10	6267B	0.01% +200μV	0.01% +200μV	200μV/ 10mV	$1,215
0-40	0-30	6268B	0.01% +200μV	0.01% +200μV	1mV/ 5mV	$1,675
0-40	0-50	6269B	0.01% +200μV	0.01% +200μV	1mV/ 5mV	$1,775
0-60	0-3	6271B	0.01% +200μV	0.01% +200μV	200μV/ 10mV	$1,165
0-60	0-15	6274B	0.01% +200μV	0.01% +200μV	200μV/ 20mV	$1,370

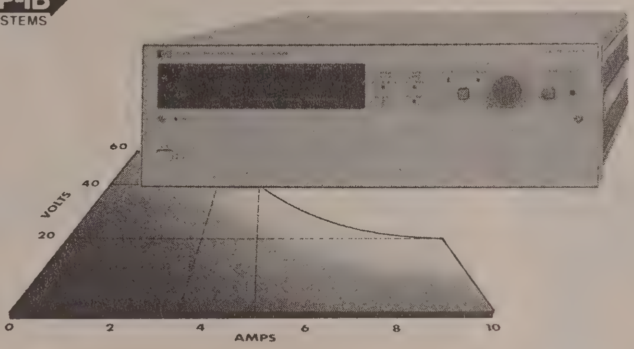
Ratings for High-Performance Supplies

Volts	Amps	Model	Load Effect	Source Effect	PARD Rms/p-p	Price
0-8	0-1000	6464C	0.05% +5mV	0.05% +5mV	80mV/ 1V	$8,110
0-15	0-200	6453A	0.2%+10mV Com		150mVrms	$3,650
0-16/ 0-18	0-600/ 0-500	6466C	0.05% +5mV	0.05% +5mV	180mV/ 1V	$7,100
0-36	0-100	6456B	0.2%+10mV Com		180mVrms	$3,450
0-36	0-300	6469C	0.05% +5mV	0.05% +5mV	180mV/ 1V	$6,900
0-40	0-25	6434B	40mV	18mV	40mV/ 500mV	$1,620
0-60	0-5	6438B	60mV	30mV	120mV/ 400mV	$1,215
0-64	0-50	6459A	0.2%+10mV Com		160mVrms	$3,345
0-64	0-150	6472C	0.05% +100mV	0.05% +100mV	160mV/ 2V	$6,900
0-110	0-100	6475C	0.05% +100mV	0.05% +100mV	220mV/ 2V	$6,900
0-120	0-2.5	6443B	120mV	60mV	240mV/ 400mV	$1,115
0-220	0-50	6477C	0.05% +100mV	0.05% +100mV	330mV/ 2V	$6,900
0-300	0-35	6479C	0.05% +100mV	0.05% +100mV	330mV/ 3V	$6,900
0-400, 500,600	0-25, 20,15	6483C	0.05% +100mV	0.05% +100mV	600mV/ 5V	$7,300
1-600	5mA- 1.5A	6448B	1%+ 400mV	600mV	600mV/ 2V	$1,470

HEWLETT PACKARD

The 6034A *Autoranging* DC Power Supply with HP-IB has expanded systems capability . . . a comprehensive solution for system-controlled DC power.

DESIGNED FOR HP-IB SYSTEMS



- HP-IB programming of voltage, current and OVP
- HP-IB measurement of voltage and current
- Read-back of status information
- Autoranging output
- Programmable "soft" limits
- Friendly programming format
- Digital panel meters
- Fast down-programming
- Compact and lightweight
- Self-test and diagnostics

SALES AND SERVICE OFFICES

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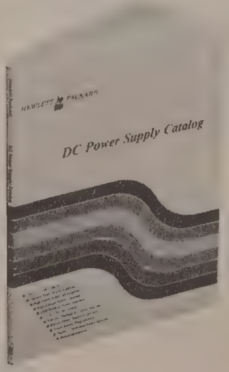

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1820 Embarcadero Road, Palo Alto, CA 94303

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

STANDARD HIGH VOLTAGE DC POWER SUPPLIES

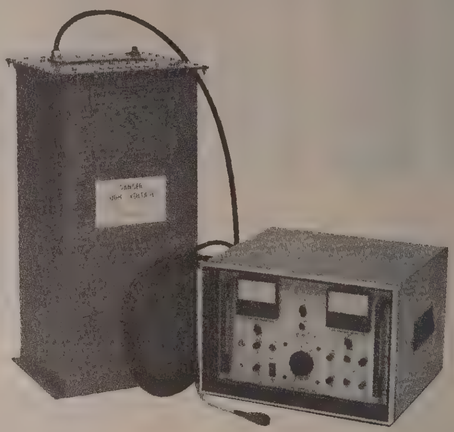
Complete line of HV DC power supplies available with voltages up to 300 kV, listed according to power rating. Features are identical throughout the line.

STANDARD FEATURES

(provided with all units)

- Output connected triple range voltage meter.
- Triple range current meter in return leg of HV circuit.
- Reversible polarity.
- Rated current available from zero to rated voltage.
- Solid state rectifiers.
- Continuously variable output voltage from zero to maximum.
- HV on and off pushbuttons.
- Meter recalibration potentiometers.

Model No.	Voltage (kV)	Current (mA)	Output	Input
801-1A	1	1 Amp	1 KILOWATT	115 VOLT, 50/60 Hz, SINGLE PHASE
803-330	3	330		
805-200	5	200		
810-100	10	100		
820-50	20	50		
825-40	25	40		
830-33	30	33		
850-20	50	20		
860-16	60	16		
875-13	75	13		
8100-10	100	10		
8120-8	120	8		
8150-6.5	150	6.5		
8200-5	200	5		
801-1.5A	1	1.5 Amp	1.5 KILOWATT	
803-500	3	500		
805-300	5	300		
810-150	10	150		
825-60	25	60		
830-50	30	50		
850-30	50	30		
875-20	75	20		
8100-15	100	15		
8120-12.5	120	12.5		
8150-10	150	10		
8200-7.5	200	7.5		
801-2.5A	1	2.5 Amp	2.5 KILOWATT	
803-830	3	830		
805-500	5	500		
810-250	10	250		
825-100	25	100		
850-50	50	50		
875-33	75	33		
8100-25	100	25		
8120-20	120	20		
8150-16	150	16		
8200-12.5	200	12.5		
8250-10	250	10		
8300-8	300	8		



Typical DC Power Supply

Hipotronics

Quality Products

These units are designed and manufactured with the highest quality components. They are available with fully instrumented control consoles or without controls for use in OEM equipment.

All critical components—transformers, capacitors, rectifier assemblies, tanks etc., are designed and manufactured by Hipotronics so that superior quality and on-time delivery schedules can be assured.

Model No.	Voltage (kV)	Current (mA)	Output	Input
801-5A	1	5 Amp	5 KILOWATT	208/230 VOLT, 50/60 Hz, THREE PHASE Single Phase
803-1.6A	3	1.66 Amp		
805-1A	5	1 Amp		
810-500	10	500		
825-200	25	200		
850-100	50	100		
875-67	75	67		
8100-50	100	50		
8120-41.5	120	41.5		
8150-33.3	150	33.3		
8200-25	200	25		
8250-20	250	20		
8300-16.6	300	16.6		
801-10A	1	10 Amp	10 KILOWATT	
803-3300	3	3.3 Amp		
805-2000	5	2 Amp		
810-1000	10	1 Amp		
825-400	25	400		
850-200	50	200		
875-130	75	130		
8100-100	100	100		
8120-80	120	80		
8150-65	150	65		
8200-50	200	50		
8250-40	250	40		
8300-33	300	33		

Model No.	Voltage (kV)	Current (mA)	Output	Input
801-15A	1	15 Amp	15 KILOWATT	480 VOLT, 50/60 Hz, THREE PHASE Single Phase
803-5A	3	5 Amp		
805-3A	5	3 Amp		
810-1.5A	10	1.5 Amp		
825-600	25	600		
850-300	50	300		
875-200	75	200		
8100-150	100	150		
8120-125	120	125		
8150-100	150	100		
8200-75	200	75		
8250-60	250	60		
8300-50	300	50		
801-25A	1	25 Amp	25 KILOWATT	
803-8.8A	3	8.8 Amp		
805-5A	5	5 Amp		
810-2.5A	10	2.5 Amp		
825-1A	25	1 Amp		
850-500	50	500		
875-335	75	335		
8100-250	100	250		
8120-200	120	200		
8150-170	150	170		
8200-125	200	125		
8300-80	300	80		
801-50A	1	50 Amp	50 KILOWATT	
803-16.6A	3	16.6 Amp		
805-10A	5	10 Amp		
810-5A	10	5 Amp		
825-2A	25	2 Amp		
850-1A	50	1 Amp		
875-670	75	670		
8100-500	100	500		
8120-420	120	420		
8150-335	150	335		
8200-250	200	250		
8300-165	300	165		

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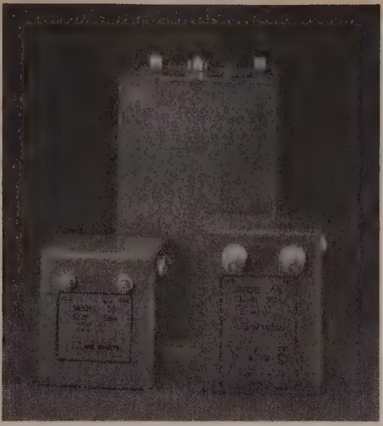
Hipotronics

HV DC POWER PACKS



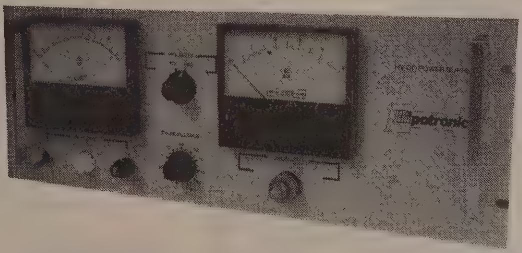
1. Power Packs:

Manufactured with all components rated at well above designated operating level and pre-assembly Hipot tested at 1.5 operating voltage. Power Packs are available from 2.5kV to 100kV.

Model No.	Input		Polarity (Neg./Pos.)	Output	
	115 Volts 50/60 Hz	220 Volts 50/60 Hz		KV	MA
2.5B	.5 Amps	.25 Amps	Both	2.5	5
2.5C	1 Amp	.5 Amps	Both	2.5	10
5B	1 Amp	.5 Amps	Both	5	5
7.5C	.75 Amps	.4 Amps	Both	7.5	10
10B	1.5 Amps	1 Amp	Both	10	5
10C	.5 Amps	.25 Amps	Both	10	10
15B	.75 Amps	.4 Amps	Both	15	5
15C	2 Amps	1 Amp	Both	15	10
20B	2 Amps	1 Amp	Both	20	5
30B	2 Amps	1 Amp	Both	30	5
30C	2 Amps	1 Amp	Both	30	10
40A	2 Amps	1 Amp	Both	40	2.0
50B	3 Amps	1.5 Amps	Both	50	5
60A	3 Amps	1.5 Amps	Both	60	2.0
100C	15 Amps	8 Amps	Both	100	10

2. Metered Power Pakcs with simplified controls:

Provide complete output metering and overload protection system in a unit suitable for mounting in standard 19" relay racks. Current limited to 5mA.



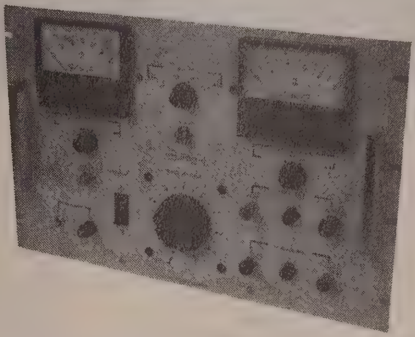
SPECIFICATIONS:

INPUT: 125 Volts [Output Voltages & Currents—Stated for **Nominal 117 Volt Input**].
REGULATION: 10% to 15% No Load to Full Load.
RIPPLE: 0.5% RMS per Milliampere Output.

Model No.	Output (kV)	Current (mA)	Ripple (%rms/mA)	Polarity	KV Meter Range (kV)	Current Meter Range (mA)
R2B	0-2	5	0.5	Reversible	0-2.5	0-5
R5B	0-5	5	0.5	Reversible	0-6	0-5
R10B	0-10	5	0.5	Reversible	0-12	0-5
R15B	0-15	5	0.5	Reversible	0-15	0-5
R20B	0-20	5	0.5	Reversible	0-25	0-5
R30B	0-30	5	0.5	Reversible	0-30	0-5
R50B	0-50	5	0.5	Reversible	0-50	0-5
R60A	0-60	2.0	0.5	Reversible	0-60	0-2.0

3. Power Packs with deluxe controls:

Provided with many safety and control features previously found only in higher power DC Supplies. Current in 2mA, 5mA, and 10mA.

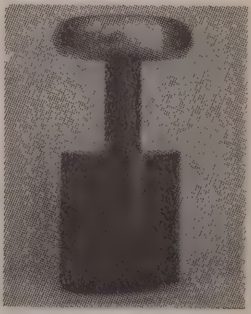


SPECIFICATIONS:

INPUT: 115 Volts, 50/60 Hz, Single Phase.
REGULATION: 15% No Load to Full Load.
RIPPLE: 0.5% RMS Per Milliampere Output.
HV OUTPUT: 20 Foot Shielded Cable.

Model No.	Max kV	mA	kV Meter Ranges	mA Meter Ranges
82.5B	2.5	5	0-.5/1/2.5	0-1/2.5/5
82.5C	2.5	10	0-.5/1/2.5	0-2.5/5/10
85B	5	5	0-1/2.5/5	0-1/2.5/5
87.5C	7.5	10	0-1.5/3.75/7.5	0-2.5/5/10
810B	10	5	0-2.5/5/10	0-1/2.5/5
810C	10	10	0-2.5/5/10	0-2.5/5/10
815B	15	5	0-3.75/7.5/15	0-1/2.5/5
815C	15	10	0-3.75/7.5/15	0-2.5/5/10
820B	20	5	0-4/8/20	0-1/2.5/5
830C	30	10	0-6/12/30	0-2.5/5/10
830B	30	5	0-6/12/30	0-1/2.5/5
840A	40	2	0-8/20/40	0-.4/.8/2
850B	50	5	0-10/25/50	0-1/2.5/5
860A	60	2	0-12/30/60	0-.4/.8/2
8100C	100	10	0-25/50/100	0-2/5/10

STRAIGHT ISOLATION TRANSFORMERS



Operate in Oil, Gas and Air (Rated in Air) for use in Laser, Accelerator & Laboratory Power Supplies and for Insulation, Cable, Hipot and Corona Testing.

MODEL	IT 100	IT 300
D.C. Isolation	100 KV	300 KV
INPUT/OUTPUT VOLTAGE	115/115V, 60 Cycle Single Phase	
KVA	1 KVA	

Hipotronics

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HITRAN

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Key source for reliable magnetic components, power supplies and control systems for over 40 years.

200W TO 200KW STANDARD & SPECIALTY DC POWER SYSTEMS

STANDARD BATTERY CHARGERS

Industrial float type chargers, designed to automatically control charging rates for a wide variety of battery types. Filtered and unfiltered 600V class input. Single phase and three phase. 47 to 63 Hz. Outputs range from 12 to 260V at 6 to 600Adc.

Two series are available:

***SCR Series** constant voltage chargers automatically controlled by solid state integrated circuitry.*

***SR Series** constant voltage chargers automatically controlled by a saturable reactor (magnetic amplifier) and solid state integrated circuitry.*

Performance

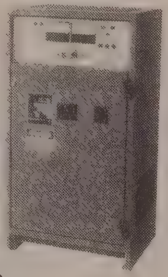
- Full rated output for both continuous and intermittant loads.
- Electronic current limiting at 110% of rated output.

Regulation.

- Continous taper charging as required.
- ± ½% Load Regulation of DC voltages from no load to full load.
- ± ½% of DC voltage setting maintained with input line variations of ± 10% voltage, and/or ± 5% frequency.
- ± 1% Output Regulation maintained against the combined variations of line, load and temperature.

Design Features

- Components selected for long life and reliability.
- Components derated to assure protection against voltage transients and short term overloads.
- No adjustment taps required.
- Lockable float/equalize controls on recessed front panel.
- Enclosures wall, floor or rack mountable.



Specialty SR Series Battery Charger

AC Input Voltage

120, 220, 240, 480 single phase, 47-63Hz and 208, 240, 380, 416, 480 three phase, 47-63Hz.

DC Output Ratings

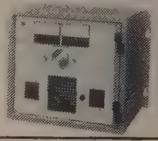
6-600 Adc at 12, 24, 48, 130 or 260 Vdc, nominal.

Standard Accessories

- DC Ammeter and Voltmeter.
- Potentiometers for float and equalize charge adjustments.
- AC input circuit breaker.
- Dual fused DC output.
- Front panel switch to change from float to equalize charging rate.
- Internal connection blocks for AC input, DC output and optional accessories.
- Protection diode to prevent damage due to improper connection of battery cables.

Optional Accessories

- DC circuit breaker to replace standard fusing.
- Equalize timer, 0-72 hour.
- Ground detection alarm relays and lights.
- HI & LO Vdc alarm relays and lights.
- Charger failure alarm relay and lights.
- Output filtering as required, 30mV RMS or less as charger or eliminator.
- And many more.



SCR Series Battery Charger

STANDARD PLASMA POWER SUPPLIES

DCS SERIES — Direct Current Sputtering

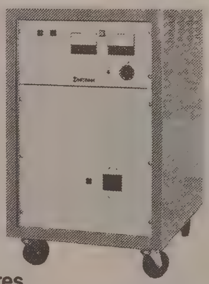
Designed for use in the vacuum sputtering, thin film deposition industry. Constant-current control, saturable reactor regulated, 600V class input, three phase, 50/60Hz, 600 and 1000Vdc at 3 to 25KW output. Special outputs to 75KW available.

Performance

- Input: 210/240 or 440/480V three phase 50/60Hz
- Output: 600/1000Vdc
- AC ripple less than 5%
- Current regulation better than 5%

Standard Features

- Tapped transformer secondaries
- Short circuit protection
- Transient supression
- Grounded B+ on chassis
- Forced air cooled
- Current rate signal interface ability



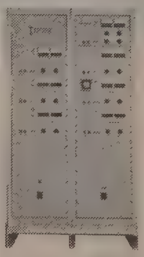
DCS-10000L

Optional Features

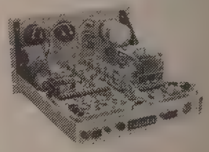
- Constant power or constant voltage
- Floating B+ to 50V off ground
- Free floating B+, (B− and B+ ground free)
- Multiple gun output
- Programmable timer (0.2 seconds to 60 hours)
- Remote control adapter kit
- Auto transformer for 380-415V input

Standard Models Available

KW	CATALOG NUMBER DCS-	CURRENT OUTPUT AT 600/1000VDC	CABINET DIMENSIONS H″ × W″ × D″
3	3000L	5A/3A	17.5 × 19 × 20
5	5000L	8.3A/5A	37 × 22 × 30
10	10000L	16.7A/10A	37 × 22 × 30
15	15000L	25A/15A	43 × 26 × 36
20	20000L	33.3A/20A	60 × 40 × 54
25	25000L	41.7A/25A	60 × 40 × 54



Chassis Mounted Control Circuitry



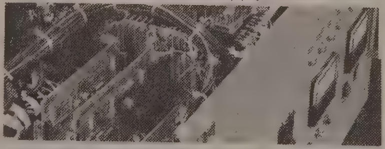
Specialty Plasma Power Supply

SPECIALTY POWER SYSTEMS

Also see our catalog pages under TRANSFORMERS and AC POWER SOURCES.

- Power converters - AC to DC, DC to AC, AC to AC, or DC to DC
- Rectifiers, Inverters, Regulators
- Low voltage
- High voltage to 50KV
- High current to 20,000 Amperes
- Frequency to 10KHz

Typical Specialty Power Supply Construction



- Variable-voltage
- Variable-frequency
- Phase-angle fired SCR controlled
- Saturable reactor controlled
- Unregulated, Regulated
- Voltage, Current or Power Regulation to ± 0.1%

Route 31, RD 5-65 • Flemington, New Jersey 08822 • 201-782-5525 • Telex: 833701/AGEX/FLEM

Integrated Circuits Incorporated
10301 Willows Road, Redmond, WA 98052
(206) 882-3100 TWX: 910-443-2302

MINIATURE DC-DC CONVERTERS

When size is at a premium, performance is critical, and reliability is a must, ICI Miniature DC-DC Converters are the industry leaders.

Since 1969, ICI has been developing innovative designs of on-board power devices. ICI combines unique electrical design with proven thick-film hybrid processes to obtain maximum performance and power per cubic inch. With dedicated engineering and production, the power devices group conducts a continuous development program in DC-DC converter technology. This program assures state-of-the-art products for demanding applications. At ICI, every unit receives individual testing; every unit carries ICI's one-year warranty.

Standard models, normally shipped from inventory, are available for both military/airborne and industrial applications. With over 100 models in production and power ratings to 20 watts, the ICI product line provides the customer with a wide selection of devices for his application.

For military and airborne applications, ICI's metal-packaged hermetically-sealed units are available in several configurations—each series offering unique advantages.

For industrial applications, ICI's standard families of encapsulated designs provide a broad choice of models for operation over a temperature range of −20°C to +70°C.

And for custom applications, including MIL-STD-883 requirements, ICI can provide design expertise based on solid experience to achieve quick response and expedited delivery of an end-item that will do the job—and do it well.

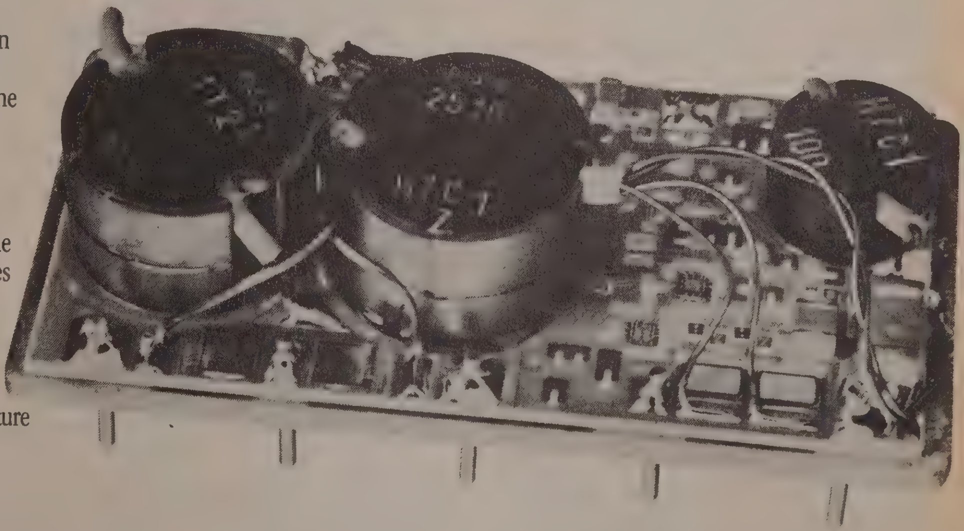
Integrated Circuits Incorporated . . . for the best in DC-DC converters.

Optional Environmental Screening

All ICI metal-packaged units are available with environmental screening, referenced to MIL-STD-883, per ICI's in-house screening procedure, as follows:

- Pre-cap internal visual inspection: Method 2017.
- Stabilization bake: 24 hours at 125°C, Method 1008, Cond. B.
- Temperature cycle: 10 times, −55°C/+125°C, Method 1010.
- Constant Acceleration: 500 g, Method 2001.
- Gross Leak: Method 1014.
- Fine Leak: Method 1014, Cond. A.
- Burn-in: 96 hour, at max. rated case temp., Method 1015
- Final electrical test: Per specification.
- Final external visual inspection: Method 2009

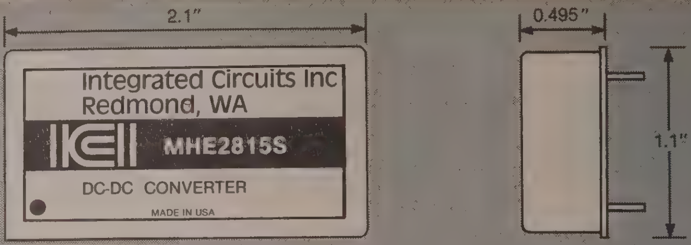
To order optional screening, add suffix /ES to part number. Example: MHE2805S/ES. Consult ICI for prices.



MHE SERIES

- **Up to 20 watts output power**
- **16 to 40 VDC input range**
- **Up to 86% typical efficiency**
- **-55°C to +85°C case temp. range**

The MHE models are high efficiency, isolated, regulated DC-DC converters that require no external components. Various output voltages are available in these hermetically-sealed, metal-packaged models that are suitable for military and airborne applications.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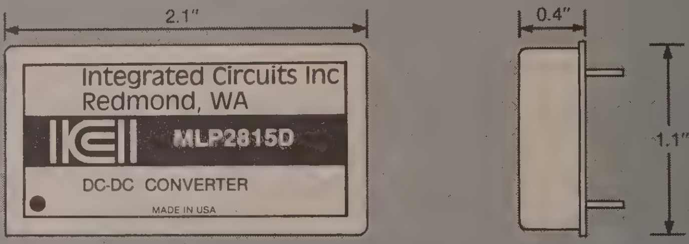
1.1"
Integrated Circuits Inc
Redmond, WA
MHE2815S
DC-DC CONVERTER
MADE IN USA

PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
M	MHE2805S	16.0 to 40 0	5 0	3000	81	15
	MHE2812S	16 0 to 40.0	12.0	1667	86	20
	MHE2815S	16.0 to 40.0	15.0	1333	86	20
	MHE2812D	16 0 to 40.0	± 12 0	± 625	78	15
	MHE2815D	16.0 to 40.0	± 15.0	± 500	78	15

MLP SERIES

- **Up to 15 watts output power**
- **Low profile: 0.4 inches high**
- **16 to 40 VDC input range**
- **-55°C to +85°C case temp. range**

The MLP series devices are similar to the MHE series except for a lower case profile. Isolation, regulated outputs, high efficiency, wide input voltage range, and metal hermetic package make the MLP series ideal for military, aerospace, or other high reliability applications.


2.1"
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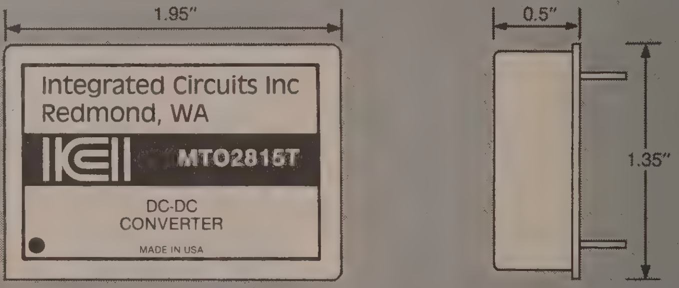
Integrated Circuits Inc
Redmond, WA
MLP2815D
DC-DC CONVERTER
MADE IN USA

PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
M	MLP2805S	16 0 to 40.0	5.0	2000	81	10
	MLP2812S	16.0 to 40.0	12.0	1250	86	15
	MLP2815S	16.0 to 40.0	15.0	1000	86	15
	MLP2812D	16 0 to 40.0	± 12.0	± 417	78	10
	MLP2815D	16.0 to 40.0	± 15.0	± 333	78	10

MTO SERIES

- **15 watts—triple output**
- **16 to 40 VDC input range**
- **79% efficiency**
- **-55°C to +85°C case temp. range**

The MTO models have three output voltages, with a common ground. All three regulated outputs are fully isolated from the input. The full rated output power can be drawn from the +5 VDC output, or the dual outputs can be loaded up to the limits shown. Total output power must be limited to 15 watts. Metal, hermetic package.


1.95"
0.5"
1.35"
Integrated Circuits Inc
Redmond, WA
MTO2815T
DC-DC
CONVERTER
MADE IN USA

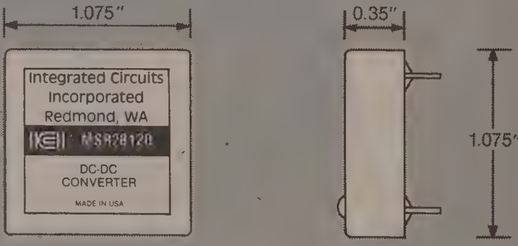
PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
O	MTO2812T	16 0 to 40 0	+ 5 0 ± 12.0	2000 ± 208	77	15
	MTO2815T	16.0 to 40.0	+ 5.0 ± 15 0	2000 ± 167	79	15

MSR SERIES

- **Up to 4 watts output power**
- **16 to 32 VDC input range**
- **Up to 75% efficiency**
- **-55°C to +85°C case temp. range**

The MSR models offer the high efficiency and wide input range of flyback switching regulators, yet have full input/output isolation. There are single, dual and triple output models, with all outputs fully regulated. The packages are metal, hermetically-sealed.

NOTE: EXTERNAL OUTPUT CAPACITORS ARE REQUIRED.


1.075"
0.35"
1.075"
Integrated Circuits
Incorporated
Redmond, WA
MSR2812D
DC-DC
CONVERTER
MADE IN USA

PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
K	MSR2805S	16.0 to 32.0	5.0	700	72	3.5
	MSR2812D	16.0 to 32.0	± 12 0	± 167	75	4.0
	MSR2815D	16.0 to 32.0	± 15.0	± 133	75	4.0
N	MSR28512T	16.0 to 32.0	+ 5 0 ± 12.0	300 ± 63	70	3.0
	MSR28515T	16.0 to 32.0	+ 5.0 ± 15 0	300 ± 50	70	3.0

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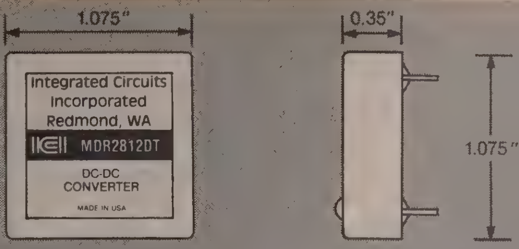
MDR SERIES

- **3 watts of output power**
- **Input voltages of 12, 24, and 28 VDC**
- **Regulated, isolated outputs**
- **-55°C to +85°C case temp. range**

The MDR series of DC-DC converters offers the excellent regulation and low output ripple provided by a series output regulator, in a hermetically-sealed metal package. No external components are required, and the outputs are fully isolated from the input.

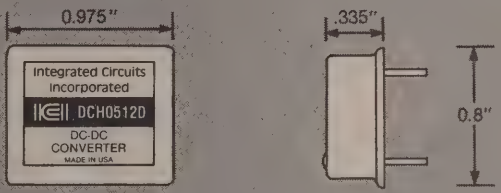


PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
I	MDR1212DT	10.8 to 14.0	± 12.0	± 125	60	3.0
	MDR1215DT	10.8 to 14.0	± 15.0	± 100	60	3.0
	MDR2412DT	20.0 to 28.0	± 12.0	± 125	60	3.0
	MDR2415DT	20.0 to 28.0	± 15.0	± 100	60	3.0
	MDR2812DT	24.0 to 32.0	± 12.0	± 125	60	3.0
	MDR2815DT	24.0 to 32.0	± 15.0	± 100	60	3.0

DCH SERIES

- **Up to 3 watts output power**
- **Unregulated**
- **Input voltages of 5, 12, and 28 VDC**
- **-55°C to +100°C case temp. range**

The DCH series consists of isolated, unregulated models that deliver up to 3 watts of output power. They can be used with external series regulators or in applications not requiring well regulated voltages. The metal packages are hermetically sealed.



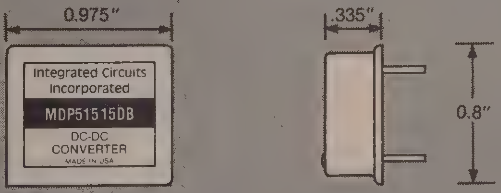
PRICE GROUP	MODEL	NOMINAL VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
L	DCH0505S	5.0	5.0	400	67	2.0
	DCH0512S	5.0	12.0	208	72	2.5
	DCH0512D	5.0	± 12.0	± 104	72	2.5
	DCH0515D	5.0	± 15.0	± 83	72	2.5
	DCH1205S	12.0	5.0	500	70	2.5
	DCH1212S	12.0	12.0	250	72	3.0
	DCH1212D	12.0	± 12.0	± 125	72	3.0
	DCH1215D	12.0	± 15.0	± 100	72	3.0
	DCH1228S	12.0	28.0	107	75	3.0
	DCH1228D	12.0	± 28.0	± 53	75	3.0
	DCH2805S	28.0	5.0	500	68	2.5
	DCH2812S	28.0	12.0	250	75	3.0
	DCH2812D	28.0	± 12.0	± 125	75	3.0
	DCH2815D	28.0	± 15.0	± 100	75	3.0

MDP SERIES

- **Up to 1.5 watts output power**
- **Wide input voltage ranges**
- **High efficiency/non-isolated**
- **-55°C to +85°C case temp. range**

The MDP miniature switching regulators include models with one regulated output and one unregulated output, as well as models with dual regulated outputs. The input common is connected internally to the output common. They are contained in metal, hermetically-sealed packages.

NOTE: EXTERNAL OUTPUT CAPACITORS ARE REQUIRED.



PRICE GROUP	MODEL	VDC INPUT	OUTPUT VDC	EFF. %	MAX. WATTS
P	MDP50505DP	+ 3 to + 7	+ 5 REGULATED/- 5 UNREG.	75	1.25
	MDP505SN	+ 3 to + 7	- 5 REG. SINGLE OUTPUT	72	1.25
	MDP51205DP	+ 3 to + 7	+ 12 REGULATED/- 5 UNREG.	75	1.25
	MDP51212DP	+ 3 to + 7	+ 12 REGULATED/- 12 UNREG	75	1.25
	MDP51212DN	+ 3 to + 7	- 12 REGULATED/+ 12 UNREG.	75	1.25
	MDP51212DB	+ 3 to + 7	± 12 REG./BALANCE UNREG.	75	1.25
	MDP51515DB	+ 3 to + 7	± 15 REG./BALANCE UNREG.	75	1.25
	MDP120505DP	+ 9 to + 15	+ 5 REGULATED/- 5 UNREG.	72	1.50
	MDP1205SN	+ 9 to + 15	- 5 REG. SINGLE OUTPUT	72	1.50
	MDP121205DN	+ 9 to + 15	- 12 REGULATED/+ 5 UNREG.	78	1.50
	MDP121212DB	+ 9 to + 15	± 12 REG./BALANCE UNREG.	80	1.50
	MDP121515DB	+ 9 to + 15	± 15 REG./BALANCE UNREG.	80	1.50
	MDP240505DP	+ 16 to + 32	+ 5 REGULATED/- 5 UNREG	72	1.50
	MDP241212DP	+ 16 to + 32	+ 12 REGULATED/- 12 UNREG.	80	1.50
	MDP241212DN	+ 16 to + 32	- 12 REGULATED/+ 12 UNREG	80	1.50
	MDP241212DB	+ 16 to + 32	± 12 REG /BALANCE UNREG.	80	1.50
	MDP241515DB	+ 16 to + 32	± 15 REG./BALANCE UNREG.	80	1.50

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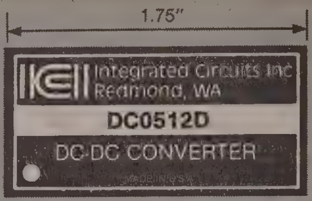
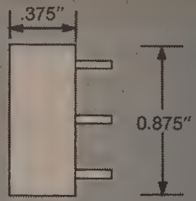
DC SERIES

- Up to 6.4 watts of output power @ 70°C
- Isolated, unregulated outputs
- Rugged encapsulated construction
- 4 input voltage ranges

The DC series of unregulated DC-DC converters consists of single and dual output models, in four input voltage ranges. They can be used with external regulators or in applications that do not require regulated voltages. Operating ambient temperature range for these plastic, encapsulated devices is −20°C to +70°C.



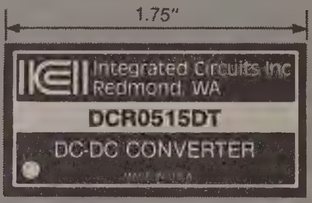


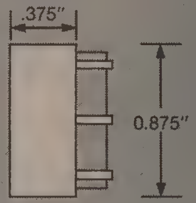
PRICE GROUP	MODEL	NOMINAL VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
A	DC0512D	5	± 12	± 208	75	5.0
	DC0515D	5	± 15	± 167	77	5.0
	DC0525D	5	± 25	± 100	77	5.0
	DC1205S	12	5	1000	67	5.0
	DC1212D	12	± 12	± 267	77	6.4
	DC1215D	12	± 15	± 213	77	6.4
	DC1218D	12	± 18	± 178	77	6.4
	DC2805S	28	5	1000	73	5.0
	DC2812D	28	± 12	± 267	81	6.4
	DC2815D	28	± 15	± 213	81	6.4
	DC2818D	28	± 18	± 178	81	6.4
	DC4805S	48	5	1000	70	5.0
	DC4812S	48	12	530	80	6.4
	DC4812D	48	± 12	± 267	80	6.4
	DC4815D	48	± 15	± 213	80	6.4
	DC4818D	48	± 18	± 178	80	6.4

DCR SERIES

- Up to 4 watts output power @ 70°C
- Isolated, regulated outputs
- Foldback current limiting
- High efficiency—no external components

The DCR series features isolated, dual-tracking outputs and four different input voltage ranges. They have input pi filters for good ripple rejection and the non-saturating core design minimizes radiated and conducted noise. These plastic, encapsulated converters can be operated over an ambient temperature range of −20°C to +70°C.





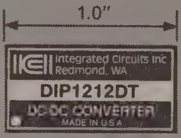
PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
B	DCR0512DT	4.5 to 5.5	± 12.0	± 156	65	3.75
	DCR0515DT	4.5 to 5.5	± 15.0	± 125	65	3.75
	DCR1212DT	10.8 to 14.0	± 12.0	± 167	65	4.0
	DCR1215DT	10.8 to 14.0	± 15.0	± 133	65	4.0
	DCR2812DT	24.0 to 32.0	± 12.0	± 167	65	4.0
	DCR2815DT	24.0 to 32.0	± 15.0	± 133	65	4.0
	DCR4812DT	44.0 to 56.0	± 12.0	± 167	65	4.0
	DCR4815DT	44.0 to 56.0	± 15.0	± 133	65	4.0

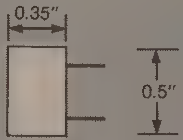
DIP SERIES

- Up to 1.5 watts output power
- High efficiency
- Wide input voltage ranges
- 14 pin DIP compatible package

The DIP switching regulator series consists of units that operate over a wide input voltage range, over a wide range of loads, with high efficiency. They are ideal for battery applications or wherever high efficiency and small size are important. The output common is connected internally to the input common. They are encapsulated in plastic packages and will operate over the ambient temperature range of −20°C to +70°C.

NOTE: EXTERNAL OUTPUT CAPACITORS ARE REQUIRED.





PRICE GROUP	MODEL	VDC INPUT	OUTPUT VDC	EFF. %	MAX. WATTS
D	DIP370505DP	+ 3 to + 7	+ 5 REGULATED/− 5 UNREG.	75	1.25
E	DIP371205DP	+ 3 to + 7	+ 12 REGULATED/− 5 UNREG.	75	1.25
	DIP371212DP	+ 3 to + 7	+ 12 REGULATED/− 12 UNREG.	75	1.25
	DIP371212DN	+ 3 to + 7	− 12 REGULATED/+ 12 UNREG.	75	1.25
	DIP371212DB	+ 3 to + 7	± 12 REG./BALANCE UNREG.	75	1.25
	DIP371515DB	+ 3 to + 7	± 15 REG./BALANCE UNREG.	75	1.25
D	DIP505SN	+ 3 to + 7	− 5 REG. SINGLE OUTPUT	72	1.25
	DIP1205SN	+ 9 to + 15	− 5 REG. SINGLE OUTPUT	72	1.50
	DIP1205SP	+ 9 to + 15	+ 5 REG. SINGLE OUTPUT	72	1.50
E	DIP121212DB	+ 9 to + 15	± 12 REG./BALANCE UNREG.	78	1.50
	DIP121515DB	+ 9 to + 15	± 15 REG./BALANCE UNREG.	78	1.50
D	DIP240505DP	+ 16 to + 32	+ 5 REGULATED/− 5 UNREG.	72	1.50
E	DIP241212DP	+ 16 to + 32	+ 12 REGULATED/− 12 UNREG.	80	1.50
	DIP241212DN	+ 16 to + 32	− 12 REGULATED/+ 12 UNREG.	80	1.50
	DIP241212DB	+ 16 to + 32	± 12 REG./BALANCE UNREG.	80	1.50
	DIP241515DB	+ 16 to + 32	± 15 REG./BALANCE UNREG.	80	1.50

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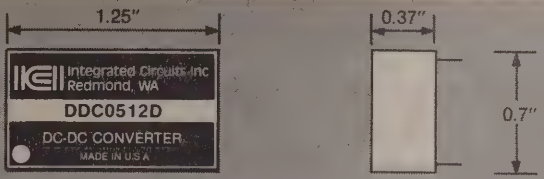
DDC SERIES

- **Up to 5 watts output power @ 70°C**
- **Isolated, unregulated outputs**
- **24 pin DIP compatible package**
- **4 input voltage ranges**

The DDC models are unregulated and are designed to be used in applications where regulated voltages are not needed, or with external regulators. The outputs are isolated from the input. They can be operated over an ambient temperature range of −20°C to +70°C, and they are encapsulated in plastic packages.

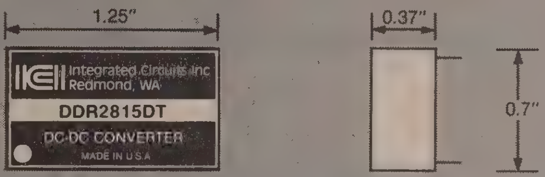


PRICE GROUP	MODEL	NOMINAL VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
F	DDC0505S	5	5	800	63	4.0
	DDC0512D	5	± 12	± 167	75	4.0
	DDC0515D	5	± 15	± 133	75	4.0
	DDC1205S	12	5	1000	68	5.0
	DDC1212D	12	± 12	± 208	80	5.0
	DDC1215D	12	± 15	± 167	80	5.0
	DDC2805S	28	5	1000	70	5.0
	DDC2812D	28	± 12	± 208	83	5.0
	DDC2815D	28	± 15	± 167	83	5.0
	DDC4805S	48	5	1000	72	5.0
	DDC4812D	48	± 12	± 208	84	5.0
	DDC4815D	48	± 15	± 167	84	5.0

DDR SERIES

- **Up to 3 watts output power @ 70°C**
- **Isolated, regulated outputs**
- **24 pin DIP compatible package**
- **5 input voltage ranges**

The DDR series DC-DC converters are isolated and regulated. They have short-term short-circuit protection and are built with a non-saturating core design to minimize reflected ripple and radiated noise. The rugged plastic 24-pin DIP packages are rated for operation from −20°C to +70°C ambient.

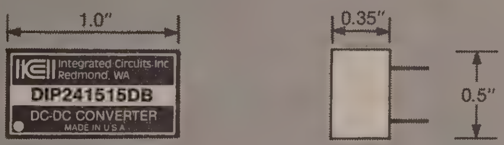


PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
G	DDR0505S	4.5 to 5.5	5.0	400	45	2.0
H	DDR0512DT	4.5 to 5.5	± 12.0	± 104	52	2.5
	DDR0515DT	4.5 to 5.5	± 15.0	± 83	52	2.5
G	DDR1205S	10.8 to 14.0	5.0	500	45	2.5
H	DDR1212DT	10.8 to 14.0	± 12.0	± 125	55	3.0
	DDR1215DT	10.8 to 14.0	± 15.0	± 100	55	3.0
G	DDR2405S	20.0 to 28.0	5.0	500	45	2.5
H	DDR2412DT	20.0 to 28.0	± 12.0	± 125	55	3.0
	DDR2415DT	20.0 to 28.0	± 15.0	± 100	55	3.0
G	DDR2805S	24.0 to 32.0	5.0	500	45	2.5
H	DDR2812DT	24.0 to 32.0	± 12.0	± 125	55	3.0
	DDR2815DT	24.0 to 32.0	± 15.0	± 100	55	3.0
G	DDR4805S	44.0 to 56.0	5.0	500	45	2.5
H	DDR4812D	44.0 to 56.0	± 12.0	± 125	55	3.0
	DDR4815D	44.0 to 56.0	± 15.0	± 100	55	3.0

DIP__DT SERIES

- **1 watt output power @ 70°C**
- **Isolated, regulated outputs**
- **14 pin DIP compatible package**
- **5 input voltage ranges**

The DIP__ DT series converters can provide up to one watt of regulated, isolated output power. The ±12 VDC and ±15 VDC outputs are regulated by monolithic dual-tracking series regulators, which provide good regulation and ripple characteristics. Also available as non-catalog standards are 5 VDC output models that provide up to 0.5 watts. The plastic, encapsulated packages are rated for operation from −20°C to +70°C ambient.



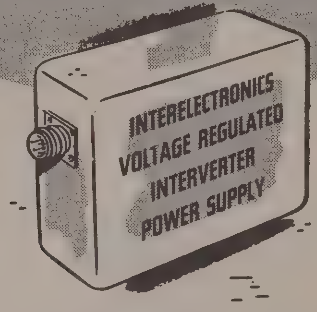
PRICE GROUP	MODEL	VDC INPUT	OUTPUT @ FULL LOAD			MAX. WATTS
			VDC	mA	EFF. %	
C	DIP512DT	4.5 to 5.5	± 12.0	± 42	52	1.0
	DIP515DT	4.5 to 5.5	± 15.0	± 33	52	1.0
	DIP1212DT	10.8 to 14.0	± 12.0	± 42	55	1.0
	DIP1215DT	10.8 to 14.0	± 15.0	± 33	55	1.0
	DIP2412DT	20.0 to 28.0	± 12.0	± 42	55	1.0
	DIP2415DT	20.0 to 28.0	± 15.0	± 33	55	1.0
	DIP2812DT	24.0 to 32.0	± 12.0	± 42	55	1.0
	DIP2815DT	24.0 to 32.0	± 15.0	± 33	55	1.0
	DIP4812DT	44.0 to 56.0	± 12.0	± 42	55	1.0
	DIP4815DT	44.0 to 56.0	± 15.0	± 33	55	1.0

Integrated Circuits Incorporated
10301 Willows Rd. Redmond, WA 98052
(206) 882-3100 TWX: 910-443-2302

PROVEN RELIABILITY—

DC-DC, DC-AC, SOLID-STATE POWER INVERTERS

over 260,000 logged hours— voltage-regulated, frequency-controlled, for missile, telemeter, ground-support, 135°C all-silicon units available now—



Interelectronics all-silicon thyratron-like gating elements and cubic-grain toroidal magnetic components convert DC to any desired number of AC or DC outputs from 1 to 10,000 watts.

Ultra-reliable in operation (over 260,000 logged hours), no moving parts, unharmed by shorting output or reversing input polarity. High conversion efficiency (to 92%, including voltage regulation by Interelectronics patented reflex high-efficiency magnetic amplifier circuitry).

Wide input voltage range (1 to 250 volts DC). Wide input voltage regulation (output voltage maintained with variations up to 50% in input voltage).

Light weight (to 6 watts/oz.), compact (to 8 watts/cu. in.), low ripple (to 0.01 mv. p-p), excellent voltage regulation (to 0.1%), precise frequency control (to 0.2%) with Interelectronics extreme environment magnetostrictive standards or to 0.0001% with fork or piezoelectric standards.

Complies with MIL specs. for shock (100G 11 misc.), acceleration (100G 15 min.), vibration (100G 5 to 5,000 cps.), temperature (to 150 degrees C), RF noise (I-26600).

AC single and polyphase units supply sine waveform output (to 2% harmonics), will deliver up to ten times rated line current into a short circuit to actuate MIL type magnetic circuit breakers or fuses, will start gyros and motors with starting current surges up to ten times normal operating line current.

Now in use in major missiles, powering telemeter transmitters, radar beacons, electronic equipment. Single and polyphase units now power airborne and marine missile gyros, synchros, servos, magnetic amplifiers.

Interelectronics—first and most experienced in the solid-state power supply field produces its own all-silicon solid-state gating elements, all high flux density magnetic components, high temperature ultra-reliable film capacitors and components, has complete facilities and know how—has designed and delivered more working KVA than any other firm!

For complete engineering data, write Interelectronics today, or call (914) EL 8-8000 in Congers.

INTERELECTRONICS CORPORATION

550 U.S. Route 303, Congers, New York 10920

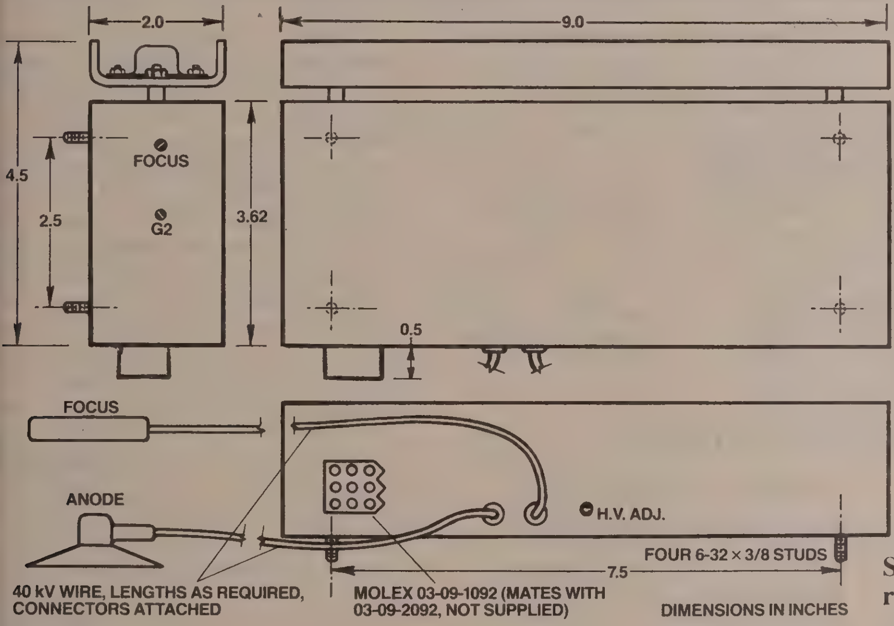
International High Voltage Electronics, Inc.

98 Mill Plain Road
Danbury, CT 06810
Area 203 792-7820

We design and manufacture high-voltage CRT power supplies. Years of experience in this specialty enable us to propose specifications and to supply power-source products that satisfy the most demanding display quality requirements.

We also design and manufacture products that require the same expertise and experience. They include high-voltage power supplies for photo-copy, PMT, image intensifier, electrostatics, X-ray spectroscopy, radiology, electron microscope, ion and electron accelerator, laser, and TWT applications.

Three representative product lines are cataloged briefly here. Please call us with your specific needs and price/performance goals.


2.0
9.0
4.5
2.5
3.62
FOCUS
G2
0.5
FOCUS
ANODE
H.V. ADJ.
FOUR 6-32 × 3/8 STUDS
7.5
40 kV WIRE, LENGTHS AS REQUIRED, CONNECTORS ATTACHED
MOLEX 03-09-1092 (MATES WITH 03-09-2092, NOT SUPPLIED)
DIMENSIONS IN INCHES

HVS shadow-mask color CRT power supply 20 kV to 25 kV

Stable anode supply with low ripple reduces "banding" effect on screen

Use the HVS power supply where color CRT image quality is one of your prime concerns. The typical specifications shown here can be tightened or relaxed to meet your performance requirements most economically.

We can synchronize the power supply's internal oscillator with your sweep frequency. Our engineers may propose other options to cope with specific display problems.

We can furnish the HVS power supply to operate on your available DC power source at any nominal voltage from 24 to 33 volts.

The HVS supply responds to remote TTL shutdown and startup signals.

Circuits are protected against arcs and momentary shorts. Under fault conditions that would cause overvoltage or overcurrent, the supply shuts down, then attempts to restart. The cycle will repeat if the fault persists. This performance characteristic satisfies DHHS safety requirements.

TYPICAL SPECIFICATIONS

INPUTS

Nominal power supply: 24 to 33 volts DC
Supply voltage regulation: +10% −5%
Input current: 2.3 amperes
TTL remote shutdown:
  0=high voltage OFF
  1=high voltage ON

OUTPUTS

ANODE VOLTAGE

Adjustable, 20 kV to 25 kV
Current: 1.2 milliampere at 25 kV
Ripple: less than 500 millivolts peak-to-peak
Line regulation: 0.05%
Load regulation, no-load to full-load: 0.05%
Temperature coefficient: 200 ppm/°C

FOCUS VOLTAGE

Adjustable, 5.5 kV to 6.5 kV
Typical ripple: less than 400 millivolts
(Floating focus voltage section accepts input from dynamic focus amplifier.)
Bandwidth for coupler: 40 Hz to 250 kHz
B+ power for external focus amplifier: 400 volts DC @ 4 milliamperes

G1 VOLTAGE

−200 volts DC, zener-regulated
Ripple: less than 200 millivolts
Current: 0 to 0.5 milliampere

G2 VOLTAGE

Adjustable, 0 to 825 volts DC
Ripple: less than 400 millivolts

SAFETY

Anode voltage cannot exceed 27 kV
Anode current cannot exceed 1.4 mA
Tolerates momentary short circuits
Outputs are arc-over protected

ENVIRONMENTAL

Operating temperature: 0°C to 60°C (case)
Storage temperature: −35°C to 90°C
Weight: 3.6 pounds

International High Voltage Electronics, Inc.

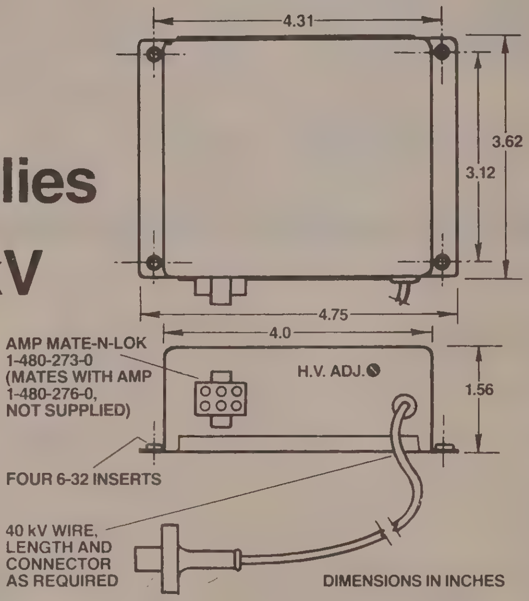
98 Mill Plain Road
Danbury, CT 06810
Area 203 792-7820

HDF

CRT focus power supplies

2.5 kV to 6 kV

Model	Output Voltage
HDF3	2.5 kV to 3 kV
HDF4	3 kV to 4 kV
HDF5	4 kV to 5 kV
HDF6	5 kV to 6 kV


4.31
3.62
3.12
4.75
4.0
AMP MATE-N-LOK 1-480-273-0 (MATES WITH AMP 1-480-276-0, NOT SUPPLIED)
H.V. ADJ.
1.56
FOUR 6-32 INSERTS
40 kV WIRE, LENGTH AND CONNECTOR AS REQUIRED
DIMENSIONS IN INCHES

For a better CRT display

The best spot size for clear resolution across the entire area of a CRT screen is maintained by the HDF electrostatic focus power supply. Its output voltage is stable with low ripple. That voltage is modulated as the beam is deflected. It increases with the longer beam lengths from gun to screen edges and corners, so that focus voltage is, in effect, being adjusted continuously throughout every sweep. Correspondingly, screen resolution remains optimum at all locations.

A dynamic focus amplifier is built into the HDF power supply. In response to DC signals that may range from 0 to 10 volts, it adds the variable correction to the high-voltage focus output. The amplifier's output can range up to 300 volts, peak-to-peak.

The electron beam's length changes as a parabolic function of its deflection, and a compliant system is essential for good dynamic focus performance. The HDF power supply is capable of transient responses corresponding to a bandwidth from DC to 50 kHz.

Four HDF models are available with four ranges of adjustable output voltages. Any focus voltage from 2.5 kV to 6 kV can be provided by selecting the appropriate HDF model.

TYPICAL SPECIFICATIONS

INPUT POWER

Input supply: 24 volts DC ±10%
Input current: 500 milliamperes
(other available inputs to 33 volts DC)

FOCUS VOLTAGE OUTPUT

Adjustable: see table for range
Output current: 300 microamperes
Line regulation: 0.03%
Load regulation: 0.03%
Dynamic load regulation: 5 volts/100μA
Ripple: 0.1% of voltage, peak-to-peak
Temperature coefficient: 200 ppm/°C

DYNAMIC FOCUS AMPLIFIER

Input voltage signal: 0 to 10 volts DC
Gain adjustment: 22 to 33
Phase delay: less than 1 microsecond
Modulation output: 300 volts DC, peak-to-peak
Full-power bandwidth: DC to 200 kHz

ENVIRONMENTAL

Operating temperature: 0°C to 60°C
Storage temperature: −35°C to 90°C
Weight: approximately 1 pound

HF

CRT focus power supplies

2.5 kV to 6 kV

Model	Output Voltage
HF3	2.5 kV to 3 kV
HF4	3 kV to 4 kV
HF5	4 kV to 5 kV
HF6	5 kV to 6 kV

FOR SEPARATE AMPLIFIER

B+ voltage: 350 volts DC
B+ current: 4 milliamperes

The HF dynamic focus voltage power supply is identical to the HDF supply, except that it does not contain a built-in amplifier. It has an isolated, floating high-voltage section. Connections are provided to add a modulating voltage between ground and the low end of the high-voltage output circuit.

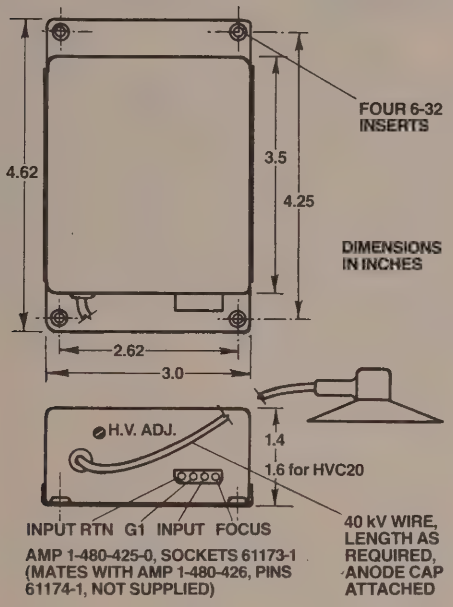
The HF supply provides B+ voltage for an external focus amplifier. With suitable amplifier performance, the HF supply's performance is just as good as that of the HDF supply.

International High Voltage Electronics, Inc.
98 Mill Plain Road
Danbury, CT 06810 **Area 203 792-7820**

HVC

high-voltage CRT power supplies

5 kV to 20 kV


FOUR 6-32 INSERTS
4.62
3.5
4.25
DIMENSIONS IN INCHES
2.62
3.0
H.V. ADJ.
1.4
1.6 for HVC20
INPUT RTN
G1
INPUT
FOCUS
AMP 1-480-425-0, SOCKETS 61173-1 (MATES WITH AMP 1-480-426, PINS 61174-1, NOT SUPPLIED)
40 kV WIRE, LENGTH AS REQUIRED, ANODE CAP ATTACHED

INPUT	OUTPUT		
All	Model	Voltage, maximum	Current, maximum
26V±10% 400mA maximum, direct current	HVC5	5 kV	800μA
	HVC8	8 kV	500μA
	HVC12	12 kV	400μA
	HVC15	15 kV	300μA
	HVC20	20 kV	250μA

TYPICAL SPECIFICATIONS

INPUT POWER

Nominal power supply: 24 to 33 volts DC ±10%

VOLTAGE OUTPUT

Ripple, peak-to-peak: 0.05% of voltage (anode and auxiliary voltages)
Transient response: 0.05% of voltage (per 100μA current change)
Line regulation: ±0.03%
Load regulation: ±0.03%
Temperature coefficient: 0.02%/°C

ENVIRONMENTAL

Operating temperature: 0°C to 60°C (case)
Storage temperature: −55°C to +90°C
Case material: aluminum
Weight: approximately 1 pound

TYPICAL OPTIONS

Connectors and mounting to suit your design.
G1 and focus voltages to ±1 kV.
Ripple, peak-to-peak: 0.001% of voltage.
Ability to tolerate continuous short circuit.
Oscillator sync. with your clock frequency.
Input supply to suit your circuitry.
H.V. ADJ. range between minus 10% and rated maximum voltage instead of zero to maximum.
Pre-set anode voltage between 2 kV and 20 kV with elimination of external H.V. ADJ.

Prevent distortion on critical CRT displays

A high-voltage anode power supply that is carefully engineered for the application with minimum ripple and tight regulation is essential to clean, stable, undistorted, high-resolution image reproduction. Display quality plays a vital life-support role in medical equipment, and it often determines the effectiveness of an entire costly system in other graphics applications.

All HVC high-voltage power supplies meet rigorous test specifications. More important, they perform exceedingly well on actual CRT's under actual field conditions.

Circuit design is built around an efficient self-excited sine-wave inverter that powers a high-voltage transformer at a frequency in the 100 kHz range. It provides fold-back on overload and minimizes RFI. Outputs of the transformer secondary are multiplier-rectified and filtered to derive the anode voltage and any required auxiliary outputs.

Refinements in circuit and package design protect against arcs, corona and temporary shorts to ground. They also protect your other circuitry from electrostatic or electromagnetic interference. The transformer is of ferrite-cup core design. All HVC circuits are enclosed in an aluminum case, and all high-voltage components are carefully potted in a high-quality silicone elastomer.

High-voltage outputs are filtered and regulated precisely to prevent the spurious patterns and distortions that voltage swings and ripple would create.

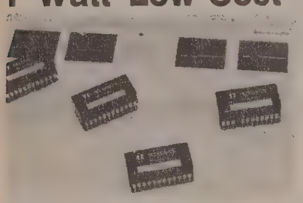
You can select from five maximum anode voltages that range from 5 to 20 kV. You can set the exact anode voltage you require—zero to rated maximum—with a screwdriver adjustment.

Other case designs, in addition to the one shown here, are available. Other input power supplies, from 24 volts to 33 volts DC, can be accommodated.

You can call for auxiliary outputs, such as focus and G1 voltages, up to 1 kV with either polarity. Their operating voltages will change proportionally when the anode voltage is adjusted.

Intronics-1 Watt to 100 Watt DC-DC Converters

1 Watt Low-Cost



DCR (Regulated)
INPUT: 5, 12VDC
OUTPUT: 5, ±5, 12, ±12, 15, ±15
DCU (Unregulated)
INPUT: 5, 12VDC
OUTPUT: 5, ±12, ±15
24-Pin DIP Package

Individual Model Characteristics (Typical at +25°C)

Model	Input Voltage VDC	Output VDC @ mA	Model	Input Voltage VDC	Output VDC @ mA
DCR 5/5	5	5 @ 100	DCR 12/12-12	12	±12 @ 80
DCR 12/5	12	5 @ 100	DCR 5/15-15	5	±15 @ 65
DCR 5/12	5	12 @ 80	DCR 12/15-15	12	±15 @ 65
DCR 12/12	12	12 @ 80	DCU 5/5	5	5 @ 200
DCR 5/15	5	15 @ 65	DCU 12/5	12	5 @ 200
DCR 12/15	12	15 @ 65	DCU 5/12-12	5	±12 @ 80
DCR 5/5-5	5	±5 @ 100	DCU 5/15-15	5	±15 @ 65
DCR 5/12-12	5	±12 @ 80	DCU 12/15-15	12	±15 @ 65

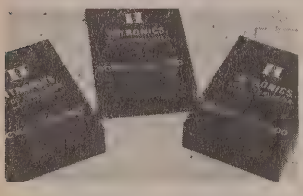
5 Watt Low-Noise

SINGLE
INPUT: 5, 12, 24, 28, 48VDC
OUTPUT: 5, 12, 15VDC
DUAL
INPUT: 5, 12, 24, 28
OUTPUT: ±12, ±15

- Small 2″ Square Package
- High 70% Efficiency

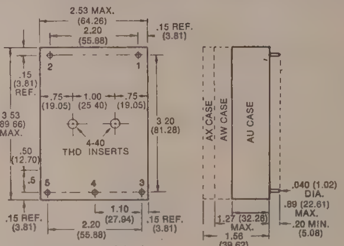
Model	Input Voltage VDC	Output VDC @ mA	Model	Input Voltage VDC	Output VDC @ mA
DCE 5/5S/1000	5	5 @ 1A	DCE 48/5S/1000	48	12 @ 1A
DCE 5/12S/500	5	12 @ 500	DCE 48/12S/500	48	12 @ 500
DCE 5/15S/350	5	15 @ 350	DCE 48/15S/350	48	15 @ 350
DCE 12/5S/1000	12	5 @ 1A	DCE 5/12/150	5	±12 @ 150
DCE 12/12S/500	12	12 @ 500	DCE 5/15/150	5	±15 @ 150
DCE 12/15S/350	12	15 @ 350	DCE 12/12/150	12	±12 @ 150
DCE 24/5S/1000	24	5 @ 1A	DCE 12/15/150	12	±15 @ 150
DCE 24/12S/500	24	12 @ 500	DCE 24/12/150	24	±12 @ 150
DCE 24/15S/350	24	15 @ 350	DCE 24/15/150	24	±15 @ 150
DCE 28/5S/1000	28	5 @ 1A	DCE 28/12/150	28	±12 @ 150
DCE 28/12S/500	28	12 @ 500	DCE 28/15/150	28	±15 @ 150
DCE 28/15S/350	28	15 @ 350			

12-22 Watt Wide Input Range, Isolated



INPUT: 12, 24, 48VDC
OUTPUT: ±12, ±15VDC

- Wide 2:1 Input Range
- No Heat Sink Required
- Low Output Ripple
- High Input/Output Isolation
- Short Circuit Protection



DIMENSIONS IN INCHES (mm)

Specifications Typical at +25°C. After 15 minute warm-up unless otherwise noted.

Model DCWD	12/12D/500	12/15D/400	24/12D/500	24/15D/400	48/12D/500	48/15D/400	5/12/425	5/15/330
Input Voltage	9-18DC	9-18VDC	18-36VDC	18-36VDC	36-72VDC	36-72VDC	4.5-5.5 VDC	4.5-5.5VDC
Input Current (Nom. Line) No Load Full Load	200mA 1.67A	200mA 1.67A	100mA 830mA	100mA 830mA	50mA 420mA	50mA 420mA	480mA 3300mA	480mA 3300mA
Input/Output Isolation	$10^{11}\Omega \vert\vert 120pF$ 300VDC						$10^{11}\Omega \vert\vert 120pF$ 300VDC	
Output Voltage	±12VDC, 1%	±15VDC, 1%	±12VDC, 1%	±15VDC, 1%	±12VDC, 1%	±15VDC, 1%	+12VDC, ±2%	+15VDC, ±2%
Output Ripple	7mV rms (100mV p-p)						1.0mV rms	
Regulation Line Load vs. Temperature	0.1% max. 0.1% max. 0.05%/°C						0.02% max. 0.05% max. 0.02%/°C	
Temperature Range Operating, 100% Load Storage	−25°C to +71°C −25°C to +85°C						−25°C to +71°C −25°C to +85°C	
Case Size	(AU)						AU	AU

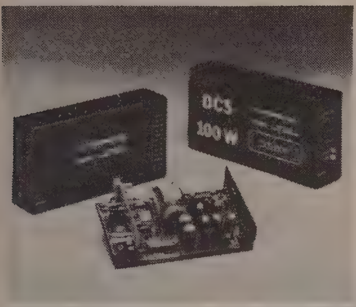
Models DCW	5VDC OUT @ 3000mA			5VDC OUT @ 4000mA			12VDC OUT @ 1700mA			15VDC OUT @ 1500mA		
	12/5/3000	24*/5/3000	48/5/3000	12/5/4000	24/5/4000	48/5/4000	12/12/1700	24/12/1700	48/12/1700	12/15/1500	24/15/1500	48/15/1500
Input Voltage	9 to 18VDC	18 to 36VDC	36 to 72VDC	9 to 18VDC	18 to 36VDC	36 to 72VDC	9 to 18VDC	18 to 36 VDC	36 to 72VDC	9 to 18VDC	18 to 36VDC	36 to 72VDC
Input Current (Nom. Line) No Load Full Load	125mA 1800mA	100mA 900mA	75mA 450mA	250mA 2500mA	130mA 1350mA	100mA 675mA	250mA 2500mA	130mA 1250mA	100mA 625mA	250mA 2500mA	130mA 1250mA	100mA 625mA
Input/Output Isolation	$10^{10}\Omega \vert\vert 100pF$ 300VDC			$10^{10}\Omega \vert\vert 250pF$ 300VDC			$10^{10}\Omega \vert\vert 470pF$ 300VDC			$10^{10}\Omega \vert\vert 540pF$ 300VDC		
Output Voltage	5VDC ±1%**			5VDC ±1%**			12VDC ±1%**			15VDC ±1%**		
Output Ripple	7.0mV rms			7.0mV rms			7.0mV rms			7.0mV rms		
Regulation Line Load vs. Temperature	.5% max. 1% max. 0.02%/°C			.5% max. 1% max. 0.02%/°C			.5% max. 1% max. 0.02%/°C			.5% max. 1% max. 0.02%/°C		
Temperature Range Operating, 100% Load Storage	−25°C to +71°C −25°C to +85°C			−25°C to +60°C −25°C to +85°C			−25°C to +60°C −25°C to +85°C			−25°C to +60°C −25°C to +85°C		
Case Height	AW			AX			AW			AW		

** For applications requiring closer preset accuracy, please consult factory.

intronics

INTRONICS, INCORPORATED, 57 CHAPEL STREET
NEWTON, MA 02158 • TEL.: (617) 964-4000 • TWX: 710-335-6835

30 to 100 Watt High Performance



- DISPLAY INDICATORS
- EXTERNAL DISABLE
- PROTECTION MODES
  Input Polarity
  Output OVP
  Output Overcurrent
- EXTERNAL SYNC
- REMOTE SENSE
- ISOLATION
  Input to Output: 1000VDC
  Primary to Derived: 500VDC
- TEMPERATURE RATINGS:
  Operation: −25°C to +85°C
  (Base Plate)
  Storage: −40°C to +85°C
- EFFICIENCY:
  71% typical (depends on model)
  Varies <3% over 2:1 input range
- REGULATION: Line/Load: 0.2%
- SIZE:
  30-Watt: 6.55″ x 4.22″ x 1.55″
  50-Watt: 8.05″ x 4.22″ x 4.50″
  100-Watt: 9.00″ x 4.50″ x 1.20″

ORDERING GUIDE DCS A-X/YY

A — Series (30, 50, 100)
X — Input Code
Y — Output Code

INPUT CODES

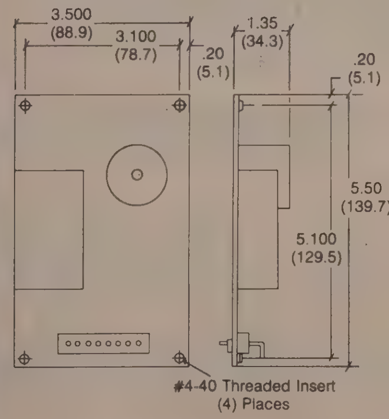
Code	Input Range
1	9-18VDC (except 100W)
2	18-36VDC
3	36-72VDC

	30-Watt				50-Watt				100-Watt			
Output Code	Output Voltage(s)	Nom.	Output Current(s) Min.	Max.	Output Voltage(s)	Nom.	Output Current(s) Min.	Max.	Output Voltage(s)	Nom.	Output Current(s) Min.	Max.
1	+ 5VDC	6A	0.6A	6A	+ 5VDC	10A	1A	10A	+ 5VDC	20A	2A	20A
2	+12VDC	2.5A	0.25A	2.5A	+12VDC	4A	0.4A	4A	+12VDC	8A	0.8A	8A
3	+15VDC	2A	0.2A	2A	+15VDC	3.3A	0.3A	3.3A	+15VDC	6.6A	0.67A	6.6A
4	+24VDC	1.25A	0.12A	1.25A	+24VDC	2A	0.2A	2A	+24VDC	4A	0.4A	4A
5	+28VDC	1A	0.1A	1A	+28VDC	1.8A	0.18A	1.8A	+28VDC	3.6A	0.36A	3.6A
6	+ 5VDC − 5VDC	4.8A 1.0A	0.48A 0.12A	6A 1.0A	+ 5VDC − 5VDC	8A 2A	0.8A 0.2A	10A 4A	+ 5VDC − 5VDC	16A 4A	1.6A 0.4A	20A 8A
7	+12VDC −12VDC	1.25A 1.0A	.125A .125A	2.0A 1.0A	+12VDC −12VDC	2A 2A	0.2A 0.2A	3.2A 3.2A	+12VDC −12VDC	4A 4A	0.4A 0.4A	6.4A 6.4A
8	+15VDC −15VDC	1A 1A	0.1A 0.1A	1.6A 1.0A	+15VDC −15VDC	1.7A 1.7A	0.17A 0.17A	2.7A 2.7A	+15VDC −15VDC	3.4A 3.4A	0.34A 0.34A	5.4A 5.4A
9	+18VDC −18VDC	0.8A 0.8A	0.08A 0.08A	1.38A 1.38A	+18VDC −18VDC	1.4A 1.4A	0.15A 0.15A	2.3A 2.3A	+18VDC −18VDC	2.8A 2.8A	0.3A 0.3A	4.6A 4.6A
10	+ 5VDC +12VDC	3A 1.2A	0.3A 0.12A	4.8A 1.6A	+ 5VDC +12VDC	5A 2A	0.5A 0.2A	8A 3A	+ 5VDC +12VDC	10A 4A	1A 0.4A	16A 6A
11	+ 5VDC +15VDC	3A 1A	0.3A 0.10A	4.8A 1.6A	+ 5VDC +15VDC	5A 1.7A	0.5A 0.17A	8A 2.8A	+ 5VDC +15VDC	10A 3.4A	1A 0.34A	16A 5.6A
12	+ 5VDC +24VDC	3A 0.6A	0.3A 0.06A	4.8A 0.8A	+ 5VDC +24VDC	5A 1A	0.5A 0.1A	8A 1.6A	+ 5VDC +24VDC	10A 2A	1A 0.2A	16A 3.2A
13	+ 5VDC +12VDC − 5VDC	3A 0.9A 0.6A	0.3A 0.09A 0.06A	4.8A 1.4A 1.2A	+ 5VDC +12VDC − 5VDC	5A 1.5A 1A	0.5A 0.15A 0.1A	8A 2.3A 1.5A	+ 5VDC +12VDC − 5VDC	10A 3A 2A	1A 0.3A 0.2A	16A 4.6A 3A
14	+ 5VDC +15VDC − 5VDC	3A 0.72A 0.6A	0.3A 0.07A 0.06A	4.8A 1.2A 1.2A	+ 5VDC +15VDC − 5VDC	5A 1.2A 1A	0.5A 0.12A 0.1A	8A 2A 1.5A	+ 5VDC +15VDC − 5VDC	10A 2.4A 2A	1A 0.24A 0.2A	16A 4A 3A
15	+ 5VDC +12VDC −12VDC	3A 0.6A 0.6A	0.3A 0.06A 0.06A	4.8A 1.0A 1.0A	+ 5VDC +12VDC −12VDC	5A 1A 1A	0.5A 0.1A 0.1A	8A 1.0A 1.0A	+ 5VDC +12VDC −12VDC	10A 2A 2A	1A 0.2A 0.2A	16A 3A 3A
16	+ 5VDC +15VDC −15VDC	3A 0.48A 0.48A	0.3A 0.05A 0.05A	4.8A 0.72A 0.72A	+ 5VDC +15VDC −15VDC	5A 0.8A 0.8A	0.5A 0.08A 0.08A	8A 1.0A 1.0A	+ 5VDC +15VDC −15VDC	10A 1.6A 1.6A	1A 0.16A 0.16A	16A 2.4A 2.4A
17	+ 5VDC +18VDC −18VDC	3A 0.42A 0.42A	0.3A 0.04A 0.04A	4.8A 0.6A 0.6A	+ 5VDC +18VDC −18VDC	5A 0.7A 0.7A	0.5A 0.07A 0.07A	8A 1A 1A	+ 5VDC +18VDC −18VDC	10A 1.4A 1.4A	1A 0.14A 0.14A	16A 2A 2A

40-Watt Low-Cost Isolated

ORDERING GUIDE DCC 40-A/X

A — Input Code
X — Output Code



INPUT CODES

Code	Input Range
1	10-35VDC
2	20-70VDC

Output Code	Output Voltage(s)	Output Current
1	5VDC	8.0A
2	12VDC	3.0A
3	15VDC	3.0A
4	±12VDC	1.3A
5	±15VDC	1.3A
6	5VDC ±12VDC	3.0A .5A
7	5VDC ±15VDC	3.0A .5A

Input Voltage Rated Operation	10-35VDC	20-70VDC
Input Current (Nom Line) No Load Full Load	 200mA 2.2A	 100mA 1.1A
Reflected Input Riple Current	200mA P-P	100mA P-P
Output Noise	10mV RMS 100mV P-P	
Line Regulation Load Regulation (10% to 100% Load): 5V Output Balanced Load on Dual Output Unbalanced Load on Dual Outputs Output vs. Temperature	.2% .2% .2% 10% .05%/C	
Short Circuit Protection	Indefinite	
Temperature Range: Operating Storage	 0° to +70°C −25°C to +105°C	

intronics INTRONICS, INCORPORATED, 57 CHAPEL STREET
NEWTON, MA 02158 • TEL.: (617) 964-4000 • TWX: 710-335-6835

EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

IXYS
SOLUTIONS FOR POWER CONTROL

3685 ENOCHS
SANTA CLARA, CA 95051
TELEPHONE: (408) 733-4045

50 WATT CMOS POWER MOS SWITCHING POWER SUPPLY
SINGLE & TRIPLE OUTPUT

FEATURES
- 50W continuous power rating
- Highly regulated output standard options: 5, 12, 15, 24, 48, 75 Volts
- High reliability
- Fault tolerant connector for Un-interruptable operation
- Short circuit protection
- Over Voltage protection
- Soft start
- No minimum load
- 90 to 135 VAC input
- Designed to meet UL-478 and CSA 22.2 #154
- Tailorability: see note 1
- XVS module: see note 2

APPLICATIONS
- Desktop computers
- Computer peripherals
- Terminals
- Work stations
- Telecommunication
- Electronic instruments
- Industrial control
- DC servo motor control
- Stepper motor control
- Logic power supplies
- Custom electronics
- General purpose power supplies

STATE OF THE ART
- CMOS Pulse Width Modulation (PWM)
- 50 to 200 KHz customer specified fixed switching frequency
- IXYS proprietary XVS-3 Opto-Coupled Voltage Sensing module
- Highest Efficiency
- Lowest component count
- Smallest size
- Lightest weight

GENERAL SPECIFICATIONS

Parameter	Typical Limits
Input voltage	90 to 135 VAC
Hold-up Time	16 milliseconds
Line Regulation	±0.05-0.1%
Load Regulation	±0.1%
Adjustability	±10%
Efficiency	80% Typical
Temperature Coefficient of Output	±0.04%/deg C Maximum
Transient response (75%-100% load swing)	Transient setting to within 1% regulation band in less than 500 μs
Temperature Derating	50 watts at 50 deg C ambient 35 watts at 70 deg C ambient
Ripple: Main Output	20mV P.P.
High Frequency Noise	20mV P.P
Dimensions	5×3½×1¾ in (12.7×8.9×4.5 cm)
Weight	9.5 ounces (270 grams)

NOTES

(1) For quantity orders, power rating (to 75 watts max.), switching frequency (to 200KHz max.), regulated output voltage (to 2 volts min.), and form factor (output connectors, PCB, et al) are tailorable to customer specification.

(2) IXYS Opto-Coupled Voltage Sensor Module(s) available OEM in model XVS-3 (VDE package) as shown on XS5D and model XVS-2 (8 pin DIP package). Inquire direct to IXYS.

(*) Specifications subject to change without notice.

Information furnished by IXYS is believed to be accurate and reliable. However, no responsibility is assumed by IXYS for its uses; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of IXYS.

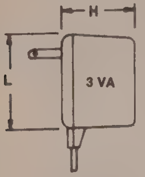
MADE IN THE USA

SEE OUR OTHER PAGES IN EEM-SECTION 3130/SECTION 3700

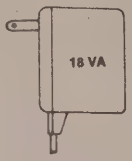
JEROME INDUSTRIES CORPORATION

WALL PLUG-IN CONVERTER/ADAPTERS AND BATTERY CHARGERS

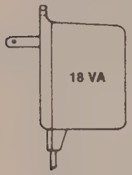
AVAILABLE SIZES IN DURABLE PLASTIC HOUSING



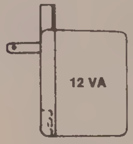
STYLE—E
1.94Lx1.82Wx1.45H



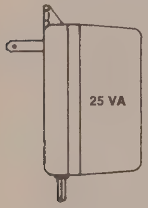
STYLE—B
2.18Lx2.06Wx1.71H



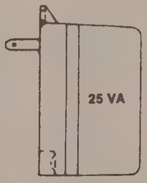
STYLE—BT
2.18Lx2.06Wx1.71H



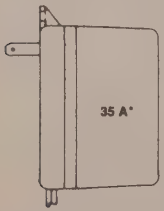
STYLE—D
2.18Lx2.06Wx1.71H



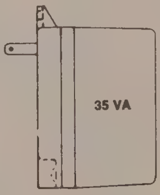
STYLE—H
3.12Lx2.35Wx1.92H



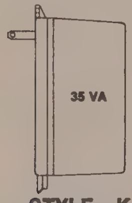
STYLE—J
3.12Lx2.35Wx1.92H



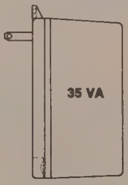
STYLE—F
3.25Lx2.72Wx2.25H



STYLE—G
3.25Lx2.72Wx2.25H



STYLE—K
4.75Lx3.00Wx2.75W

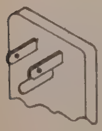


STYLE—M
4.75Lx3.00Wx2.75W

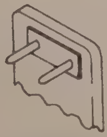
* Maximum Volt Ampere Rating for Transformers to meet U.L. Requirements. The Volt Ampere Capacity may be reduced from 20-50% for Power Supplies and some Battery Chargers.

NOTE: All Units available with Receptacle Mounting Tabs, except E.

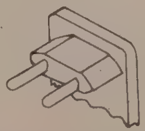
PLUG VARIATIONS FOR ALL OF THE ABOVE HOUSINGS



GROUND PIN



EUROPEAN PRONGS



EUROPEAN PRONGS WITH TURRET

WE SPECIALIZE IN CUSTOM DESIGN

PLEASE SPECIFY THE FOLLOWING WHEN ORDERING

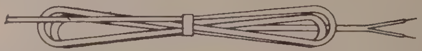
Choose Case Style

Style B — Style D — Style E — Style F — Style G, etc.

Electrical Requirements to Specify:

1. Input — Volts — Hz
2. Output — Volts A.C. — Amperes A.C.
   Volts D.C. — Amperes D.C.
3. Max. Ripple Voltage
4. Max. No Load Voltage
5. Regulation Requirements
6. Type and Length of Cord
7. Type of Cord Termination
8. Other Requirements including U.L. & C.S.A.

CORD AND PLUG SPECIFICATIONS FOR PLUG-IN ADAPTERS



CORD SPECIFICATIONS

Standard Length . . . . 6 Feet

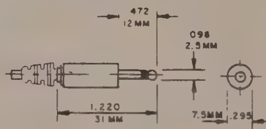
Standard Color . . . . Black

Hanked & Tied

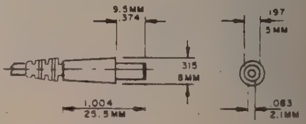
Special Wire Sizes, Lengths, Colors, and Plugs Available on Request

Available with the Following Standard Plug Styles:

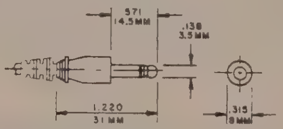
STYLE No. 1
22/2 CONDUCTOR


472
12 MM
098
2.5 MM
1.220
31 MM
7.5MM
.295

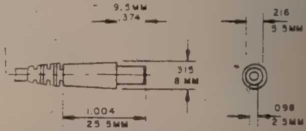
STYLE No. 4
22/2 CONDUCTOR


9.5MM
.374
315
8MM
1.004
25.5MM
197
5MM
.083
2.1MM

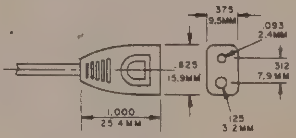
STYLE No. 2
22/2 CONDUCTOR


571
14.5MM
.138
3.5MM
1.220
31 MM
.315
8MM

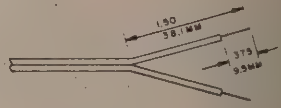
STYLE No. 5
22/2 CONDUCTOR


9.5MM
.374
315
8 MM
1.004
25 5MM
216
5 5MM
098
2 5MM

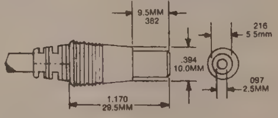
STYLE No. 3
SPT-1 18/2 CONDUCTOR


375
9.5MM
.093
2.4MM
.625
15.9MM
312
7.9 MM
1.000
25 4MM
125
3 2MM

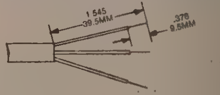
STYLE No. 6
22/2 CONDUCTOR


1.50
38.1MM
375
9.5MM

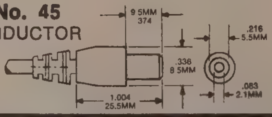
STYLE No. 7
SPT-1 18/2 CONDUCTOR


9.5MM
382
216
5 5mm
.394
10.0MM
097
2.5MM
1.170
29.5MM

STYLE No. 8
PVC-22/3 CONDUCTOR


1 545
39.5MM
.376
9.5MM

STYLE No. 45
22/2 CONDUCTOR


9 5MM
374
.216
5.5MM
.336
8 5MM
.083
2.1MM
1.004
25.5MM

JEROME INDUSTRIES CORPORATION / 730E DIVISION STREET, ELIZABETH, NEW JERSEY 07201 / 201-353-5700 / TELEX 132001

CUSTOM DESIGN

JEROME INDUSTRIES CORPORATION

POWER SOURCES — WALL PLUG-IN AND DESK TOP STYLE

APPLICATIONS—Computers, Modems, Microprocessor Controlled Systems, Telecommunications, Operational Amplifiers, Computer Peripherals, Test Equipment, Security Systems, Multiplexers, Medical Equipment

ALL ITEMS CAN BE MADE TO U.L. SPECIFICATIONS 478, 1310, 506, 516, 544, 697, 1012, 1236, 1411 AND OTHERS. ALSO EQUIVALENT C.S.A. REQUIREMENTS

FEATURES

Available Electrical and Mechanical Features to Enhance the Appearance or Working Capability of Plug-In Adapters:

- Screw Terminals, Styles D, J, G and M.
- Cord & Plug assemblies to Customer Specs.
- On & Off Switch
- Single & Multiple Outputs Available
- Pilot Light
- Regulated Models are Short Circuit and Thermal Protected
- Others to Specific Customer Requirements

NOTED FEATURES FOR ALL PLUG-IN CONVERTER/ ADAPTERS

- All Units can be designed to U.L. & C.S.A. Requirements
- Molded Cases have dual tapered Surface for positive push-pull grip
- Case available in a variety of colors — to match the product they operate
- Your personal Hot Leaf stamped Logo or Trade Mark enhance the case appearance.

WALL PLUG-IN LINEAR REGULATED POWER SUPPLIES

	OUTPUT	
MODEL #'s	VDC	AMP
RK101	+ 5	1.4
RK102	+12	1.0
RK103	+24	0.5
RK301	+ 5 +12 −12	1.0 0.2 0.2
RK302	+ 5 − 5 +12	1.0 0.1 0.3
RK303	+ 5 +12 −12	0.6 0.2 0.2

STANDARD SPECIFICATIONS

- — Input Range 105-130VAC 60 HZ
- — Also available with input of 200-250 VAC 50 Hz
- — Output Line-Load Regulation 0.5%
- — Rated for Continuous Duty
- — 0° - 40°C Operating Ambient
- — Each Output Max 10 MV(RMS) Ripple
- — AC Dielectric strength 1500VRMS for One Minute Between Primary and Secondary Windings

TYPICAL UL & CSA LISTED PLUG-IN POWER SUPPLIES

	INPUT		RATED OUTPUT			MAX. RIP-PLE		
PART #	VAC	HZ	VDC	IDC	NO LOAD	MV	REMARKS	CSA LISTED
PIDE-9A	120	60	9	0.1	12.5	150	—	Yes
PIDB-15	120	60	9	0.2	12	300	Thermal Fuse	Yes
PIDB-28	120	60	9	0.5	14.4	510	Thermal Fuse	Yes

TRANSFORMERS

	INPUT		RATED OUTPUT				
PART #	VAC	HZ	VAC	IAC	NO LOAD	REMARKS	CSA LISTED
PITB-125	120	60	10	0.75	13	Thermal Fuse	Yes
PITB-149	120	60	12	0.93	14.2	Thermal Fuse	No
PITB- 67	120	60	13.5	1.1	15.7	Current Fuse	Yes
PITB-126	120	60	18	0.25	20.3	Thermal Fuse	No

FOR INFORMATION CONTACT OUR SALES DEPARTMENT

JEROME INDUSTRIES CORPORATION /730E DIVISION STREET, ELIZABETH, NEW JERSEY 07201 / 201-353-5700 / TELEX 132001

High Voltage Power Supplies: The

High voltage power supplies used to be a disreputable, exasperating lot. They were always breaking down, blowing up, or causing a general panic at precisely the wrong time.

In short, high voltage didn't have a very good name.

Inside Story.

Then along came a company called KSI. Remarkably, KSI brought common sense (and uncommon engineering) to the uncertain world of high voltage.

First, KSI invented the Arc Quencher™—an ingenious new design that makes high voltage power supplies short-circuit proof. And unlike other "fail-safe" systems, the Arc Quencher doesn't preserve itself at the expense of the load.

KSI then added double shielding, RFI filtering, isolated control power, and many other protective features.

Finally!!! High voltage power supplies were becoming reliable, upstanding citizens!

But KSI didn't stop here. High voltage power supplies were still notoriously behind the times. Who wanted to put an antique bucket of bolts into a highly advanced system?

So KSI went to work. It employed the latest vacuum-tube and control-circuit technology. It housed the components in compact tanks and modern control modules. And it used plug-in PCBs with LED indicators and test points.

To make matters even better, KSI taught its power supplies to speak ASCII with computers. Through fiber optics, computers precisely control each critical aspect of power-supply operation.

What's more, KSI is applying the same sensible engineering approach to high-frequency switchmode and resonant supplies.

And now for the happy ending: KSI custom designs high voltage *systems* for a whole range of applications, including:

- Ion implantation
- X-ray systems
- Lasers
- E-beam systems
- Ion deposition
- Ion milling.

To find out the latest developments in this exciting and continuing story, call or write: Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923. Phone (617) 777-5102. TWX: 887159. FAX: (617) 777-3340.

Typical Specifications

Description	Output Voltage	Reg.	Max. Current	Technology	Application
Multiple Output	Quad 0 to 10kV	.05%	4x 4mA	High-freq.	Beam optics
	0 to 10V 0 to 1.5kV 0 to 10kV	1% 1% 1%	300A 2.2A 40mA	High-freq. resonant	Deposition systems
D.C. Adjustable	+5 to +100kV	.01%	40mA	Output tube regulation	Ion implanters
Pulsed	+40 to +130kV	.1%	800mA		X-ray
Bipolar	−75, +75kV	.01%	200mA	High-freq. resonant	
Fixed voltage	25kV	1%	100mA		Lasers

We've given high voltage power supplies a good name...

KSI Kaiser Systems, Inc.

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KSI

High Voltage Power Supply Selection Guide

Selecting the right high voltage power supply for a specific application requires careful consideration of many parameters. The following table, which compares the performance characteristics of several types of high voltage supplies, will provide guidance in making the appropriate choice for your application.

Type	Unregulated	Input Regulated			Output Regulated
Technology	—	linear	switch mode	resonant converter	linear
Frequency	50 Hz to 400 Hz	50 Hz to 400 Hz	10 kHz to 50 kHz	10 kHz to 50 kHz	50 Hz to 400 Hz
Output Voltage (Max.)	to > 1 MV	to > 1 MV	to 500 kV	to 500 kV	to 150 kV
Power Level	any	any	to 3 kW	to 50 kW	200 W to 200 kW
Regulation Method	N/A	var. transf. SCR	pulse width modulation	freq., phase modulation	series pass element
Stored Energy*	high	high	low	low	lowest
Output Current Limit Δt	≥ 10 ms	≈ 10 ms	≈ .1 ms	≈ .5 ms	< 1 μs
Transient Response	N/A	slow	medium	medium	very fast
EMI	very low	medium	high	medium	very low
Efficiency	≈ 95%	≈ 90%	≈ 85%	≈ 85%	75 to 90%
Parts Count	lowest	low	high	high	low
Size per Watt	large	large	small	small	large
Cost per Watt	low	medium–high	medium	medium	high
Insulation Medium	air, oil, SF6		air, oil, SF6, encapsulation		air, oil, SF6

*Stored energy at output due to output filter. Low filter requirements (higher ripple) reduce stored energy.

Choose your supplier as carefully as you choose your supplies. Ask yourself the following: are his designs modern, efficient, and reliable? Does he care as much about quality as you do? Will he deliver on time and to specifications?

Then call KSI.

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LOCAL SOURCE?
MIL SPECS?
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SPECS?
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LIFE TEST?
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MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1•B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

Why KEC Switchers place first with
the Specifier,
the Qualifier,
the Buyer.
10
10
10

KEC makes a line of high-quality, reliable, switching power supplies guaranteed to make all three important members of your procurement team happy, and here's why:

Here's why your design engineers will love them:

- We build a better power supply to begin with and then we guarantee it with a full two-year warranty.
- We don't play "specmanship." All our specs are extremely conservative, so there is no need for our customers to design in safety margins. We do it for you.
- Our power supplies won't be the weak link that makes your system fail. (Our return rate is less than 1%).

Here's why your components engineers will score KEC first:

- KEC products not only perform as advertised—they perform much better.
- KEC welcomes head-on confrontation with any other equally rated power supplies because KEC always wins.
- The qualifying engineer knows he isn't wasting his time when he tests KEC product performance.

Here's why purchasing loves to do business with KEC:

- There is no more friendly power supply company. You always have a direct line to our top management, and we give helpful answers—not gruff responses.
- We continue to service and support our customers after they buy—with on-time deliveries, with schedule flexibility, and with helpful application consultations.
- And, perhaps of greatest importance to the buyer—we are fiercely competitive in across-the-board pricing from "onesies and twosies" to 5,000 or 10,000 pieces.

KEC offers a complete selection of precision switching power supplies ranging from 15W to 750W. The line includes both single and multi-output units in open frame and modular enclosed styles. To learn more about this remarkable line of switchers, send for the brochure on KEC's newest line of KS Series multi-output switching power supplies, with ratings from 100 watts to 300 watts—all UL recognized.

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(See following three pages.)

KEC

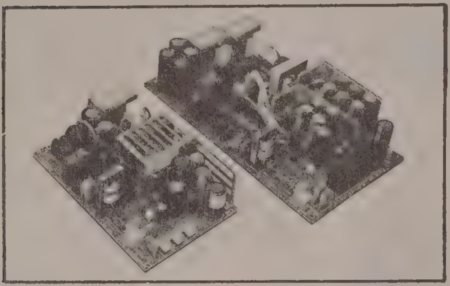
PRECISION SWITCHING POWER SUPPLIES
SELECTOR GUIDE

It tells you all you'll ever need to know to locate the exact switching power supply for most applications. It's complete with brief specs and prices. If you need to know more, just send for our comprehensive product data sheets.

MULTI-OUTPUT

KFD SERIES - MULTI OUTPUT 25, 40, 80 W.

The KFD-25E, 40E and 80E world-class power supplies have been engineered for full time duty at their maximum rated out-puts. They are designed to meet UL, CSA, and VDE safety requirements; and EMI emissions comply with FCC/VDE requirements.



AC INPUT . . . 115/230 VAC (-20% to +15%)
Efficiency (Typical) . . . 70%

DIM.	KFD 25E	KFD40E	KFD80E
L	5.9	6.3	9
W	3.55	3.9	5
H	1.58	1.9	1.9

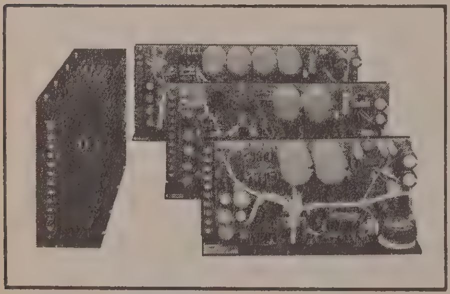
MODEL NUMBER	OUTPUT NO. 1 V(nom)/I(max)	OUTPUT NO. 2 V(nom)/I(max)	OUTPUT NO. 3 V(nom)/I(max)	OUTPUT NO. 4 V(nom)/I(max)	WATT / * PRICE
KFD 25E-01	+5V/3.5A	+12V/1A	−12V/0.5A		25W $55
KFD 25E-02	+5V/3.5A	+15V/1A	−15V/0.5A		
KFD40E-01	+5V/5A	+12V/2.5A	−12V/0.5A		40W $74
KFD40E-02	+5V/5A	+15V/2.5A	−15V/0.5A		
KFD40E-03	+5V/5A	+12V/2.5A	−5V/0.5A		
KFD40E-04	+5V/5A	+12V/2.5A	−48V/0.3A		
KFD80E-01	+5V/7A	+12V/4A	−12V/0.5A	−5V/0.5A	80W $105
KFD80E-02	+5V/7A	+15V/3A	−15V/0.5A	−5V/0.5A	
KFD80E-03	+5V/7A	+12/3A	−12V/0.5A	+24/0.5A	

▨ Shaded area indicates post regulated outputs; no minimum load required.

*1-9 units

KS SERIES – MULTI OUTPUT (UP TO 6). 100-300 W.

With a range of 100 to 300 watts, these two Series cover the broadest spectrum of applications. They are particularly well suited for use with word processing equipment, computers, as well as a wide range of peripherals. Both overload and overvoltage protection is standard. All models UL recognized.



AC INPUT...115/230VAC (−20% to +10%)
Efficiency (Typical)...75%

DIM.	KS 100	KS 130	KS 170	KS 200	SCB306
H	2.44	2.44	2.44	2.44	2.50
L	9.06	10.5	10.0	13.0	11.75
W	4 21	4 94	5 63	4 94	7.60

MODEL NUMBER	Output 1 V(nom)/I(max)	Output 2 V(nom)/I(max)	Output 3 V(nom)/I(max)	Output 4 V(nom)/I(max)	Output 5 V(nom)/I(max)	Output 6 V(nom)/I(max)	WATTS / ** PRICE
KS 100-01	+5V/10A	+12V/1.5A	−12V/1.5A	−5V/.5A			100W $188
KS 100-02	+5V/10A	+15V/1.5A	−15V/1.5A	−5V/.5A			
KS 100-03	+5V/10A	+12V/1.5A	−12V/1.5A	+24V/1.5A			
KS 100-04	+5V/10A	+15V/1.5A	−15V/1.5A	+24V/1.5A			
KS 100-03	+5V/10A	+12V/1.5A*	+12V/1.5A*	+24V/1.5A			
KS 100-06	+5V/10A	+12V/1.5A*	−12V/1.5A	+12V/1.5A*			
KS 130-01	+5V/15A	+12V/4A	−12V/3A	−5V/0.5A			130W $205
KS 130-02	+5V/15A	+15V/4A	−15V/3A	−5V/0.5A			
KS 130-03	+5V/15A	+12V/4A	−12V/3A	+24V/2A			
KS 130-04	+5V/15A	+15V/4A	−15V/3A	+24V/2A			
KS 130-05	+5V/15A	+12V/4A*	+12V/3A*	+24V/2A			
KS 130-06	+5V/15A	+12V/4A*	−12V/3A	+12V/2A*			
KS 170-01	+5V/20A	+12V/4A	−12V/4A	+24V/4A			170W $234
KS 170-02	+5V/20A	+15V/4A	−15V/4A	+24V/4A			
KS 170-03	+5V/20A	+12V/4A	−12V/4A	−5V/0.5A			
KS 170-04	+5V/20A	+15V/4A	−15V/4A	−5V/0.5A			
KS 170-05	+5V/20A	+12V/4A*	+12V/4A*	+24V/4A			
KS 170-06	+5V/20A	+12V/4A*	−12V/4A	+12V/4A			
KS 200-01	+5V/25A	+12V/4A	−12V/4A	−5V/0.75A	+24V/4A		200W $257
KS 200-02	+5V/25A	+15V/4A	−15V/4A	−5V/0.75A	+24V/4A		
KS 200-03	+5V/25A	+12V/4A	−12V/4A	−24V/2A	+24V/4A		
SCB306-01	+5V/20A	+12V/4A	−12V/4A	+24V/4A	+15V/4A	−15V/4A	300W $365
SCB306-02	+5V/20A	+12V/4A	−12V/4A	−5V/1A	+24V/4A	−24V/4A	

▨ Shaded outputs have separate returns.
* Can be paralleled for high-current applications

**1-9 units

(Continued on next page)

(Multi-Output continued)

AC INPUT...115VAC (−20% to +10%)
Efficiency (Typical)...60%

DIM.	KFL 15	KFL 25	KFL 40
L	5.5	6.3	7.1
W	3.9	3.9	3.9
H	1.8	1.9	2.0

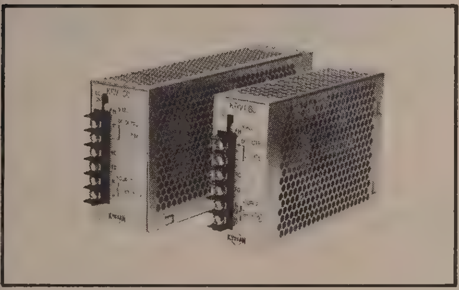
KFL SERIES – 4 OUTPUT. 15, 25, 40 W.

The KFL Series features independently regulated outputs and offers optimum size-to-power ratios. Available in both caged and open versions in 15, 25, and 40-watt models, these units provide ultra-reliable performance in the smallest possible space. Ideal for personal computers. All models UL recognized.

MODEL NUMBER	OUTPUT NO. 1 V(nom)/I(max)	OUTPUT NO. 2 V(nom)/I(max)	OUTPUT NO. 3 V(nom)/I(max)	OUTPUT NO. 4 V(nom)/I(max)	WATT / PRICE*
KFL 15-01U	+5V/2A	−5V/0.5A	+12V/0.5A	−12V/0.5A	15W / $80
KFL 15-02U	+5V/2A	−5V/0.5A	+15V/0.5A	−15V/0.5A	
KFL 25-01U	+5V/3.5A	−5V/0.5A	+12V/1.0A	−12V/0.5A	25W / $95
KFL 25-02U	+5V/3.5A	−5V/0.5A	+15V/1.0A	−15V/0.5A	
KFL 40-01U	+5V/5A	−5V/0.5A	+12V/1.5A	−12V/0.5A	40W / $103
KFL 40-02U	+5V/5A	−5V/0.5A	+15V/1.5A	−15V/0.5A	

*1-9 units

SINGLE OUTPUT



AC INPUT...115 VAC/230 VAC (−25% +15%)
Efficiency (Typical)...75%

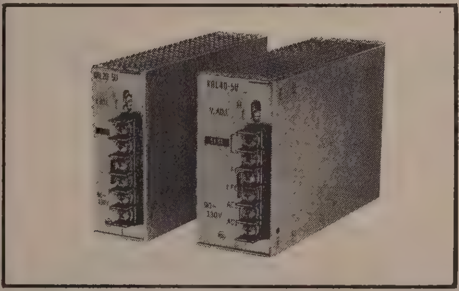
MODEL	H	L	W
KRV 60	3.94	6.65	1.69
KRV 100	3.94	8.74	2.09

KRV SERIES—SINGLE OUTPUT, 60 & 100W.

The KRV Series features **100 kHz** switching speed instead of the usual 20 kHz, resulting in very small efficient packages and providing more wattage per cubic inch. These state-of-the-art power supplies are ideal for any application where space is at a premium.

MODEL NUMBER	Maximum Current Output at 50°C				
	5Vdc	12Vdc	15Vdc	24Vdc	Watt/Price*
KRV 60**	12A	5A	4A	2.5A	60W / $129
KRV 100**	20A	8A	6.5A	4A	100W / $176

**Add voltage to complete model number. Contact factory for non-standard voltages *1-9 units



AC INPUT...115VAC (−20% to +10%)
Efficiency (Typical)...62%

MODEL	H	L	W
KRL 20	3.9	6.46	1.46
KRL 40	3.9	6.46	1.97

KRL SERIES – SINGLE OUTPUT, 20 & 40 W.

The KRL Series is optimum for those applications requiring totally isolated outputs. A compact size and low price allows maximum flexibility in configuring your own multi-output system—often at a cost less than competitive multi-output units.

MODEL NUMBER	Maximum Current Output at 50°C				
	5Vdc	12Vdc	15Vdc	24Vdc	Watt/Price*
KRL20**	4A	1.7A	1.3A	0.8A	20W / $57
KRL40**	8A	3.3A	2.7A	1.7A	40W / $66

**Add voltage to complete model number. Contact factory for non-standard voltages. *1-9 units

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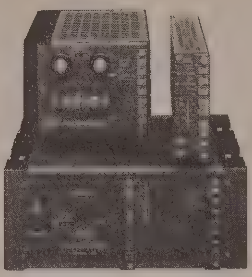
(Continued on next page)

(Single Output continued)



AC INPUT...115/230VAC (−20% to +10%)
Efficiency (Typical)...73%

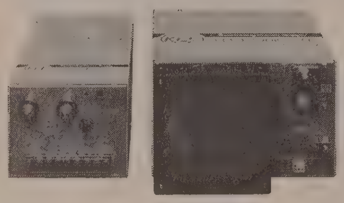
DIM.	SB-30	SB-55	SB-100	SB-150	SB-200	SB-300
W	1.30	1.93	3.44	5.25	5.25	9.45
H	3.94	3.94	3.94	3.94	3.94	3.94
L	7.88	7.88	7.88	7.88	7.88	7.88

SB MODULAR SERIES – SINGLE OUTPUT, FULLY ENCLOSED. 30-300 W.

Compact and cool operating, the SB series of modular power supplies are particularly well suited for a wide range of applications requiring a fully enclosed unit with a single output and high reliability. These rugged units feature overvoltage and overload protection as standard.

MODEL NUMBER	Max. Current Output at 50°C						
	5Vdc	12Vdc	15Vdc	20Vdc	24Vdc	48Vdc	Watt/Price*
SB-30**	6.0A	2.5A	2.0A	1.5A	1.2A		30W/$129
SB-55**	11A	4.5A	3.6A	2.75A	2.2A		55W/$146
SB-100**	20A	8.0A	6.6A	5.0A	4.0A		100W/$203
SB-150**	30A	12A	10A	7.5A	6.0A		150W/$240
SB-200**	40A	16.6A	13.3A	10.0A	8.3A	4.1A	200W/$349
SB-300**	60A	25.0A			12.5A	6.2A	300W/$545

**Add voltage to complete model number. Contact factory for non-standard voltages. *1-9 units



AC INPUT...115 or 230VAC (−15% to +10%)
Efficiency (Typical)...SD Series: 80%, SE Series: 80%

DIM.	SD SERIES	SE SERIES
W	5.00	7.75
H	3.90	4.93
L	12.12	9.70

SD & SE HIGH POWER SERIES – SINGLE OUTPUT, MODULAR 375 & 750 W.

The SD and SE Series combine high power and space saving compactness. The units feature *as standard:* power fail indicator, remote start-up and shut-down, along with remote sensing and overvoltage protection.

SD SERIES

115VAC MODELS	SDI-5	SDI-12	SDI-24	SDI-28	SDI-48	Watt / Price*
230VAC MODELS	SD2-5	SD2-12	SD2-24	SD2-28	SD2-48	375W
NOM. VOLTAGE	5V	12V	24V	28V	48V	
MAX. CURRENT	75A	31A	16A	13A	8A	$580

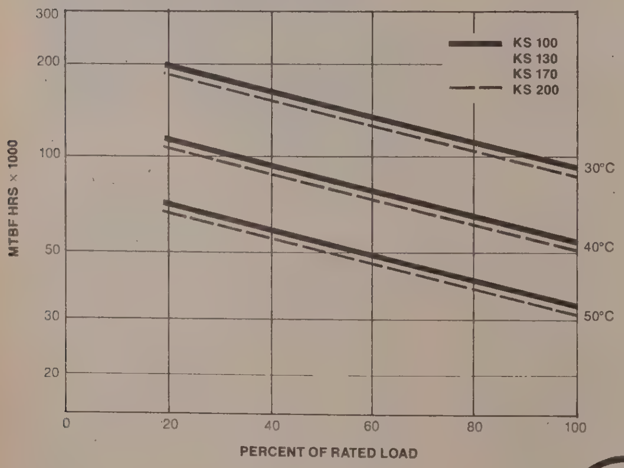
SE SERIES

115VAC MODELS	SEI-5	SEI-12	SEI-24	SEI-28	SEI-48	Watt / Price*
230VAC MODELS	SE2-5	SE2-12	SE2-24	SE2-28	SE2-48	750W
NOM. VOLTAGE	5V	12V	24V	28V	48V	
MAX. CURRENT	150A	64A	31A	27A	16A	$705

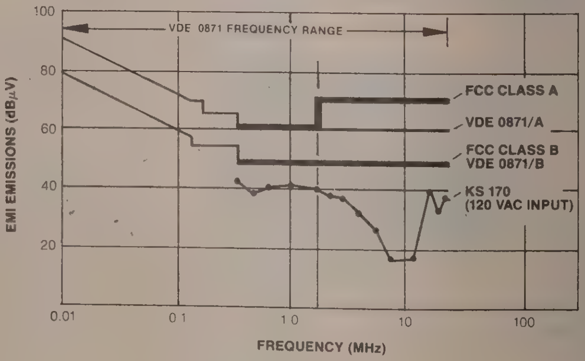
Dimensions are in inches. Model numbers, specifications and prices are subject to change *1-9 units

KS SERIES, RELIABILITY AND FCC/EMI COMPLIANCE

MEAN TIME BETWEEN FAILURE



EMI SPECIFICATIONS—KS PERFORMANCE WITH OPTION F



OPTION F—Reduces conducted noise to comply with FCC and VDE levels A. Although the figure above indicates that the actual conducted noise is less than FCC level B, an external filter is recommended for compliance with FCC and VDE levels B. The recommended filter is a Stanford Applied Engineering Model CA-3, or equivalent.

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Two new facilities to better serve your power supply requirements.

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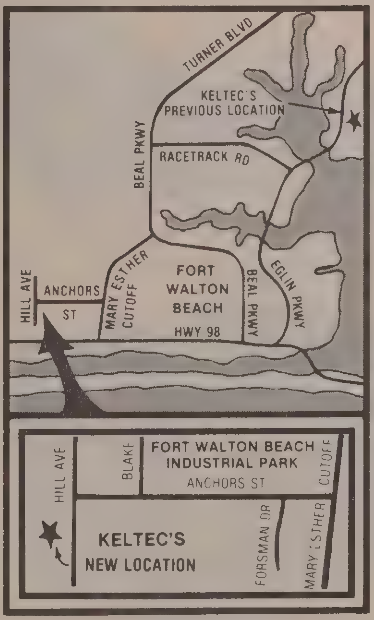
Keltec power supplies are the choice for use in sophisticated electronic surveillance and electronic counter measure systems for the military market, plus civilian applications in telecommunications, computers and satellite communications systems.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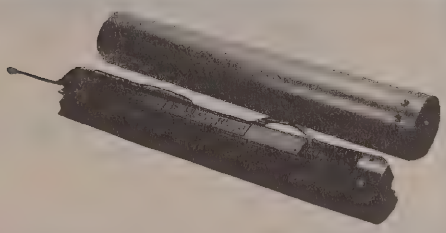
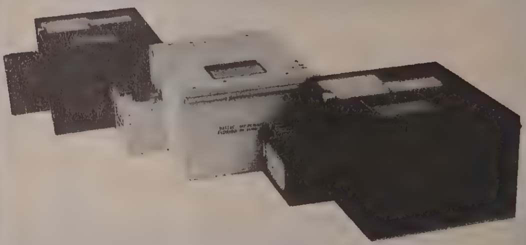
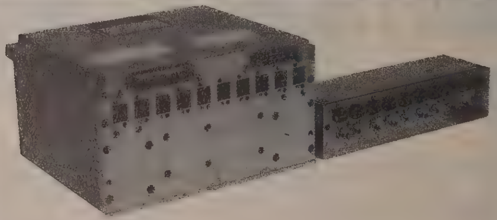


Airborne Disposable Jammer TWTA

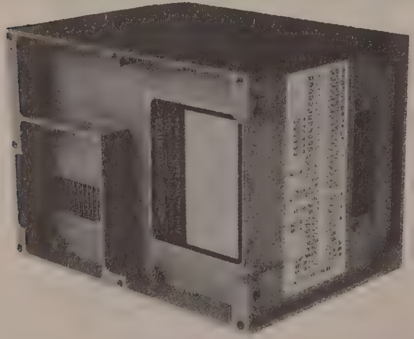


TWT Power Supplies for an Airborne ECM Pod

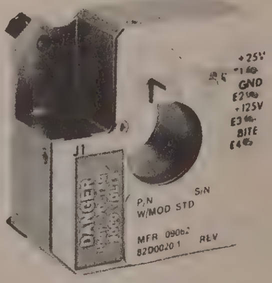
Shipboard Multi-TWT Power Supply & Distribution Unit



Multi-TWT Power Supply & Modulator for an Airborne ECM Pod



Multi-output Low Voltage Power Supply for Airborne Radar Warning Receiver System



High Voltage CRT Power Supply for Airborne Display

For over twenty years, Keltec Florida has been designing and manufacturing high reliability power conversion products to meet the most stringent military environmental specifications. Long recognized as a leader in TWT power supplies, we have used our vast experience base to enhance and improve our entire product capability.

For all of your power conversion needs, look to Keltec Florida—The Leader!

At Keltec, we provide our customers the ultimate in state-of-the-art custom-designed power conversion products. Whether your needs demand high power density, multi-output low voltage power supplies or high technology high voltage supplies for TWT's, CRT's, magnetrons, or klystrons, Keltec stands ready to design and build to your specifications.

Keltec Florida
Defense Operations

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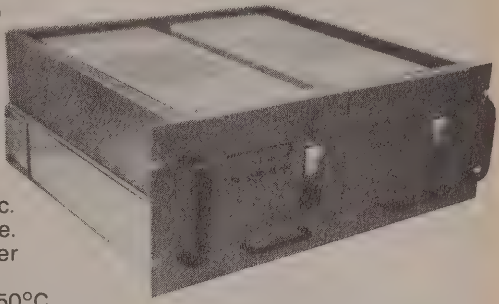
Custom Designed High Grade Industrial Power Supplies

- **Switchers**
- **Linears**
- **DC to DC Converters**
- **AC to DC Off-Line Switchers**
- **Multi-Input**
- **Multi-Output**
- **High MTBF Designs**

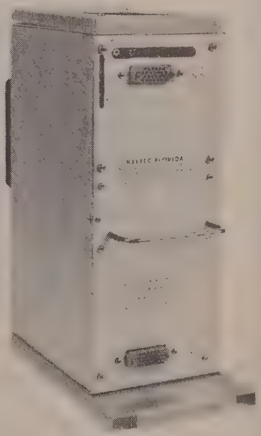
Keltec Industrial Operations provides custom Engineering and Manufacturing capability to a wide variety of industrial power supply users. Complete electrical and mechanical design service; modern manufacturing methods; a highly skilled production test capability and a fully staffed Quality Assurance department combine to provide highly reliable, cost efficient power supplies in large quantities to support major industrial/ commercial programs.

Redundant Multi-Output AC to DC Switcher Provides 650 Watts!



Dual input range: 115V or 220V; 40 to 400Hz.
Outputs: +5V @ 50A
±15V @ 2A
−5V @ 3A
Regulation: ±0.3%
Ripple: 100mV p-p. max.
Fully protected with electronic overload. Automatic recovery. 30msec. storage protects against power failure.
MTBF in excess of 50,000 hours per MIL-STD-2127D at 50°C ambient.
Operating temperature: −10° to +50°C.
Meets FCC20780 EMI requirements for Class A equipment.

100,00 Hours MTBF Low Noise DC to DC Switcher



Low noise switching power supply with 5 outputs is used to power logic circuits in digital microwave radio links. Highly reliable with over 100,000 hours calculated MTBF.
Inputs: 20-28vdc and 42-56vdc.
Outputs: ±5V @ 25A ±0.5%
+12V @ 3A ±0.5%
−15V @ 1.5A ±1.0%
−20V @ 1.5A ±1.0%
Ripple: 50mv p-p. max.
Protection: Adjustable current limiting. Automatic recovery on all outputs. Reverse polarity and overtemp. protection.
Operating Temp: −20° to +55°C.

Off-Line Switcher has 5-Outputs.

Off-Line AC to DC switcher with 5-outputs is used in air-traffic control systems world-wide.
Inputs: 115V and 220V; 40 to 400Hz.
Outputs: +5V @ 10A
±15V @ 2A
10V @ 6A
12V @ 6A
Regulation: ±0.3%
Ripple: 100mv p-p. max.
Meets FCC20780 EMI requirements for Class A equipment.
MTBF in excess of 50,000 hours calculated in accordance with MIL-STD-217D at 50° ambient.
10V and 12V outputs are fully adjustable over the range for panel light control.

Complete capabilities for any type of high reliability, industrial power supply. Contact Keltec Florida, Industrial Operations with your requirements.

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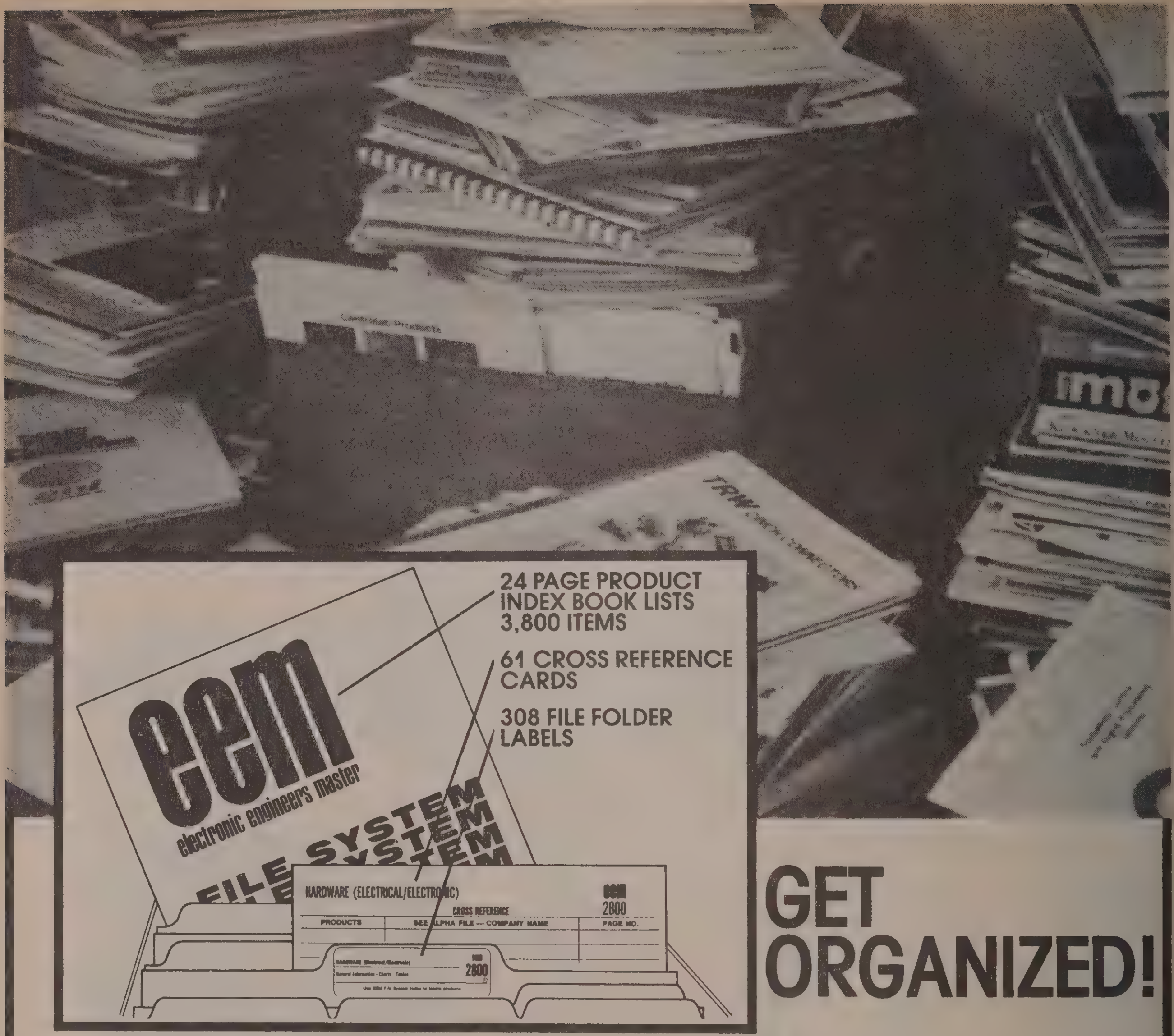
24 PAGE PRODUCT INDEX BOOK LISTS 3,800 ITEMS
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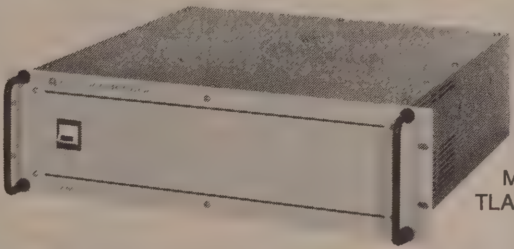
Has all approvals needed for world-wide use... single and multi output.

IEEE 488 COMPATIBLE PROGRAMMERS


Model TLA 488-16

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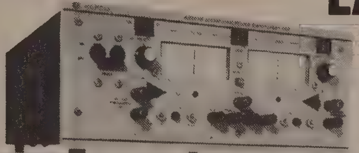
Model BOP 50-4M-488-B



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Linear programmable... unipolar & bipolar... conventional & high speed... low, medium, & high voltage.

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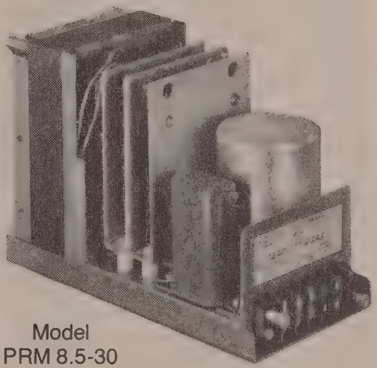
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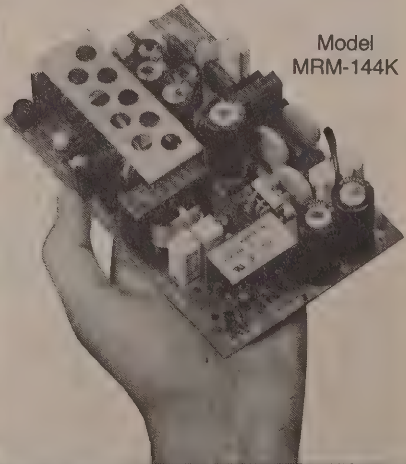
Model MRM-144K

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(1)+50°C current rating (2)Nominal output. Contains taps for two settings higher and two settings lower (3)+40°C current rating

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0-100	0-1	ATE 100-1M	13
0-100	0-1	JQE 100-1M	15
+100 to −100	+1 to −1	BOP 100-1M	14
+100 to −100	+2 to −2	BOP 100-2M	14
+100 to −100	+4 to −4	BOP 100-4M	14
0-100	0-2.5	ATE 100-2.5M	13
0-100	0-2.5	JQE 100-2.5M	15
0-100	0-5	ATE 100-5M	13
0-100	0-5	JQE 100-5M	15
0-100	0-10	ATE 100-10M	13
0-100	0-10	JQE 100-10M	15
120(2)	0-0.5(2)	PRM 120-0.5	12
120	0-1	PRM 120-1	12
120	0-1.5	PRM 120-1.5	12
120	0-2.4	PRM 120-2.4	12
0-150	0-0.3	ATE 150-0.3M	13
0-150	0-0.7	ATE 150-0.7M	13
0-150	0-1.5	ATE 150-1.5M	13
0-150	0-1.5	JQE 150-1.5M	15
0-150	0-3.5	ATE 150-3.5M	13
0-150	0-3.5	JQE 150-3.5M	15
0-150	0-7	ATE 150-7M	13
0-150	0-7	JQE 150-7M	15
0-200	0-0.01	NTC-200	16
240(2)	0-0.25(2)	PRM 240-0.25	12
0-325	0-0.4	HB 4AM	17
0-325	0-0.8	HB 8AM	17
0-500	0-0.4	APH 500M	18
0-500	0-0.4	OPS 500B	19
+500 to −500	+0.08 to −0.08	BOP 500M	17
0-500	0-0.4	BHK 500-0.4M	18
0-525	0-0.5	HB 525M	17
0-1000	0-0.02	APH 1000M	18
0-1000	0-0.02	OPS 1000B	19
+1000 to −1000	+0.04 to −0.04	BOP 1000M	17
0-1000	0-0.2	BHK 1000-0.2M	18
0-2000	0-0.001	NTC-2000	16
0-2000	0-0.01	APH 2000M	18
0-2000	0-0.01	OPS 2000B	19
0-2000	0-0.1	BHK 2000-0.1M	18
0-3500	0-0.01	OPS 3500	19
0-5000	0-0.005	OPS 5000	19

(1) +50°C current rating (2) Nominal output. Contains taps for two settings higher and two settings lower (3) +40° current rating

KEPCO® POWER SUPPLIES

INDEX

MULTI OUTPUT POWER SUPPLIES

OUTPUT #1		OUTPUT #2		OUTPUT #3		OUTPUT #4		MODEL	PAGE
VOLTS	AMPS[1]	VOLTS	AMPS[1]	VOLTS	AMPS[1]	VOLTS	AMPS[1]		
+3.5-5.5	0-6	+12	0.4	−12	0-0.4			RMT 021-SA	9
+3.5-5.5	0-6	+15	0.4	−15	0-0.4			RMT 022-SA	9
+3.5-5.5	0-6	+12	0.4	− 5	0-0.4			RMT 023-SA	9
+3.5-5.5	0-6	+15	0.4	− 5	0-0.4			RMT 024-SA	9
+3.5-5.5	0-6	+12	0.4	−9	0-0.4			RMT 025-SA	9
+4.5-5.5	0-10	+12	0-1	−12	0-1			RDT 001-AA-24	9
+4.5-5.5	0-10	+15	0-1	−15	0-1			RDT 002-AA-24	9
+4.5-5.5	0-10	+12	0-1	−12	0-1			RDT 001-AA-48	9
+4.5-5.5	0-10	+15	0-1	−15	0-1			RDT 002-AA-48	9
+4.5-5.5	0-10	+12	0-1	−12	0-1			RMT 001-AA	9
+4.5-5.5	0-10	+15	0-1	−15	0-1			RMT 002-AA	9
+4.5-5.5	0-10	+12	0-1	− 5	0-1			RMT 003-AA	9
+4.5-5.5	0-10	+15	0-1	− 5	0-1			RMT 004-AA	9
+4.5-5.5	0-10	+12	0-1	− 9	0-1			RMT 005-AA	9
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+4.5-5.5	0-20	12	0-2	5	0-5			RXT 053-C	9
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+ 5	1.0-3.0	+12	0.4-2.0	−12	0.0-0.3			EMR 200K	7
+ 5	2.0-6.0	+12	0.2-1.0	−12	0.2-1.0			EMR 300K	7
+ 5	2.0-4.0	+12	0.1-0.5	−12	0.0-0.3	+24	0.2-1.0	EMR 400K	7
+ 5	2.0-5.0	+12	0.4-2.3	−12	0.0-0.3	+24	0.2-1.0	EMR 500K	7
+ 5	0.45-2.5	+12	0.3-2.0	−12	0.0-0.1			MRM 144K	6
+ 5	0.45-2.5	+12	0.3-2.0	−12	0.0-0.1			MRM 144KV	6
+ 5	0.45-2.5	+12	0.3-2.0	−12	0.0-0.1			MRM 146K	6
+ 5	0.75-3.0	−12	0.04-0.17	+24	0.0-2.2			MRM 147K/KB	6
+ 5	2.0-5.0	+12	0.5-1.8	+12	0.5-2.0	−12	0.25-0.5	MRM 174K/KF	6
+ 5	0.13-2.2	− 5	0.08-0.14	+24	0.0-1.3			MRM 183K	6
+ 5	2.0-6.0	+12	0.5-3.0	−12	0-1	− 5	0-0.5	MRM 250-KV	6
+ 5	0-6	+12	0-1	−12	0-1	+24	0-0.2	EFX 050T-1	7
+ 5	0-6	+15	0-1	−15	0-1	+24	0-0.2	EFX 050T-2	7
+ 5	0-6	+12	0-1	−12	0-1	− 5	0-0.8	EFX 050T-3	7
+ 5	0-6	+15	0-1	−15	0-1	− 5	0-0.8	EFX 050T-4	7
+ 5	0-8	+12	0-2	−12	0-2	+24	0-0.5	EFX 100T-1	7
+ 5	0-8	+15	0-1.6	−15	0-1.6	+24	0-0.5	EFX 100T-2	7
+ 5	0-8	+12	0-2	−12	0-2	− 5	0-1.6	EFX 100T-3	7
+ 5	0-8	+15	0-1.6	−15	0-1.6	− 5	0-1.5	EFX 100T-4	7
+ 5	0-8	+12	0-3.5	−12	0-0.5	+24	0-0.5	EFX 100T-5	7
+ 5	0-8	+12	0-2.8	−12	0-0.5	+12	0-1.8	EFX 100T-6	7
+ 5	0-15	+12	0-2.5	−12	0-2.5	+24	0-1	EFX 150T-1	7
+ 5	0-15	+15	0-2	−15	0-2	+24	0-1	EFX 150T-2	7
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+ 5	0-15	+15	0-2	−15	0-2	− 5	0-2	EFX 150T-4	7
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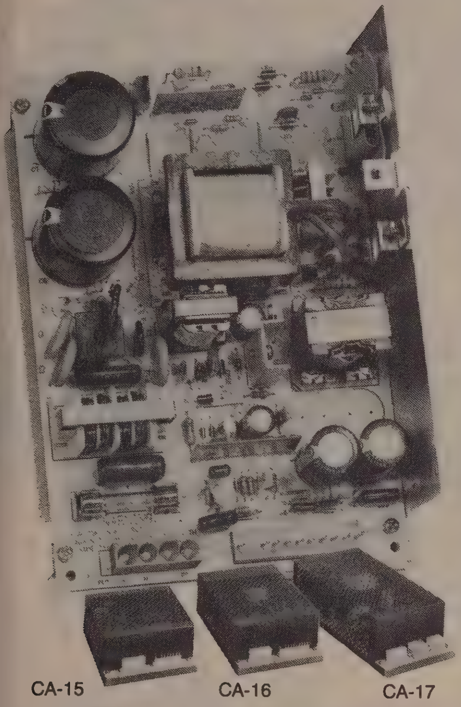
+ 5	0-20	+15	0-3	−15	0-3	+24	0-1	EFX 210T-2	7
+ 5	0-20	+12	0-4	−12	0-4	− 5	0-2	EFX 210T-3	7
+ 5	0-20	+15	0-3	−15	0-3	− 5	0-2	EFX 210T-4	7
0-6	0-5	0 to +20	0-1	0 to −20	0-1			MPS 620M	16
+12	0-0.5	−12	0-0.5					CMP 01-H	9
+12	0-0.5	− 5	0-0.5					CMP 03-H	9
+12	0-0.5	− 9	0-0.5					CMP 05-H	9
+12	0-12	12	0-12					PRM 2x12-12	12
+15	0-0.4	−15	0-0.4					CMP 02-H	9
+15	0-0.4	− 5	0-0.5					CMP 04-H	9
+15	0-10	15	0-10					PRM 2x15-10	12
+24	0-6	24	0-6					PRM 2x24-6	12
+60	0-2.5	60	0-2.5					PRM 2x60-2.5	12

KEPCO® POWER SUPPLIES

KEPCO/TDK OEM SWITCHING MODULES

High Frequency, High Efficiency Power Supplies with Built-In Overvoltage Protector and Current Limiter

NEW WORLD POWER™ ERX™ SINGLE OUTPUT



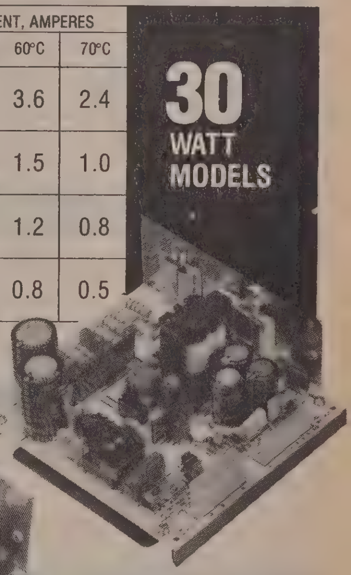
OPTIONAL STEEL ENCLOSURES

This series introduces a whole new generation of cost-effective switchers meeting the highest international safety and EMI standards at remarkably low prices. A built-in filter attenuates conducted EMI below FCC 20780, Class B, and VDE 0871. Optional enclosure reduces radiated EMI below VDE 0875/7.1, level N.

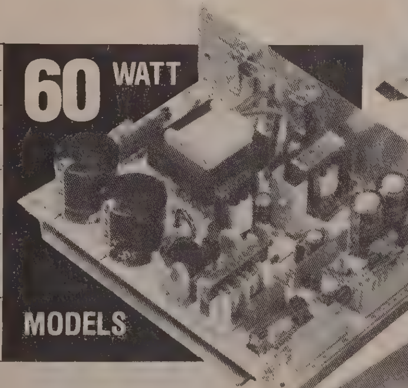
All models are "SELV" per the spacings and hi-pot requirements of VDE 0806 and IEC-380 (certified by TÜV Rheinland), and also meet the requirements of UL478 and CSA C22.2-154. The spacing, even with the larger transformer needed to meet these requirements, has been achieved through the use of two custom hybrid microcircuits. These also reduce the number of parts on the board, resulting in a clean, uncluttered layout, and greatly extended reliability.

The series consist of 12 models: 5V, 12V, 15V, and 24V models in three sizes, 30 Watts, 60 Watts, and 120 Watts. They provide well-stabilized, adjustable d-c outputs, protected by a current limiter and overvoltage protector, with remote error sensing available to compensate for the connecting wire's voltage loss.

MODEL	OUTPUT VOLTS	ADJUSTMENT RANGE	OUTPUT CURRENT, AMPERES			
			40°C	50°C	60°C	70°C
ERX 5-6	5	4.0-5.5	6	4.8	3.6	2.4
ERX 12-2.5	12	10.8-13.2	2.5	2.0	1.5	1.0
ERX 15-2	15	13.5-16.5	2.0	1.6	1.2	0.8
ERX 24-1.3	24	21.6-26.4	1.3	1.0	0.8	0.5



MODEL	OUTPUT VOLTS	ADJUSTMENT RANGE	OUTPUT CURRENT, AMPERES			
			40°C	50°C	60°C	70°C
ERX 5-12	5	4.0-5.5	12	9.6	7.2	4.8
ERX 12-5	12	8.4-13.2	5.0	4.0	3.0	2.0
ERX 15-4	15	10.5-16.5	4.0	3.2	2.4	1.6
ERX 24-2.5	24	16.8-26.4	2.5	2.0	1.5	1.0



1 This KEPCO product is backed by a firm 1-YEAR WARRANTY

MODEL	OUTPUT VOLTS	ADJUSTMENT RANGE	OUTPUT CURRENT, AMPERES			
			40°C	50°C	60°C	70°C
ERX 5-24	5	4.0-5.5	24.0	19.2	14.4	9.6
ERX 12-10	12	8.4-13.2	10.0	8.0	6.0	4.0
ERX 15-8	15	10.5-16.5	8.0	6.4	4.8	3.2
ERX 24-5	24	16.8-26.4	5.0	4.0	3.0	2.0

120
WATT MODELS

KEPCO INC. • 131-38 SANFORD AVENUE • FLUSHING, N.Y. 11352 USA • (212) 461-7000 • TWX #710-582-2631 • FAX: (212) 767-1102

KEPCO® POWER SUPPLIES

KEPCO/TDK OEM SWITCHING MODULES

High Frequency, High Efficiency Power Supplies with Built-In Overvoltage Protector and Current Limiter

MRM™ TRIPLE AND QUADRUPLE OUTPUT

This series of frameless, printed-card style switching power supplies produce multiple outputs to meet, in various combinations, the logic, display, serial output, and disk drive needs of CRT terminals, microcomputers, and video games.

All members of the series have built-in filtering which meets FCC/VDE conducted EMI specs class B (except MRM 147K, Class A). All are UL recognized and CSA certified. The newest member, MRM 250KV, additionally meets the safety requirements of an SELV power supply per VDE 0806 and IEC 380. MRM 144KV also meets these requirements. Both have been so certified by TÜV Rheinland. All models have OVP on their +5V outputs, and all except MRM 146K and MRM 183K have 115/230V selectable inputs.

The 60 Watt MRM 250KV, a flyback converter, has four outputs: +5V, +12V, −12V, and −5V. The 40 Watt MRM 144K and −KV and 146K, also flyback converters have three outputs: +5V, +12V, and −12V. MRM 147K (70 Watts), a forward converter, and MRM 183K (43 Watts), a flyback, both produce three outputs. Both have one +5V output; MRM 147K has a −12V, and MRM 183K a −5V, negative reference rail for serial communication outputs. Both have a +24V output: in the MRM 147K it can produce 2.2A; in the MRM 183K it can produce 1.3A. MRM 174K (75 Watts), a forward converter, has four outputs: two separate +12V outputs, one to power a CRT display, the other up to two 5-1/4″ disk drives; a +5V output for TTL logic; and a −12V negative reference rail for serial communications.

A special feature of the MRM 174K is a circuit to minimize transient disturbances on the +12V output being used to power the video display. Such disturbances normally occur when other outputs undergo load change, as when a r/w head starts seeking. Also, the source frequency component of the ripple in the CRT's + 12V output is held below 4mV p-p to minimize interaction with the vertical rate of a CRT display.

MRM 144K, 144KV, 146K	40W
Output #1	+ 5V/0.45 to 2.5A (5.0 max)
Output #2	+12V/0.3 to 2.0A (2.5 max)
Output #3	−12V/0.0 to 0.1A (0.5 max)

MRM 147K	70W
Output #1	+ 5V/0.75 to 3.0A (6.6A peak)
Output #2	−12V/0.04 to 0.17A (0.37A peak)
Output #3	+24V/0.0 to 2.2A (3.3A peak)

MRM 174K	75W
Output #1	+ 5V/2.0 to 5.0A
Output #2	+12V/0.5 to 1.8A (2.8 peak)
Output #3	+12V/0.5 to 2.0A
Output #4	−12V/0.25 to 0.5A

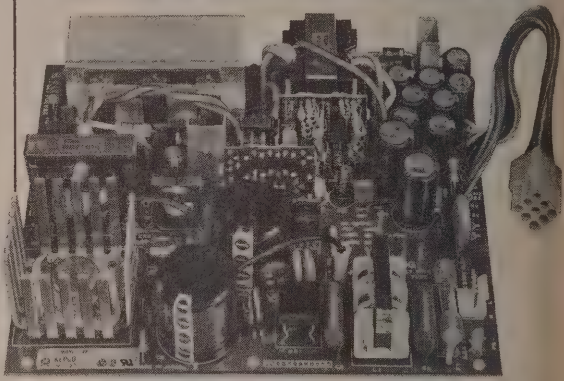
MRM 183K	43W
Output #1	+ 5V/0.13 to 2.2A
Output #2	− 5V/0.08 to 0.14A
Output #3	+24V/0.0 to 1.3A (1.7A peak)

MRM 250KV	60W
Output #1	+5V/2.0 to 6.0A[1]
Output #2	+12V/0.5 to 3.0A[1]
Output #3	−12V/0.0 to 1.0A
Output #4	−5V/0.0 to 0.5A

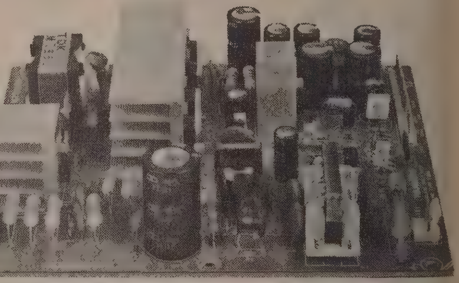
[1] Max current #1 and #2 is 8.0A

UL RECOGNIZED CSA CERTIFIED

MRM 147KB (with barrier strip)

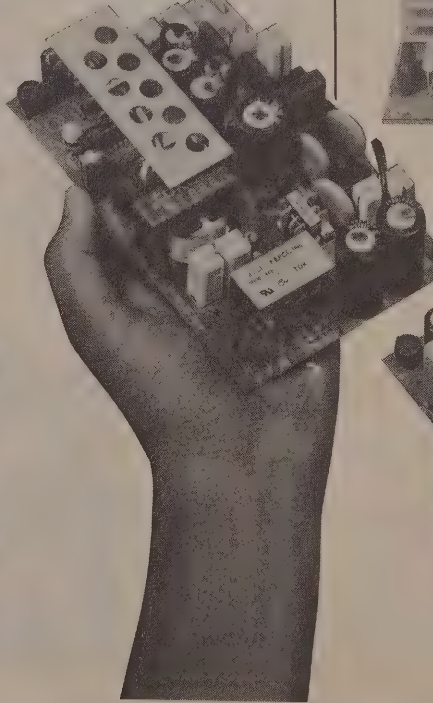


MRM 174KF (with flying lead/connector)



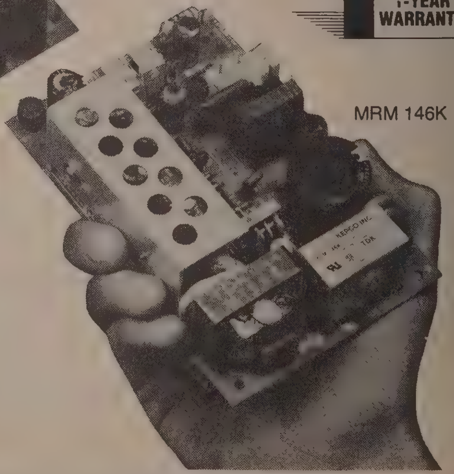
MRM 183K (with pin-header connector)

MRM 144K
MRM 144KV



This KEPCO product is backed by a firm 1-YEAR WARRANTY

MRM 146K



KEPCO® POWER SUPPLIES

KEPCO/TDK OEM SWITCHING MODULES

High Frequency, High Efficiency Power Supplies with Built-In Overvoltage Protector and Current Limiter

EMR™

TRIPLE AND QUADRUPLE OUTPUT

EMR 500K
80 Watts
4 outputs

EMR 400K
53 Watts 4 outputs

EMR 300K
54 Watts
3 outputs

EMR 200K
42 Watts
3 outputs

EMR 100K
22 Watts
3 outputs

This KEPCO product is backed by a firm 1-YEAR WARRANTY

These new high-quality multi-output fully enclosed and shielded power supplies are priced well below many competitive open frame designs. This is due to the computer-aided design of these units, and to the extensive use of proprietary TDK hybrid microcircuits, which dramatically reduce the parts population of the boards.

The five EMR models range from a 3-output 22-Watt model for logic circuits, through a 4-output 80-Watt model with sufficient 24V power to run an 8″ floppy disk drive.

EMR 100K (22W)	Output #1	+ 5V/1.0 to 3.0A
	Output #2	+12V/0.0 to 0.3A
	Output #3	−12V/0.0 to 0.3A

EMR 200K (42W)	Output #1	+ 5V/1.0 to 3.0A
	Output #2	+12V/0.4 to 2.0A
	Output #3	−12V/0.0 to 0.3A

EMR 300K (54W)	Output #1	+ 5V/2.0 to 6.0A
	Output #2	+12V/0.2 to 1.0A
	Output #3	−12V/0.2 to 1.0A

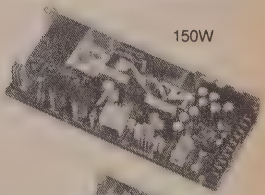
EMR 400K (53W)	Output #1	+ 5V/2.0 to 4.0A
	Output #2	+12V/0.1 to 0.5A
	Output #3	−12V/0.0 to 0.3A
	Output #4	+24V/0.2 to 1.0A

EMR 500K (80W)	Output #1	+ 5V/2.0 to 5.0A
	Output #2	+12V/0.4 to 2.3A
	Output #3	−12V/0.0 to 0.3A
	Output #4	+24V/0.2 to 1.0A

EFX™ QUADRUPLE OUTPUT

UL RECOGNIZED

CSA CERTIFIED



150W

50W

Four convenient sizes: 50 Watts, 100 Watts, 150 Watts and 210 Watts. Each available in a variety of popular volt-ampere combinations. Custom combinations are also available to your order.

SIZE	DIMENSIONS	NET WGT.	SHIP WGT.
50W	7.25″W x 5.00″D x 2.00″H	1.6 lbs.	3.0 lbs.
100W	9.50″W x 5.00″D x 2.00″H	2.4 lbs.	3.5 lbs.
150W	13.40″W x 5.00″D x 2.52″H	3.5 lbs.	4.5 lbs.
210W	15.00″W x 5.00″D x 2.52″H	4.8 lbs.	6.0 lbs.

50 WATTS

	AMPERES OUTPUT CURRENT AT 50°C					
MODEL NO.	+5 VOLTS	−5 VOLTS	+12 (15) VOLTS	+12 VOLTS	−12 (15) VOLTS	+24 VOLTS
EFX 050T-1	6.0 Typ. 7.2 Max.	—	1.0 Typ. 1.5 Max.	—	1.0 Typ. 1.5 Max.	0.2 Typ. 0.3 Max.
EFX 050T-2	6.0 Typ. 7.2 Max.	—	(1.0 Typ.) (1.2 Max.)	—	(1.0 Typ.) (1.2 Max.)	0.2 Typ. 0.3 Max.
EFX 050T-3	6.0 Typ. 7.2 Max.	0.8 Typ. 1.2 Max.	1.0 Typ. 1.5 Max.	—	1.0 Typ. 1.5 Max.	—
EFX 050T-4	6.0 Typ. 7.2 Max.	0.8 Typ. 1.2 Max.	(1.0 Typ.) (1.2 Max.)	—	(1.0 Typ.) (1.2 Max.)	—

100 WATTS

MODEL NO.	+5 VOLTS	−5 VOLTS	+12 (15) VOLTS	+12 VOLTS	−12 (15) VOLTS	+24 VOLTS
EFX 100T-1	8.0 Typ. 9.6 Max.	—	2.0 Typ. 3.0 Max.	—	2.0 Typ. 3.0 Max.	0.5 Typ. 0.75 Max.
EFX 100T-2	8.0 Typ. 9.6 Max.	—	(1.6 Typ.) (2.4 Max.)	—	(1.6 Typ.) (2.4 Max.)	0.5 Typ. 0.75 Max.
EFX 100T-3	8.0 Typ. 9.6 Max.	1.5 Typ. 2.25 Max.	2.0 Typ. 3.0 Max.	—	2.0 Typ. 3.0 Max.	—
EFX 100T-4	8.0 Typ. 9.6 Max.	1.5 Typ. 2.25 Max.	(1.6 Typ.) (2.4 Max.)	—	(1.6 Typ.) (2.4 Max.)	—
EFX 100T-5	8.0 Typ. 9.6 Max.	—	3.5 Typ. 5.0 Max.	—	0.5 Typ. 0.75 Max.	0.5 Typ. 0.75 Max.
EFX 100T-6	8.0 Typ. 9.6 Max.	—	2.8 Typ. 4.0 Max.	1.8 Typ. 2.7 Max.	0.5 Typ. 0.75 Max.	—

150 WATTS

MODEL NO.	+5 VOLTS	−5 VOLTS	+12 (15) VOLTS	+12 VOLTS	−12 (15) VOLTS	+24 VOLTS
EFX 150T-1	15.0 Typ. 18.0 Max.	—	2.5 Typ. 3.75 Max.	—	2.5 Typ. 3.75 Max.	1.0 Typ. 1.5 Max.
EFX 150T-2	15.0 Typ. 18.0 Max.	—	(2.0 Typ.) (3.0 Max.)	—	(2.0 Typ.) (3.0 Max.)	1.0 Typ. 1.5 Max.
EFX 150T-3	15.0 Typ. 18.0 Max.	2.0 Typ. 3.0 Max.	2.5 Typ. 3.75 Max.	—	2.5 Typ. 3.75 Max.	—
EFX 150T-4	15.0 Typ. 18.0 Max.	2.0 Typ. 3.0 Max.	(2.0 Typ.) (3.0 Max.)	—	(2.0 Typ.) (3.0 Max.)	—

210 WATTS

MODEL NO.	+5 VOLTS	−5 VOLTS	+12 (15) VOLTS	+12 VOLTS	−12 (15) VOLTS	+24 VOLTS
EFX 210T-1	20.0 Max.	—	4.0 Max.	—	4.0 Max.	1.0 Max.
EFX 210T-2	20.0 Max.	—	(3.0 Max.)	—	(3.0 Max.)	1.0 Max.
EFX 210T-3	20.0 Max.	2.0 Max.	4.0 Max.	—	4.0 Max.	—
EFX 210T-4	20.0 Max.	2.0 Max.	(3.0 Max.)	—	(3.0 Max.)	—

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KEPCO® POWER SUPPLIES

KEPCO/TDK OEM SWITCHING MODULES

High Frequency, High Efficiency Power Supplies with Built-In Overvoltage Protector and Current Limiter

SINGLE OUTPUT

RMK™ 30 Watt output 100-130V a-c source power.

RMX™ 50 to 300 Watt output in 5-sizes. 100-130/200-260V a-c source power selectable.

This KEPCO product is backed by a firm

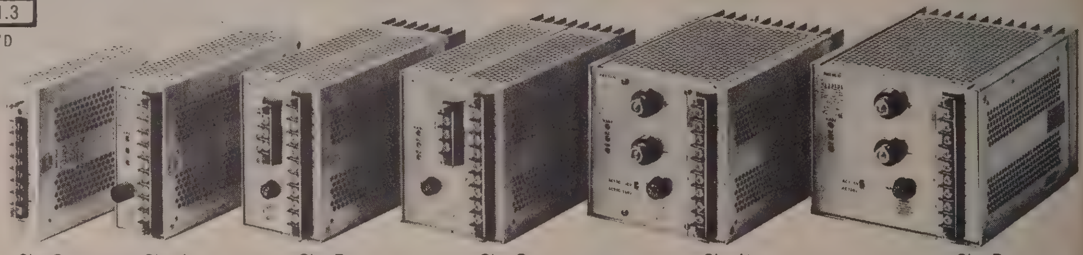
5-YEAR WARRANTY

Size S

MODEL	VOLTS	AMPS at 50°C
RMK 05-S	3.5-5.5	6.0
RMK 09-S	6.3-9.9	3.3
RMK 12-S	8.4-13.2	2.5
RMK 15-S	10.5-16.5	2.0
RMK 24-S	16.8-26.4	1.3

Size: 5.12''H x 1.38''W x 5.75''D
Wgt: 1.4 lbs.

UL RECOGNIZED CSA CERTIFIED



Size A

MODEL	VOLTS	AMPS at 50°C
RMX 05-A	3.5-5.5	10.0
RMX 09-A	6.3-9.9	6.0
RMX 12-A	8.4-13.2	5.0
RMX 15-A	10.5-16.5	4.0
RMX 24-A	16.8-26.4	2.5
RMX 28-A	19.6-30.8	2.15

Size: 5.12''H x 2.17''W x 7.52''D
Wgt: 3.1 lbs.

Size B

MODEL	VOLTS	AMPS at 50°C
RMX 05-B	3.5-5.5	26.0
RMX 09-B	6.3-9.9	15.0
RMX 12-B	8.4-13.2	12.0
RMX 15-B	10.5-16.5	10.2
RMX 24-B	16.8-26.4	7.5
RMX 28-B	19.6-30.8	6.4

Size: 5.12''H x 3.27''W x 8.82''D
Wgt: 4.85 lbs.

Size C

MODEL	VOLTS	AMPS at 50°C
RMX 05-C	3.5-5.5	30.0
RMX 09-C	6.3-9.9	17.2
RMX 12-C	8.4-13.2	14.6
RMX 15-C	10.5-16.5	12.3
RMX 24-C	16.8-26.4	8.0
RMX 28-C	19.6-30.8	6.8

Size: 5.12''H x 4.06''W x 8.82''D
Wgt: 5.25 lbs.

Size N

MODEL	VOLTS	AMPS at 50°C
RMX 05-N	3.5-5.5	45.0
RMX 09-N	6.3-9.9	25.0
RMX 12-N	8.4-13.2	19.0
RMX 15-N	10.5-16.5	15.0
RMX 24-N	16.8-26.4	9.5
RMX 28-N	19.6-30.8	8.0

Size: 5.12''H x 5.24''W x 8.82''D
Wgt: 8.4 lbs.

Size D

MODEL	VOLTS	AMPS at 50°C
RMX 05-D	3.5-5.5	60.0
RMX 09-D	6.3-9.9	32.0
RMX 12-D	8.4-13.2	27.0
RMX 15-D	10.5-16.5	23.0
RMX 24-D	16.8-26.4	16.0
RMX 28-D	19.6-30.8	13.7

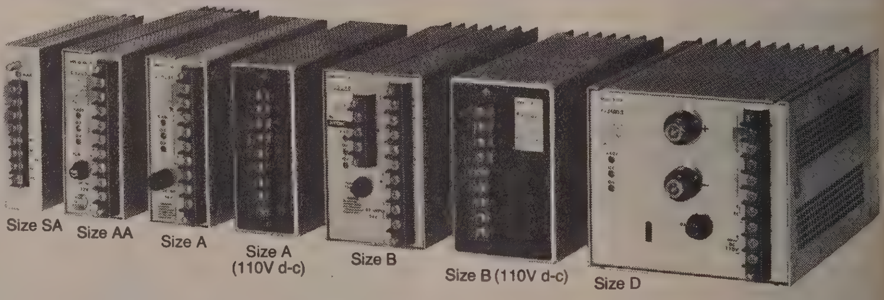
Size: 5.12''H x 6.02''W x 8.82''D
Wgt: 9.0 lbs.

UL RECOGNIZED CSA CERTIFIED

RMD™

d-c to d-c CONVERTERS

The KEPCO/TDK series RMD are d-c input, isolated voltage stabilizers. Standard inputs are 12V, 24V, 48V and 110V d-c. Outputs are 5V, 9V, 12V, 15V, 24V and 28V. For other input and output ratings consult factory.



Size SA—12V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-SA-12	3.5-5.5	6.0
RMD 09-SA-12	6.3-9.9	3.3
RMD 12-SA-12	8.4-13.2	2.5
RMD 15-SA-12	10.5-16.5	2.0
RMD 24-SA-12	16.8-26.4	1.3
RMD 28-SA-12	19.6-30.8	1.1

Size: 5.12''H x 1.38''W x 6 97''D
Wgt: 1.4 lbs.

Size AA—12V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-AA-12	3.5-5.5	10.0
RMD 09-AA-12	6.3-9.9	6.0
RMD 12-AA-12	8.4-13.2	5.0
RMD 15-AA-12	10.5-16.5	4.0
RMD 24-AA-12	16.8-26.4	2.5
RMD 28-AA-12	19.6-30.8	2.15

Size: 5.12''H x 2.17''W x 8.82''D
Wgt: 3.3 lbs.

Size A- 24V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-A-24	3.5-5.5	10.0
RMD 09-A-24	6.3-9.9	6.0
RMD 12-A-24	8.4-13.2	5.0
RMD 15-A-24	10.5-16.5	4.0
RMD 24-A-24	16.8-26.4	2.5
RMD 28-A-24	19.6-30.8	2.1

Size: 5.12''H x 2.17''W x 7.52''D
Wgt: 3.1 lbs.

Size A—48V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-A-48	3.5-5.5	10.0
RMD 09-A-48	6.3-9.9	6.0
RMD 12-A-48	8.4-13.2	5.0
RMD 15-A-48	10.5-16.5	4.0
RMD 24-A-48	16.8-26.4	2.5
RMD 28-A-48	19.6-30.8	2.1

Size: 5.12''H x 2.17''W x 7.52''D
Wgt: 3:1 lbs.

Size A—110V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-A-110	3.5-5.5	10.0
RMD 15-A-110	10.5-16.5	4.0
RMD 24-A-110	16.8-26.4	2.5

Size: 5.12''H x 2.17''W x 7.52''D
Wgt: 3.1 lbs.

Size B—24V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-B-24	3.5-5.5	26.0
RMD 09-B-24	6.3-9.9	15.0
RMD 12-B-24	8.4-13.2	12.0
RMD 15-B-24	10.5-16.5	10.2
RMD 24-B-24	16.8-26.4	7.5
RMD 28-B-24	19.6-30.8	6.4

Size: 5.12''H x 3.27''W x 8.82''D
Wgt: 4.85 lbs.

Size B—48V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-B-48	3.5-5.5	26.0
RMD 09-B-48	6.3-9.9	15.0
RMD 12-B-48	8.4-13.2	12.0
RMD 15-B-48	10.5-16.5	10.2
RMD 24-B-48	16.8-26.4	7.5
RMD 28-B-48	19.6-30.8	6.4

Size: 5.12''H x 3.27''W x 8.82''D
Wgt: 4.85 lbs.

Size B—110V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-B-110	3.5-5.5	26.0
RMD 15-B-110	10.5-16.5	10.2
RMD 24-B-110	16.8-26.4	7.5

Size: 5.12''H x 3.27''W x 8.82''D
Wgt: 4.85 lbs.

Size D—48V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-D-48	3.5-5.5	50.0
RMD 09-D-48	6.3-9.9	28.0
RMD 12-D-48	8.4-13.2	21.0
RMD 15-D-48	10.5-16.5	17.0
RMD 24-D-48	16.8-26.4	10.5
RMD 28-D-48	19.6-30.8	9.0

Size: 5.12''H x 6.02''W x 8.82''D
Wgt: 9.0 lbs.

Size D—110V d-c input

MODEL	VOLTS	AMPS at 50°C
RMD 05-D-110	3.5-5.5	60.0
RMD 15-D-110	10.5-16.5	23.0
RMD 24-D-110	16.8-26.4	16.0

Size: 5.12''H x 6.02''W x 8.82''D
Wgt: 9.0 lbs.

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KEPCO® POWER SUPPLIES

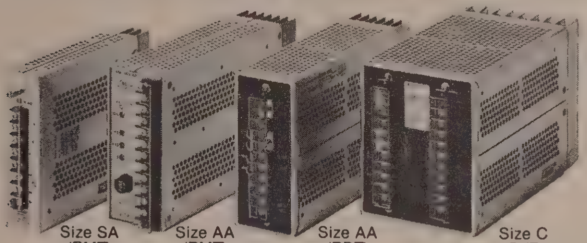
KEPCO/TDK OEM SWITCHING MODULES

High Frequency, High Efficiency Power Supplies with Built-In Overvoltage Protector and Current Limiter

RMT™ RDT™ RXT™ TRIPLE OUTPUT

UL RECOGNIZED CSA CERTIFIED

The KEPCO/TDK Series RDT/RMT/RXT provide the instrument designer with a compact, high efficiency source of the multiple voltages needed to drive modern digital-analog circuits. Each model provides a basic 5V logic output. The SA size is rated at 0-6 Amperes; the AA size provides 0-10 Amperes, and the C size is rated at 0-20 Amperes. These are combined with various auxiliary outputs as tabulated below.


Size SA (RMT) Size AA (RMT) Size AA (RDT) Size C (RXT)

SIZE SA

Size: 5.12''H x 1.38''W x 6.97''D **Wgt:** 1.4 lbs.

MODEL	PRINCIPAL OUTPUT#1		AUXILIARY OUTPUT #2		OUTPUT #3	
	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS
RMT 021-SA	+5	6	+12	0.4	−12	0.4
RMT 022-SA	+5	6	+15	0.4	−15	0.4
RMT 023-SA	+5	6	+12	0.4	− 5	0.4
RMT 024-SA	+5	6	+15	0.4	− 5	0.4
RMT 025-SA	+5	6	+12	0.4	− 9	0.4

50°C ratings. At +71°C derate principal output to 2.4A. For Models RMT 021-SA and RMT 022-SA derate each auxiliary output to 0.2A. Input is 115V a-c only.

SIZE AA

Size: 5.12''H x 2.17''W x 8.82''D **Wgt:** 3.3 lbs.

MODEL	PRINCIPAL OUTPUT#1		AUXILIARY OUTPUT #2		OUTPUT #3	
	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS
RMT 001-AA(1)	+5	10	+12	1	−12	1
RMT 002-AA(1)	+5	10	+15	1	−15	1
RMT 003-AA(1)	+5	10	+12	1	− 5	1
RMT 004-AA(1)	+5	10	+15	1	− 5	1
RMT 005-AA(1)	+5	10	+12	1	− 9	1

(1) Std. input: 115V a-c, for 250V a-c input, add suffix "-230" to model number.

50°C ratings. At +71°C derate principal output to 4.0A. Derate each auxiliary output to 0.3A.

RDT 001-AA-24	+5	10	+12	1	−12	1
RDT 002-AA-24	+5	10	+15	1	−15	1
RDT 001-AA-48	+5	10	+12	1	−12	1
RDT 002-AA-48	+5	10	+15	1	−15	1

50°C ratings. At +71°C derate principal output to 4.0A. Derate each auxiliary output to 0.3A. Suffix "-24" input is 20-30V d-c. Suffix "-48" is 42-56V d-c.

SIZE C

Size: 5.12''H x 4.06''W x 8.82''D **Wgt:** 6.4 lbs.

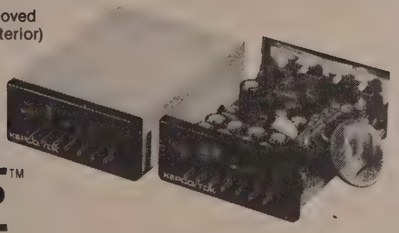
MODEL	PRINCIPAL OUTPUT#1		AUXILIARY OUTPUT #2		OUTPUT #3	
	VOLTS	AMPS	VOLTS	AMPS	VOLTS	AMPS
RXT 051-C	5	20	12	2.0	12	2.0
RXT 052-C	5	20	15	1.6	15	1.6
RXT 053-C	5	20	12	2.0	5	5.0

50°C ratings. At +71°C derate principal output to 8.0A. Derate each auxiliary output currents as follows: 2.0A to 0.8A; 1.6A to 0.6A; 5.0A to 2.0A. Input is selectable 115/230V a-c.

This KEPCO product is backed by a firm **5-YEAR WARRANTY**

DUAL OUTPUT

(Cover removed to show interior)



CMP™

SIZE H

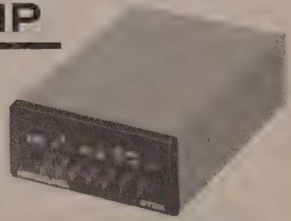
MODEL	OUTPUT #1 VOLTS	AMPS (1)	OUTPUT #2 VOLTS	AMPS (1)	CURRENT LIMIT
CMP 01-H	+(10.8-13.2)	0.5A	−(10.8-13.2)	0.5A	0.51A
CMP 02-H	+(13.5-16.5)	0.4A	−(13.5-16.5)	0.4A	0.41A
CMP 03-H	+(10.8-13.2)	0.5A	−(4.5-5.5)	0.5A	0.51A
CMP 04-H	+(13.5-16.5)	0.4A	−(4.5-5.5)	0.5A	0.51A
CMP 05-H	+(10.8-13.2)	0.5A	−(8.1-9.9)	0.5A	0.51A

(1) At +50°C.

SINGLE OUTPUT

Miniature (1.18"H x 2.76"W x 3.75"D) high efficiency sources of stabilized d-c. 10-Watt output, 100-130V a-c source power. Weight: 9 ounces.

MP™



Size H

MODEL	VOLTS	AMPS at 50°C	CURRENT LIMIT
MP 05-H	4.5-5.5V	2.0	2.1A
MP 09-H	8.0-10.0V	1.1	1.2A
MP 12-H	10.5-13.5V	1.0	1.1A
MP 15-H	13.5-16.5V	0.8	0.9A

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KEPCO® POWER SUPPLIES

GENERAL SPECIFICATIONS AND FEATURES FOR SWITCHING POWER SUPPLIES

MODEL	INPUT Volts a-c	INPUT Volts d-c	EFFICIENCY Typical (%)	HOLDING TIME mSec.	SOFT START	REMOTE CONTROL	REMOTE ERROR SENSING Volts	RECOVERY CHARACTERISTICS mSec.	OVERVOLTAGE PROTECTION	CURRENT LIMIT	ISOLATION Input to Case Input to Output KV a-c 1 min	ISOLATION Output to Case V d-c	ISOLATION MΩ
SINGLE OUTPUT													
ERX	115/230	—	>70	>20	Yes	No	0.35	1	Fixed(1)	Rectangular Fixed	1.25 3.75	500	100
MP	115	—	>73	>7.5	No	No	NA	1	Zener Shunt	Rectangular Fixed	1.5	500	100
RMD	—	12, 24, 48, 110	71-75	—	No	Yes	0.25(2)	1(3)	Adjustable	Rectangular Adj.	1.5	500	100
RMK	115	145	>73	>30	Yes	Yes	0.25	2	Fixed 120%	Rectangular Adj.	1.5	500	100
RMX	115/230	290	68-80	>30	Yes	Yes	0.25(2)	1	Adjustable	Rectangular Adj.	2.5	500	100
MULTI-OUTPUT													
CMP	115	—	>75	>7.5	No	No	NA	1	Zener Shunt	Rectangular Fixed	1.5	500	100
EFX	115/230	—	70-75	>20	Yes	No	NA	5	+5V fixed	Fixed 130%	2.5	500	100
EMR	115/230	—	66-78	>20	Yes	No	NA	2	+5V fixed	Rectangular Fixed(4)	1.5	500	100
MRM	115/230(5)	—	65-70	>16.8(6)	Yes	No	NA	—	+5V fixed	Rectangular Fixed	1.5(7)	500	100
RMT-SA	115	145	>65	>20	Yes	No	NA	5	Fixed 120%(8)	5V: Adj.(9) Aux.: Fixed(10)	1.5	500	20
RMT-AA	115	145	>65	>20	Yes	Yes	0.25(3)	5	Fixed 120%(8)	5V: Adj.(9) Aux.: Fixed(9)	1.5	500	20
RMT-AA 230	230	290	>65	>20	Yes	Yes	0.25(3)	5	Fixed 120%(8)	5V: Adj.(9) Aux.: Fixed(9)	1.5	500	20
RXT	115/230	290	>75	>20	Yes	Yes	0.35	2	Fixed 120%(8)	5V: Adj.(9) Aux.: Fixed(9)	2.5	500	100
RDT	—	24, 48	>74	—	No	Yes	0.25	5	Fixed 120%(8)	5V: Adj.(9) Aux.: Fixed(9)	1.5	500	100

(1) OVP Settings:
5-Volt Models: 5.8V~6.9V; 12-Volt Models: 13.7V~15.7V;
15-Volt Models: 17.0V~19.0V; 24-Volt Models: 27.0V~30.5V.
(2) 0.35V/wire, Size C
(3) For Size A & AA; Size B is 2 mSec
(4) EMR 100K & EMR 200K: foldback
(5) MRM 146K & MRM 183K: 115V a-c only
(6) MRM 146K, 144K, & 144KV: 8.3 mSec
(7) MRM 144KV: 1.25/3.75
(8) For principal output only
(9) Rectangular characteristics
(10) Foldback characteristics

HOLDING TIME: The minimum time, in milliseconds, that the power supply will function, at full load, after loss of source power.

SOFT START: A surge limiting circuit is incorporated to limit the initial turn-on current. A separate logic level on-off circuit is provided in many models for no-surge cycling. (See Remote Control)

REMOTE CONTROL: A TTL compatible logic level signal can be used to turn the power supply on and off. An internal pull-up resistor programs the power supply on in the absence of external signals. This can be used for sequencing and for no-surge cycling.

REMOTE ERROR SENSING: Separate terminals allow a 4-terminal connection between power supply and load. These connections can compensate for voltage drops in the connecting wires.

RECOVERY CHARACTERISTICS: The table lists the time for recovery to within 0.5% (or 0.05V) of the final output value following a step load change of either 50% to 100% or 100% to 50% of maximum (+50 °C) rated load.

OVERVOLTAGE PROTECTION: The tabulated overvoltage protector either shuts down the power supply at the O.V.P. voltage threshold or, in the case of the zener shunt-type, limits the maximum voltage.

CURRENT LIMIT: The rectangular shape of the current limit characteristic means these units may be connected in series or in parallel and may drive capacitive or non-linear loads without special precaution.

KEPCO® POWER SUPPLIES

STATIC SPECIFICATIONS FOR SWITCHING POWER SUPPLIES

MODEL			SOURCE EFFECT % Typical	LOAD EFFECT % (10%–100%)	TEMPERATURE EFFECT % Coefficient per °C	TEMPERATURE EFFECT % Envelope 0–50°C	COMBINED EFFECT % (For rated changes in source voltage, load current, and temperature)	TIME EFFECT (8-hour drift, with constant source voltage, load, and temperature)	RIPPLE AND NOISE: OVERALL rms mV	RIPPLE AND NOISE: SOURCE COMPONENT p-p mV	RIPPLE AND NOISE: SWITCHING COMPONENT p-p mV	RIPPLE AND NOISE: SPIKE VOLTAGE to 10 MHz p-p mV
SINGLE OUTPUT												
ERX		Typ	0.6	0.6	—	1.0	2.2	0.1%	—	(1)	(2)	(3)
		Max	1.0	1.0	—	2.0	4.0	0.5%	—	(1)	(2)	(3)
MP		Typ	<0.1	<0.15	—	<1.0	<1.0	<0.02%	<7	<20	<50	—
		Max	0.2	0.3	—	1.5	1.5	0.1%	10	50	100	1% E_o + 50
RMD		Typ	<0.4	<0.4	<0.01	<0.2	<1.0	<0.01%	<3	—	<50	—
		Max	0.8	0.8	0.05	0.6	2.2	0.05%	10	—	100	1% E_o + 50
RMK		Typ	<0.4	<0.4	<0.02	<0.6	<1.4	<0.02%	<7	<20	<30	<70
		Max	0.8	1.0	0.1	1.0	2.8	0.1%	10	50	70	1% E_o + 50
RMX		Typ	<0.3	<0.3	<0.02	<0.4	<1.0	<0.02%	<5	<10	<15	<50
		Max	0.6	0.6	0.1	0.8	2.0	0.1%	10	50	50	1% E_o + 50
MULTI-OUTPUT												
CMP	Outputs #1 and 2	Typ	<0.1	<0.15	—	<1.0	<1.0	<0.02%	<7	<20	<50	—
		Max	0.2	0.3	—	1.5	1.5	0.1%	10	50	100	1% E_0 +50
EFX	Output #1	Typ	<0.5	<0.5	—	<0.5	<1.0	<0.02%	—	<25	<50	—
		Max	1.0	1.0	—	1.0	3.0	0.1%	—	50	100	1% E_0 + 50
	Outputs #2, 3, 4	Typ	<0.5	<5.0	—	<0.5	<6.0	<0.02%	—	<25	<50	—
		Max	1.0	10.0	—	1.0	12.0	0.1%	—	50	100	1% E_0 + 50
EMR	+5V	Typ	—	—	—	—	—	—	—	—	<50	—
		Max	1.0-1.5	1.5-6	—	<3.0	<±3.0	<0.5%	—	—	<100	2% E_0 + 50
	AUX	Typ	—	—	—	—	<±5.0	—	—	—	<50	—
		Max	1.0-1.5	1.5-6	—	<3.0	<±7.0	<0.5%	—	—	<200	2% E_0 + 50
MRM	+5V	Typ	—	—	—	—	—	—	—	—	—	—
		Max	<1.0	<2.0	—	<2.0	<2~5	<10 mV	—	<30	<50~100	<150
	AUX	Typ	—	—	—	—	—	—	—	—	—	—
		Max	<1.0	<2~5	—	<2.0	<5~20	<10~40 mV	—	<4~150	<50~100	<500
RDT		Typ	<0.4	<0.4	<0.02	<0.6	<1.4	<0.01%	<7	—	<30	—
		Max	0.8	1.0	0.1	1.0	2.8	0.05%	10	—	100	1% E_0 +50
RMT	Principal AA & SA & AA-Aux	Typ	<0.4	<0.4	<0.02	<0.6	<1.4	<0.01%	<7	<20	<30	—
		Max	0.8	1.0	0.1	1.0	2.8	0.05%	10	50	100	1% E_0 + 50
	Auxiliary SA-Size	Typ	<0.1	<0.1	<0.01	<0.4	<0.6	<0.01%	<4	<2	<2	—
		Max	0.2	0.2	0.05	0.6	1.0	0.05%	7	10	10	1% E_0 + 50
RXT		Typ	<0.4	<0.4	<0.02	<0.4	<1.2	<0.02%	<5	<20	<30	—
		Max	0.8	1.0	0.1	0.8	2.6	0.1%	10	50	100	1% E_0 +50

(1) — 5-Volt models:	5 typ, 10 max.	
	12- and 15-Volt models:	20 typ, 40 max.
	24-Volt models:	30 typ, 50 max.
(2) — 5-Volt models:	40 typ, 70 max.	
	12- and 15-Volt models:	40 typ, 80 max.
	24-Volt models:	40 typ, 100 max.
(3) — 5-Volt models:	150	
	12- and 15-Volt models:	300
	24-Volt models:	400

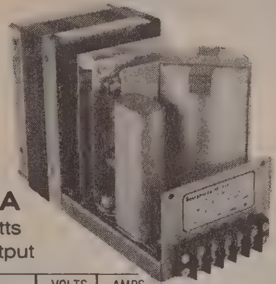
KEPCO® POWER SUPPLIES

OEM MODULES

UL RECOGNIZED

This KEPCO product is backed by a firm 5-YEAR WARRANTY

FERRORESONANT VOLTAGE STABILIZERS



Enclosures available for Sizes A, AA and C

Size A
180 Watts Fixed Output

MODEL	VOLTS	AMPS
PRM 12-15	12.0	0-15
PRM 24-8	24.0	0-8
PRM 28-7	28.0	0-7
PRM 120-1.5	120.0	0-1.5

Size AA
280 Watts Fixed Output

MODEL	VOLTS	AMPS
PRM 8.5-30	8.5	0-30
PRM 12-23	12	0-23
PRM 15-18	15	0-18
PRM 24-12	24	0-12
PRM 28-10	28	0-10
PRM 48-6	48	0-6
PRM 120-2.4	120	0-2.4

Size B
120 Watts Fixed Output

MODEL	VOLTS	AMPS
PRM 12-10	12.0	0-10
PRM 24-5	24.0	0-5
PRM 120-1	120.0	0-1

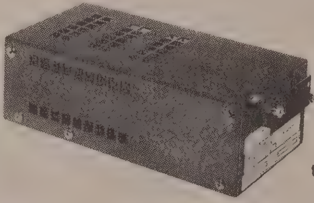
Size C
300 Watts Dual Output

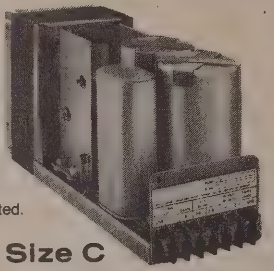
MODEL	VOLTS	AMPS
PRM 2x12-12	12.0	0-12
PRM 2x15-10	15.0	0-10
PRM 2x24-6	24.0	0-6
PRM 2x60-2.5	70.0	0-2.5

Two independent outputs identically rated.

INFLUENCE QUANTITY	OUTPUT EFFECT
SOURCE VOLTAGE: 100-130V a-c	$\pm 1\%\ E_0$ max. (1) $\pm 1.5\%\ E_0$ max. (2)
LOAD CHANGE: 100% to 50% 100% to 25%	$< +10\%\ E_0$ max (3) $< +20\%\ E_0$ max. (3)
TIME: 8-hour (drift)	$< 1\%\ E_0$ max.
TEMPERATURE: Per °C	$< 0.05\%\ E_0$ max.
RIPPLE and NOISE: rms	3 mV to 300 mV(3)

(1) At full load. (2) At no load. (3) Depends on model.





Size C
450 Watts Fixed Output

MODEL	VOLTS	AMPS
PRM 12-35	12.0	0-35
PRM 24-20	24.0	0-20
PRM 28-17	21.0	0-17
PRM 48-10	48.0	0-10

Size D
60 Watts Selectable Output

MODEL	VOLTS	AMPS
PRM 5-10	5.0	0-10.0
PRM 8-7	8.0	0-7.0
PRM 12-5	12.0	0-5.0
PRM 15-4	15.0	0-4.0
PRM 21-2.9	21.0	0-2.9
PRM 26-2.3	26.0	0-2.3
PRM 36-1.7	36.0	0-1.7
PRM 120-0.50	120.0	0-0.50
PRM 240-0.25	240.0	0-0.25

The nominal output is listed. Taps for two settings higher and two settings lower.

Fixed output, heavy duty stabilizers for exceptional longevity under rugged conditions. PRM's offer high efficiency (50-75%) and excellent source isolation. For custom volt-ampere combinations, consult factory.

NOTE: The models listed are for operation on 115V a-c 60 Hz mains only (tolerance ±3 Hz). For 50 Hz service areas separate models are available. These units have reduced ratings (approximately 20% less than the corresponding 60 Hz models).

DIMENSIONS:
Size A Models:(1) $6\frac{13}{16}$H x $4\frac{3}{4}$W x $10\frac{27}{32}$D.
Weight : 24 lbs.
Size AA Models:(1) $6\frac{13}{16}$H x $4\frac{3}{4}$W x $10\frac{29}{32}$D.
Weight: 24 lbs.
Size B Models: $3\frac{13}{32}$H x 5W x $13\frac{7}{8}$D.
Weight: 17 lbs.
Size C Models:(1) $6\frac{13}{16}$H x $4\frac{3}{4}$W x $15\frac{1}{8}$D.
Weight: 30 lbs(2)
Size D Models: $3\frac{13}{32}$H x 5W x $10\frac{7}{8}$D.
Weight: 11 lbs.

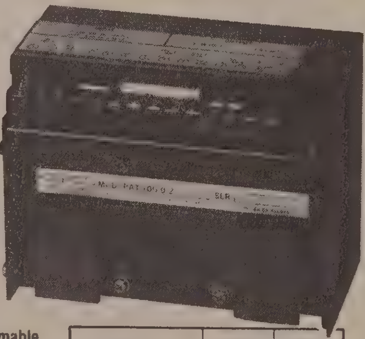
(1) Dimension, Models A and C are uncased modules
(2) Dual Output: 38 lbs. 450 Series: 40 lbs.

PRM™

LINEAR PROGRAMMABLE VOLTAGE / CURRENT STABILIZERS

PAT™

20 WATT PROGRAMMABLE VOLTAGE STABILIZER



These operationally programmable power modules offer a single high-gain control channel for voltage or current stabilization, backed up by an adjustable overcurrent limiter. Programmable from IEEE-488 bus using a Kepco digital interface.

MODEL	VOLTS	AMPS
PAT 7-2	0-7	0-2
PAT 15-1.5	0-15	0-1.5
PAT 21-1	0-21	0-1
PAT 40-0.5	0-40	0-0.5
PAT 72-0.3	0-72	0-0.3
PAT 100-0.2	0-100	0-0.2

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE
SOURCE: 105-125/210-250V a-c		<0.0005%
LOAD: No load — full load		<0.005%
TIME: 8-hours (drift)		<0.01%
TEMPERATURE: Per °C		<0.01%
RIPPLE and NOISE:	rms	<0.1 mV
	p-p	<0.5 mV

DIMENSIONS: $3\frac{22}{32}$"H x $6\frac{3}{8}$"W x $4\frac{7}{8}$"D. **WEIGHT:** 6 lbs.

50 WATT PROGRAMMABLE VOLTAGE/CURRENT STABILIZER

PTR™

Programmable voltage/current stabilizer with automatic crossover and optional overvoltage protection, conventional speed design. Programmable from IEEE-488 bus using a Kepco digital interface.

MODEL	VOLTS	AMPS
PTR 7-5.5	0-7	0-5.5
PTR 15-3.3	0-15	0-3.3
PTR 21-2.5	0-21	0-2.5
PTR 40-1.4	0-40	0-1.4
PTR 72-0.8	0-72	0-0.8
PTR 100-0.6	0-100	0-0.6

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE INTERNAL	EXTERNAL(1)
SOURCE: 105-125/210-250V a-c		<0.001%	<0.005%	<0.005%
LOAD: No load — full load		<0.005%	<3.0 mA	<0.01%
TIME: 8-hours (drift)		<0.01%	<0.05%	<0.02%
TEMPERATURE: Per °C		<0.01%	<0.05%	<0.02%
RIPPLE and NOISE:	rms	<0.1 mV	<0.5 mA	<0.5 mA
	p-p	<2.0 mV	<2.0 mA	<2.0 mA

(1) External current sensing and feedback to the voltage amplifier.

DIMENSIONS: $3\frac{17}{64}$"H x 5"W x $13\frac{27}{32}$"D (incl. barrier-strip). **WEIGHT:** 11 lbs.

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KEPCO INC. • 131-38 SANFORD AVENUE • FLUSHING, N.Y. 11352 USA • (212) 461-7000 • TWX #710-582-2631 • FAX: (212) 767-1102

KEPCO® POWER SUPPLIES

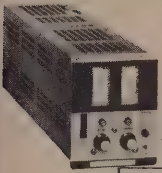
POWER MANAGERS™ for LABORATORY/SYSTEMS

ATE™ LINEAR PROGRAMMABLE POWER SUPPLIES FOR AUTOMATIC TEST EQUIPMENT SYSTEMS.

FEATURING:

- Full external control over both voltage and current with automatic crossover; separate voltmeter and ammeter for continuous output monitoring. Local control through 10-turn rheostats on front panel, remote through fixed gain power amplifier scaling from an input of 10 Volts to rated voltage. Digital input via IEEE 488 bus possible with Kepco digital interface programmer.
- User selectable slow or fast mode of operation; slow mode is ideal for delivering constant voltage; in fast mode, the ATE can follow rapidly changing load voltages to deliver constant current, or follow high speed voltage or current programming.
- Two built-in, uncommitted amplifiers for scaling, summing, or other manipulation of programming signals. Both voltage and current control channels have full zeroing and calibration facilities for compatibility with Kepco's digital interfaces.
- Programmable/tracking overvoltage protection.

This KEPCO product is backed by a firm 5-YEAR WARRANTY



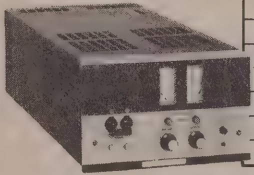
QUARTER-RACK 50 WATT

MODEL	VOLTS	AMPS
ATE 6-5M	0-6	0-5
ATE 15-3M	0-15	0-3
ATE 25-2M	0-25	0-2
ATE 36-1.5M	0-36	0-1.5
ATE 55-1M	0-55	0-1
ATE 75-0.7M	0-75	0-0.7
ATE 100-0.5M	0-100	0-0.5
ATE 150-0.3M	0-150	0-0.3

100 WATT

MODEL	VOLTS	AMPS
ATE 6-10M	0-6	0-10
ATE 15-6M	0-15	0-6
ATE 25-4M	0-25	0-4
ATE 36-3M	0-36	0-3
ATE 55-2M	0-55	0-2
ATE 75-1.5M	0-75	0-1.5
ATE 100-1M	0-100	0-1
ATE 150-0.7M	0-150	0-0.7

HALF-RACK 250 WATT



MODEL	VOLTS	AMPS
ATE 6-25M	0-6	0-25
ATE 15-15M	0-15	0-15
ATE 25-10M	0-25	0-10
ATE 36-8M	0-36	0-8
ATE 55-5M	0-55	0-5
ATE 75-3M	0-75	0-3
ATE 100-2.5M	0-100	0-2.5
ATE 150-1.5M	0-150	0-1.5

THREE-QUARTER RACK 500 WATT

MODEL	VOLTS	AMPS
ATE 6-50M	0-6	0-50
ATE 15-25M	0-15	0-25
ATE 25-20M	0-25	0-20
ATE 36-15M	0-36	0-15
ATE 55-10M	0-55	0-10
ATE 75-8M	0-75	0-8
ATE 100-5M	0-100	0-5
ATE 150-3.5M	0-150	0-3.5

FULL-RACK 1000 WATT

MODEL	VOLTS	AMPS
ATE 6-100M	0-6	0-100
ATE 15-50M	0-15	0-50
ATE 25-40M	0-25	0-40
ATE 36-30M	0-36	0-30
ATE 55-20M	0-55	0-20
ATE 75-15M	0-75	0-15
ATE 100-10M	0-100	0-10
ATE 150-7M	0-150	0-7

STATIC STABILIZATION TABLE

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE Typ.	OUTPUT EFFECTS VOLTAGE MODE Max	OUTPUT EFFECTS CURRENT MODE Typ.	OUTPUT EFFECTS CURRENT MODE Max.	OFFSETS(3) ΔE_{10}	OFFSETS(3) ΔI_{10}
SOURCE VOLTAGE (min.-max.):(1)		$<0.0005\%$ E_0 max.	0.001% E_0 max.	$<0.002\%$ I_0 max.	0.005% I_0 max.	<1 μV	<1 nA
LOAD (no load-full load):		$<0.001\%$ E_0 max.	0.002% E_0 max.	<0.5 mA (2)	1 mA (2)	<1 μV	<1 nA
TIME (8-hour drift):		$<0.005\%$ E_0 max.	0.01% E_0 max.	$<0.01\%$ I_0 max.	0.02% I_0 max.	<20 μV	<1 nA
TEMPERATURE, per °C:		$<0.005\%$ E_0 max.	0.01% E_0 max.	$<0.01\%$ I_0 max.	0.02% I_0 max.	<20 μV	<2 nA
RIPPLE and NOISE	rms:	<0.1 mV	0.3 mV	$<0.01\%$ I_0 max.	0.03% I_0 max.	—	—
(Slow Mode)	p-p:	<1 mV	3 mV	$<0.1\%$ I_0 max.	0.3% I_0 max.	—	—
RIPPLE and NOISE	rms:	<1 mV	3 mV	$<0.01\%$ I_0 max.	0.03% I_0 max.	—	—
(Fast Mode)	p-p:	<10 mV	30 mV	$<0.1\%$ I_0 max.	0.3% I_0 max.	—	—

(1) 105-125/210-250V a-c.

(2) In slow mode, the leakage current through the output capacitor adds approximately 0-6 mA to the current mode load effects.

(3) Uncommitted amplifier offsets.

DYNAMIC SPECIFICATIONS

OUTPUT VOLTAGE RATING	6V	15V	25V	36V	55V	75V	100V	150V
BANDWIDTH (−3db)(1)	53 KHz	21 KHz	13 KHz	9 KHz	6 KHz	4 KHz	3 KHz	2 KHz
PROGRAMMING TIME CONSTANT (μsec)(1)	3.0	7.5	12.5	18.0	27.5	37.5	50.0	75.0
REMOTE ERROR SENSING	0 to 0.5V/lead, both terminals							
OVP CONTROL	Local: trimmer-adjustable; remote: 0-10V signal (or may be set to track output voltage.							
VOLTAGE RECOVERY	For step load change between 10% and 100% I_0 maximum <50 μsec typ., <100 μsec max. to recover within 10 mV							

(1) In fast mode, operating into a resistive load.

DIMENSIONS:

50 Watt (Quarter-Rack):
$5\frac{7}{32}$"H x $4\frac{5}{32}$"W x $17\frac{1}{8}$"D(1) Weight: 17 lbs.
100 Watt (Quarter-Rack):
$5\frac{7}{32}$"H x $4\frac{5}{32}$"W x $17\frac{1}{8}$"D(1) Weight: 20 lbs.
250 Watt (Half-Rack):
$5\frac{7}{32}$"H x $8\frac{11}{32}$"W x $17\frac{9}{64}$"D(1) Weight: 43 lbs.
500 Watt (Three Quarter-Rack):
$5\frac{7}{32}$"H x $12\frac{17}{32}$"W x $17\frac{9}{64}$"D(1) Weight: 56 lbs.
1000 Watt (Full-Rack):(2)
$6\frac{31}{32}$"H x $16\frac{1}{2}$"W x $20\frac{1}{64}$"D(1) Weight: 103 lbs.

(1) Add 2 1/2" for connector protrusion.

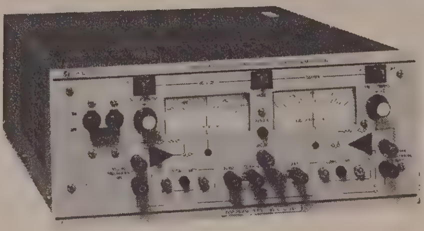
(2) The full rack model is supplied with brackets for direct mounting in a standard 19-inch rack.

KEPCO® POWER SUPPLIES

POWER MANAGERS™ for LABORATORY/SYSTEMS

4-QUADRANT VOLTAGE/CURRENT STABILIZERS

This KEPCO product is backed by a firm
5-YEAR WARRANTY



BOP™

These low-voltage bipolar power supplies offer full, programmable control over both voltage and current with a mode selector. The power supply is bounded in all four quadrants by four fully adjustable, programmable boundary limits. The wide-band BOP offers two operational pre-amplifiers for scaling, summing and signal processing. Programmable from an IEEE-488 bus using optional interface board. (See page 21).

	MODEL	d-c OUTPUT RANGE		CLOSED LOOP GAIN		OUTPUT IMPEDANCE			
				VOLTAGE CHANNEL G_V (V/V)	CURRENT CHANNEL G_I (A/V)	VOLTAGE MODE		CURRENT MODE	
		E_0 max.	I_0 max.			SERIES R	SERIES L	SHUNT R	SHUNT C
100 WATT	BOP 50-2M	± 50V	± 2A	5.0	0.2	0.5 mΩ	100μH	50 kΩ	0.05μF
	BOP 100-1M	±100V	± 1A	10.0	0.1	2.0 mΩ	200μH	100 kΩ	0.05μF

Size: 5 7/32"H x 12 17/32"W x 17 9/64"D **Weight:** 48 lbs.

200 WATT	BOP 20-10M	± 20V	±10A	2.0	1.0	40 μΩ	50μH	20 kΩ	0.1μF
	BOP 36-6M	± 36V	± 6A	3.6	0.6	120 μΩ	50μH	36 kΩ	0.1μF
	BOP 50-4M	± 50V	± 4A	5.0	0.4	0.25 mΩ	100μH	50 kΩ	0.05μF
	BOP 72-3M	± 72V	± 3A	7.2	0.3	0.48 mΩ	200μH	72 kΩ	0.05μF
	BOP 100-2M	±100V	± 2A	10.0	0.2	1.0 mΩ	200μH	100 kΩ	0.05μF

Size: 5 7/32"H x 12 17/32"W x 17 9/64"D **Weight:** 51 lbs.

400 WATT	BOP 20-20M	± 20V	±20A	2.0	2.0	20 μΩ	50μH	20 kΩ	0.2μF
	BOP 36-12M	± 36V	±12A	3.6	1.2	60 μΩ	50μH	36 kΩ	0.2μF
	BOP 50-8M	± 50V	± 8A	5.0	0.8	125 μΩ	100μH	50 kΩ	0.15μF
	BOP 72-6M	± 72V	± 6A	7.2	0.6	240 μΩ	200μH	72 kΩ	0.1μF
	BOP 100-4M	±100V	± 4A	10.0	0.4	500 μΩ	200μH	100 kΩ	0.1μF

Size: 5 7/32"H x 16 15/32"W x 20 9/64"D **Weight:** 90 lbs.

DYNAMIC SPECIFICATIONS

Parameter	Mode	BOP 20-10M	BOP 20-20M	BOP 36-6M	BOP 36-12M	BOP 50-2M	BOP 50-4M	BOP 50-8M	BOP 72-3M	BOP 72-6M	BOP 100-1M	BOP 100-2M	BOP 100-4M
Bandwidth	V	3.0 kHz	2.0 kHz	1.8 kHz	2.8 kHz	4.5 kHz	2.8 kHz	3.3 kHz	2.0 kHz	2.0 kHz	4.0 kHz	3.0 kHz	2.0 kHz
(d-c to f-3 db)	I	3.0 kHz	2.0 kHz	1.8 kHz	1.8 kHz	3.0 kHz	2.8 kHz	1.5 kHz	2.0 kHz	2 0 kHz	3.0 kHz	3.0 kHz	2.0 kHz
Programming	V	50 μsec	80 μsec	85 μsec	55 μsec	35 μsec	55 μsec	50 μsec	80 μsec	80 μsec	40 μsec	50 μsec	80 μsec
Time Constant	I	50 μsec	80 μsec	85 μsec	85 μsec	50 μsec	55 μsec	100 μsec	80 μsec	80 μsec	50 μsec	50 μsec	80 μsec
Large Signal	V	3.3 kHz	2.1 kHz	1.9 kHz	3.0 kHz	5 5 kHz	3.0 kHz	3.3 kHz	2.1 kHz	2.1 kHz	4.7 kHz	3.3 kHz	2.1 kHz
Freq. Response	I	3.1 kHz	2.1 kHz	1.9 kHz	1.9 kHz	3 1 kHz	3.0 kHz	1.5 kHz	2.1 kHz	2.1 kHz	3.5 kHz	3.3 kHz	2.1 kHz
Slewing Rate	V	0.4V/μsec	0.26V/μsec	0.4V/μsec	0.65V/μsec	1.7V/μsec	0.9V/μsec	1V/μsec	0.9V/μsec	0.9V/μsec	3V/μsec	2V/μsec	1.3V/μsec
	I	200 mA/μsec	260 mA/μsec	70 mA/μsec	140 mA/μsec	40 mA/μsec	75 mA/μsec	75 mA/μsec	40 mA/μsec	80 mA/μsec	22 mA/μsec	40 mA/μsec	50 mA/μsec
Recovery	V	150 μsec	150 μsec	250 μsec	150 μsec	140 μsec	180 μsec	100 μsec	300 μsec	150 μsec	150 μsec	200 μsec	200 μsec
Step Load	J	30 μsec	50 μsec	30 μsec	30 μsec	30 μsec	30 μsec	50 μsec	30 μsec	50 μsec	40 μsec	30 μsec	50 μsec

STATIC SPECIFICATIONS

INFLUENCE QUANTITY		OUTPUT EFFECTS[(2)]				PREAMPLIFIER OFFSETS		REFERENCE ±10V
		VOLTAGE MODE		CURRENT MODE				
		TYP	MAX	TYP	MAX	ΔE_{10}	ΔI_{10}	
SOURCE (min-max)[(1)]		<0.0005%	0.001%	<0.002%	0.005%	<5μV	<1nA	<0.0005%
LOAD (NL–FL):		<0.001%	0.002%	<0.5mA	1mA	—	—	<0.0005%
TIME (8-hour drift):		<0.005%	0.01%	<0.01%	0.02%	<20μV	<1nA	<0.005%
TEMP., per °C:		<0.005%	0.01%	<0.01%	0.02%	<20μV	<1nA	<0.005%
RIPPLE and NOISE:[(3)]	rms	<1mV	3mV	<0.01%	0.03%	—	—	—
	p-p[(4)]	<10mV	30mV	<0.1%	0.3%	—	—	—

(1) 105-125/210-250V a-c.

(2) Output effects, expressed as a percentage, are referred to the maximum rated output voltage or current.

(3) Measured with the common terminal grounded so that the common mode current does not flow through the load.

(4) Peak-to-peak ripple is measured over a 20 Hz to 10 MHz bandwidth.

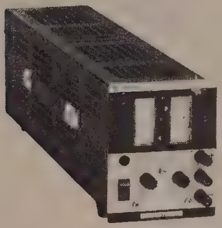
KEPCO® POWER SUPPLIES

POWER MANAGERS™ for LABORATORY/SYSTEMS

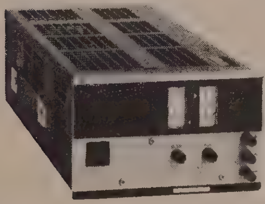
JQE™ GENERAL PURPOSE VOLTAGE STABILIZERS

Systems-type, voltage stabilizers with current limiting, programmable from the IEEE bus using Kepco digital interfaces. JQE's voltage control channel has an I-C front end for maximum stability and minimum offset. The rated power is delivered under the realistic thermal environs of a system's cabinet with no derating. The 10-turn voltage control is standard. For units requiring overvoltage protection and/or high speed programming, see the ATE group.

QUARTER-RACK 100 WATT



HALF-RACK 250/500 WATT



This KEPCO product is backed by a firm **5-YEAR WARRANTY**

FULL-RACK 1000 WATT

MODEL	d-c OUTPUT RANGE		OUTPUT IMPEDANCE VOLTAGE MODE		CURRENT MODE(2)		MAX. INPUT AMPS at 125 V a-c
	VOLTS	AMPS	SERIES R	SERIES L	SHUNT R	SHUNT C	
JQE 6-10M	0-6	0-10	30 μΩ	1 μH	50 kΩ	3 kμF	2.0
JQE 15-6M	0-15	0-6	125 μΩ	1 μH	84 kΩ	1 kμF	2.1
JQE 25-4M	0-25	0-4	300 μΩ	1 μH	125 kΩ	700 μF	2.2
JQE 36-3M	0-36	0-3	600 μΩ	1 μH	165 kΩ	400 μF	2.2
JQE 55-2M	0-55	0-2	1.4 mΩ	1 μH	250 kΩ	220 μF	2.3
JQE 75-1.5M	0-75	0-1.5	2.5 mΩ	1 μH	330 kΩ	160 μF	2.3
JQE 100-1M	0-100	0-1	5 mΩ	2 μH	500 kΩ	110 μF	2.1
JQE 6-22M	0-6	0-22	14 μΩ	0.5 μH	23 kΩ	5.8 kμF	4.2
JQE 6-45M	0-6	0-45	7 μΩ	0.5 μH	11 kΩ	8 kμF	9.0
JQE 15-12M	0-15	0-12	63 μΩ	0.5 μH	42 kΩ	2.7 kμF	4.0
JQE 15-25M	0-15	0-25	30 μΩ	0.5 μH	20 kΩ	4.5 kμF	8.4
JQE 25-10M	0-25	0-10	125 μΩ	0.5 μH	50 kΩ	2.4 kμF	5.3
JQE 25-20M	0-25	0-20	63 μΩ	0.5 μH	25 kΩ	4.3 kμF	10.5
JQE 36-8M	0-36	0-8	225 μΩ	0.5 μH	62.5 kΩ	1.4 kμF	6.0
JQE 36-15M	0-36	0-15	120 μΩ	0.5 μH	33 kΩ	3.6 kμF	9.5
JQE 55-5M	0-55	0-5	550 μΩ	1 μH	100 kΩ	850 μF	5.0
JQE 55-10M	0-55	0-10	275 μΩ	1 μH	50 kΩ	2.1 kμF	9.0
JQE 75-3M	0-75	0-3	1.25 mΩ	1 μH	165 kΩ	850 μF	4.0
JQE 75-8M	0-75	0-8	469 μΩ	1 μH	62.5 kΩ	1.2 kμF	10.0
JQE 100-2.5M	0-100	0-2.5	2 mΩ	1 μH	200 kΩ	600 μF	4.5
JQE 100-5M	0-100	0-5	1.25 mΩ	1 μH	100 kΩ	600 μF	8.4
JQE 150-1.5M	0-150	0-1.5	5 mΩ	2 μH	330 kΩ	440 μF	4.6
JQE 150-3.5M	0-150	0-3.5	2.2 mΩ	2 μH	140 kΩ	440 μF	8.7
JQE 6-90M	0-6	0-90	3.5 μΩ	0.5 μH	3.5 kΩ	17.6 kμF	15.7
JQE 15-50M	0-15	0-50	15 μΩ	0.5 μH	10 kΩ	12 kμF	16.6
JQE 25-40M	0-25	0-40	31 μΩ	0.5 μH	12.5 kΩ	14 kμF	21.0
JQE 36-30M	0-36	0-30	60 μΩ	0.5 μH	16 kΩ	11 kμF	19.0
JQE 55-20M	0-55	0-20	138 μΩ	1 μH	25 kΩ	7.3 kμF	18.0
JQE 75-15M	0-75	0-15	250μΩ	1 μH	33 kΩ	4.2 kμF	18.0
JQE 100-10M	0-100	0-10	0.62 mΩ	1 μH	50 kΩ	2.2 kμF	17.0
JQE 150-7M	0-150	0-7	1.1 mΩ	2 μH	72 kΩ	1 kμF	18.0

DIMENSIONS:

Quarter-Rack Models: $5\frac{7}{32}$"H x $4\frac{5}{32}$"W x $17\frac{3}{16}$D(1); Weight: 19 lbs.
Half-Rack Models: $5\frac{7}{32}$"H x $8\frac{11}{32}$"W x $7\frac{3}{8}$"D(1)
Weight: 250W–42 lbs 500W–56 lbs.
Full-Rack Models: $5\frac{7}{32}$"H x $16\frac{1}{2}$"W(2) x $17\frac{1}{64}$"D(1); Weight: 103 lbs.

(1) behind panel (2) with "ears" standard 19" panel width

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE	CURRENT MODE(1)	AMPLIFIER OFFSETS VOLTAGE ΔE_{io}	CURRENT ΔI_{io}	REFERENCE 6.2V ± 5%
SOURCE: 105-125/210-250V a-c		<0.0005%	<0.005%	<10 μV	<2 nA	0.0001%
LOAD: No load-full load		<0.005% or 0.2 mV(2)	<0.01%	<200 μV	<5 nA	—
TIME: 8-hours (drift)		<0.01% or 1 mV(2)	<0.02%	<20 μV	<2 nA	0.005%
TEMPERATURE: Per °C		<0.01%(4)	<0.02%(3)	<20 μV	<5 nA	0.005%
RIPPLE and NOISE:(4)	rms	<0.2 mV	<0.02% of I_o max.	—	—	—
	p-p(5)	<1.0 mV	<0.1% of I_o max.	—		—

(1) External current sensing, using the *voltage* amplifier. Effects are measured for a 1-volt current sensing voltage drop.

(2) Whichever is greater.

(3) Typical temperature effect coefficients are: 0.005% per °C voltage mode; 0.01% per °C externally sensed current mode.

(4) One terminal grounded or connected so that the common-mode current does not flow through the load or (in current-mode) through a sensing resistor.

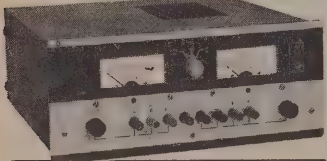
(5) 20 Hz to 10 MHz.

KEPCO® POWER SUPPLIES

POWER MANAGERS™ for LABORATORY/SYSTEMS

MPS 620M™

Multiple output voltage stabilizer with adjustable current limits. Model MPS 620M is the ideal bench power supply for the logic experimenter.



Output #1	0-6V, 0-5A
Output #2	0 to +20V, 0-1A
Output #3	0 to −20V, 0-1A

Outputs 2 and 3 are tracked. Output 1 is protected by an overvoltage crowbar.

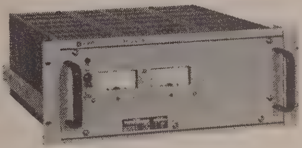
DIMENSIONS:

$5\,^{7}/_{32}$"H x $12\,^{17}/_{32}$"W x $12\,^{7}/_{8}$"D.

WEIGHT: 29 lbs.

PRR™

Ferroresonant stabilized 1000W designs producing fixed voltages.



MODEL	VOLTS	AMPS
PRR 12-77M	12.0	0-77
PRR 24-42M	24.0	0-42
PRR 28-36M	28.0	0-36
PRR 48-22M	48.0	0-22

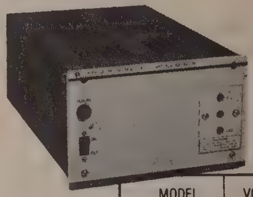
DIMENSIONS:

$6\,^{31}/_{32}$"H x 19"W x $13\,^{7}/_{16}$"D behind panel.

WEIGHT: 63 lbs.

NTC™

Low power shunt stabilized power supplies that can be used on their own as a fast-programmable voltage source, or serve as an interface for higher-powered operational power supplies. The NTC as an interface permits programming with the negative terminal common.



MODEL	VOLTS	AMPS
NTC-200	0-200	0-0.01
NTC 2000	0-2000	0-0.001

DIMENSIONS:

NTC–200: $5\,^{7}/_{32}$"H x $4\,^{5}/_{32}$"W x $17\,^{3}/_{16}$"D.
NTC–2000: $5\,^{7}/_{32}$"H x $8\,^{11}/_{32}$"W x $12\,^{7}/_{8}$"D.

WEIGHT: NTC–200: 11 lbs., NTC–2000: 21 lbs.

INFLUENCE QUANTITY	MPS		PRR		NTC(2)		
	OUTPUT EFFECTS		OUTPUT EFFECTS		VOLTAGE AMPLIFIER OFFSETS		REFERENCE ±6.2V
	0 to 6V Output	0 to ±20V Output	Typ.	Max.	ΔE_{io}	ΔI_{io}	
SOURCE: 105-125/210-250V a-c	0.01%	0.01%	±0.5%	±1.0%	<100 μV	<10 nA	0.0005%
LOAD: No load—full load	0.01%	0.05%	(1)		<1 mV	<10 nA	—
TIME: 8-hour drift	0.01%	0.01%	<1%		<20 μV	<5 nA	0.005%
TEMPERATURE: Per °C	0.01%	0.01%	<0.05%		<20 μV	<5 nA	0.005%
RIPPLE and NOISE: rms	0.1 mV	0.1 mV	—	50 mV	<0.01%	—	—
RIPPLE and NOISE: p-p	1 mV	1 mV	—	—	<0.05%	—	—

(1) 100%-50% load change—voltage increase 3 ~ 6%; 100%-25% load change—voltage increase 5 ~ 10%

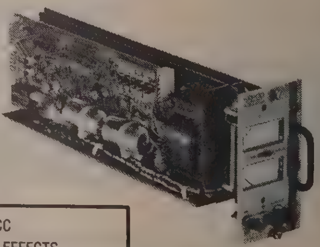
(2) The output effect can be calculated by the relationship: $\Delta E_o = \pm\Delta E_r (R_f/R_i) \pm \Delta E_{io} (1 + R_f/R_i) \pm \Delta I_{io} (R_f)$, where R_f is the built-in feedback resistance, and R_i is the external coupling resistance from the signal source or reference, E_r.

PCX-MAT™ PLUG-IN POWER SUPPLIES CC™

Voltage stabilizers, current limited. Programmable from IEEE-488 bus using Kepco digital interface.

MODEL	VOLTS	AMPS
PCX 7-2MAT	0-7	0-2
PCX 15-1.5MAT	0-15	0-1.5
PCX 21-1MAT	0-21	0-1
PCX 40-0.5MAT	0-40	0-0.5
PCX 72-0.3MAT	0-72	0-0.3
PCX 100-0.2MAT	0-100	0-0.2

MODEL	AMPS	VOLTS
CC 7-2M	0-2	0-7
CC 15-1.5M	0-1.5	0-15
CC 21-1M	0-1	0-21
CC 40-0.5M	0-0.5	0-40
CC 72-0.3M	0-0.3	0-72
CC 100-0.2M	0-0.2	0-100



Current stabilizer Programmable from IEEE-488 bus using Kepco digital interface.

INFLUENCE QUANTITY	PCX-MAT		CC
	OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE	OUTPUT EFFECTS CURRENT MODE
SOURCE: 105-125/210-250V a-c	<0.0005%	<0.005%	<0.0005%
LOAD: No load—full load	<0.005%	<0.01%	<0.005%
TIME: 8-hour (drift)	<0.01%	<0.02%	<0.02%
TEMPERATURE: Per °C	<0.01%	<0.02%	<0.01%
RIPPLE and NOISE: rms	<0.1 mV	<0.02% of I_0 max.	<0.02% of selected scale
RIPPLE and NOISE: p-p	<3 mV	<0.2% of I_0 max.	<0.1% of selected scale

This KEPCO product is backed by a firm
5-YEAR WARRANTY

DIMENSIONS: $5\,^{7}/_{32}$"H x $2\,^{25}/_{32}$"W x $14\,^{15}/_{16}$"D. (behind panel). **WEIGHT:** 8 lbs.

Note: Use optional cases CA-3, CA-4 or CA-5 for bench use, or plug-in style rack adapters RA-22-6A or RA-32. Consult factory for details of the mounting options.

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KEPCO® POWER SUPPLIES

POWER MANAGERS™ for LABORATORY/SYSTEMS

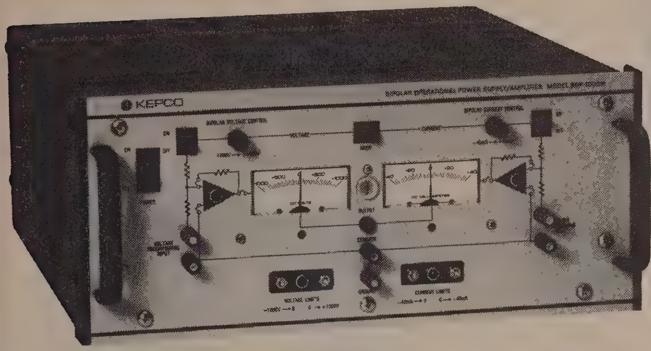
HIGH VOLTAGE MODELS

FOUR-QUADRANT VOLTAGE/CURRENT STABILIZERS

Programmable from IEEE-488 using one of the Kepco stand-alone digital interfaces.

BOP-HV, Bipolar High-voltage Operational Power Supplies, combine the capabilities of fast-programmable power supplies with a bi-directional output stage that can respond in either direction from zero and permits operation either as a sink or as a source. The BOP-HV are programmable from an IEEE-488 bus using one of the stand-alone Kepco digital interfaces.

This KEPCO product is backed by a firm
5-YEAR WARRANTY



BOP-HV™

MODEL	VOLTS	AMPS
BOP 500M	+500 to −500	+0.08 to −0.08
BOP 1000M	+1000 to −1000	+0.04 to −0.04

DIMENSIONS: 6 31/32"H x 16½"W(1) x 17"D
(1) 19" with flanges.

WEIGHT: 65 lbs.

DYNAMIC SPECIFICATIONS

PARAMETER	MODE SWITCH	BOP 500M	BOP 1000M
BANDWIDTH (d-c to f_{-3dB})	Voltage	2 kHz	1 kHz
	Current	1.3 kHz	0.64 kHz
PROGRAMMING TIME CONSTANT	Voltage	75 µsec	150 µsec
	Current	125 µsec	250 µsec
LARGE SIGNAL FREQUENCY RESPONSE	Voltage	2 kHz	0.5 kHz
	Current	2 kHz	0.5 kHz
SLEWING RATE	Voltage	6V/µsec	3V/µsec
	Current	1 mA/µsec	0.13 mA/µsec
TRANSIENT RECOVERY (Step Load Change)	Voltage	100 µsec	100 µsec
	Current	125 µsec	250 µsec

STATIC SPECIFICATIONS

INFLUENCE QUANTITY		OUTPUT EFFECTS(2) VOLTAGE MODE	OUTPUT EFFECTS(2) CURRENT MODE
SOURCE VOLTAGE (min.-max.):(1)		<0.0005%	<0.0005%
LOAD (No load—full load):		<0.0005%	<0.005%
TIME (8-hour drift):		<0.01%	<0.01%
TEMPERATURE, Per °C:		<0.01%	<0.01%
RIPPLE and NOISE:	rms	<10 mV	<25µA(3)
	p-p	<500 mV	<200µA(3)

(1) 105-125/210-250V a-c.

(2) Specifications are expressed as a *percent-of-setting* for the output range 10% to 100%. Below 10% output, the specification limit is the rated percentage of the 10% output setting.

(3) For frequency components in the bandwidth of the current stabilizer. Beyond cutoff, noise will appear as a voltage component equal to the rated voltage mode noise.

ADJUSTABLE VOLTAGE STABILIZERS

HB™

DIMENSIONS:
3 15/32"H x 19"W x 14 3/8"D

MODEL	VOLTS(2)	AMPS	SHIP. WGT.
HB 4AM	0-325	0-0.4	35 lbs.
HB 8AM	0-325	0-0.8	41 lbs.
HB 525M	0-525	0-0.5	41 lbs.

STATIC SPECIFICATIONS

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE (1) (External Sensing)
SOURCE: 105-125/210-250V a-c		<0.01%	<0.01% at rated sample
LOAD: No load—full load		<0.01%	<0.01% at rated sample
TIME: 8 hours (drift)		<0.01%	<0.05%
TEMPERATURE: Per °C		<0.01%	<0.05% at rated sample
RIPPLE and NOISE:	rms	<1 mV	<0.01% of I_o max
	p-p	<5 mV	<0.5% of I

This KEPCO product is backed by a firm
5-YEAR WARRANTY

(1) External current sensing, using the *voltage* amplifier. Effects are measured for a 1-volt current sensing voltage drop.

(2) 5 equal voltage steps.

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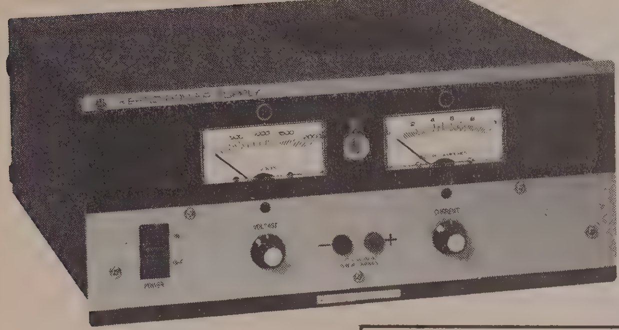
KEPCO® POWER SUPPLIES

POWER MANAGERS™ for LABORATORY/SYSTEMS HIGH VOLTAGE MODELS

PROGRAMMABLE (UP TO 1000 VOLTS) FROM IEEE-488 USING ONE OF THE KEPCO STAND-ALONE DIGITAL INTERFACES.



APH™ AUTOMATIC CROSSOVER CONVENTIONALLY FILTERED

High voltage laboratory power supplies offering continuously adjustable/programmable voltage and current in an automatic crossover configuration.

MODEL	VOLTS	AMPS
APH 500M	0-500	0-0.04
APH 1000M	0-1000	0-0.02
APH 2000M	0-2000	0-0.01

DIMENSIONS: $5\frac{7}{32}$"H x $12\frac{17}{32}$"W x $12\frac{7}{8}$"D
WEIGHT: 27 lbs.

STATIC SPECIFICATIONS

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE (1)	OUTPUT EFFECTS CURRENT MODE (Internal Sensing)
SOURCE: 105-125V a-c		<0.001%	<0.005%
LOAD (No load—full load):		<0.005%	<0.01% of I_0 max.
TIME: 8-hour (drift)		<0.01%	<0.01% of I_0 max.
TEMPERATURE: Per °C		<0.01%	<0.01% of I_0 max.
RIPPLE and NOISE	rms	<2 mV	<40 μA
	p-p	<10 mV	<200 μA

(1) Specifications are expressed as a *percent-of-setting* for the output range 10% to 100%. Below 10% output, the specification limit is the rated percentage of the 10% output setting.

This KEPCO product is backed by a firm **5-YEAR WARRANTY**

BHK™ 200 WATT AUTOMATIC CROSSOVER CONVENTIONAL AND HIGH SPEED

Programmable (up to 1000V) from an IEEE-488 bus using one of the stand-alone Kepco digital interfaces. Programmable voltage and current stabilizer for high voltage arranged in an automatic crossover configuration. Provision is made for disconnecting the output capacitor for high speed programming.

MODEL	VOLTS	AMPS
BHK 500-0.4M	0-500	0-0.4
BHK 1000-0.2M	0-1000	0-0.2
BHK 2000-0.1M	0-2000	0-0.1

CONTROL/PROGRAMMING:
Output voltage is controlled from the panel by a combination of a 10-position decade switch and a 10-turn vernier control. This arrangement provides 0.005% resolution yet does not inhibit the ability to sweep program a BHK linearly through its entire range. External control can be exercised by a resistance (1000 ohms per volt) or by a control voltage, delivering 0 to +1 milliampere into the summing junction with respect to the plus (+) output/sense terminal. External signals can be substituted for, or summed with, the internal reference for additional control. BHK can be strapped for either conventional speed operation or for fast programming. In fast mode the output can be controlled at 0.5V per microsecond.

DIMENSIONS: $5\frac{7}{32}$"H x 19'W x $15\frac{5}{16}$"D (behind panel)

WEIGHT: 46 lbs.

STATIC SPECIFICATIONS

INFLUENCE QUANTITY		OUTPUT EFFECTS VOLTAGE MODE	OUTPUT EFFECTS CURRENT MODE (Internal Sensing)
SOURCE: 105-125/210-250V a-c		<0.005%	<100 μA
LOAD: No load—full load		<0.01%	<100 μA
TIME: 8 hours (drift)		<0.01%	<0.01%
TEMPERATURE: Per °C		<0.01%	<0.05% of I_0 max
RIPPLE and NOISE: (Slow Speed)	rms	<1 mV	<100 μA
	p-p	<10 mV	<1 mA
RIPPLE and NOISE: (High Speed)	rms	<50 mV	<500 μA
	p-p	<500 mV	<5 mA

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KEPCO® POWER SUPPLIES

POWER MANAGERS™ for LABORATORY/SYSTEMS HIGH VOLTAGE MODELS

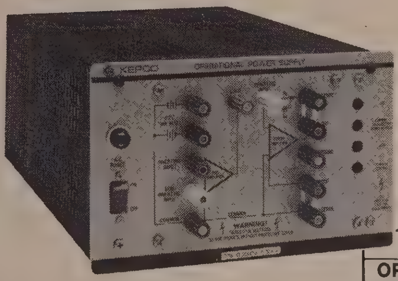
This KEPCO product is backed by a firm 5-YEAR WARRANTY

OPS™
group IX B

HIGH SPEED OPERATIONAL POWER SUPPLIES

PROGRAMMABLE (UP TO 1000 VOLTS) FROM IEEE-488 USING ONE OF THE KEPCO STAND-ALONE DIGITAL INTERFACES.

20 watt, high voltage stabilizer, equipped with an operational patch panel and featuring a capacitorless output for fast programming applications. Restricted to non-capacitive loads.



DIMENSIONS: $5\frac{7}{32}$"H x $8\frac{11}{32}$"W x $12\frac{7}{8}$"D

WEIGHT: 19 lbs.

MODEL	VOLTS	AMPS
OPS 500B	0–500	0.04
OPS 1000B	0–1000	0.02
OPS 2000B	0–2000	0.01

STATIC SPECIFICATIONS

INFLUENCE QUANTITY (min.-max.)[1]		UNCOMMITTED CONTROL CHANNEL OFFSET VOLTAGE ΔE_{io}	UNCOMMITTED CONTROL CHANNEL OFFSET CURRENT ΔI_{io}
SOURCE: 105–125V a-c		$<10\ \mu V$	<1 nA
LOAD (No load—full load):		$<10\ \mu V$ [3]	<1 nA
TIME: 8-hour (drift)		$<20\ \mu V$	<1 nA
TEMPERATURE: Per °C		$<20\ \mu V$	<0.5 nA
RIPPLE and NOISE	rms	$<0.01\%$ of E_0	
	p-p	$<0.1\%$ of E_0	

[1] 105-125/210-250V a-c.

The output effect can be calculated by the relationship:

$$\Delta E_o = \pm\Delta E_r (R_f/R_i) \pm\Delta E_{io} (1 + R_f/R_i) \pm\Delta I_{io} (R_f),$$

where R_f is the feedback resistor and R_i is the input resistor from the reference, E_r.

DYNAMIC SPECIFICATIONS

PARAMETER	STABILIZATION MODE	OPS 500B	OPS 1000B	OPS 2000B
BANDWIDTH (d-c to f_{-3dB})	Voltage	800 Hz	400 Hz	200 Hz
	Current	320 Hz	160 Hz	80 Hz
PROGRAMMING TIME CONSTANT	Voltage[1]	200 μsec	400 μsec	800 μsec
	Current[2]	500 μsec	1 msec	2 msec
LARGE SIGNAL FREQUENCY RESPONSE	Voltage	320 Hz	160 Hz	80 Hz
SLEWING RATE	Voltage	>1V/μsec	>1V/μsec	>1V/μsec
TRANSIENT RECOVERY (Step Load Change)	Voltage	<100 μsec	<100 μsec	<100 μsec
	Current	500 μsec	1 msec	2 msec

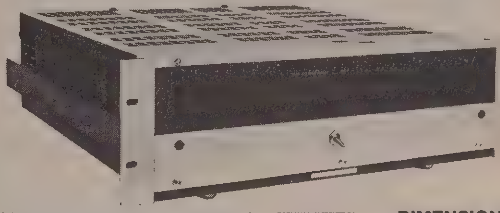
[1] Calculated for a feedback resistance of 1000 ohms per volt of output and a feedback capacitance of 400 pF. The range of capacitance available internally is 400 pF to 3900 pF.

[2] Calculated for a load resistance equal to E_o max/I_o max and the tabulated value for equivalent output capacitance.

OPS™
group X

HIGH SPEED OPERATIONAL POWER SUPPLIES

A high speed, high voltage fast-programmable voltage source: Because of its capacitorless output design, OPS models function at design-speed only when used with resistive loads.



MODEL	VOLTS	AMPS
OPS 3500	0–3500	0–0.01
OPS 5000	0–5000	0–0.005

DIMENSIONS: $5\frac{7}{32}$"H x 19"W x $16\frac{31}{32}$"D

WEIGHT: 45 lbs.

STATIC SPECIFICATIONS

INFLUENCE QUANTITY		UNCOMMITTED CONTROL CHANNEL OFFSET VOLTAGE ΔE_{io}	UNCOMMITTED CONTROL CHANNEL OFFSET CURRENT ΔI_{io}	CURRENT CONTROL CHANNEL OUTPUT EFFECTS	REFERENCE ±6.2V ±5% NOMINAL
SOURCE VOLTAGE (min.-max.):[1]		$<10\ \mu V$	<1 nA	$<10\ \mu A$	$<0.0005\%$
LOAD (No load—full load):		$<10\ \mu V$[2]	<1 nA	$<10\ \mu A$	—
TIME (8-hour drift):		$<20\ \mu V$	<1 nA	$<0.01\%$ of $I_{o\,max}$	$<0.005\%$
TEMPERATURE, Per °C:		$<20\ \mu V$	<0.5 nA	$<0.01\%$ of $I_{o\,max}$	$<0.005\%$
RIPPLE and NOISE:	rms	$<0.01\%$ of E_0		$<50\ \mu A$	—
	p-p	$<0.1\%$ of E_0		$<500\ \mu A$	—

[1] 105-125/210-250V a-c. Model OPS 5000: 60 Hz ± 3% only.

[2] E_{io} for load in current stabilization mode is ΔE_o/open-loop gain. ΔE_o is the compliance voltage change.

The output effect can be calculated by the relationship:

$$\Delta E_o = \pm\Delta E_r (R_f/R_i) \pm\Delta E_{io} (1 + R_f/R_i) \pm\Delta I_{io} (R_f),$$

where R_f is the feedback resistor and R_i is the input resistor from the reference, E_r.

DYNAMIC SPECIFICATIONS

	STABILIZATION MODE	OPS 3500	OPS 5000
BANDWIDTH (d-c to f_{-3dB})	Voltage	230 Hz	160 Hz
	Current	130 Hz	100 Hz
PROGRAMMING TIME CONSTANT	Voltage[1]	700 μsec	1 msec
	Current[2]	1.2 msec	1.6 msec
LARGE SIGNAL FREQUENCY RESPONSE	Voltage	135 Hz	100 Hz
SLEWING RATE	Voltage	>3V/μsec	>3V/μsec
TRANSIENT RECOVERY (Step Load Change)	Voltage	<100 μsec	<100 μsec
	Current	1.2 msec	1.6 msec

[1] Calculated for a feedback resistance of 1000 ohms per volt of output and a feedback capacitance of 200 pF. The range of capacitance available internally is 200 pF to 1900 pF.

[2] Calculated for a load resistance equal to E_{omax}/I_{omax} and the tabulated value for equivalent output capacitance.

KEPCO® DIGITAL PROGRAMMING INTERFACES

NEW TLA 488-16 INTERACTIVE PROGRAMMER

FOR CONTROLLING UP TO 16 POWER SUPPLIES, USING CIIL COMMANDS

This new Kepco interface not only enables your computer or bus controller to give commands in the Control Interface Intermediate Language (CIIL) over the IEEE 488 bus to as many as 16 Kepco ATE or BOP power supplies; it also enables the power supplies to respond with appropriate flags if they are unable to carry out those commands (hence TLA: Talker-Listener-Adapter).

The commands you can give are voltage setting with current limit, or current setting with voltage limit. The TLA 488-16 automatically translates the desired voltage or current settings into percentages of full scale.

The responses you receive inform you whether your commands have been carried out, and if not why not.

A discrete fault (or status) monitor reports catastrophic failure either in the unit itself, or in the power supplies.

The TLA 488-16 consists of one single-board micro-computer which uses the 8088 CPU microprocessor, and as many as four plug-in boards. The "A" boards are for Kepco ATE power supplies: TL 488-1A controls one power supply, TL 488-2A controls two, and TA 488-4A controls four. TL 488-4B controls up to four Kepco bipolar BOP power supplies. All control circuits of the plug-in boards are optically isolated, to 500 Volts, from each other and from the digital interface circuit. The microcomputer board and all plug-in boards are standard Multibus[1] size.

TLA 488-16 recognizes these CIIL commands:

Function
Close
Set
Open
Reset
Confidence Test
Internal Self Test
Status

It recognizes this noun:
Direct Current Source

It recognizes these noun modifiers:

Voltage
Current
Voltage Limit
Current Limit

(the only allowable combinations of noun modifiers are "Voltage with Current Limit" and "Current with Voltage Limit")

It can receive from the power supplies under its control, and transmit to the host computer, these error messages:

Voltage Comparison Error
Current Comparison Error
Invalid Command
Voltage Out of Range
Relay Not Open[2]
Relay Not Closed[2]
Set Modifier Error
Current Out of Range
Device Not Present
Device Not Selected
Device Disconnected
Crowbarred
Overload

TLA 488-16 implements these interface functions on the IEEE 488 bus:

Source Handshake
Acceptor Handshake
Service Request
Talker
Listener
Device clear

---

[1] Multibus™ is a trademark of the Intel Corporation

[2] Refers to optional relay placed between the power supply and the load driven by a separate port of the TLA 488/16

GENERAL SPECIFICATIONS

Ambient operating temperature range: 0 to +55°C Storage range: −20 to +75°C
Mounting: 19" rack (Provisions for Jonathan 130-QD series slides)
A-C input: Selectable 115/230V a-c; 50~60 Hz
Input current: @ 115V a-c: 5A; @ 230V a-c: 2.5A
Aux. d.c. output: +5V at 10A
Dimensions: 5-7/32" x 19" x 16-3/16" Weight: 8 lbs.
Color: Gray, Fed. Std. 26440

PLUG-IN PROGRAM CARDS

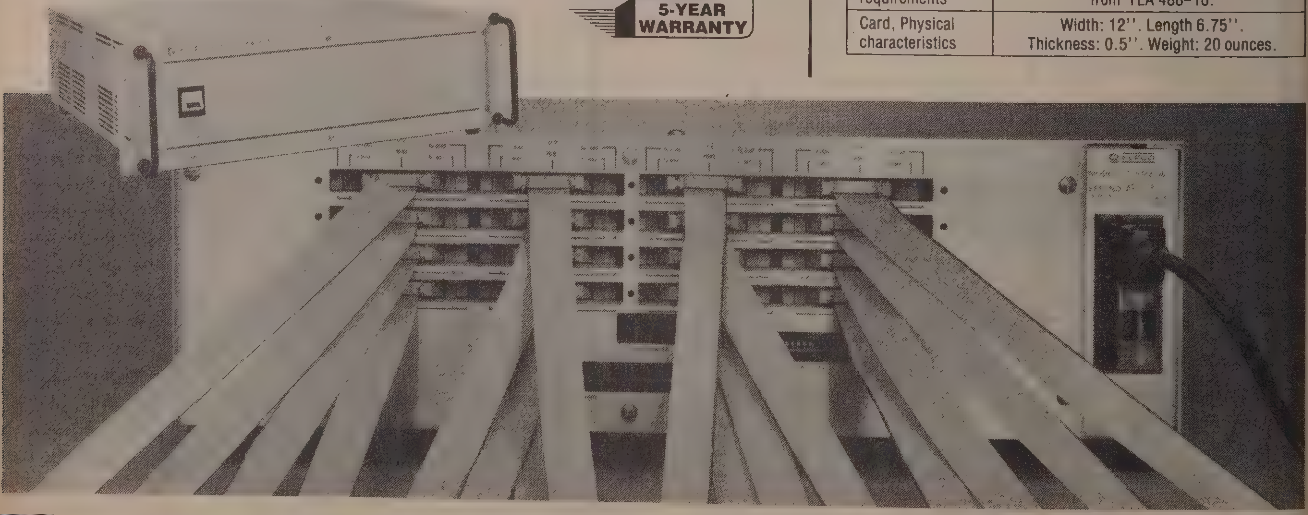
(Standard Multibus Size)

The TLA 488-16 has provision for up to four plug-in cards, which can control the voltage and current function of up to four Kepco unipolar ATE or bipolar BOP power supplies.

SPECIFICATIONS

MODEL	For ATE Models: TL 488-1A -2A -4A	For BOP Models: TL 488-4B
Number of isolated input/output ports	1 2 4	4
Analog outputs/port	Two (2) channels.	
Analog output channels mode of Operation	Voltage and Current Limit or Current and Voltage Limit. Determined by noun modifiers within set command.	
Analog output voltage level	0 to + 10V for Volt. or Volt. limit channel 0 to + 1V for Curr. or Curr. limit channel.	0 to ± 10V for main or Curr. channel. 0 to + 10V for complementary Curr. or Volt. limit channel.
Analog output current level	0 to + 2mA per channel.	0 to ± 2mA for main channel. 0 to + 2mA for limit channel.
Output impedance	< 0.05 ohms.	
Output resolution	12 bit.	
Linearity error (0 to + 70 °C)	< ± ½ LSB.	
Adjustments (both channels)	Full scale calibration. Zero adjustment.	
Temp. coefficient (per degree C)	± 0.002% at full scale. ± 20μV at zero.	
Isolation between ports	500V d-c.	
Power supply ident. codes	Set with DIP switch for each port.	
Input signals accepted from the power supply	Supply absent flag. Voltage/current mode flag. Crowbar flag. Volt. out of limit (0.1% of full scale). Curr. out of limit (1.0% of full scale).	
Input digital commands	Via Multibus from TLA 488-16. All signals TTL compatible.	
Power requirements	+ 5V at 2A, via Multibus from TLA 488-16.	
Card, Physical characteristics	Width: 12''. Length 6.75''. Thickness: 0.5''. Weight: 20 ounces.	

This KEPCO product is backed by a firm 5-YEAR WARRANTY



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This KEPCO product is backed by a firm
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INTERNAL DIGITAL PROGRAMMING INTERFACES FOR THE BIPOLAR POWER SUPPLIES

The Kepco Bipolar power supplies in the new 100 Watt, 200 Watt and 400 Watt series are designed to accept a built-in interface card for digital control. The interface cards, termed "BIT", are available in two styles: "-500" for parallel data buses and "-488" for the popular instrumentation bus based on IEEE-488. In either style, the cards are available with either hexadecimal (12 bit) or decimal (3-BCD) format.

Each card is configured to control either the host BOP's voltage control channel or its current control channel as the user may select. There is an additional "limit channel" which can be addressed to control either voltage or current limits with 8 bit or 2-BCD resolution.

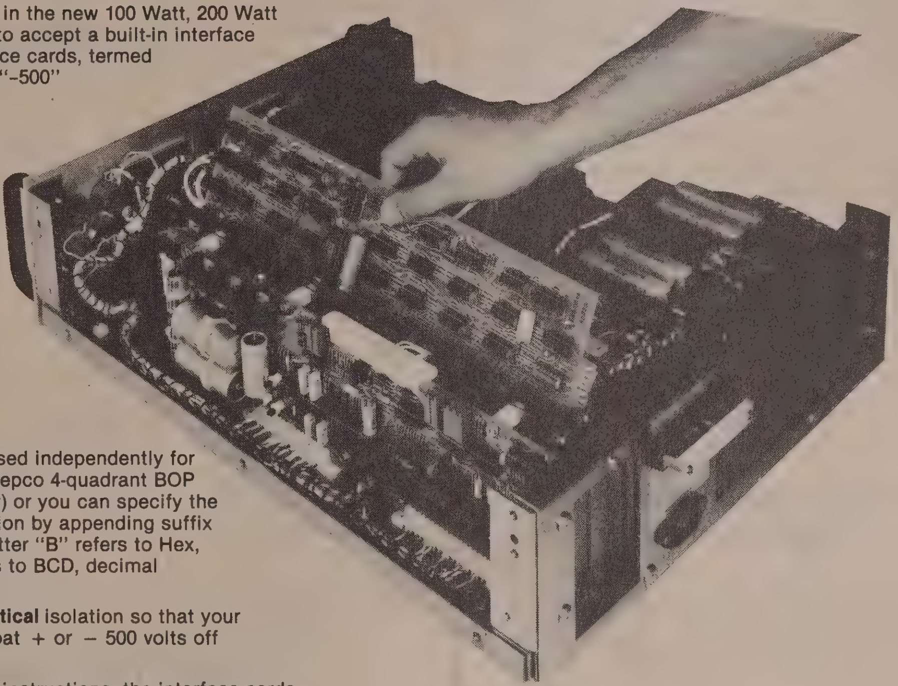
The interface cards can be purchased independently for field installation into an existing Kepco 4-quadrant BOP (100W, 200W, or 400W models only) or you can specify the interface as a factory-provided option by appending suffix -500B (or D) or -488 B (or D). The letter "B" refers to Hex, binary control; the letter "D" refers to BCD, decimal control.

The interface cards incorporate **optical** isolation so that your power supply can be allowed to float + or − 500 volts off digital ground.

In addition to the setting and limit instructions, the interface cards accept polarity (plus or minus) and range (10:1) instructions. The BIT-488 cards (IEEE-488) also implement the GPIB's remote enable and device clear interface functions.

An interconnecting cable is provided for field installation of the series BIT interface card into the host power supply. The interconnect cable from a BIT-488 interface to a GPIB is included when the digital interface is ordered. Model SNQ 488-2 (2 meters long).

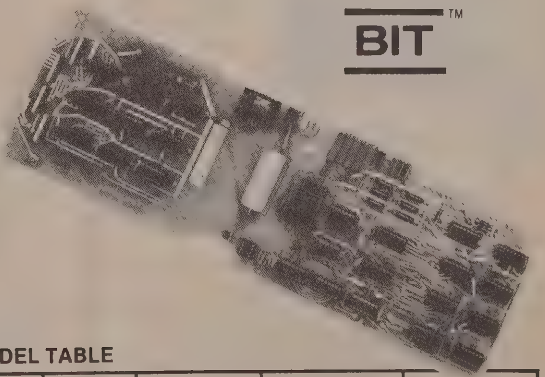
The BIT-500 parallel data interfaces require only a digital input connector model PC-12 which is supplied with the interface card.



Digital interface card mounts inside your BOP and provides either parallel data or IEEE-488 control.

Data Form (For IEEE-488 interfaces)
The digital interface looks for an instruction of the form CMMMLL (six ASCII encoded characters) where "C" is a 1-byte control character that specifies range and polarity while "MMM" are the 3 characters that specify the setting of the main control channel (voltage or current) in terms of percent of full scale. "LL" are the two control characters for the corresponding limit channel.

BIT™



SPECIFICATIONS

OUTPUT VOLTAGE (Main Channel)	High Range	0 to ± 10V
	Low Range	0 to ± 1.0V
OUTPUT VOLTAGE (Limit Channel)		0 to + 10V
OUTPUT CURRENT (Each Channel)		± 2.0 mA max
OUTPUT IMPEDANCE		<0.05 ohms
LINEARITY ERROR (0 to + 70°C)		± 1/2 LSB
TEMPERATURE COEFFICIENT	Full Scale	± 35 PPM/°C max
	Zero, High Range	± 20 μV/°C max
	Zero, Low Range	± 10 μV/°C max
LOGIC INPUT		TTL COMPATIBLE
DATA TRANSFER FORMAT		Byte serial, BIT parallel (for BIT 488) BIT parallel (for BIT 500)
INTERFACE FUNCTIONS IMPLEMENTED (for BIT 488 only)		AH1, L1 RL2, DC2
SOURCE POWER		Supplied by Host Power Supply

MODEL TABLE

SUFFIX (1)	MODEL (2)	DATA FORMAT	RESOLUTION Principal Channel	Limit Channel	INPUT
—488-B	BIT 488-B	ASCII/Hex	12 Bits (binary)	8 Bits (binary)	For IEEE-488 (GPIB) bus
—488-D	BIT 488-D	ASCII/Decimal	3-Digit (BCD)	2-Digit (BCD)	For IEEE-488 (GPIB) bus
—500-B	BIT 500-B	Hexadecimal	12 Bits (binary)	8 Bits (binary)	For parallel data transfer bus
—500-D	BIT 500-D	Decimal	3-Digit (BCD)	2-Digit (BCD)	For parallel data transfer bus

(1) Add to model No. of the BOP to specify a factory-installed interface.
(2) Use this designation when ordering separately for field installation.

KEPCO®

STAND ALONE DIGITAL INTERFACES FOR SINGLE OR MULTIPLE CHANNEL OPERATION

These digital programmers are designed for use with all Kepco operationally-programmable power supplies (high speed and conventionally filtered) and/or voltage-controlled instruments. They enable you to interface your d-c power supplies with the logic bus of a computer-controlled system.

The interface output is an isolated ±10 volt analog signal that makes a simple 2-wire connection to the programming terminals of Kepco ATE, BOP and other programmable power supplies.

Use the 2-channel version to control both voltage and current.

The two channels provided on each Model SN 488-B or SN 488-D plug-in card in the 4-card or 8-card housings are not isolated. Use them to control both voltage and current of the same power supply.

MODEL		SINGLE AND DUAL-CHANNEL PROGRAMMERS, ¼-RACK SIZE								PLUG-IN BOARDS FOR 4 CARD & 8-CARD HOUSINGS	
		SN488-				SN500-				SN 488-B	SN 488-D
		121	122	031	032	121	122	031	032		
NUMBER OF CHANNELS		1	2	1	2	1	2	1	2	2	2
INPUT DATA CODING FORMAT		Hex		Decimal		Hex		Decimal		Hex	Decimal
RESOLUTION		12 Bit		3 Digit		12 Bit		3 Digit		12 Bit	3 Digit
LINEARITY ERROR		± 1/2 LSB									
OUTPUT CURRENT		2 mA max.									
OUTPUT IMPEDANCE		<0.05 ohms									
OUTPUT VOLTAGE	High Range	± 10V									
	Low Range	± 1V									
LOGIC INPUT		TTL COMPATIBLE									
DIGITAL INPUT DATA TRANSFER FORMAT		Byte Serial, Bit Parallel				Bit Parallel				Byte Serial, Bit Parallel	
A-C INPUT	Voltage	105-125V/210-250V (selectable by switch)									
	Frequency	50-440 Hz									
	Power	≈12 VA								≈7 VA	
ISOLATION		1000V max. between digital input and analog input									

QUARTER-RACK STYLE PROGRAMMERS

Are available in either bit-parallel format or byte-serial format that is compatible with any IEEE-488 controller. You can buy single channel models or programmers with two independent, isolated channels.

SN 488

A 2-meter long GPIB Cable to SN 488 is included.

Optional connectors:
SNQ 488-1 (Cable, 1 meter)
SNQ 488-2 (Cable, 2 meters)
PC-488 Plug printed circuit edge to IEEE-488

DIMENSIONS: $5\frac{7}{32}$"H x $4\frac{5}{32}$"W x $17\frac{3}{16}$"D.
WEIGHT: 10 lbs.

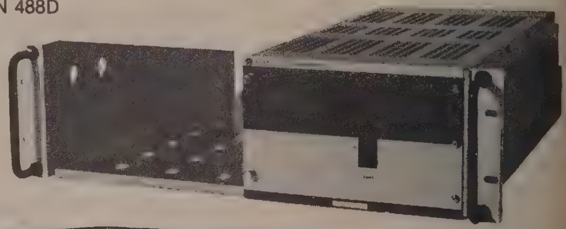
Applicable to Model SN 488-121,-122,-031-,032
and to Model SN 500-121,-122,-031,-032

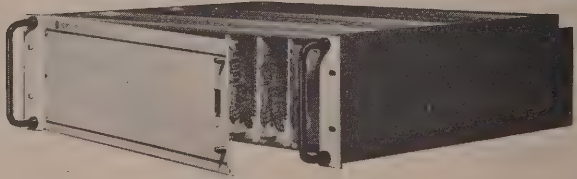
CARD-CAGE STYLE PROGRAMMERS FOR MULTIPLE UNIT SYSTEMS

HALF RACK SNR 488-4

Housing for 4 Dual-Channel Cards
SN 488B or SN 488D

DIMENSIONS:
$5\frac{7}{32}$"H x 19"W
x $17\frac{13}{16}$"D
WEIGHT: 17 lbs.





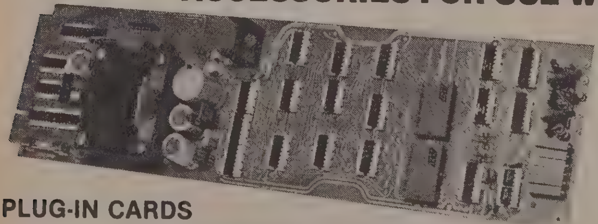
FULL RACK SNR 488-8

Housing for 8 Dual-Channel Cards
SN 488B or SN 488D

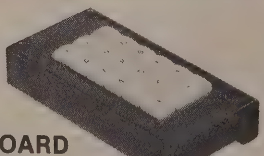
DIMENSIONS: $5\frac{7}{32}$"H x 19"W x 18"D **WEIGHT:** 23 lbs.

This KEPCO product is backed by a firm **5-YEAR WARRANTY**

ACCESSORIES FOR USE WITH SNR 488-4 AND SNR 488-8



PLUG-IN CARDS
FOR EITHER HOUSING
Model SN 488-B (Hex format)
Model SN 488-D (BCD format)



KEYBOARD
SN 488-K

Hexadecimal keyboard for manually driving SNR 488-4 or SNR 488-8 *Weight:* 0.8 lbs.

CABLES (IEEE-488 INTERFACE)

SNC 488-1	(1 meter)
SNC 488-2	(2 meter
SNC 488-4	(4 meter)

KEYBOARD CABLES

SNP 488-1	(1 meter)
SNP 488-2	(2 meter)
SNP 488-4	(4 meter)

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KEPCO® HARDWARE

for laboratory-type power supplies and digital programmers

RACK ADAPTER PANELS

These models adapt Kepco (linear and ferroresonant modules) power supplies to the standard 19" wide equipment rack or cabinet.
Panel mounting holes are pre-drilled (standard E.I.A. pattern).
Finish: Light gray, color 26440, Fed. Std. 595.

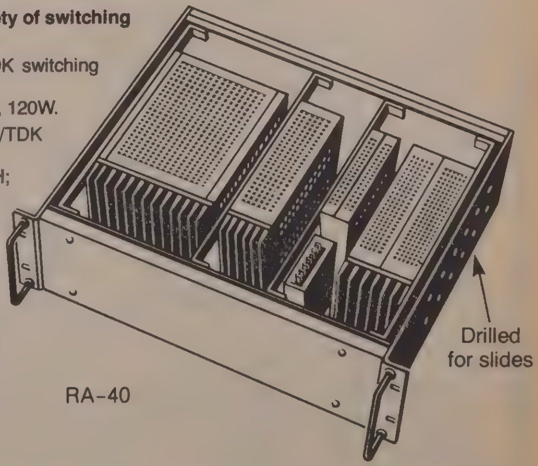
MODEL	DESCRIPTION	USED FOR	DIMENSIONS HEIGHT inches	DIMENSIONS HEIGHT mm	DIMENSIONS WIDTH inches	DIMENSIONS WIDTH mm
RA 8-2	2 unit rack adapter	PRM size A and AA series or size C: Dual Output, Extra-Filtered and -450 series	5 7/32	132.6	19	482.6
RA 9-3	3 unit rack adapter	PRM size A and AA series or size C: Dual Output, Extra-Filtered and -450 series	6 31/32	177.0	19	482.6
RA 10-1	1 unit rack adapter	PRM size A and AA series	5 7/32	132.6	19	482.6
RA 14-3	3 unit rack adapter	PRM size B-120 series or size D-60 series	3 15/32	88.1	19	482.6
RA 15-1	1 unit rack adapter	PRM size B-120 series	3 15/32	88.1	19	482.6
RA 16-4	4 unit rack adapter	PRM size B-120 series or size D-60 series	5 7/32	132.6	19	482.6
RA 17-5	5 unit rack adapter	PRM size B-120 series or size D-60 series	5 7/32	132.6	19	482.6
RA 18-1	1 unit rack adapter	PRM size C-180F series Extra-Filtered	5 7/32	132.6	19	482.6
RA 26-1	1 unit rack adapter	PAT model	3 15/32	88.1	19	482.6
RA 27-2	2 unit rack adapter	PAT models	3 15/32	88.1	19	482.6
RA 28-4	4 unit rack adapter	PAT models	6 31/32	177.0	19	482.6
RA 30-1	1 unit rack adapter	PRM size D-60 series	3 15/32	88.1	19	482.6
RA 31-1	1 unit rack adapter	PRM size C-300 series Dual Output	5 7/32	132.6	19	482.6
RA 33-3	3 unit rack adapter	PTR models	3 1/32	132.6	19	482.6
RA 34-4	4 unit rack adapter	PTR models	5 1/4	133.4	19	482.6
RA 35-1	1 unit rack adapter	PTR model	3 1/2	88.9	19	482.6
RA 38-1	1 unit rack adapter	PRM size C-450 series	5 7/32	132.6	19	482.6

RACK MOUNTING SYSTEMS RA 39™ RA 40™ for switchers

The RA-39 and RA-40 rack mount systems are designed to allow you to combine a variety of switching Power Supply modules in a standard 19" equipment housing.

THE RA-39 SYSTEM: This system is designed for installation of the following KEPCO/TDK switching power units:
RMK-S; RMX-A,-B; RMD-SA,-AA,-A,-B; RMT-SA,-AA; RDT-AA; MP-H; CMP-H; ERX-30W, 60W, 120W.

THE RA-40 SYSTEM: This system is designed for installation of the following KEPCO/TDK switching power units:
RMK-S; RMX-A,-B,-C,-N,-D; RMD-SA,-AA,-A,-B,-D; RMT-SA,-AA; RXT-C; RDT-AA; MP-H; CMP-H; ERX-30W, 60W, 120W.



MODEL	DESCRIPTION	HEIGHT inches	HEIGHT mm	WIDTH inches	WIDTH mm	DEPTH inches	DEPTH mm	SHIP WGT LBS	SHIP WGT KG
RA-39	rack adapter	3 15/32	88.1	19	482.6	14 29/32	378.6	4	1.9
RA-40	rack adapter	5 7/32	132.6	19	482.6	14 29/32	378.6	5	2.3
RAB 39-40	for R-series	3/4	19.1	3/4	19.1	12 63/64	329.8	1	0.5
RAB 39-40X	for ERX	1	25.4	3/4	19.1	12 63/64	329.8	1	0.5
ADP-40H	use with RAB 39-40 to mount CMP & MP	3 15/32	88.1	2 49/64	70.2	1/16	1.6	1	0.5

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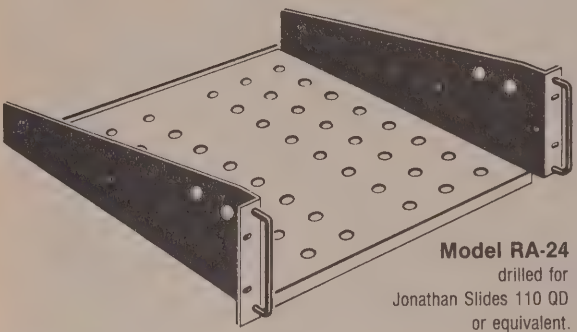
KEPCO® RACK MOUNTING SYSTEMS

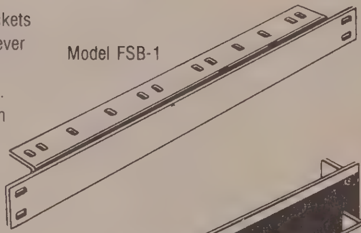
RA 24™ RA 37™

Model RA 24 mounts ATE, APH, BOP, JQE, MPS, OPS IXB, SN 488 and SN 500.
Model RA 37 mounts only ATE, SN 488, SN 500 and BOP ¾ Rack.

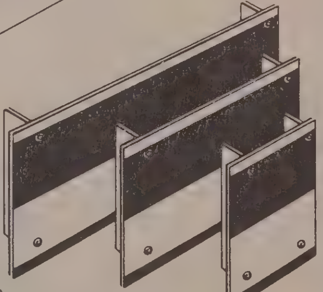


Model RA-24
drilled for
Jonathan Slides 110 QD
or equivalent.

Model FSB
The filler support brackets should be used whenever the total load in an RA-24 exceeds 75 lbs. Mount directly beneath the lower front edge of the housing and fasten to the rack edge.



BLANK FILLER PANELS
are finished with a matching stripe on one side and solid gray on the other. Color 26440 per Fed. Std. 595.



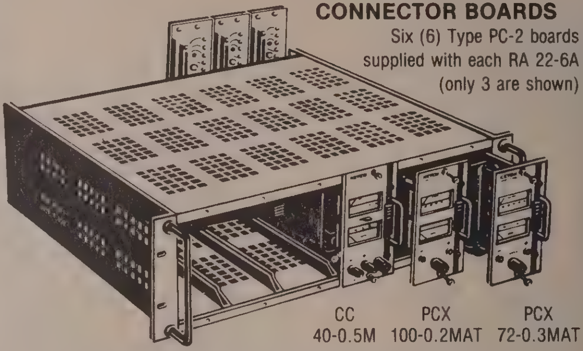
MODEL	DESCRIPTION	DIMENSIONS[1] H	W
RA-24	Rack mount for (2) ½ or (4) ¼ rack models, 17⅞'' deep	5 7/32 132.6	19'' 482.6
RA 24B	Blank bottom for custom drilling	5 7/32 132.6	19'' 482.6
RA-37	Reinforced rack mount system, 20'' deep	5 7/32 132.6	19'' 482.6
RFP 24-1 **RFP 37-1**	¼ filler panel for RA 24 ¼ filler panel for RA 37	5 7/32 132.6	4 5/32 105.6
RFP 24-2 **RFP 37-2**	½ filler panel for RA 24 ½ filler panel for RA 37	5 7/32 132.6	8 11/32 211.9
RFP 24-3 **RFP 37-3**	¾ filler panel for RA 24 ¾ filler panel for RA 37	5 7/32 132.6	12 17/32 318.3
FSB-1	Filler support bracket	1 23/32 43.6	19'' 482.6
FSB-3	Filler support bracket	3 15/32 88.1	19'' 482.6
FSB-5	Filler support bracket	5 7/32 132.6	19'' 482.6

(1) Upper dimensions are in inches; lower dimensions in millimeters.

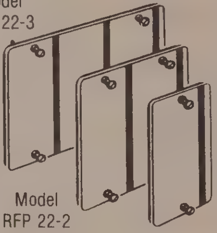
RA 22-6A™ RA 32™

The model RA-22-6A mounts Kepco Laboratory-type power supplies CC and PCX-MAT
The model RA-32 mounts, CC, PCX-MAT and any one ½ Rack or two ¼ rack size models.

PLUG-IN CONNECTOR BOARDS
Six (6) Type PC-2 boards supplied with each RA 22-6A (only 3 are shown)

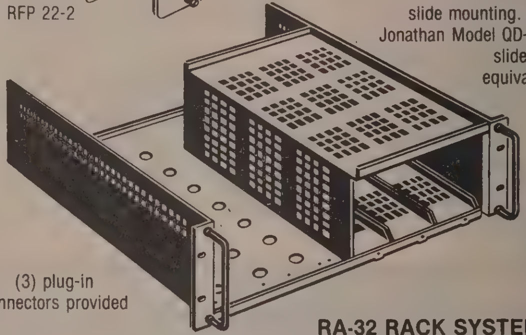


6-SLOT RACK HOUSING—MODEL RA 22-6A



FILLER PANELS
supplied without slide assembly and handle, may be used to fill unused slots in RA 22-6A, RA-32, CA-4 and CA-5.

NOTE: RA-32 is drilled for slide mounting. Use Jonathan Model QD-110 slides or equivalent

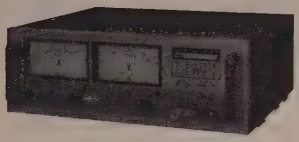


RA-32 RACK SYSTEM
combines three plug-in slots of the RA 22-6A with a half-rack space from RA-24 to provide a convenient way of mixing models.

MODEL	DESCRIPTION	DIMENSIONS[2] H	W	D
RA 22-6A	Six-slot rack housing including (6) PC-2 connectors.	5 7/32 132.6	19 482.6	16¼ 412.8
RFP 22-1	Single filler panel	5 7/32 132.6	2 25/32 70.6	—
RFP 22-2	Double filler panel	5 7/32 132.6	5 9/16 141.2	—
RFP 22-3	Triple filler panel	5 7/32 132.6	8⅜ 212.7	—
RA-32	Rack adapter for (1) half-rack or (2) ¼-rack plus (3) ⅛-rack slots	5 7/32 132.6	19 482.6	19 482.6
PC-2	Edge-connector to barrier-strip interface	5 7/32 132.6	2 21/32 67.5	—
PC-8	Edge-connector to cable interface for CC and PCX-MAT	—	—	—

(2) Upper dimensions are in inches; lower dimensions in millimeters.

KIK – Supplies for Labs and Systems



Eight Series in 93 Models are Available

PAC Series (8 models)
General Purpose Power Supplies.
To 110 @ 1A-To 10A @ 16V.

PAD-L Series (45 models)
High Current, Low Noise, High Precision
To 1000V @ 0.2A-To 500A @ 16V.

PAB Series (17 models)
Low Cost Power Supplies
To 350V @ 0.2A-To 5A @ 8V.

PAB-A Series (5 models)
Digital Readout Economical
32 @ 2.0A to 18 @ 3A

PAL Series (6 models)
Highest Efficiency >70% Lightweight
16V @ 20, 40, 60A and
32V @ 10, 20, 30A.

POW Series (3 models)
Bi-Polar Power Supply/Amplifier
±35V @ ±1A, ±35V @ 5A,
±70V @ 2A.

PDM Series (5 models)
Dual Tracking Power Supplies
To ±60V @ ±0.5-To ±3A @ ±35V.

PAE Series System Supply (3 models)
High Speed — Low Noise Modes
0-35V @ 10 amps, 20 amps or 30 amps.

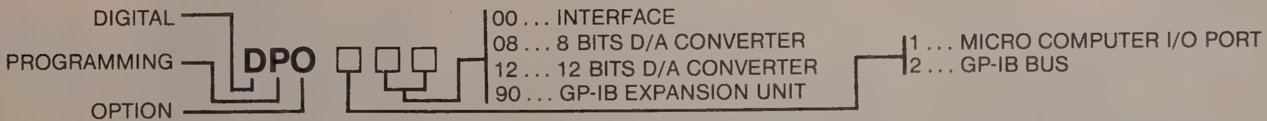
Operating Characteristics

Series	**PAC**	**PADL**	**PAB**	**PABA**	**PAL**	**POW**	**PDM**	**PAE**
Constant V	✓	✓	✓	✓	✓	✓	✓	✓
Constant I	✓	✓	✓	✓	✓	✓	✓	✓
Regulation %	.005	.005	.02	.02	.003	.03	.005	.003
Auto Crossover	✓	✓	✓	✓	✓	✓	✓	✓
Bi-Polar	—	—	—	—	—	✓	Dual Track	—
Parallel Operation	✓	✓	✓	✓	✓	—	✓	✓
Series Operation	✓	✓	✓	✓	✓	—	✓	✓
Over-Voltage	—	✓	—	—	✓	—	—	✓
Overcurrent	✓	✓	✓	✓	✓	✓	✓	✓
Overtemp	✓	✓	—	—	✓	—	—	✓
Remote Current	—	✓	—	✓	✓	—	—	✓
Remote Sensing (Sampling)	✓	✓	—	—	✓	—	✓	✓
Remote Voltage Programming	✓	✓	—	✓	✓	Amp	✓	✓
120V ±10%	✓	✓	✓	✓	✓	✓	✓	✓
240V ±10%	Avail	Some Models	Avail	Avail	✓	Avail	Avail	✓

Programmable Options – DPO Series

The DPO was developed for use with the Kikusui PAD-L line of power supplies in automatic testing applications. The DPO can also be used with the Kikusui Electronic Load (PLZ) the PAE Series and PAL Series.

The DPO Series is divided into two parts. The DPO100 Series interfaces with a micro-computer I/O bus, while the DPO200 Series interfaces with the IEEE-488 bus.

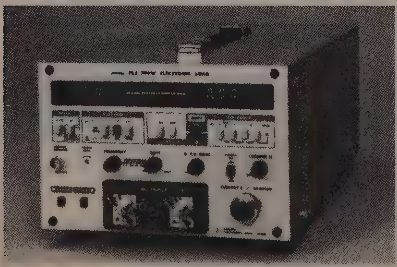

DIGITAL
PROGRAMMING
OPTION
DPO
00 . . . INTERFACE
08 . . . 8 BITS D/A CONVERTER
12 . . . 12 BITS D/A CONVERTER
90 . . . GP-IB EXPANSION UNIT
1 . . . MICRO COMPUTER I/O PORT
2 . . . GP-IB BUS

Compact
The D/A converter comes in a compact package which fits on the back of Kikusui power supplies.

Optical Insolation
The power source is optically isolated from the controller, protecting the controller from possible damage.

Expandable System
Just by adding an Expansion Unit (DPO290), it is possible to control up to 10 units using only one Interface (DPO200).

Electronic Load for General Purpose Power Supply Testing – Model PLZW



- Internal or external signal
- Internal square wave generator with variable duty cycle
- Operates in 3 modes – resistance, constant voltage, constant current
- 3 simultaneous display modes – voltage (digital) – current (digital) & peak power
- Resistance and average power displayed digitally
- Upper and lower current limit (in square wave mode) are independently controlled
- Max. capability – 4 to 60 Volts; 30, 60 & 140 amps; 150 - 300 - 700 watts

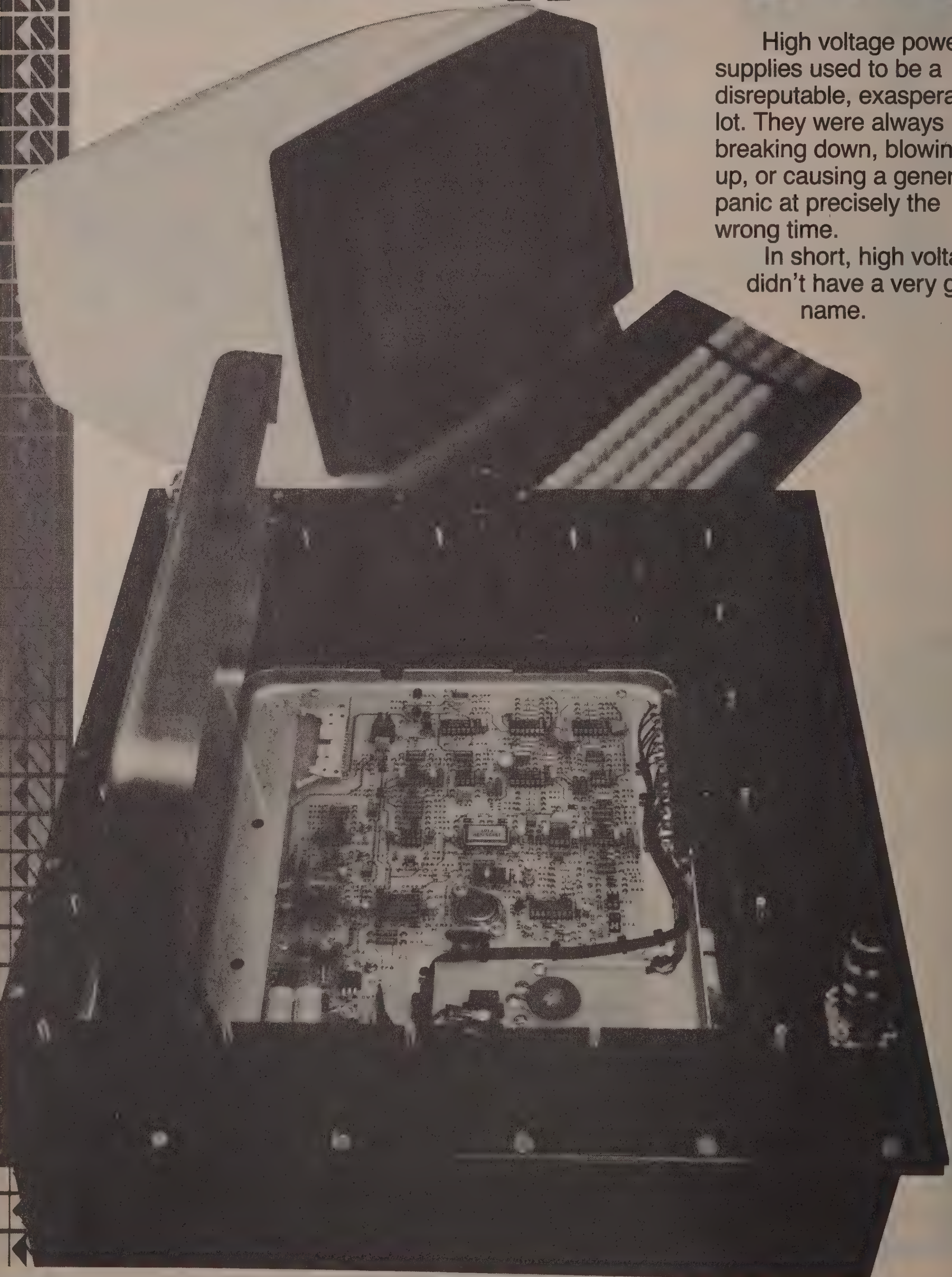
Kikusui
INTERNATIONAL CORP.
LEASING AVAILABLE

Toll free (800) 421-5334
17819 S. Figueroa St., Dept. E,
Gardena, CA 90248
Phones: CA, Alaska, Hawaii (213)515-6432
TWX: 910-346-7648

High Voltage Power Supplies: The

High voltage power supplies used to be a disreputable, exasperating lot. They were always breaking down, blowing up, or causing a general panic at precisely the wrong time.

In short, high voltage didn't have a very good name.



Inside Story.

Then along came a company called KSI. Remarkably, KSI brought common sense (and uncommon engineering) to the uncertain world of high voltage.

First, KSI invented the Arc Quencher™—an ingenious new design that makes high voltage power supplies short-circuit proof. And unlike other "fail-safe" systems, the Arc Quencher doesn't preserve itself at the expense of the load.

KSI then added double shielding, RFI filtering, isolated control power, and many other protective features.

Finally!!! High voltage power supplies were becoming reliable, upstanding citizens!

But KSI didn't stop here. High voltage power supplies were still notoriously behind the times. Who wanted to put an antique bucket of bolts into a highly advanced system?

So KSI went to work. It employed the latest vacuum-tube and control-circuit technology. It housed the components in compact tanks and modern control modules. And it used plug-in PCBs with LED indicators and test points.

To make matters even better, KSI taught its power supplies to speak ASCII with computers. Through fiber optics, computers precisely control each critical aspect of power-supply operation.

What's more, KSI is applying the same sensible engineering approach to high-frequency switchmode and resonant supplies.

And now for the happy ending: KSI custom designs high voltage *systems* for a whole range of applications, including:

- Ion implantation
- X-ray systems
- Lasers
- E-beam systems
- Ion deposition
- Ion milling.

To find out the latest developments in this exciting and continuing story, call or write: Kaiser Systems, Inc., 33 Cherry Hill Drive, Danvers, MA 01923. Phone (617) 777-5102. TWX: 887159. FAX: (617) 777-3340.

Typical Specifications

Description	Output Voltage	Reg.	Max. Current	Technology	Application
Multiple Output	Quad 0 to 10kV	.05%	4x 4mA	High-freq.	Beam optics
	0 to 10V 0 to 1.5kV 0 to 10kV	1% 1% 1%	300A 2.2A 40mA	High-freq. resonant	Deposition systems
D.C. Adjustable	+5 to +100kV	.01%	40mA	Output tube regulation	Ion implanters
Pulsed	+40 to +130kV	.1%	800mA		X-ray
Bipolar	−75, +75kV	.01%	200mA	High-freq. resonant	
Fixed voltage	25kV	1%	100mA		Lasers

We've given
high voltage
power supplies
a good name...

KSI Kaiser Systems, Inc.

33 Cherry Hill Drive, Danvers, MA 01923 · Phone: 617-777-5102

KSI

High Voltage Power Supply Selection Guide

Selecting the right high voltage power supply for a specific application requires careful consideration of many parameters. The following table, which compares the performance characteristics of several types of high voltage supplies, will provide guidance in making the appropriate choice for your application.

Type	Unregulated	Input Regulated			Output Regulated
Technology	—	linear	switch mode	resonant converter	linear
Frequency	50 Hz to 400 Hz	50 Hz to 400 Hz	10 kHz to 50 kHz	10 kHz to 50 kHz	50 Hz to 400 Hz
Output Voltage (Max.)	to > 1 MV	to > 1 MV	to 500 kV	to 500 kV	to 150 kV
Power Level	any	any	to 3 kW	to 50 kW	200 W to 200 kW
Regulation Method	N/A	var. transf. SCR	pulse width modulation	freq., phase modulation	series pass element
Stored Energy*	high	high	low	low	lowest
Output Current Limit Δt	≥ 10 ms	≈ 10 ms	≈ .1 ms	≈ .5 ms	< 1 μs
Transient Response	N/A	slow	medium	medium	very fast
EMI	very low	medium	high	medium	very low
Efficiency	≈ 95%	≈ 90%	≈ 85%	≈ 85%	75 to 90%
Parts Count	lowest	low	high	high	low
Size per Watt	large	large	small	small	large
Cost per Watt	low	medium–high	medium	medium	high
Insulation Medium	air, oil, SF6		air, oil, SF6, encapsulation		air, oil, SF6

*Stored energy at output due to output filter. Low filter requirements (higher ripple) reduce stored energy.

Choose your supplier as carefully as you choose your supplies. Ask yourself the following: are his designs modern, efficient, and reliable? Does he care as much about quality as you do? Will he deliver on time and to specifications?

Then call KSI.

We've given high voltage power supplies a good name...

KSI **Kaiser Systems, Inc.**

33 Cherry Hill Drive, Danvers, MA 01923 · Phone: 617-777-5102

SWITCHING POWER SUPPLIES

L-COM has gained a reputation by selling high quality switching power supplies to users who value product reliability and consistency of delivery performance.

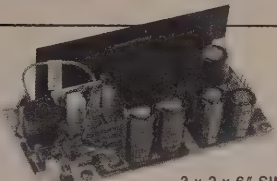
Our design and manufacturing expertise has been focused on the varied requirements of our OEM clientele which resulted in the development of the eight families of standard switching power supplies as shown below. This is only a brief outline of product availability and capabilities but it does represent the culmination of an intensive design and development program including quality and reliability testing.

Some of the built-in features found in L-COM switchers include: Continuous use ratings; Dual AC inputs; EMI-RFI Filters; Soft start and brown out features; Replaceable fuses; Conforming to UL-478; Post regulators as required; Adequate hold-up time after loss of AC power; Adequate load and line regulation; etc. Burn-in is provided to assure years of predictable trouble-free service and all switchers are fully warranteed for one year.

Our customer service people stand ready to discuss your specific needs. If your requirements fall in the 15 to 150 watt category, there's a good chance that L-COM could help you.

L-com

OPEN FRAME



1•3•4 OUTPUTS

SERIES G

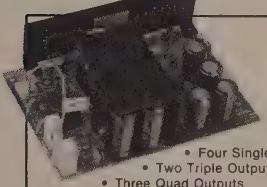
30 WATT

- **Seven stock models fill many applications.**

SIZE: 3 x 2 x 6″ SINGLE
4 x 2 x 7″ MULTIPLE

- Four Single Outputs
- One Triple Output
- Two Quad Outputs

Call or send for complete listings & specifications.
Note: Customer modifications considered.



1•3•4 OUTPUTS

SERIES G

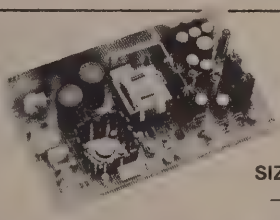
50 WATT

- **Ten stock models fill many applications.**

- Four Single Outputs
- Two Triple Outputs
- Three Quad Outputs
- One 50 watt model specifically for Disk Drive

SIZE: 4 x 2 x 6″ SINGLE
4 x 2 x 6.5″ MULTIPLE

Call or send for complete listings & specifications.
Note: Customer modifications considered.



QUAD OUTPUT

SERIES SP

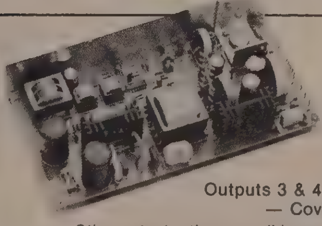
70 WATT

- **Four stock models fill many applications.**

SIZE: 4.25 x 2.5 x 8.25″

— Covers Available —

Other output ratings possible to meet custom needs.



QUAD OUTPUT

SERIES SP

150 WATT

- **Four stock models fill many applications.**

SIZE: 5 x 2.5 x 10.5″

Outputs 3 & 4 have Series regulator.

— Covers Available —

Other output ratings possible to meet custom needs.

ENCLOSED

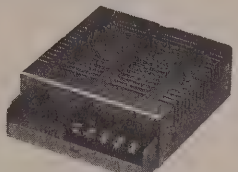
SINGLE OUTPUT

A SERIES

15 WATT

- **Four stock models fill many applications.**

MODEL	OUTPUT
A-0503	5V-3A
A-121R3	12V-1.3A
A-1501	15V-1A
A-24R7	24V-0.7A



SIZE: 4 x 1.5 x 4.6″

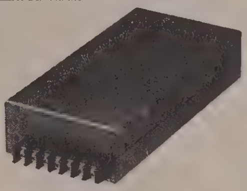
1•2 OUTPUTS

B SERIES

25 & 50 WATT

- **Four stock models fill many applications.**

MODEL	OUTPUT
B-0505	5V-5A
B-0510	5V-10A
B-1204	12V-4A
B-1503	15V-3A



SIZE: 3.8 x 1.75 x 8.4″

QUAD OUTPUT

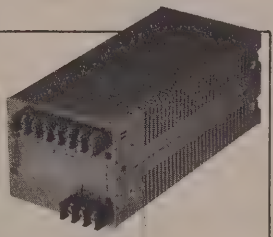
D SERIES

75 WATT

- **Five popular output voltage types for many applications.**

SIZE: 3.14 x 3.75 x 8.5″

All Outputs Regulated

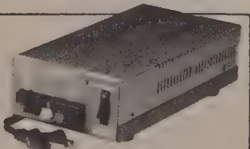


TRIPLE OUTPUT

PS SERIES

42 WATT

- **Ten stock models fill many applications.**



MODEL	OUTPUT #	OUTPUT #2	OUTPUT #3
PS-1	5V-6A	+ 12V-.5A	- 12V-.5A
PS-2	5V-6A	+ 15V-.4A	– 15V-.4A
PS-3	5V-6A	+ 12V-.5A	– 5V-1A
PS-4	5V-3A	+ 24V-.6A	– 24V-.6A

Choice of line cord or screw termination

SIZE: 4 x 2.25 x 8″

L-com POWER PRODUCTS
1755 Osgood Street No. Andover, MA 01845

Call TOLL FREE **800-343-1455**
MA.RES.617-682-6936

SPECIFICATIONS

OUTPUT POWER
50 to 240 Watts.

OUTPUT VOLTAGES
5, 12, 15 and 24 Volts.

OUTPUT CURRENT
25 Amps maximum.

COOLING
Convection or external forced air flow of 200 LFM.

INPUT VOLTAGE
92-132VAC or 184-264VAC, 47-63 Hz. Conversion by strapping change on PCB (no soldering required).

HOLD-UP TIME
20 msec minimum after removal of nominal AC input.

PARD (RIPPLE & NOISE)
1% or 100 mV, whichever is greater. Over 50 Hz-20 m Hz 8W.

EFFICIENCY
Up to 80% (70% typical).

OVERVOLTAGE PROTECTION
Standard for V1.
Factory set at 125% ± 7%.

OVER POWER PROTECTION
Fully protected from excessive power and output short circuits. A sustained fault condition will latch the power supply off. Removal of power for 30 seconds will reset the power supply. CAUTION: Outputs should not be loaded above their rated loads or damage may occur.

OVERSHOOT-UNDERSHOOT
Less than 5% for line turn on/off. Less than 2% for 20% step load change (Load current must not drop below 20%).

RESPONSE TIME
For regulated outputs — 1 msec maximum within 1% after a 20% step load change at < 1A/μsec.

OPERATING TEMPERATURE
0-40°C full power. Derates linearly to 50% power at 70°C.

STORAGE TEMPERATURE
-55°C to +85°C.

OUTPUT POLARITY (Triple & Quad Supplies)
V1 and V4 are floating and may be referenced as either positive or negative outputs. +V2 and -V3 share a common return.

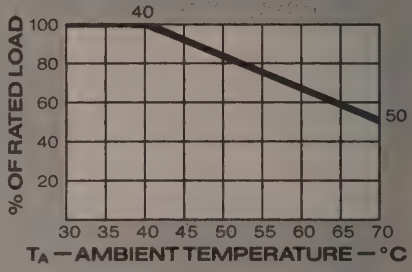
LIMITED INRUSH CURRENT
AC inrush current is limited to the following when averaged over one cycle:
115VAC — 14A Max.
230VAC — 28A Max.

VOLTAGE ADJUST RANGE
±5% for V1.
Available for selected models.

REMOTE SENSE
Standard for V1 output.
Compensates for up to 250 mV total cable drop.

SHOCK (Operating)
15G peak for 11 msec, hard mount.

POWER DERATING CURVE

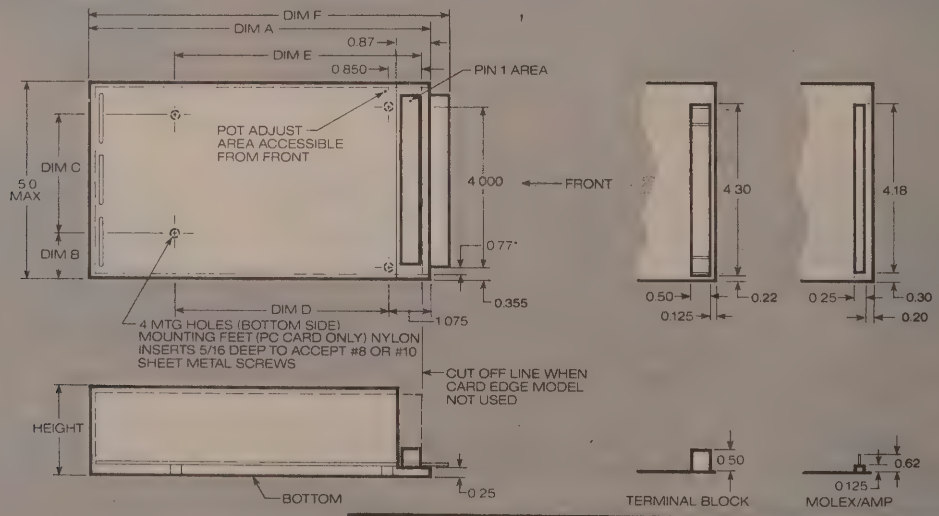


VIBRATION (Operating)
5-500 Hz at 0.75G peak, limited by 0.25 inch double amplitude.

SAFETY
Meets applicable requirements of IEC 380, VDE 0806, UL1012, CSA 22.2, No. 143 and 154.

EMI (ElectroMagnetic Interference)
Meets VDE 0871, Curve "B," and FCC Docket 20780, Curve "B."

MOV — Provides protection against input line transients.


DIM F
DIM A
0.87
DIM E
0.850
PIN 1 AREA
POT ADJUST AREA ACCESSIBLE FROM FRONT
DIM C
5.0 MAX
DIM B
4.000
FRONT
0.77
0.355
DIM D
1.075
4 MTG HOLES (BOTTOM SIDE) MOUNTING FEET (PC CARD ONLY) NYLON INSERTS 5/16 DEEP TO ACCEPT #8 OR #10 SHEET METAL SCREWS
CUT OFF LINE WHEN CARD EDGE MODEL NOT USED
HEIGHT
BOTTOM
0.25
4.30
0.50
0.125
0.22
4.18
0.25
0.30
0.20
0.50
TERMINAL BLOCK
0.62
0.125
MOLEX/AMP

	DIM A	DIM B	DIM C	DIM D	DIM E	DIM F
CONFIGURATION A (ENCLOSED) — Overall height 2.25"						
Case Size 1	7.35"	0.455"	3.77"	4.50"	—	—
Case Size 2	8.05"	1.235"	3.00"	5.40"	—	—
Case Size 3	8.80"	1.565"	2.15"	5.45"	—	—
CONFIGURATION B (BASE MOUNT) — Overall height 2.17" Max.						
Case Size 1	7.35"	0.455"	3.77"	4.50"	—	—
Case Size 2	8.05"	1.235"	3.00"	5.40"	—	—
Case Size 3	8.80"	1.565"	2.15"	5.45"	—	—
CONFIGURATION C (PC CARD) — Overall height 2.11" Max.						
Case Size 1	—	0.35"	3.77"	4.50"	7.05"	7.70"
Case Size 2	—	1.13"	3.00"	5.40"	7.75"	8.40"
Case Size 3	—	1.46"	2.15"	5.45"	8.50"	9.15"

LH RESEARCH

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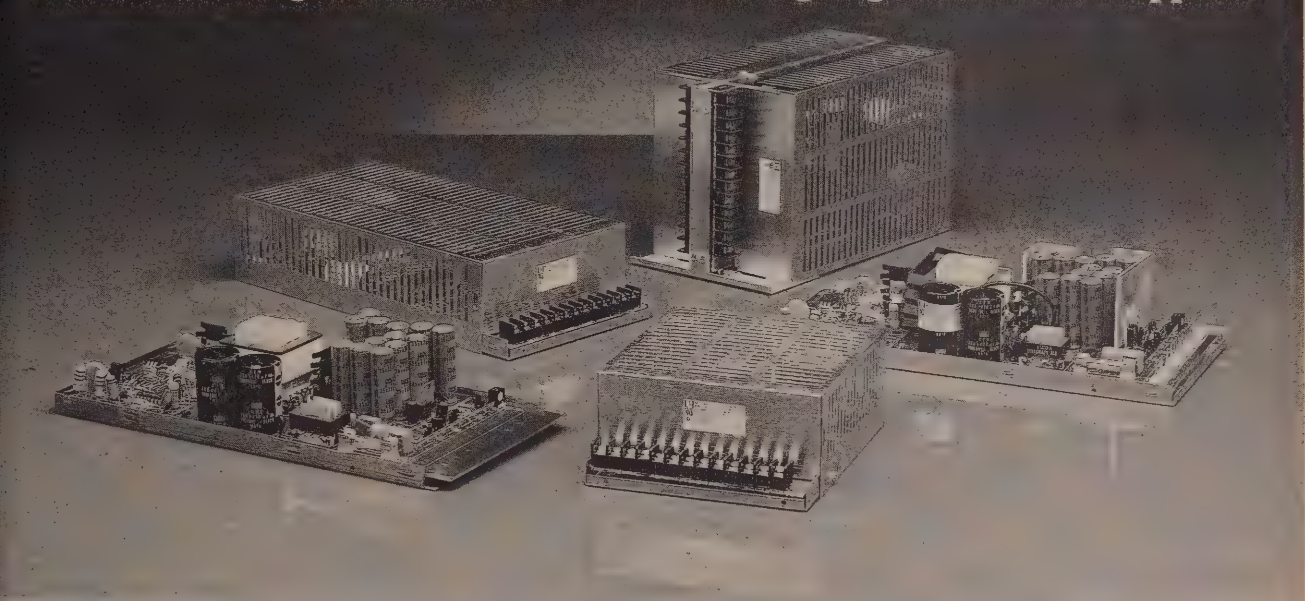
The World's Largest Manufacturer of Switching Regulated Power Supplies.



NEW! 50-240W Multi-Output Switchers that Meet All Safety & Emissions Specs, and Are Price-Competitive with Linears.

At last! A broad line of low power switchers that is priced competitively with linear power supplies.

Introducing the new International-MITE Series switchers. They offer you a broad selection of high performance power at low, low prices.

Available in three basic configurations, the new IM series is designed to meet or exceed the most stringent federal and international safety and emissions specifications. And every supply is made by LH Research; your best assurance of quality and reliability.

- State-of-the-Art MOSFET Circuitry.
- 130 Basic Models.
- Four Basic Terminations:
  - Barrier Strip
  - AMP/Molex
  - Edge Card Compatible
- Up to 8 Outputs Available.
- Three Basic Configurations:
  - Enclosed
  - Base Mounted
  - PC Board
- Designed to Meet UL, CSA, VDE and IEC Safety Specifications.
- 115V or 230V, User-Selectable.
- Designed to Meet VDE and FCC Emissions Specifications.
- Automatic Shutdown and Restart on AC Power Surge — Self-Protecting.
- Regulated & Semi-Regulated Versions.
- Off-the-Shelf Delivery.

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Full Range of Modifications to Standards. High Volume Customs.

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The Power Supplier.

LH Research, Inc., 14402 Franklin Avenue, Tustin, California 92680

LH Research Switcher

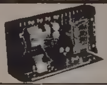
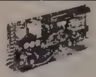
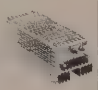
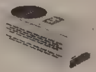
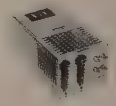
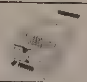
Teeny Tiny-MITE™
- Convection Cooled
- Full Line and Load Regulation
- Brownout Protection to 85 VAC
- Extended 20 msec Hold Up Time
- Designed to meet UL and CSA

Tiny-MITE
- Convection Cooled
- Unique Pin Fin Chassis—runs 23% cooler
- Flexible mounting capability
- Options include cover and DC input (selected Models)
- UL Recognized/CSA Approved

Little-MITE®[6]
Dyna-MITE®
- Convection Cooled
- AC and DC versions mechanically interchangeable
- Single motherboard for greater reliability
- Black anodized heatsinks for improved cooling
- UL Recognized/CSA Approved

Mighty-MITE
- Fan Cooled
- Up to 2.5 Watts per Cubic Inch
- Extended 20 msec Hold-up Time
- Cool running, 70% efficiency typical
- UL Recognized/CSA Approved

Super-MITE™
- Fan Cooled
- Brownout Protection to 85 VAC
- Exceptional 35 msec Hold-up Time
- Remote High and Low Margining
- UL Recognized/CSA Certified

TOTAL OUTPUT POWER	MAIN FRAME CURRENT	SINGLE 2-28VDC*	DUAL 2-28VDC*
100W	12A		**TTM22** 1.5A aux. 4.9"x 9"x 2.8"  **TTM32** 3A aux. 4.9"x 9"x 3.2"
150W	20A	**TM11**[1] — 4.0"x 9.5"x 2.5" 	**TM22** 8A aux. 5.2"x 12"x 2.8" 
175W	20A		
200W	40A	**TM41** — 5.2"x 12"x 2.5" 	
300W	50A	**LM11**[2] — 4"x 5"x 12.1" **DM11**[2] — 4"x 5"x 12.1" 	**LM22** 5A aux. 6.5"x 5"x 12.1" **DM22** 5A aux. 6.5"x 5"x 12.1" **LMX22** 9A aux. 6.5"x 5"x 12.1" **DMX22** 9A aux. 6.5"x 5"x 12.1"
350W	50A		**LM32** 10A aux. 4.1"x 7.5"x 15.9" **DM32** 10A aux. 4.1"x 7.5"x 15.9"
600W	100A	**LM41**[3] — 4.2"x 7.5"x 15.9" **DM41**[3] — 4.2"x 7.5"x 15.9" 	**LM52** 10A aux. 6"x 7.5"x 15.9" **DM52** 10A aux. 6"x 7.5"x 15.9" **LMX52** 16A aux. 6"x 7.5"x 15.9" **DMX52** 16A aux. 6"x 7.5"x 15.9"
375W	75A	**MM11** — 3.9"x 5"x 12.1" 	**MM22** 12A aux. 3.9"x 5"x 15.1" **MMX22** 18A aux. 3.9"x 5"x 15.1" **MMX72** 20A aux. 3"x 9.5"x 13.1"
600W	75A		**MM52**[4] — 5"x 6.5"x 13.4" 
750W	150A	**MM31** — 5"x 5"x 12.6" **SM71**[5] — 5"x 8"x 11" 	**MM42** 12A aux. 5"x 7"x 12.6" **MMX42** 20A aux. 5"x 7"x 12.6"
1000W	150A		**SM22** 18A aux. 6"x 8"x 11"
	200A	**SM11** — 5"x 8"x 11" 	
1500W	300A	**SM81** — 5"x 8"x 15" 	

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Selection Guide

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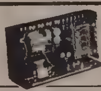
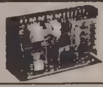
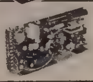
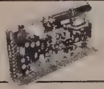
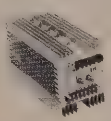
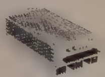
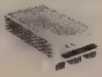
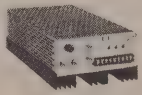
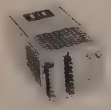
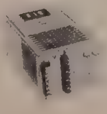
The Power Supplier.

TRIPLE 2-28VDC*	QUAD 2-28VDC*	5-7 2-28VDC*
TTM23 1.5A aux. 4.9"x 9"x 2.8"  **TTM33** 3A aux. 4.9"x 9"x 3.2"	**TTM24** 1.5A aux. 4.9"x 8"x 2.8" **TTM34** 3A aux. 4.9"x 9"x 3.2"	**TTM25** 2A aux. 4.1"x 9"x 2.8"  **TTM35** 3A aux. 4.1"x 9"x 3.2"
TM23 5A aux. 5.2"x 12"x 2.8" 		
TM33 8A aux. 6.2"x 13"x 2.8" 	**TM34** 5A aux. 6.2"x 13"x 2.8" 	
LM23 5A aux. 6.5"x 5"x 12.1" **DM23** 5A aux. 6.5"x 5"x 12.1" **LMX23** 9A aux. 6.5"x 5"x 12.1" **DMX23** 9A aux. 6.5"x 5"x 12.1"	**LM24** 5A aux. 6.5"x 5"x 12.1" **DM24** 5A aux. 6.5"x 5"x 12.1" 	**For FREE 52 page Switcher Catalog or additional information, call your local sales representative or LH RESEARCH, INC., 14402 Franklin Avenue, Tustin, CA 92680 Phone 714/730-0162**
LM33 10A aux. 4.1"x 7.5"x 15.9" **DM33** 10A aux. 4.1"x 7.5"x 15.9"  **DMX33** 10A aux. 4.1"x 7.5"x 15.9" **LMX33** 10A aux. 4.1"x 7.5"x 15.9"	**LM34** 10A aux. 4.1"x 7.5"x 15.9" **DM34** 10A aux. 4.1"x 7.5"x 14.9" 	**DMA33**[7] 10A aux. 4.1"x 7.5"x 15.9" **DMA34**[7] 10A aux. 4.1"x 7.5"x 15.9" 
LM53 10A aux. 6"x 7.5"x 15.9" **DM53** 10A aux. 6"x 7.5"x 15.9" **LMX53** 16A aux. 6"x 7.5"x 15.9" **DMX53** 16A aux. 6"x 7.5"x 15.9"	**LM54** 10A aux. 6"x 7.5"x 15.9" **DM54** 10A aux. 6"x 7.5"x 15.9" 	
MM23 10A aux. 3.9"x 5"x 15.1" **MM73** 12A aux. 3"x 9.5"x 13.1"	**MM24** 12A aux. 3.9"x 5"x 15.1" 	**MM25** 5A aux. 3.9"x 5"x 15.1"
MM63[4] 12A aux. 5"x 8.5"x 13.4" **MMX63**[4] 20A aux. 5"x 8.5"x 13.4"	**MM64**[4] 12A aux. 5"x 8.5"x 13.4" 	**MML45** 12A aux. 4.9"x 8.4"x 13.4" **MM65**[4] 12A aux. 5"x 8.5"x 13.4" **MML46** 12A aux. 4.9"x 8.4"x 13.4" **MML47** 12A aux. 4.9"x 8.4"x 13.4"
MM43 12A aux. 5"x 7"x 12.6" 	**MM44** 12A aux. 5"x 7"x 12.6" 	
SM23 10A aux. 6"x 8"x 11" **SMX23** 18A aux. 6"x 8"x 11"	**SM24** 10A aux. 6"x 8"x 11" 	

FOOTNOTES:

*Except TTM models (5-24 VDC only).

1 Maximum output 100 watts.

2 Maximum output 250 watts.

3 Maximum output 500 watts.

4 Contains two 375W mains (750W total). Total loading of each main plus all associated auxiliaries combined not to exceed 375W.

5 See SM11 for typical photo.

6 Little-Mite: 115 or 230 VAC, Dyna-Mite: 48 VDC input.

7 DMA33 and DMA34 have maximum of 4 outputs.

GENERAL NOTE:

Actual maximum auxiliary currents will vary depending on voltage levels.

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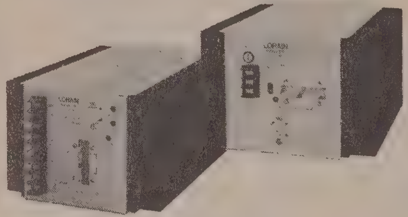
BRING IT TO THE POWER SUPPLY PROBLEM SOLVER!

PROBLEM X:

A 70°C AMBIENT FOR AN INDUSTRIAL METALS PROCESS.

SOLUTION:

THE HI-TEMP POWER SUPPLIES FROM LORAIN PRODUCTS.



The Problems Solvers at Lorain specified aluminum alloy (6063-T5) heat sinks with special black anodize to maximize heat transfer. Capacitors, IC's, and other devices are rated for high temperature operation. Our magnetics are designed with more volume than usual to reduce losses and provide better heat dissipation. No derating tricks. Full output power at the required ambient. Lorain can do it. Lorain has done it!

HI-TEMP SWITCHERS

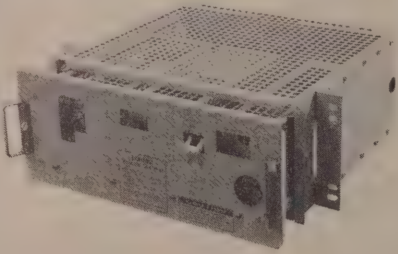
MODEL	OUTPUT
ES281AM	5V @ 45A, +12V @ 3A, −12V @ 2A
ES311F5	5V @ 60A
ES311X5	5V @ 60A (48 VDC input)
ES381CM	5V @ 60A, +15V @ 5A, −15V @ 1A

PROBLEM Y:

LOST MEMORIES DURING POWER FAILURES; SCRAMBLED DATA DUE TO LARGE MOTOR START-UPS OR CIRCUIT BREAKER TRIPS.

SOLUTION:

THE LORAIN COMPANION BACK-UP WITH BATTERY MODULE AND AUTO-RECHARGE.



Memory is lost during a power interrupt. Logic becomes illogical and data highways miss their exits. No more. Lorain's back up takes over — for seconds or minutes — until the power is restored to normal or allows for orderly shutdown. A built-in alarm tells you when it's working and it recharges itself when power returns. Easy plug-in installation in a rack or modules for direct mounting.

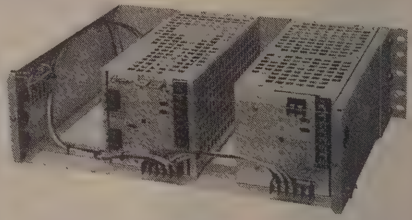
MODEL	OUTPUT
151H1A3U	5V @ 30A
151H3B3U	5V @ 15A, ±15V @ 2.5A
151F1G4C	24V @ 5A
301H1B3U	5V @ 60A

PROBLEM Z:

A PROCESS CONTROLLER NEEDS STANDARD VOLTAGES AT NON-STANDARD CURRENTS.

SOLUTION:

THE LORAIN COMPANION MULTIPLE OUTPUT POWER ASSEMBLY.



We select from our ®UL, FCC and CSA certified OEM output modules . . .

150 WATT

MODEL	OUTPUT
ES151F5	5V @ 30A
ES151F12	12V @ 12A
ES151F15	15V @ 10A
ES151F18	18V @ 8A
ES151F24	24V @ 6A
ES151F28	28V @ 5A

300 WATT

MODEL	OUTPUT
ES301F5	5V @ 60A
ES301F12	12V @ 25A
ES301F15	15V @ 20A
ES301F18	18V @ 16A
ES301F24	24V @ 12A
ES301F28	28V @ 10A

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MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1•B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

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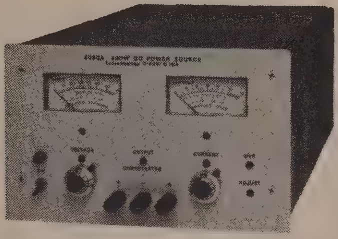
MODEL 4060A "CONSTA-POWER" EXPANDED RANGE POWER SOURCE



APPLICATIONS FOR LABORATORY-PRODUCTION-SYSTEMS

This 200 watt DC power source operates automatically in a constant-voltage or constant-current mode.

The precision MOSFET SWITCHING technology power source provides the rated 200W power over a 20 to 60 volt range, as shown in the figure. This "CONSTA-POWER" feature provides more current at lower voltages and, conversely higher voltage for a given current level.

The 4060A has available a maximum voltage of 60 volts and a maximum current of 10 amperes. Precision vernier control of voltage or current is by 10 turn potentiometers featuring a counting dial for accurate logging, and a lock level to prevent accidental mis-adjustment by production personnel. These "counting dials" also simplify returning to a given set of test conditions for laboratory or production applications.

OPERATIONAL FEATURES

- Adjustable overvoltage protection
- Fast remote programming speed
- Operation mode status indicators
- Current-locking 10 turn voltage and current controls providing high resolution
- High efficiency, light weight
- External programming of output voltage and current by voltage or resistance
- Auto-Parallel operation: up to 8 units can be connected for additional output current, controlled by one master unit
- Auto series operation of up to 4 units providing a maximum of 240 volts, controlled by one master unit.

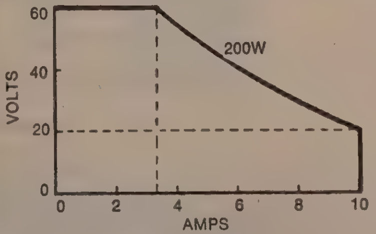
OPTION 01 — REMOTE PROGRAMMING THROUGH IEEE BUS

The 01 option makes possible digital control of the supply by a computer, calculator or other controllers. The digital format is bit parallel, byte serial ASCII coded format conforming to IEEE Standard 488-1978 (GPIB).

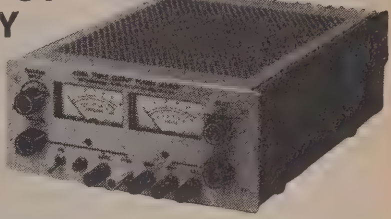
Basically, the 01 option is a digital-to-analog converter which programs either the output voltage or the output current. If both voltage and current programming is desired, either can be selected for BUS control and the remaining is programmed by an external analog voltage or resistance.

Option 01 can be installed at the factory or in the field.

DIMENSIONS: 8.5″ W x 5.25″ H x 15.6″ D. Net weight 12 lbs. Operation over 87-240 VAC, 48-63 Hz. Normal AC input 104-127 VAC, 48-63 Hz. 5.3A RMS max.



MODELS 4206A & 4218A TRIPLE OUTPUT LABORATORY POWER SOURCES



LuTechnology, Inc. introduces the Series 4200 triple output laboratory power sources.

TRIPLE OUTPUT POWER SOURCES FOR OPERATING PROTOTYPES

The LuTechnology Model 4206A and Model 4218A triple output laboratory power sources are valuable tools for developing operating prototypes utilizing digital and linear integrated circuits, microprocessors and displays.

High performance, small size, ease of operation make the Series 4200 power sources an asset to any laboratory environment. Measuring only 3½ inches (88.1 mm) high, 8¼ inches (208.7 mm) wide and 12½ inches (319.1 mm) deep, these 9½ pound (4.3 kg) units require very little space and are easy to handle.

DUAL TRACKING OUTPUTS

The 4200 Series power sources from LuTechnology combine 0 to ±20 volt tracking outputs rated at 0.5 amps with a single output rated at 0 to +6 volts at up to 2.5 amps in the 4206A and 0 to +18 volts at 1 amp in the 4218A.

OVERLOAD PROTECTION

The 4206A has a current foldback characteristic which provides further overload protection for the +6 volt output which reduces the maximum available current and minimizes semiconductor dissipation during overloads.

All outputs are protected against overload and short-circuit damage by fixed current limiting circuits. The +20 volt and −20 volt outputs in both models are limited to 0.55 amps and the +18 volt output in the 4218A is limited to 1.1 amps.

THE SERIES 4200 POWER SOURCE FEATURES

- Selectable line voltages. Standard 120 VAC, 100 VAC or 240 VAC. 47-63 Hz
- Convection cooled.
- Rack mounting kits optional
- Color: panel-light olive; cabinet — willow green.

ELECTRICAL CHARACTERISTICS

PARAMETER	SINGLE OUTPUT		DUAL TRACKING OUTPUTS
	4206A	4218A	4206A & 4218A
DC Output — Volts	0 to +6V	0 to +18V	0 to +20V & 0 to −20V
DC Output — Amps	2.5A at 6V decreasing to 1.0A at 0V	1.0A	0.5A per output
Tracking Agency	Not Applicable	Not Applicable	1% in fixed tracking ratio mode *
Resolution	20 mV	70 mV	70 mV
Output Impedance (Typical)	0.3 mΩ + 1 μH	0.3 mΩ + 1.5 μH	0.5 mΩ + 1.5 μH
Output Mode	Constant Voltage/ Current Foldback	Constant Voltage/ Current Limited	Constant Voltage/ Current Limited
PARD (Ripple & Noise)	0.35 mV rms, 20 Hz to 20 MHz 1.5 mV p-p, 20 Hz to 20 MHz		
Temperature Coefficient	(0.02% + 1 mV)/°C		
Drift (Stability)	0.1% + 5 mV		
Load Effect (Load Regulation)	0.01% + 2 mV		
Source Effect (Line Regulation)	0.01% + 2 mV		
Load Transient Recovery	50 μs to within 15 mV		
Output Voltage Overshoot	Output control setting ≥1V: No overshoot Output control setting <1V: Sum of output plus overshoot <1V		

* In variable tracking ratio mode, negative tracking output can be adjusted from less than 0.5V to within ±10% of the setting of the positive output.

ALL AMERICAN MADE

All LuTechnology products are warranted against defective materials and workmanship for a period of three years from date of shipment.

FOR MORE INFORMATION. PLEASE CONTACT CUSTOMER SERVICE AT (415) 887-1955. LuTechnology, Inc., 3516 Breakwater Court, Hayward, CA 94545.

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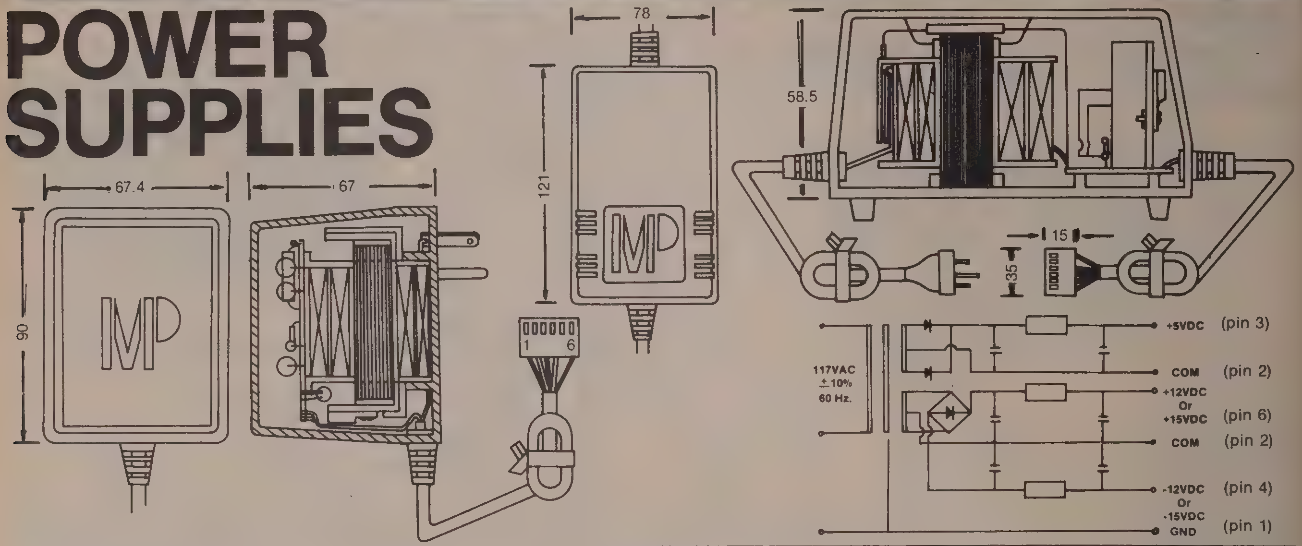
POWER SUPPLIES



CATALOG NO.	INPUT	OUTPUT 1	OUTPUT 2	OUTPUT 3
W5121000/1	117V RMS ± 10% 60 Hz	+5VDC 1A	+12VDC.150A	-12VDC.150A
T5121000/1		+5VDC 1A	+12VDC.310A	-12VDC.310A
W5151000/1		+5VDC 1A	+15VDC.120A	-15VDC.120A
T5151000/1		+5VDC 1A	+15VDC.250A	-15VDC.250A
W512750/1		+5VDC.750A	+12VDC.200A	-12VDC.200A
T512750/1		+5VDC.750A	+12VDC.360A	-12VDC.360A
W515750/1		+5VDC.750A	+15VDC.160A	-15VDC.160A
T515750/1		+5VDC.750A	+15VDC.290A	-15VDC.290A
W512500/1		+5VDC.500A	+12VDC.250A	-12VDC.250A
T512500/1		+5VDC.500A	+12VDC.415A	-12VDC.415A
W515500/1		+5VDC.500A	+15VDC.200A	-15VDC.200A
T515500/1		+5VDC.500A	+15VDC.330A	-15VDC.330A

FEATURES:

- Fully isolated outputs
- Meets UL and CSA requirements
- Overvoltage and overcurrent protected
- Plug-in convenience
- Multiple and single output to 12 watts
- Lightweight, tough impact resistant casing
- High efficiency
- One year warranty
- Short circuit protected
- Complies with FCC EMI regulations
- Regulated with low ripple
- Available with input and/or output cords and connector

BENEFITS:

- Reduce size and weight of product
- Reduce design time for product
- Eliminate power supply heat and need for other cooling devices
- Eliminate hazardous voltages
- Provide a tamper-proof power source

SPECIFICATIONS:

Input:	117V ± 10% 50/60 Hz
Regulation:	+5V 2% overall
Regulation:	+15V or +12V 5% overall
Regulation:	-15V or -12V 5% overall
Ripple:	50 MV P-P
Operating Temp:	0° C to +50° C
Storage Temp:	-55° C to 105° C
Operating Altitude:	15,000′

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-10 KV
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-23 KV
DC+
GND

Custom Design

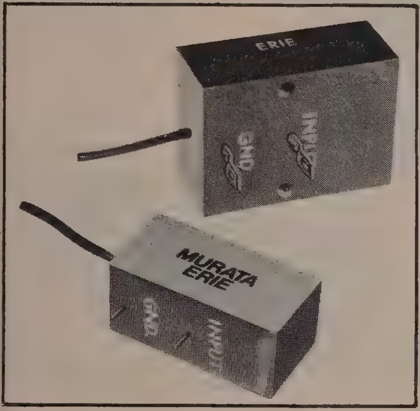
The design and fabrication of custom high voltage power supplies is a highly sophisticated specialty in which Murata Erie enjoys a high standard of excellence.

Miniaturization of power supplies is easily accomplished at Murata Erie through the use of its own miniature rectifiers, capacitors and specially designed series-bank capacitors. Industrial and military standards are met efficiently and economically, for high quality, low cost power supplies over a wide range of high voltage applications.

Murata Erie Sales Engineers are available at all times to discuss power supply requirements.

TYPICAL OPTIONAL FEATURES

- Positive or Negative Output Requirements
- Positive or Negative Input Requirements
- Multiple Outputs
- Isolated Output, with Separate Ground Return
- Inhibit Gate Input, to Turn Off the Power Supply
- Short-Circuit from Reverse Input Polarity
- Overvoltage Input Protection
- Output Current Limiting



Standard Designs

The MPS series of low cost miniature power supplies was originally designed for miniature CRT displays, but they have found a wide range of applications in the 1 KV to 5 KV range.

FEATURES

- PCB Mounting
- Miniature — Low Cost
- Ideal for many electro-optical applications

SPECIFICATIONS

Electrical

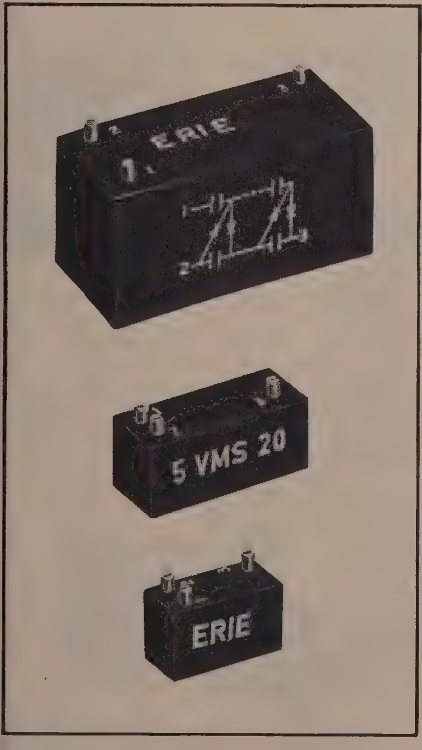
Input: See part number
Output Voltage: See part number
Output Current: To 100 μA
Load Regulation: <10%, 0 to full load
Ripple: <0.5% p-p, full load
Temp. Range: 0°C to 70°C (operating)

Mechanical

Size: .76″ x .76″ x 1.56″
Weight: <1.4 oz. (40 grams)
Terminations: PCB pins (input), 3″ lead (output)

Optional Features

— Negative input and/or output
— Isolated output (extra output ground PCB pin)
— Inhibit gate (extra PCB pin)



Multipliers

Murata Erie designs and manufactures a wide variety of custom designed high voltage multipliers. The units shown on this page are illustrative of the capabilities and expertise that Murata Erie can apply to meet your particular high voltage power supply specifications. Our application engineers will be happy to work with you to provide the best possible solution to your specific design and packaging application requirements.

FEATURES

- High Voltage Miniaturized Packaging
- Solder Post Terminations
- Positive or Negative Outputs Available
- Solid Encapsulation Eliminates Corona and Provides Environmental Protection

SPECIFICATIONS

Part Number	Max Input Voltage (p-p)	Max Output VDC ($I_L = 0$)	Dimensions (in Inches) L	W	H	Mtg. Centers (Inches)	Mtg. Pad Length (Inches)	Volume (Cubic Inches)
5VMS5	500	500	.75	.30	.40	1.13	1.48	.09
5VMS10	500	1000	.75	.30	.40	1.13	1.48	.09
5VMS15	500	1500	.75	.30	.40	1.13	1.48	.09
5VMS20	500	2000	.995	.395	.40	1.37	1.73	.15
15VMS15	1500	1500	1.00	.50	.50	1.37	1.73	.25
15VMS30	1500	3000	1.00	.50	.50	1.37	1.73	.25
15VMS45	1500	4500	1.00	.50	.50	1.37	1.73	.25
15VMS60	1500	6000	1.00	.50	.50	1.37	1.73	.25
15VMS75	1500	7500	1.125	.562	.515	1.49	1.85	.33
22VMS22	2200	2200	1.32	.69	.71	1.70	2.05	.65
22VMS44	2200	4400	1.32	.69	.71	1.70	2.05	.65
22VMS66	2200	6600	1.32	.69	.71	1.70	2.05	.65
22VMS88	2200	8800	1.32	.69	.71	1.70	2.05	.65
22VMS110	2200	11,000	1.55	.75	.75	1.91	2.28	.88
22VMS132	2200	13,200	1.32	.69	.71	1.70	2.05	.65

Temperature Range: −55°C to +85°C (Operating), −55°C to +125°C (Storage).
For use with frequencies over 30 KHz: add prefix "X" to the part number.
For negative output: add suffix "N" to the part number.

muRata ERiE
MURATA ERIE NORTH AMERICA, INC. 1148 Franklin Rd., S.E. Marietta, Georgia 30067 Tel: (404) 952-9777 Telex: 54-2329 TWX: 810-766-1531

NATIONAL POWER — TECHNOLOGY

2111 Howell Avenue, Anaheim, California 92806
(714) 937-1301 • TWX 910-591-1893

Send us your custom switcher specs

When your application calls for a custom power supply, get National Power Technology on the line, fast.

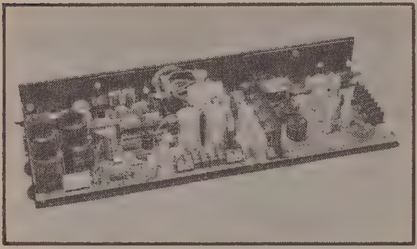
We have the full-service expertise to design and build the supply that meets your most critical requirements.

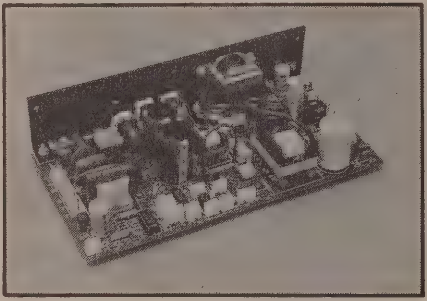
Our highly skilled engineering staff will thoroughly review your specification to ensure a reliable, cost-effective solution.

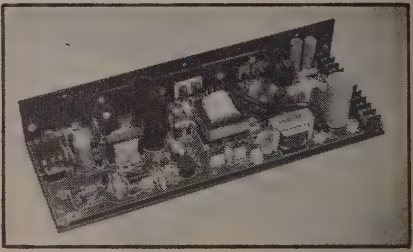
Manufacturing follows the latest, most up-to-date assembly techniques, with progressive workstations, state-of-the-art functional testing and 24-hour burn-in.

Quality is assured through multiple, on-line inspections and strict adherence to production test procedures developed from your specification. All units are carefully burned in under controlled temperature and loads; then, they are re-tested prior to shipment. Our typical MTBF rates exceed the most demanding industry standards.

So call us. Your custom power supply will arrive as specified. On time. And within budget.







Or check out these standard models

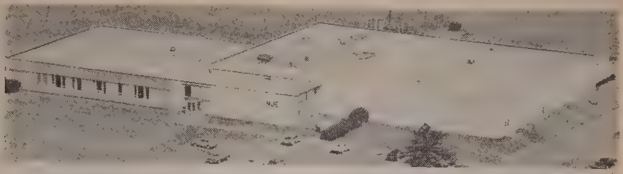
STANDARD SPECIFICATIONS: 65-400 WATTS

Input	90-132 VAC / 180-264 VAC, 47-440 Hz
Line regulation	0.2% all outputs
Load regulation	0.2% main output ±1% auxiliary outputs
Ripple & noise	1% P-P maximum, all outputs
Efficiency	68% typical
Operating temperature	50°C at full rated load. Derate to 50% of rated output at 70°C.
Temperature coefficient	0.02% per °C
Holdover storage	16 msec. minimum, 20 msec. typical
Transient response	Recovery to within 1% of nominal output voltage within 500 μSec. for a 25% load step.

All units have OVP, overload protection (all outputs) and remote sense on main outputs.

OUTPUT POWER	MODEL NO.	MAIN OUTPUT (V1) Vnom Imax	AUX #1 (V2) Vnom Imax	AUX #2 (V3) Vnom Imax	AUX #3 (V4) Vnom Imax	DIMENSIONS L" x W" x D"
65 WATTS	NQ065	+5V @ 7A	+5V @ 1A +12V @ 1A +15V @ 1A +24V @ 1A	−5V @ 1A −12V @ 1A −15V @ 1A	±5V @ 1A ±12V @ 1A ±15V @ 1A	8.1" x 4.5" x 2.4"
75 WATTS	NQ075	5V @ 8A	5V @ 1.5A 12V @ 1.5A 15V @ 1.5A 24V @ 1.5A	5V @ 1.5A 12V @ 1.5A 15V @ 1.5A 24V @ 1.5A	5V @ 3A 12V @ 3A 15V @ 3A 24V @ 3A	9.5" x 4.95" x 2.6"
100 WATTS	NT100	5V @ 12A	12V @ 5A	5V @ 3A 12V @ 3A 15V @ 3A 24V @ 3A		9.5" x 5.0" x 2.2"
130 WATTS	NQ130	5V @ 20A	5V @ 4A 12V @ 4A 15V @ 4A 24V @ 4A	5V @ 1.5A 12V @ 1.5A 15V @ 1.5A 24V @ 1.5A	5V @ 1.5A 12V @ 1.5A 15V @ 1.5A 24V @ 1.5A	10.5" x 5" x 2.5"
150 WATTS	NQ150	5V @ 20A	5V @ 3A 12V @ 3A 15V @ 3A 24V @ 3A	5V @ 3A 12V @ 3A 15V @ 3A 24V @ 3A	5V @ 4A 12V @ 4A 15V @ 4A 24V @ 4A	13.6" x 4.8" x 2.5"
200 WATTS	NQ200	5V @ 25A	5V @ 4A 12V @ 4A 15V @ 4A 24V @ 4A	5V @ 4A 12V @ 4A 15V @ 4A 24V @ 4A	5V @ 1.5A 12V @ 1.5A 15V @ 1.5A 24V @ 1.5A	15" x 4.95" x 2.75"
250 WATTS	NP250	5V @ 60A 12V @ 24A 15V @ 18A 24V @ 12A				10" x 6.6" x 2.75"
400 WATTS	NQ400	5V @ 50A	5V @ 5A 12V @ 5A 15V @ 5A 24V @ 5A	5V @ 5A 12V @ 5A 15V @ 5A 24V @ 5A	5V @ 5A 12V @ 5A 15V @ 5A 24V @ 5A	16.72" x 6.0" x 2.75"
400 WATTS	NT400	5V @ 50A	5V @ 8A 12V @ 8A 15V @ 8A	5V @ 8A 12V @ 8A 15V @ 8A		16.72" x 6.0" x 2.75"

NJE 5 YEAR WARRANTY ON ALL POWER SUPPLIES AGAINST DEFECTS IN MATERIAL OR WORKMANSHIP



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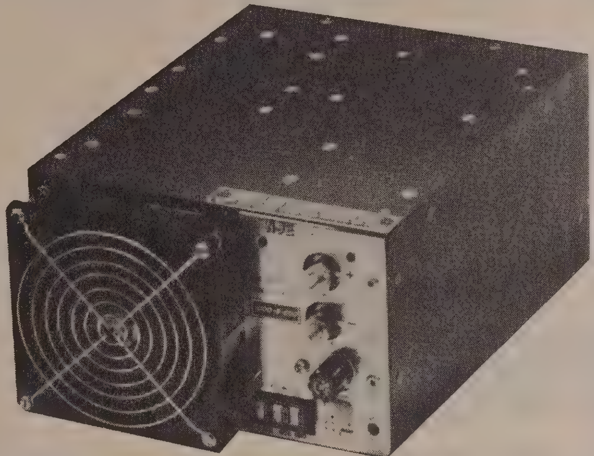
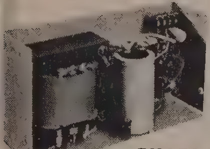
300-1728 WATT SINGLE OUTPUT SWITCHERS
ALL MODELS ARE IN TRUE INDUSTRY STANDARD 5"x8"x11"PACKAGE

- CSA Certified
- UL recognized
- 5 year warranty
- Expanded AC input range
- Inrush current limiting
- Up to 85% efficiency
- 0.2% line/load regulation
- OVP standard on all models
- Remote inhibit
- Power failure signal
- 20 msec hold-up time
- Reverse voltage and overload protection
- Remote sensing; loss of sense protection
- Thermal protection; automatic restart
- Full rated to 50° C, operation to 70° C
- Industry standard case size, 5"x8"x11" (11¼" with fan cover)

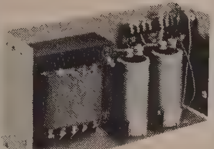


NEW
5¼" X 19" PANEL MOUNTED OPTION—CONSULT FACTORY

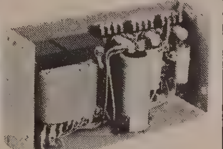
MODEL	VOLTS	AMPS	100 QTY. PRICES
MK750-2-150	2	150	$577.00
MK750-5-150	5	150	577.00
MK750-12-65	12	65	577.00
MK750-15-55	15	55	577.00
MK750-18-46	18	46	577.00
MK750-21-40	21	40	577.00
MK750-24-35	24	35	577.00
MK750-28-30	28	30	577.00
MK750-36-24	36	24	577.00
MK750-48-18	48	18	577.00
MK1000-2-200	2	200	733.00
MK1000-5-200	5	200	733.00
MK1000-12-87	12	87	733.00
MK1000-15-73	15	73	733.00
MK1000-18-61	18	61	733.00
MK1000-21-53	21	53	733.00
MK1000-24-47	24	47	733.00
MK1000-28-40	28	40	733.00
MK1000-36-33	36	33	733.00
MK1000-48-25	48	25	733.00
MK1500-2-300	2	300	920.00
MK1500-5-300	5	300	920.00
MK1500-12-130	12	130	920.00
MK1500-15-110	15	110	920.00
MK1500-18-92	18	92	920.00
MK1500-21-80	21	80	920.00
MK1500-24-70	24	70	920.00
MK1500-28-60	28	60	920.00
MK1500-36-48	36	48	920.00
MK1500-48-36	48	36	920.00



SINGLE



DUAL

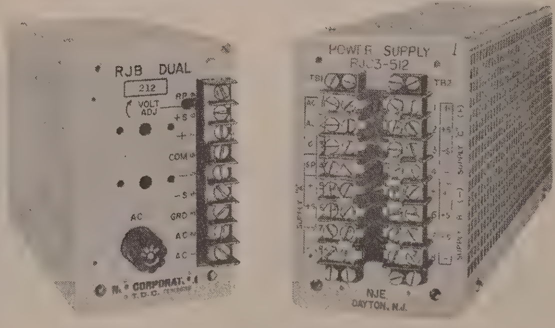


TRIPLE

- CSA Certified
- UL Recognized
- 5 year warranty
- Input: 115/230 VAC ± 10%, 47-440 Hz
- 0.1% line regulation for total line change
- 0.1% load regulation for 100% load change
- Adjustable OVP standard on 5 volt units, optional for others
- Adjustable foldback current limit
- Reverse voltage protection
- Remote sensing; loss of sense protection
- Quad output models also available
- Industry standard case sizes

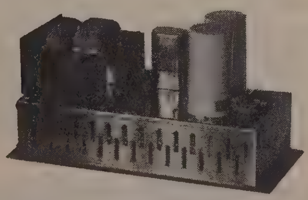
STANDARD & CUSTOM OPEN FRAME LINEARS

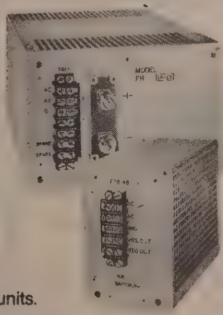
year version of industry standards.



FULLY-ENCLOSED STANDARD & CUSTOM LINEAR

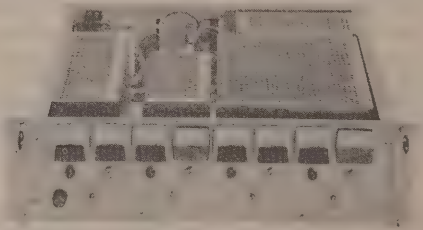
For critical applications requiring excellent regulation (.01% + 1mV), very low ripple and noise (1mV rms). Over 320 single and multiple output models; 2-500V/ .1-175A.





IGH QUALITY STANDARD
CUSTOM FERRORESONANT

or highest reliability. Efficiency, 65 to 0%; Highest MTBF per Watt. Up to 400V, 2000W units.



RACK MOUNTING ACCESSORIES

for systems using NJE power supplies and custom rack system capability.

FOR COMPLETE TECHNICAL DATA, CALL NJE TODAY. PHONE: 201-329-4611 • TWX: 710-480-5674

PRECISION CURRENT & VOLTAGE SOURCES

PRECISION CURRENT SOURCES

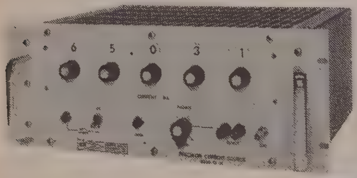
ACCURACIES TO 0.01% **STABILITIES TO 2 PPM**

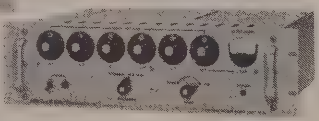
APPLICATIONS:

- Laboratory and Production Testing of Semiconductors, Gyros, Lamps, Meters, Thermistors, etc.
- Systems requiring a Precision Constant Current Setting such as X-ray Equipments, Electron Beam Welders, and Electron Beam Microscopes.

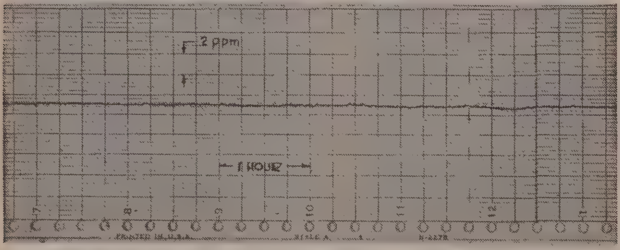
FEATURES:

- Digital In-Line Current Setting and Readout.
- 5 or 6 Decade Dividers for Setting to 1 Part in 100,000 or 1 Part in 1,000,000 of Full Scale.
- Uni- and Bi-Polar Models.
- Externally Programmable Models.
- External Modulation Capability.
- Automatic Protection Circuits.


CS-11


CS-31

Model	Current Range (mA)	Compliance Range (V)	Accuracy (%)	Stability (ppm)
CS-11	0 - 100	100	0.015	10
CS-12	0 - 1000	12.5	0.015	10
CS-13	0-5000	25	0.03	10
CS-14	0 - 10,000	12.5	0.03	10
CS-31	0 - 2000	60	0.01	5
CS-32	0- 2000	100	0.01	5
CS-111	0 - 500	250	0.1	30
CS-120	0 - 10	2000	2.0	1000
CS-151	0 - ±10	± 10	0.01	2
CS-152	0 - ±150	± 25	0.01	2
CS-153	0 - ±150	±100	0.01	2



DIGITAL PRECISION CURRENT, VOLTAGE AND VOLTAGE/CURRENT SOURCES

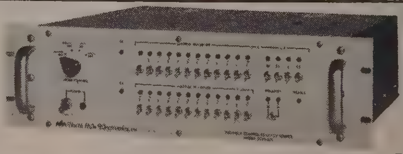
FOR COMPUTER-CONTROLLED AUTOMATIC TEST SYSTEMS

Output Selection:	4 digit BCD or 16 bit binary
Accuracy:	0.02% +½ LSB
Stability:	50 ppm
Regulation	
vs. line:	10 ppm
vs. load:	10 ppm
vs. temperature:	25 ppm/°C
Response Time:	100 μsec

CONSTANT VOLTAGE		
Model DVS-40	**Full-Scale Volts**	**Max. Amps.**
−010	10	2
−015	15	1.5
−020	20	1
−050	50	0.5
−075	75	0.3
−110	100	0.2

CONSTANT CURRENT		
Model	**Full-Scale Amps.**	**Max. Volts**
DCS-28—135	0.35	800
DCS-30—110	0.1	100
DCS-30—150	0.5	40
DCS-30—210	1	40
DCS-30—220	2	40
DCS-30—250	5	20
DCS-30—310	10	10

CONSTANT VOLTAGE/CURRENT		
Model	**Full-Scale Volts**	**Full-Scale Amps.**
DCVS-220	±100	±0.33
DCVS-222	±20	±2.0
DCVS-224	±40	±1.0


DCVS-220

PRECISION VOLTAGE/CURRENT SOURCES

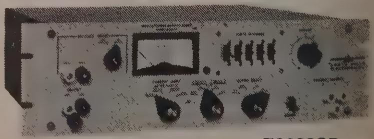
These highly stable and accurate precision sources can be operated in either constant voltage or constant current modes.

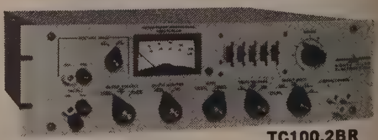
All models include such features as manual and remote programming, and output voltage regulation by either local or remote sensing.

Voltage and current outputs are selected on decade switches whose markings form an in-line digital readout.

Automatic protection limits output voltage and current to safe levels. No voltage or current overshoot occurs during turn-on or turn-off. A warning indicator alerts the operator if the actual output should differ from the dialed setting beyond the specified limits. Models TC-100.2BR and TC-602CR include a panel meter to monitor output current.

Model	Constant Voltage (V)	Constant Current (mA)	Accuracy (%)	Stability (ppm)	Decades
CVS-264	0 to ±100 @ 100 mA max.	0 to ±100 @ 100 V max.	0.1	25	5
TC-100.2 BR	0 to 100 @ 200 mA max.	0 to 100 @ 100 V max.	0.01	5	5 + vernier
TC-602 CR	0 to 60 @ 2 A max.	0 to 2000 @ 60 V max.	0.01	5	5 + vernier


TC602CR


TC100.2BR

North Hills Electronics, INC. GLEN COVE, N.Y. 11542 • 516-671-5700

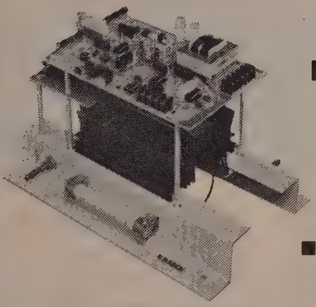
CUSTOM AC/DC POWER SUPPLIES
CONVERTERS, INVERTERS, CONTROLLERS

FROM WATTS TO MEGAWATTS

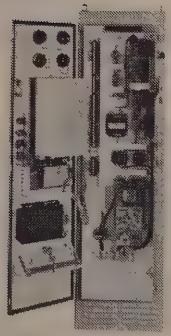
Products from NWL:
- AC/AC & AC/DC power supplies and controllers
- Silicon controlled rectifier (SCR) supplies
- High or low amperage and voltage
- Regulated: voltage, current and power
- Polarity reversing power supplies
- Transformers (oil, silicone, water-cooled, epoxy, dry)
- Reactors/chokes/filters

Products from
MEGATRAN ELECTRONIC POWER:
- Phase angle modular power controllers
- Phase angle firing circuits
- Voltage current regulators
- DC amplifiers (5 AMP + 25 AMP models)
- Current limiters
- Solid state alarm modules
- Diode stacks

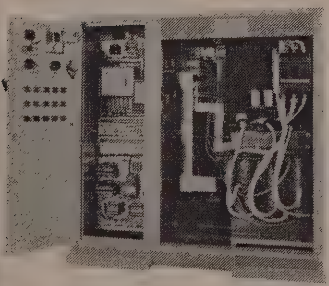
TYPICAL OF THE RANGE OF NWL CAPABILITIES. . .



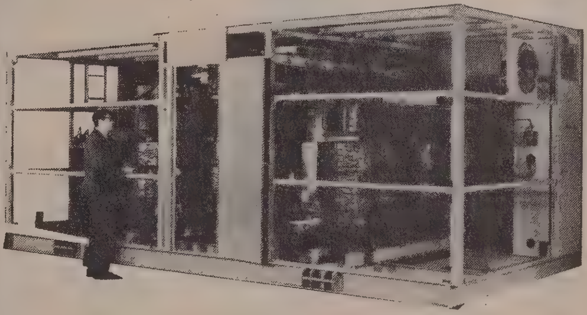
Phase Angle Modular Power Controllers
- AC line amperes: from 40 to 495
- "Linear" firing circuit
- RC network and MOV
- SCR's individually fused



Patented Microprocessor based SCR Controller with spark-rate logic for electrostatic precipitator application.



DC Power Supply for Super-conducting Magnets — 0-50 VDC @ 5000 Amps DC. Incorporates 12 pulse output, phase-angle controlled SCR's, L.C. Filter and programmable controller.



6.34 Megawatt Power Supply
- 20-ton unit for Compact Toroid Experiment (CTX). . .entirely produced at NWL's facilities. . .from micro-electronics, to magnetics, to fabrication and assembly, to full-load testing

MANUFACTURING RANGE

Up to 200 KV
1 ma to 50,000 AMP
4 Hz to 50 kHz
5 KVA to 6,000 KVA
Dry, Oil-Filled, Silicone Fluid-Filled, Water Cooled, and Epoxy Cast Units Available.

NWL also manufactures various types of power transformers, reactors, chokes. See our full page ad in the transformer section of EEM. Our engineers are available to assist you in selecting magnetic components to meet your application requirements.

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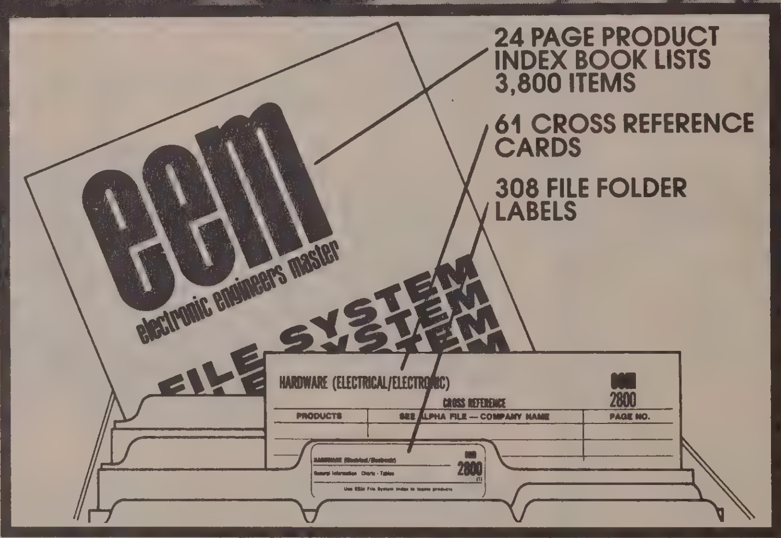
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FILE SYSTEM
HARDWARE (ELECTRICAL/ELECTRONIC)
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PRODUCTS
SEE ALPHA FILE — COMPANY NAME
PAGE NO.
2800

24 PAGE PRODUCT INDEX BOOK LISTS 3,800 ITEMS

61 CROSS REFERENCE CARDS

308 FILE FOLDER LABELS

GET ORGANIZED!

Are your catalog files organized? Can you find any given catalog in a matter of seconds? If your answer is "Yes," you probably already have the EEM File System. But, if you said "No," you really ought to look into this simple system. It will save hours of time and tons of aggravation.

The EEM File System was invented over twenty-five years ago to help people who specify, buy, or work with electronic products and equipment. It is upgraded on a constant basis to reflect the current state of the art. It's easy to use and easy to customize to your particular needs.

You say you want to file catalogs by type of product? That's easy to do with The System. But, what are you going to do when there are multiple products in one catalog? Take Mallory for example. There are all kinds of products in the Mallory Short Form Catalog. With the EEM File System all you do is file the catalog under "M" for Mallory and refer to it on all of the cross reference cards that apply.

There are thousands of EEM File Systems in everyday use in engineering and procurement offices all over the world. Shouldn't you be using this proven system?

The EEM File System is shipped in one neat package. The package contains everything you need to set up your very own filing system. Best of all, it's easy to get and very affordable. Send a check or money order for $25.00 and EEM will pay the postage and sales tax. If you must use a purchase order, please add $5.00 for postage and handling. An invoice will accompany your System.

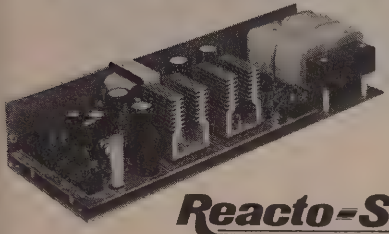
Don't waste any more time. Get organized now!

EEM FILE SYSTEM,
645 stewart ave., garden city, ny 11530

opt
INDUSTRIES INC.

300 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865 • (201) 454-2600 • TWX 510-235-2920

POWER SUPPLIES



- 200 Watt Multi-Output Switching Supply
- New Unique Design Concept
- Reserve Battery Back-up Built-in
- Over 100,000 Hrs MTBF — MIL-HDBK-217D
- Extremely Low Inrush Current
- Designed to Meet UL/CSA/VDE

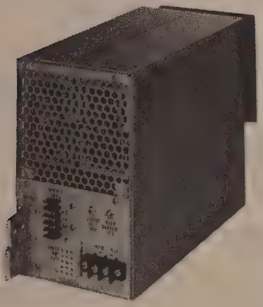
Reacto-Switcher™

ELECTRICAL CHARACTERISTICS

Parameter	Conditions	Limits
Overall Regulation	+5V output — 60% ±40% max. rated load change −5V output — 60% ±40% max. rated load change ±12V outputs — 60% ±40% max. rated load change	±1% max. ±10% max. ±8% max.
Adjustability	+5V Output	4.8V to 5.5V
Input Line Regulation	All outputs — 95 VAC ≤ Vin ≤ 130 VAC 190 VAC ≤ Vin ≤ 260 VAC	±0.15% typ. ±0.15% typ.
Noise and Ripple	Any output — Peak to Peak RMS	2% max. 0.5% max.
Input Voltage	At all rated load conditions	95 VAC to 130 VAC 190 VAC to 260 VAC User Selectable
Input Surge Current	Hot or cold start peak current	34A max.
Input Frequency Range	At all rated load and line conditions	47 Hz to 63 Hz
Efficiency	At maximum continuous output power, nominal line input	75% typ.
Hold up Time	Nominal input voltage, max. output power	16 mS min.
Overvoltage Protection Threshold	+5V output	6.25 ±0.75V
Mechanical Specification	3.00 x 5.25 x 15.0	

OUTPUT VOLTAGES AND MAXIMUM LOADS Note 10

Model Number	Output #1 Vnom Imax.	Output #2 Vnom Imax.	Output #3 Vnom Imax	Output #4 Vnom Imax.	Continuous Output Power Range
Px 3351	+5V @ 20A	−5V @ 3A	+12V @ 4A	−12V @ 4A	0-200W



1500 WATT, 100 KHz OFF-LINE SWITCHMODE POWER SUPPLY — MODEL SP-1500-XX

2.0 to 48.0 Volt Outputs (5.0 Volt, 300 Amperes, Specifications Typical)*

The SP-1500X series achieves 3.75 watts per cubic inch with standard forced air cooling. Reliability is in excess of 100,000 hours — MTBF in the commercial version.

This series is suitable for applications in high reliability main frame systems, telephone switchgear systems, and other systems requiring low to medium voltages. The basic converter topology used is also being applied in custom high voltage applications, such as S and K band TWT amplifiers and jammers.

ELECTRICAL CHARACTERISTICS

Output Voltage Range: 4.5V to 5.5V
Output Current: 300A
Output Overcurrent adj. range: 50A to 325A
Output Ripple, Max. rated Load current: 35 mv P-P Max.
Output Voltage Regulation: ±0.2 Max.
Holdup Time — Standard: ≥10 Msec
Float Battery Option Available
Overvoltage Protection
(Automatic reset or latch avail.): 6.0 ±25V
Short Circuit Current
(Automatic reset or latch avail): 0 Amps
Logic Inhibit (≤0.5V inhibits, ≥2.4V enables): TTL Compatible
Remote Sense (both output and return): 0.5V Max.
Polarity (Isolation: ±200 VDC to chassis): Floating Output
Overtemperature Flag (normally open): Sinks 5 ma Max.
Throughput Efficiency (full load): ≥ 80% (5V, 300A)
Soft Start: Linear Ramp.

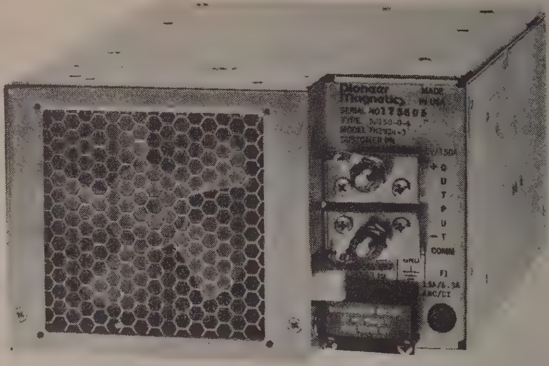
INPUT

30, 208-240 VAC, Standard: 167-265 VAC
230 VAC, Single Phase, Optional: 167-265 VAC
280 VDC, Optional: 210-325 VDC
Frequency Range: 47-500 Hz
Inrush Current: 30A Max.
Turn-on time with application of Primary Power: 1 sec
Turn-on time with Logic Enable: 200 msec
Size: 5″W x 8″H x 10″L
Weight: 14 pounds
UL, CSA recognized, designed to meet VDE
MTBE Commercial Version — ≥ 100,000 Hrs. Available in Military Version
Any output voltage from 2.0 to 48.0 volts available. Voltages below 5.0 volts limited to 350 Amperes output current.
XX Specifies output voltage (i.e., 5V-05/28V-28)

Pioneer Magnetics

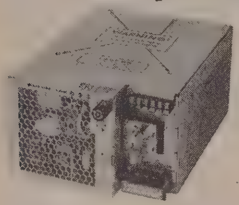
The best in high power switching supplies

You can choose from two complete lines of medium and high power switching power supplies. First, the Dependables: Setting industry standards for reliability and performance. Second, the International Line: Designed to meet tough international noise and safety specs.



THE INTERNATIONAL LINE

The Dependables



- Over 200,000 units in the field
- Demonstrated MTBF's as high as 115,000 hours
- UL recognized and CSA certified for data processing and office machines
- Exceptional dynamic load and line performance
- Full output rating at 50°C
- 60% to over 80% efficiency
- AC and DC input versions
- Optional battery backup

The International Line

- Designed to meet FCC and VDE level B conducted and radiated noise specs. (150 KHz to 30 MHz)
- Designed to meet IEC/VDE, UL and CSA safety standards
- Conservatively rated to provide full performance at maximum output
- Full output rating at 50°C
- 60% to over 80% efficient
- No main channel preload required to maintain secondary channel regulation
- Selectable input
- Optional low-voltage battery backup

Specifications

AC Input

Dependables Dedicated Input:
92-138 VRMs, 184-264 VRMS
47-63 Hz, Single Phase. Line Dips to 70-140 VRMS

International Line Selectable Input:
90-135 VRMS or 180-264 VRMS
47-63 Hz, Single Phase. Line Dips to 75 or 140 VAC

DC Input (Dependables Only)

22-34, 42-56 or 100-145 VDC

Total Error Band (Main Channel)

±2% including the following:

- Input line voltage variation over the specified range
- Static loads from 0 to 100%
- Ripple and switching spikes
- Temperature stability over full operating range of 0 — 50°C
- Drift for 8 hr. period following initial warmup

Dynamic Load Response

Dependables: Dynamic load steps (1A/μsec slew rate) 25% on 5 VDC units; up to 90% on higher voltage units: Included in 2% error band above. International Line: 2% maximum excursion on 5 VDC units with 25% load step (1A/μsec slew rate) at nominal input line; up to 90% load step on higher voltage units.

Overvoltage Protection

Standard on primary channel and optional on secondary channels.

Other Standard Features

- Overload protection (foldback-type)
- Overtemperature protection
- Reverse voltage protection
- Remote Sense
- AC Input Fuse
- No turn-on or turn-off overshoot
- Operating temperature: 0° to 50°; derates to 80% of rated power at 71°C
- Storage temperature: −55°C to +85°C

Standard Options

Standard Options Include:

- Power Fail Signal
- Logic On/Off
- Crowbar
- Remote Programming/Margining
- Local Margin Check
- Output Tolerance Status
- Output Power Good Signal
- OV Secondary Channels

Special Options Include:

- Precision parallel load sharing module
- Automatic battery backup and charging
- EMI filtering for FCC and VDE requirements

Custom options may be designed to your exact requirements.

Selection guide Single output power supplies

The Dependables

AC Input Model DC Input Model[4]	PM2496 PM2721	PM2497 PM2722	PM2500	PM2501	PM2502[3]
Maximum 5V Power (Watts)	300	750	1000	1500	2000
Output Voltage	Output Current	Output Current	Output Current	Output Current	Output Current
2	100A	200A	250A	325A	450A
3	60A	100A	—	—	450A
5	50A 60A —	100A 120A 150A	200A — —	300A — —	400A — —
12	25A	60A	85A	125A	180A
15	25A	50A	70A	100A	150A
24	16A	33A	40A	60A	90A
28	13A	27A	36A	55A	80A
48	8A	16A	20A	32A	47A
Size, Inches (cm)	5 x 8 x 11 (12.7 x 20.3 x 27.9)				5 x 16 x 11 (12.7 x 40.6 x 27.9)
Weight, Pounds (kg)	16 (7.3)	18 (8.2)	20 (9.1)	20 (9.1)	35 (15.9)

The International Line

PM2920	PM2921	PM2922	PM2923	PM2924	PM2925	PM2926
250	350	500	625	750	850	1000
Output Current	Output Current	Output Current	Output Current	Output Current	Output Current	Output Current
100A	125A	200A	—	—	—	—
60A	100A	150A	175A	200A	—	—
50A	70A	100A	125A	150A	170A	200A
21A	30A	42A	52A	60A	71A	85A
17A	25A	33A	42A	50A	57A	70A
10A	16A	21A	26A	33A	35A	40A
9A	13A	18A	22A	27A	30A	36A
5A	8A	10A	13A	16A	18A	20A
5 x 8 x 11 (12.7 x 20.3 x 27.9)[7]						
16 (7.3)						

Notes: [1] Other output voltage/current combinations are available.
[2] For 24 VDC input, check factory for output ratings.
[3] Requires 184-250 VRMS, 3-phase input.
[4] Consult factory for DC-input models of International line.

Multiple-output units

The Dependables

AC Input Model DC Input Model[9]		PM2675 PM2775	PM2676 PM2776	PM2677[1] PM2777	PM2678[1] PM2778	PM2680[1]
Maximum Total Output Power (Watts)		375	600	750	850	To 1500W Consult Factory
Main Channel[2]	DC Voltages Available	2, 3, 5, 12, 15, 24, 28, or 48 VDC				
	Max Power (Watts)[3]	250	500	600	750	875
	Max Current (Amps)	50	100	120	150	175
Channels 2, 3 & 4 Max Output Current[4] (Amps)	DC Voltages Available	2, 3, 5, 12, 15 VDC		24, 28 VDC		
	Low Current	6		3		
	Standard	12		6		
	High Current[5]	15		7.5		
Fifth Channel Output		Consult Factory				
Case Size, Inches (cm)		5 x 8 x 11 (12.7 x 20.3 x 27.9)[5]				
Weight, Pounds (kg)		20 (9.1)[8]				

The International Line

PM2970	PM2971	PM2972	PM2973	PM2974	PM1975[1]	PM2976
250	375	500	625	750	850	1000
2, 3, 12, 15, 24, 28, or 48 VDC						
200	300	400	500	600	750	750
40A	60A	80A	100A	120A	150A	150
2, 3, 12, 15, 24, 28 VDC					30, 48 VDC	
6A					3A	
12A					6A	
15A					7.5A	
Consult Factory						
5 x 8 x 11 (12.7 x 20.3 x 27.9)[7]						
18 (8.2)[8]						

NOTES:

[1] Brownout capability may be reduced for this model.
[2] Dependables multiple require 50W minimum load on main channel to maintain proper regulation on other channels. No minimum load required on International Line.
[3] For 2V and 3C channels, wattage is 60% of figure shown.
[4] Sum of all channel output wattages may not exceed maximum supply rating.
[5] For higher current ratings (up to 30A), consult factory.
[6] For 24 VDC-input model ratings, consult factory.
[7] Models PM2975 and 2976 measure 5 x 8 x 12¾ inches. (12.7 x 20.3 x 32.4 cm). For multiple outputs, allow ¾ inch for clearance of molex connectors.
[8] Models PM2975 and PM2976 weigh 20 lb. (9.1 kg).
[9] Consult factory for DC-input model of International Line.

Pioneer Magnetics

The most powerful name in switching supplies.

800-233-1745 (Outside California)
800-848-1745 (Within California)
1745 Berkeley St., Santa Monica, CA 90404
(213) 829-6751 TWX 910-343-6249

It is Pioneer Magnetic's policy to improve products as new techniques and components become available. We reserve the right to change specifications without prior notice.

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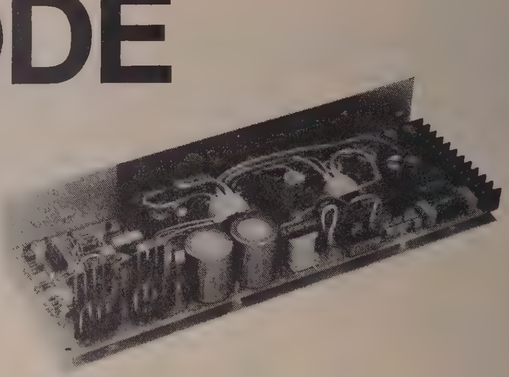
POWERCOMPONENTS *Power Components Company*
Subsidiary of Vanguard Electronics Co., Inc.
1480 W. 178th STREET, GARDENA, CA 90248 • (213) 323-8120 TWX 910-346-7067

SWITCH-MODE POWER SUPPLIES
FOR THE OEM MARKET



UNIQUE FEATURES

- Proportional Base Drive Circuitry
- Pulse Width Modulated by Single I.C. for Higher Reliability
- Soft Start Circuitry
- Built-in Line Filtering
- All Auxiliary Outputs Post Regulated
- 100% Burn-in at Full Load
- 100% Computer Tested
- UL/CSA/VDE/FCC

ELECTRICAL SPECIFICATIONS

Input: 90-132 VAC or 180-264 VAC 47-500 Hz

Output: See tables

Line Regulation: .1% of all outputs

Load Regulation: .1% or better on main output; 1% on auxiliary outputs

Ripple and Noise:
Main Output: Line harmonic frequency 50 mV pk-pk
Switching frequency 50 mV pk-pk
Noise and spikes 1% of V_o (see graph)
Auxiliary Outputs: Line harmonic frequency 5 mV pk-pk
Switching frequency and noise 1% max of V_o

Temperature: 0-70°C

Protection: Overvoltage protection — main output
Overload/short circuit protection — self recovery type
Over temperature — self recovery type with hysterisis

Holdup Time: 20 ms @ nominal line and full load

Overshoot: Turn On/Turn-Off — none

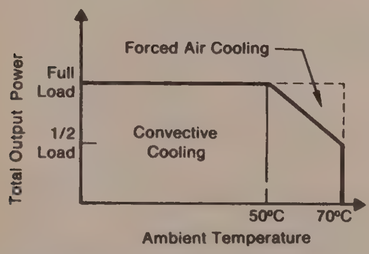
Remote Sensing: Main output

Efficiency: 70% minimum

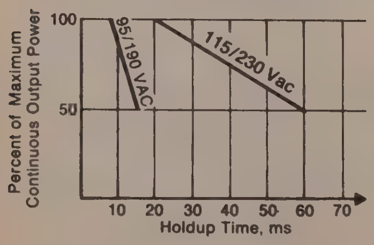
Power Fail Signal Monitors AC Line Voltage (Option):*
Power Good = Hi
Power Fail = Lo

EMI Enclosure (Option)*

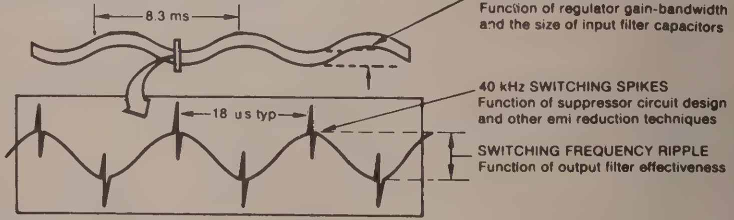
TYPICAL THERMAL CHARACTERISTICS



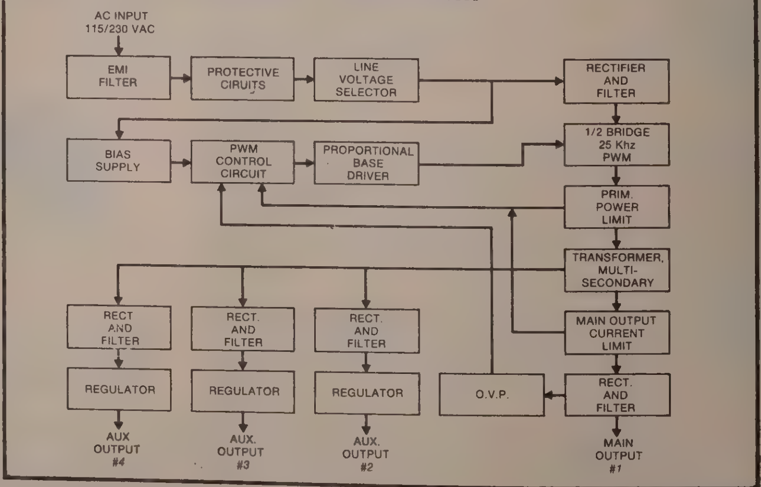
TYPICAL HOLDUP TIME AFTER LOSS OF INPUT POWER



RIPPLE AND NOISE


8.3 ms
18 us typ
120 Hz POWER LINE RIPPLE
Function of regulator gain-bandwidth and the size of input filter capacitors
40 kHz SWITCHING SPIKES
Function of suppressor circuit design and other emi reduction techniques
SWITCHING FREQUENCY RIPPLE
Function of output filter effectiveness

FUNCTIONAL BLOCK DIAGRAM


AC INPUT 115/230 VAC
EMI FILTER
PROTECTIVE CIRUITS
LINE VOLTAGE SELECTOR
RECTIFIER AND FILTER
BIAS SUPPLY
PWM CONTROL CIRCUIT
PROPORTIONAL BASE DRIVER
1/2 BRIDGE 25 Khz PWM
PRIM. POWER LIMIT
TRANSFORMER, MULTI-SECONDARY
MAIN OUTPUT CURRENT LIMIT
RECT AND FILTER
RECT. AND FILTER
RECT. AND FILTER
REGULATOR
REGULATOR
REGULATOR
O.V.P.
RECT. AND FILTER
AUX OUTPUT #4
AUX. OUTPUT #3
AUX. OUTPUT #2
MAIN OUTPUT #1

POWER COMPONENTS *Power Components Company*
Subsidiary of Vanguard Electronics Co., Inc.
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MODEL SELECTION TABLE

1600 SERIES
160 Watts Continuous Output Power
(Dimension: 2.5″ x 5″ x 14″)

Main Output	Output No. 2	Output No. 3	Output No. 4	Model No.
5V, 15A	15V, 3A	15V, 3A	5V, 3A	1644-001
5V, 15A	15V, 3A	15V, 3A	24V, 3A	1644-002
5V, 15A	12V, 3A	12V, 3A	5V, 3A	1644-003
5V, 15A	12V, 3A	12V, 3A	24V, 3A	1644-004
5V, 20A	15V, 1.5A	15V, 1.5A	5V, 1.5A	1641-001
5V, 20A	15V, 1.5A	15V, 1.5A	24V, 1.5A	1641-002
5V, 20A	12V, 1.5A	12V, 1.5A	5V, 1.5A	1641-003
5V, 20A	12V, 1.5A	12V, 1.5A	24V, 1.5A	1641-004
5V, 20A	15V, 3A	15V, 1.5A	5V, 1.5A	1642-001
5V, 20A	15V, 3A	15V, 1.5A	24V, 1.5A	1642-002
5V, 20A	12V, 3A	12V, 1.5A	5V, 1.5A	1642-003
5V, 20A	12V, 3A	12V, 3A	24V, 1.5A	1642-004
5V, 20A	15V, 3A	15V, 3A	5V, 1.5A	1643-001
5V, 20A	15V, 3A	15V, 3A	24V, 1.5A	1643-002
5V, 20A	12V, 3A	12V, 3A	5V, 1.5A	1643-003
5V, 20A	12V, 3A	12V, 3A	24V, 1.5A	1643-004

2200 SERIES
220 Watts Continuous Output Power
(Dimensions: 2.5″ x 5″ x 15″)

Main Output	Output No. 2	Output No. 3	Output No. 4	Model No.
5V, 20A	15V, 5A	15V, 5A	5V, 3A	2244-001
5V, 20A	15V, 5A	15V, 5A	24V, 3A	2244-002
5V, 20A	12V, 5A	12V, 5A	5V, 3A	2244-003
5V, 20A	12V, 5A	12V, 5A	24V, 3A	2244-004
5V, 30A	15V, 1.5A	15V, 1.5A	5V, 1.5A	2241-001
5V, 30A	15V, 1.5A	15V, 1.5A	24V, 1.5A	2241-002
5V, 30A	12V, 1.5A	12V, 1.5A	5V, 1.5A	2241-003
5V, 30A	12V, 1.5A	12V, 1.5A	24V, 1.5A	2241-004
5V, 30A	15V, 3A	15V, 1.5A	5V, 1.5A	2242-001
5V, 30A	15V, 3A	15V, 1.5A	24V, 1.5A	2242-002
5V, 30A	12V, 3A	12V, 1.5A	5V, 1.5A	2242-003
5V, 30A	12V, 3A	12V, 1.5A	24V, 1.5A	2242-004
5V, 30A	15V, 3A	15V, 3A	5V, 1.5A	2243-001
5V, 30A	15V, 3A	15V, 3A	24V, 1.5A	2243-002
5V, 30A	12V, 3A	12V, 3A	5V, 1.5A	2243-003
5V, 30A	12V, 3A	12V, 3A	24V, 1.5A	2243-004

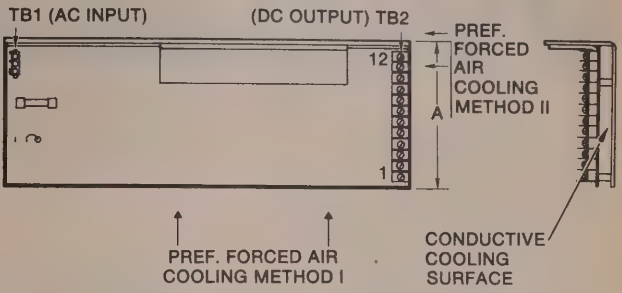
3300 SERIES
330 Watts Continuous Output Power
(Dimensions: 2.5″ x 5″ x 17″)

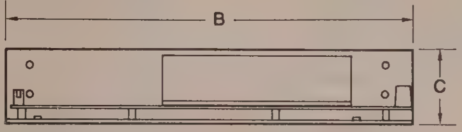
Main Output	Output No. 2	Output No. 3	Output No. 4	Model No.
5V, 35A	15V, 5A	15V, 5A	5V, 3A	3344-001
5V, 35A	15V, 5A	15V, 5A	24V, 5A	3344-002
5V, 35A	12V, 5A	12V, 5A	5V, 3A	3344-003
5V, 35A	12V, 5A	12V, 5A	24V, 3A	3344-004
5V, 40A	15V, 5A	15V, 5A	5V, 1.5A	3343-001
5V, 40A	15V, 5A	15V, 3A	24V, 1.5A	3343-002
5V, 40A	12V, 3A	12V, 3A	5V, 1.5A	3343-003
5V, 40A	12V, 3A	12V, 3A	24V, 1.5A	3343-004
5V, 50A	15V, 1.5A	15V, 1.5A	5V, 1.5A	3341-001
5V, 50A	15V, 1.5A	15V, 1.5A	24V, 1.5A	3341-002
5V, 50A	12V, 1.5A	12V, 1.5A	5V, 1.5A	3341-003
5V, 50A	12V, 1.5A	12V, 1.5A	24V, 1.5A	3341-004
5V, 50A	15V, 3A	15V, 1.5A	5V, 1.5A	3342-001
5V, 50A	15V, 3A	15V, 1.5A	24V, 1.5A	3342-002
5V, 50A	12V, 3A	12V, 1.5A	5V, 1.5A	3342-003
5V, 50A	12V, 3A	12V, 1.5A	24V, 1.5A	3342-004

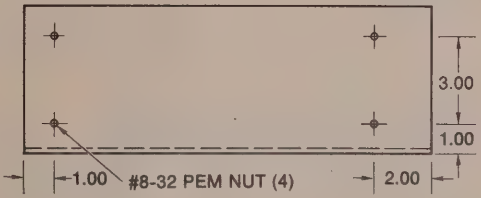
* For specific requirements contact your local representative or call factory direct to Ken Finley at (213) 323-8120.

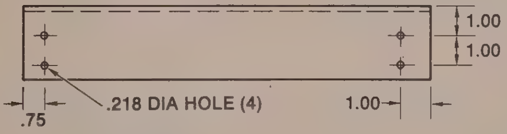
DELIVERY — STOCK TO 2 WEEKS, ALL MODELS!

MECHANICAL SPECIFICATIONS


TB1 (AC INPUT)
(DC OUTPUT) TB2
12
1
A
PREF. FORCED AIR COOLING METHOD II
PREF. FORCED AIR COOLING METHOD I
CONDUCTIVE COOLING SURFACE







TABLE

UNIT (INCH)

Model	A	B	C
1600	5.00	14.00	2.50
2200	5.00	15.00	2.50
3300	5.00	17.00	2.50

TERMINATION

TB1: AC INPUT MATING CONNECTOR 350766-1 AMP.
1 CHASSIS GND
2 LINE
3 NEUTRAL

TB2: DC OUTPUT TERMINAL BLOCK

1	+5 MAIN	7	$+V_o$ #2
2	+5 MAIN	8	$-V_o$ #2
3	+5 MAIN SENSE	9	$+V_o$ #3
4	+5 MAIN RETURN SENSE	10	$-V_o$ #3
5	+5 RETURN	11	$+V_o$ #4
6	+5 RETURN	12	$-V_o$ #4

* FOR REMOTE SENSING, DISCONNECT JUMPER STRAP AT TERMINAL BLOCK.

FOR LOCAL SENSING, REMOTE SENSE TERMINALS MAY BE USED FOR POWER OUTPUT.

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS-silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

THE QUIET ONES!

Outstanding performance parameters in a completely enclosed power supply, with extremely low noise (figure shown in tables). Line noise is limited by differential and common mode line filters.

More power per cubic inch in a power supply built to precision instrument standards.

FEATURES

- 168 Hour Burn-In
- Single/Triple/Quad Outputs
- 70% Typical Efficiency
- No 50/60 Hz Magnetics
- Built to meet VDE, FCC, UL, CSA and RFI
- 2 Year Warranty
- Soft Start
- Fused
- Surge Guard
- RFI Filters
- Brown-Out Protection
- Reverse Voltage Protection
- Sense Leads on Single Output Models
- Barrier Strip or Connector for Input/Output

PP30

30 WATT SWITCHER

SIZE: 5.45 L x 3.20 W x 1.56 H Inches

Model	Volts	Current (Amps)	Noise and Ripple mVP-P(max.)
03011	5	6	15
03031	12-15	2	30
03041	24-28	1	45
03051	43-53	.5	60
03061	5 ±12	3 .5 ea	20 5 ea
03071	5 ±15	3 .5 ea.	20 5 ea.
PP30C	Mating Connector		

ALSO AVAILABLE:

Open Frame Models.
200 Watts to 1000 Watts.
DC-DC converters.
Custom-built to your specifications.

PP60

60 WATT SWITCHER

SIZE: 5.94 L x 4.05 W x 1.56 H Inches

Model	Volts	Current (Amps)	Noise and Ripple mVP-P(max.)
05011	5	12	20
05031	12-15	4	30
05041	24-28	2	45
05051	43-53	1.2	60
05061	5 ±12	6 .5 ea	20 5 ea
05071	5 ±15	6 .5 ea.	20 5 ea.
PP60C	Mating Connector		

PP120

120 WATT SWITCHER

SIZE: 6.94 L x 4.67 W x 2.06 H Inches

Model	Volts	Current (Amps)	Noise and Ripple mVP-P(max.)
10011	5	20	25
10031	12-15	8	35
10041	24-28	4	50
10051	43-53	2.4	70
10061	5 ±12	10 1.2 ea	20 5 ea
10071	5 ±15	10 1.2 ea.	20 5 ea
10081	5 ±12 +12	6 1, .5 4/6*	20 5 ea 50
10091	5 ±12 +24	6 1, .5 2/3*	20 5 ea 50
PP120C	Mating Connector		

*Continuous Current/Peak Current

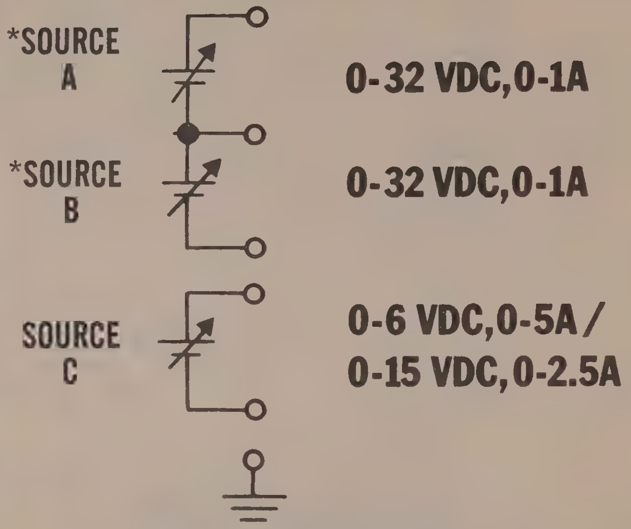
PRIME POWER

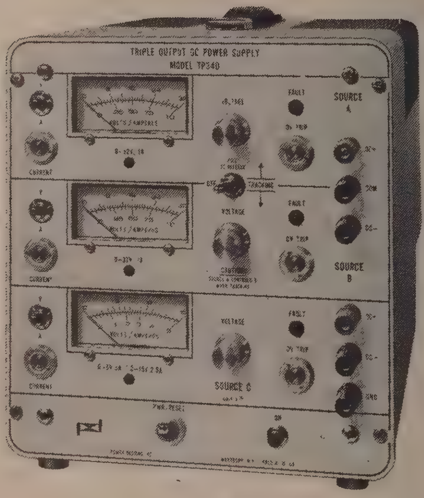
A PRIME TECHNOLOGY COMPANY

Twin Lakes Road • P.O. Box 185 • North Branford, CT 06471 • (203) 481-5721 • TWX 710-452-3092

TECHNICAL DATA

TRIPLE OUTPUT LABORATORY POWER SUPPLY T²L, COS/MOS & MICROPROCESSOR ANALOG APPLICATIONS





MODEL TP340

* Independent or 0.1% tracking with panel switch

NOISE & RIPPLE LESS THAN 1mV P-P

features:

- No derating. All outputs may be operated simultaneously at full capacity for a maximum of 100W.
- Outputs are floating with respect to each other and chassis except for an internal connection between one negative terminal and one positive terminal of the 32 volt sources. The two 32 volt sources may be operated in series to provide 0-64 VDC, 0-1A in any polarity with respect to chassis or left floating. The 0-6 VDC source may be operated in any polarity with respect to chassis or left floating.
- Independent adjustment of each output voltage utilizing 10-turn potentiometers with .05% resolution.
- Separate current limiting adjustment for each output.
- Separately adjustable overvoltage crowbars on each output. Overvoltage crowbars on 0-32V outputs trip simultaneously if either one operates.
- Three taut band suspension dual range meters individually selectable for voltage or current of each source.
- A "FAULT" indicator lamp on each output signals overload, short circuit, crowbar trip or current limit operation.
- Automatic voltage tracking of the 0-32 VDC sources to ±0.1% by means of a panel toggle switch. This switch is equipped with a locking lever to prevent accidental operation. Single potentiometer control of tracking outputs.
- Outputs may be shorted into each other in any polarity without damage.

electrical specifications:

Parameter	Sources A & B (1) 0-32V, 0-1A each output	Source C 0-6V, 0-5A 0-15V, 0-2.5V
INPUT:	105-125, 58-440 Hz (2)	
OUTPUT	0-32V, 0-1A	0-6V, 0-5A/ 0-15V, 0-2.5A
LOAD REGULATION:	0.01% +1 mV	0.01% +1 mV per amp
LINE REGULATION:	0.01% +0.5 mV	0.01% +0.5 mV
STABILITY (3)	0.02% +1 mV	0.02% +1 mV
RECOVERY TIME (4)	50 μs	100 μs
CURRENT LIMIT	2%-105% of rated current	2%-105% of rated current
TEMPERATURE	0-50°C	0-50°C
TEMP. COEFFICIENT	0.02% +300 μV/°C	0.02% +300 μV/°C
OV CROWBAR	Adj. 3-40V (5)	Adj. 3-20V
TRACKING	0.1% +10 mV by front panel switch	
VOLTAGE CONTROLS	10 turn potentiometer	10 turn potentiometer
FAULT INDICATORS	Lamp indicates short circuit and overload	Lamp indicates short circuit and overload
METERING	Dual range volt/ammeter	Dual range volt/ammeter

(1) Sources A & B have one common terminal
(2) Options available for 50 Hz and/or 220V operation
(3) 24 hours at constant line, load and ambient temperature
(4) To recover to within 15 mV of nominal for a 10%-100% load change
(5) Both sources will crowbar if either one operates

mechanical specifications:

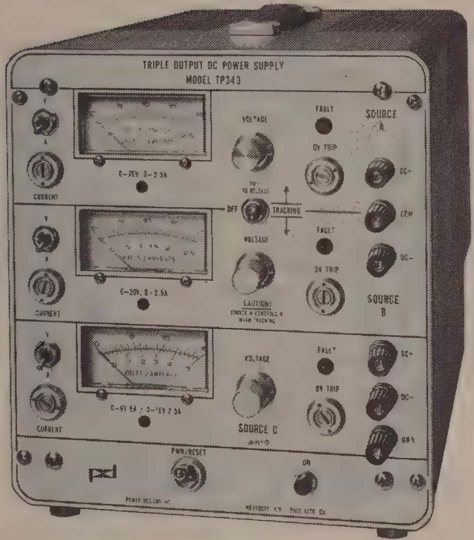
DIMENSIONS: 8¾" H x 7¾" W x 13½" D.
WEIGHT: 20 lbs.
FINISH: Natural anodized aluminum panels blue vinyl enamel cabinet, with carrying handle.

POWER DESIGNS

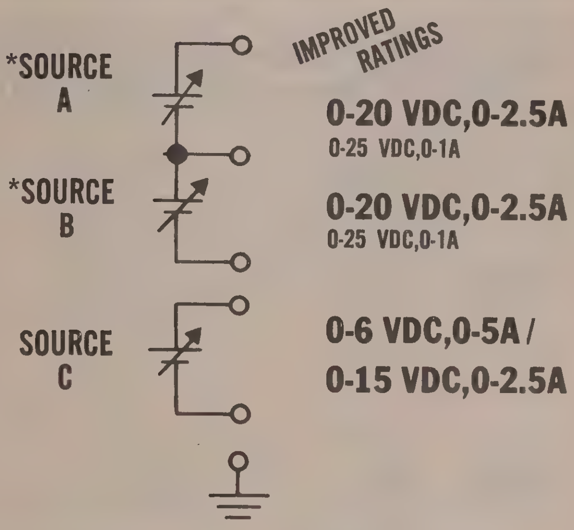
POWER DESIGNS INC.
1700 SHAMES DRIVE ■ WESTBURY, N.Y. 11590
Tel: 516-333-6200 ■ TWX 510-222-6561

TECHNICAL DATA

TRIPLE OUTPUT LABORATORY POWER SUPPLY T²L, COS/MOS & MICROPROCESSOR ANALOG APPLICATIONS



MODEL TP343A



* Independent or 0.1% tracking with panel switch

NOISE & RIPPLE LESS THAN 1mV P-P

electrical specifications:

Parameter	Sources A & B (1) 0-20V, 0-2.5A each output	Source C 0-6V, 0-5A 0-15V, 0-2.5A
INPUT:	105-125, 58-440 Hz	
OUTPUT	0-20V, 0-2.5A/0-25V, 0-1A	0-6V, 0-5A/ 0-15V, 0-2.5A
LOAD REGULATION:	0.01% +1 mV per amp	0.01% +1 mV per amp
LINE REGULATION:	0.01% +0.5 mV	0.01% +0.5 mV
STABILITY (2)	0.02% +1 mV	0.02% +1 mV
RECOVERY TIME (3)	100 μs	100 μs
CURRENT LIMIT	2%-105% of rated current	2%-105% of rated current
TEMPERATURE	0-50°C	0-50°C
TEMP. COEFFICIENT	0.02% +300 μV/°C	0.02% +300 μV/°C
OV CROWBAR	Adj. 3-30V (4)	Adj. 3-20V
TRACKING	0.1% +10 mV by front panel switch	
VOLTAGE CONTROLS	10 turn potentiometer	10 turn potentiometer
FAULT INDICATORS	Lamp indicates short circuit and overload	Lamp indicates short circuit and overload
METERING	Dual range volt/ammeter	Dual range volt/ammeter

(1) Sources A & B have one common terminal
(2) 24 hours at constant line, load and ambient temperature
(3) To recover to within 15 mV on nominal for a 10%-100% load change
(4) Both sources will crowbar if either one operates

mechanical specifications:

DIMENSIONS: 8¾" H x 7¾" W x 13½" D.
WEIGHT: 20 lbs.
FINISH: Natural anodized aluminum panel; blue vinyl enamel cabinet, with carrying handle.

features:

- No derating. All outputs may be operated simultaneously at full capacity for a maximum of 140W.
- Outputs are floating with respect to each other and chassis except for an internal connection between one negative terminal and one positive terminal of the 20 volt sources. The two 20 volt sources may be operated in series to provide 0-40 VDC, 0-2.5A in any polarity with respect to chassis or left floating. The 0-15V source may be operated in any polarity with respect to chassis or left floating.
- Independent adjustment of each output voltage utilizing 10-turn potentiometers with .05% resolution.
- Separate current limiting adjustment for each output.
- Separately adjustable overvoltage crowbars on each output. Overvoltage crowbars on 0-20V outputs trip simultaneoulsy if either one operates.
- Three taut band suspension dual range meters individually selectable for voltage or current of each source.
- A "FAULT" indicator lamp on each output signals overload, short circuit, crowbar trip or current limit operation.
- Automatic voltage tracking of the 0-20 VDC sources to ±0.1% by means of a panel toggle switch. This switch is equipped with a locking lever to prevent accidental operation. Single potentiometer control of tracking outputs.
- Outputs may be shorted into each other in any polarity without damage.

POWER DESIGNS

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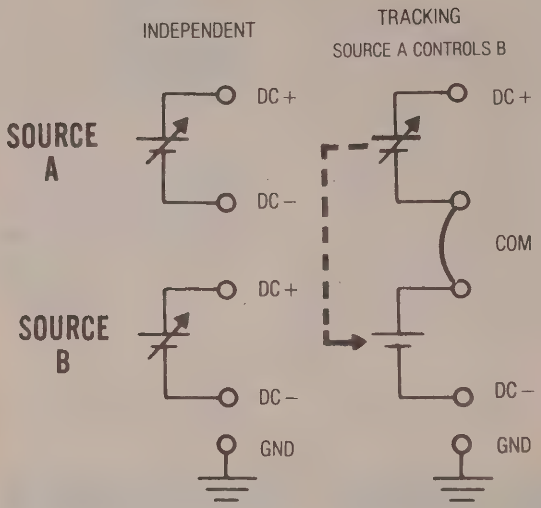
CONSTANT VOLTAGE/CONSTANT CURRENT DUAL OUTPUT DC POWER SUPPLY

MODEL TW347

TWO SOURCES, INDEPENDENT OR TRACKING* EACH 0-16 VDC, 0-5A/0-18 VDC, 0-3A



*10mV with panel switch

MODEL TW347 DUAL OUTPUT DC POWER SUPPLY
CONSTANT VOLTAGE/CONSTANT CURRENT
SOURCE A
SOURCE B

features:

Each independent source in this general-purpose instrument can supply either a constant-voltage output with continuously adjustable current limiting or a constant-current output with continuously adjustable voltage compliance. The source will automatically transfer from voltage regulation to current regulation or vice versa at any predetermined operating point.

No derating. Outputs may be operated simultaneously at full capacity for a maximum of 160W.

When operated in the independent mode, the outputs are floating with respect to each other and chassis. In the tracking mode there is an internal connection between both outputs and source B tracks source A within 10 mV.

The two sources can be operated in series to provide 0-32V, 0-5A / 0-36V, 0-3A either as a constant voltage or constant current source.

Two taut band suspension dual range meters individually selectable for voltage or current.

parameter:	electrical specifications:	
INPUT	105-125V RMS 57-63 Hz; 350 W; 3.5A RMS	
OUTPUT	Dual, each source 0-16VDC 0-5A/0-18VDC 0-3A	
	CONSTANT VOLTAGE	CONSTANT CURRENT
LOAD REGULATION	0.01% +1m V per Amp.	0.2 mA per Volt
LINE REGULATION	0.01% +0.5mV	1 mA
RIPPLE	2 mV p.t.p.	10 mA p.t.p.
TEMP. COEFFICIENT	0.02% +0.3 mV/°C	0.02% +0.5 mA/°C
STABILITY(1)	0.02% +0.5 mV	0.05% +2 mA
TRACKING	10 mV	
RECOVERY TIME(1)	100 μS	
OV CROWBAR	Adj. 3-22V	
CONTROLS	0-18.5V 10 turn potentiometer 5 mV resolution	0.1-5.25A 10 turn potentiometer 1.5 mA resolution
TEMPERATURE	0-30°C. Current linearly derated to 4A at 50°C	
LAMP INDICATORS	LED indicators for independent or tracking modes; LED indicator for constant current operation and overload.	
METERING	Dual range Volt/Ammeter, with selector switch	

	mechanical specifications:
DIMENSIONS	8¾″ H x 7¾″ W x 13½″ D
WEIGHT	24 lbs.
FINISH	Natural anodized aluminum panel; blue vinyl enamel cabinet, with carrying handle

(1) 24 hours at constant line, load and ambient temperature

(2) To recover to within 30 mV of nominal for a 10%-100% load change

POWER DESIGNS

POWER DESIGNS INC.

1700 SHAMES DRIVE ■ WESTBURY, N.Y. 11590
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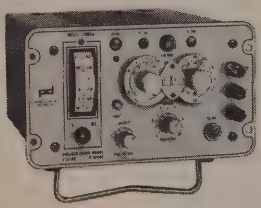
CALIBRATED POWER SOURCES

CALIBRATED, STABLE, LOW NOISE, HIGH RESOLUTION POWER SOURCES FOR PRECISION LABORATORY APPLICATIONS

0-20 VDC/0-2A

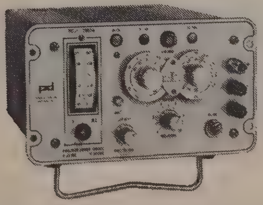
MODEL 2020B



• Two dual concentric switches (four decades) and a calibrated potentiometer provide digital readout to five significant figures • A toggle switch provides readout to six figures above 10 volts • Last-place potentiometer has 10 μV resolution • Source impedance is less than two milliohms at DC, less than 0.5 ohms at 1 MHz • Recovery time is less than 50 microseconds to return within a 20 millivolt band of the programmed voltage for an 80% load change • Front and rear access terminals.

• Better than 0.1% calibration accuracy • 10 PPM plus 100 μV stability for 8 hours • Temperature coefficient better than 10 PPM or 50 μV per °C • Self-restoring overload and short circuit protection with adjustable current limit control and flashing limit indicator • 100 μV maximum peak-to-peak ripple • Solid silver decade switch contacts • 100 hour minimum burn-in prior to calibration • Individual calibration data furnished with each unit • Provisions for remote sensing and remote resistance programming at 1000 Ω/volt • Voltage or current metering.

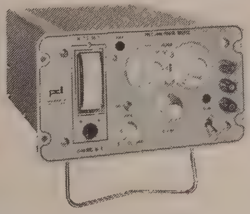
0-20 VDC/0-1A



• Two dual concentric switches (four decades) and a calibrated potentiometer provide digital readout to five significant figures • A toggle switch provides readout to six figures above 10 volts • Last-place potentiometer has 10 μV resolution • Source impedance is less than two milliohms at DC, less than 0.5 ohms at 1 MHz • Recovery time is less than 50 microseconds to return within a 20 μV band of the programmed voltage for an 80% load change • Front and rear access terminals.

MODEL 2010

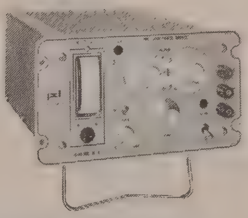
0-20 VDC, 2 A/0-50 VDC, 1A



• Two dual concentric switches (4 decades) and a calibrated 10-turn potentiometer provide calibrated readout to six significant figures • Dual range with automatic switchover • UNIPLY® provides 2 amperes output to 20 VDC and 1.0 ampere output to 50 VDC • Sixth place interpolation with 10 microvolts resolution • Electrical performance equivalent to Model 2010 and 2020B.

MODEL 5020

0-100 VDC/0-500 mA



• Two dual concentric switches (4 decades) and a calibrated 10-turn potentiometer provide calibrated readout to six significant figures • Sixth place interpolation with 10 microvolts resolution • Electrical performance equivalent to Model 2010 and 2020B.

MODEL C500

Model	Range Volts	Current Amps	Regulation Line/Load	Max. Ripple Pk to Pk	Stability	TC Per °C	Size	Special Features
2010	0-20	0-1.0	.0005% +100 μV	100 μV	.001% +100 μV/8 hrs.	.001% or 50 μV	8⅜ x 4¾ x 8 27/32	4 decade readout with .1% accuracy. Continuous current limiting with panel pushbutton setting. Remote programmable 1000Ω/V.
2020B	0-20	0-2	.0005% +100 μV	100 μV	.001% +100 μV/8 hrs.	.001% or 50 μV	8⅜ x 4¾ x 11 9/16	4 decade readout with .1% accuracy. Remote programmable 1000Ω/V.
5020	0-20/50	0-2A/1A	.001% +100 μV	100 μV	.001% +100 μV/8 hrs.	.001% or 50 μV	8⅜ x 4¾ x 11 9/16	Same as 2020B
C500	0 100/0.5A	0-0.5	.001% +100 μV	250 μV	.001% +100 μV/8 hrs.	.001% or 50 μV	8⅜ x 4¾ x 11 9/16	4 decade readout with 0.1% accuracy. Continuous current limiting. Remote programmable 1000Ω/V.

POWER DESIGNS

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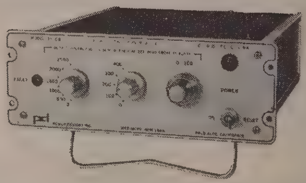
TECHNICAL DATA

PHOTOMULTIPLIER HIGH VOLTAGE POWER SOURCES

MODEL 3K10B

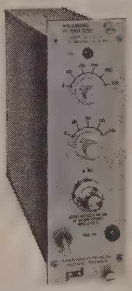
10-3000 VDC 0-10 MA



The Model 3K10B is a calibrated laboratory power source ideally suited for photomultiplier and similar applications requiring high stability, low noise and superior regulation.
Noise & Ripple: 3 mV P-P to 15 MHz • Reg. .001%

MODEL AEC-315B

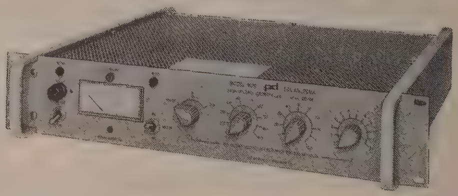
10-3000 VDC • 0-10 MA



The Model AEC-315B is a calibrated high voltage power supply designed for use with photomultiplier systems requiring a high stability, low noise, well regulated power source. It mounts in a standard 8¾" NIM Bin per AEC Specification TID-20893 (Rev. 3) "Standard Nuclear Instrument Modules" and occupies two module widths. It is supplied with an integral three-wire power cord and NEMA plug and does not use the NIM Bin Power Supply.
Noise & Ripple: 3 mV P-P to 15 MHz • Reg. .001%

MODEL 2K20

1-2012 VDC • 0-20 MA



The Model 2K20 is a calibrated high voltage power source designed to supply closely regulated DC to critical circuits where stability, low noise and reliability are of prime consideration.
Noise & Ripple: Less than 300 μV rms • Reg. .001% or 10 PPM

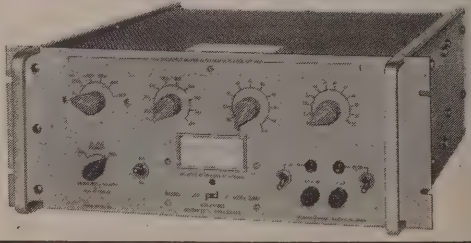
MODEL 1570

1-3012 VDC • 0-40 MA

The Model 1570 is a calibrated, high voltage power source designed to supply closely regulated DC to critical circuits where stability, low noise and reliability are prime considerations.
Ripple. 1 mV P-P • Reg. 0.001% +2 mV

MODEL 1556B

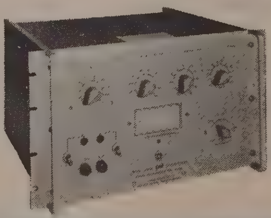
10-6021 VDC • 0-20 MA



The Model 1556B is a calibrated high voltage power source designed to supply closely regulated DC with unusually low noise and ripple content. This instrument reflects field experience with more than 5000 units in field service for six years.
Ripple & Noise: 1 mV P-P Max 30 MHz • Reg. 0.001% +2 mV

MODEL 1543A

10-10,021 VDC • 0-10 MA



The Model 1543A is a calibrated high voltage power source designed to supply closely regulated DC with unusually low noise and ripple content. This instrument reflects field experience with more than 5000 units in field service for six years.
Ripple & Noise: 5 mV P-P Max. 30 MHz • Reg. 0.001% +2 mV

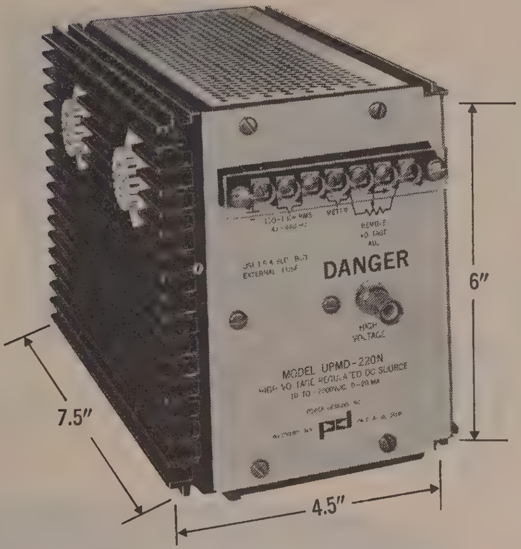
POWER DESIGNS

POWER DESIGNS INC.

1700 SHAMES DRIVE ■ WESTBURY, N.Y. 11590
Tel: 516-333-6200 ■ TWX 510-222-6561

TECHNICAL DATA

MODULAR HIGH VOLTAGE PRECISION POWER SOURCES POWER SUPPLIES FOR NUCLEAR INSTRUMENTATION



The UPMD series of high voltage sources are compact modular units designed for critical applications where high stability, low noise and flexibility of output voltage control are important considerations.
They are ideal for such applications as photomultipliers, Geiger-Muller counters, proportional detectors, CRT sources, high resolution video displays, electrostatic lenses, etc.

MODELS UPMD N/P 10-2000VDC • 0-20MA
MODELS UPMD N/P 10-3000VDC • 0-10MA
MODELS UPMD N/P 10-5000VDC • 0-5MA

MODEL	*OUTPUT POLARITY	VOLTAGE RANGE	OUTPUT CURRENT
UPMD-220N	NEGATIVE	10-2000 VDC	0-20 MA
UPMD-220P	POSITIVE	10-2000 VDC	0-20 MA
UPMD-310N	NEGATIVE	10-3000 VDC	0-10 MA
UPMD-310P	POSITIVE	10-3000 VDC	0-10 MA
UPMD-550N	NEGATIVE	10-5000 VDC	0-5 MA
UPMD-550P	POSITIVE	10-5000 VDC	0-5 MA

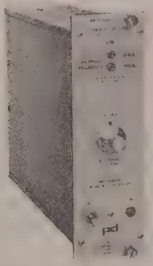
* Corresponding output terminal connected to chassis.

OPTIONS
1. Remote voltage programming (specify ratio)
2. Isolation up to 250V above chassis

MODEL AEC-5000B

The Model AEC-5000 is a high voltage calibrated modular power source for operation with high resolution solid state detectors where low noise and stability is a prime consideration.

The instrument occupies two module widths in a standard NIM Bin per AEC Specification TID-20893 (Rev. 3) for "Standard Nuclear Instrument Modules" and operates from the ±24 VDC sources provided by the Bin power supply.

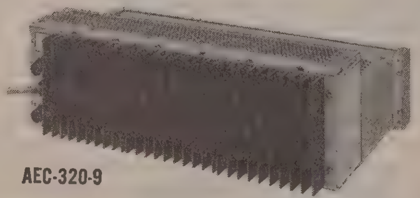


AEC-5000B

MODEL AEC-320-9

The Model AEC-320-9 power supply is a ±6, ±12, and ±24 VDC source designed to mount at the rear of a modular instrumentation bin (NIM) it exceeds the requirements of the AEC Report TID 20893 (Rev. 4) for a type V-H supply.

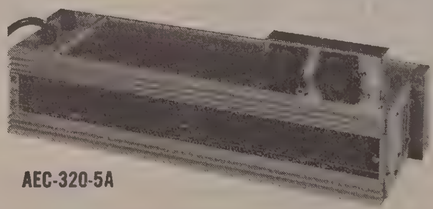
1.2.1 INPUT
103-129V (117V nominal) 47-65 Hz 350 watts or
206-258V (234V nominal) 47-65 Hz 350 watts
1.2.2 OUTPUT
+24 VDC, 0-1.5 Amperes current shared
−24 VDC, 0-1.5 Amperes current shared
Total combined currents must not exceed 2 Amperes
+12 VDC, 0-3A current shared
−12 VDC, 0-3A current shared
Total combined currents must not exceed 4 Amperes
+6 VDC, 0-10A current shared
−6 VDC, 0-10A current shared
Total combined currents must not exceed 10 Amperes
117 VAC, 0-.5A
Total power output capability
150 VA with equally shared currents
130 VA with unbalanced currents



AEC-320-9

MODEL AEC-320-5A

This is a 12/24V power supply that will be mounted at the rear of a modular instrumentation bin in accordance with AEC Report TID-20893. Due to the restricted volume available and high operational reliability required, only the highest quality components are be employed. All semiconductor components are constructed of hermetically sealed silicon units. The supply is designed with a life expectancy of at least 5 years. No internal fans or blowers. The supply is in accordance with Drawing ND-515 and is constructed and wired as shown for System 1b in Drawing ND-522.



AEC-320-5A

Four output power sources for mounting at the rear of a nuclear instrument BIN per TID-20893.
+ and −24 VDC, 0-1A
+ and −12 VDC, 0-2A
Total Power output 96W.
Combined output under 120W

COMPLETE DETAILED SPECIFICATIONS ON REQUEST

POWER DESIGNS
POWER DESIGNS INC.
1700 SHAMES DRIVE ■ WESTBURY, N.Y. 11590
Tel: 516-333-6200 ■ TWX 510-222-6561

TECHNICAL DATA

LABORATORY BENCH POWER SOURCES

MODEL 6050C

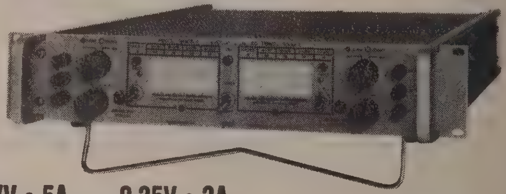
• Constant Voltage/Constant Current. Automatic crossover mode lights indicate operation characteristic. Alternating mode lights indicate operation beyond source capability. • UNIPLY Technique provides increased output current at lower output voltages. • Power Supply provides increased output power at input line voltages above 105 VAC. • A 3 Digit Display permits reading of the output voltage with an accuracy of 0.1V + 1 digit or output current with an accuracy of 20 MA +1 digit and a resolution of 10 MA. • Panel Adjustable overvoltage crowbar operates to short circuit the Power Supply output in less than 200 microseconds at any output voltage above a present level. • Ten-turn potentiometers for voltage and current control with increased resolution. • Positive or Negative output polarity. • Front or Rear access terminals. • Remote Sensing or Remote Programming.
Ripple & Noise: 5 mV P-P Max 30 MHZ • Reg. 0.001% +2 mV

0-6V • 5A
0-15V • 3A
0-30V • 2A
0-60V • 1A
with Digital Panel Meter

MODEL 6050C

MODEL TW6050A

Each independent source in this instrument is a voltage regulated DC power supply that functionally replaces four conventional units. The Model TW6050A utilizes a regulator technique* trademarked UNIPLY® which provides regulator efficiencies and operating features not obtainable with common dissipative type circuits.
Ripple & Noise: Less than 1 mV P-P • Line Reg. 0.01% +1 mV
Load Reg. 0.01% +1 mV for 0-100% changes in rated output current



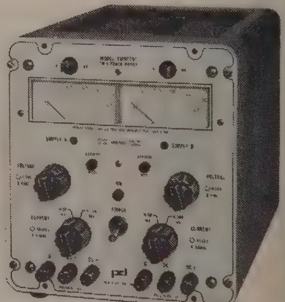
0-7V • 5A **0-25V • 2A**
0-15V • 3A **0-60V • 1A**
EACH SOURCE

MODEL TW6050A

MODEL TW5005W

The Model TW5005W is a general-purpose power supply containing two sources in a single case. Each source may be operated in either the constant-voltage or constant-current mode and the two sources may be operated independently or combined in a series or parallel arrangement. Transfer from constant-voltage to constant-current or vice versa is automatic.
A single ten-turn potentiometer in each source provides voltage control with 15 millivolt resolution. Each source has two current ranges, 50 or 500 ma. When the current range is switched, the current limit adjustment and the meter range are automatically transferred.
Ripple & Noise: Less than 1 mV P-P
Reg. Better than 0.005% +1 mV at front & rear access terminals

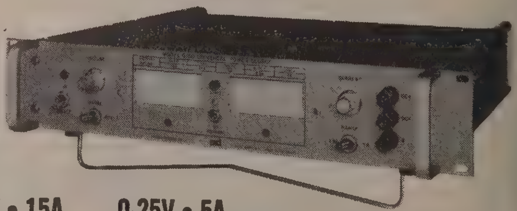
0-50 VDC • 0-500 MA
EACH SOURCE



MODEL TW5005W

MODEL 6150

The Model 6150 offers more than twice the output power of the Model 6050A, with essentially the same electrical characteristics. Two taut-band meters are provided. Each instrument has two voltage and current ranges 0-6V/0-60V, 0-1.5A/0-15A. Ranges switch automatically with range switch setting. The Model 6150 mounts in a 19" rack, measures 3½"H x 16"D and is suitable for laboratory bench operation as well.
Ripple & Noise:Less than 1 mV P-P • Line Reg. 0.01% +1 mV
Load Reg. 0.01% +1 mV for 0-100% changes in rated output current



0-6V • 15A **0-25V • 5A**
0-15V • 7.5A **0-60V • 2A**

MODEL 6150

POWER DESIGNS
POWER DESIGNS INC.
1700 SHAMES DRIVE ▪ WESTBURY, N.Y. 11590
Tel: 516-333-6200 ▪ TWX 510-222-6561

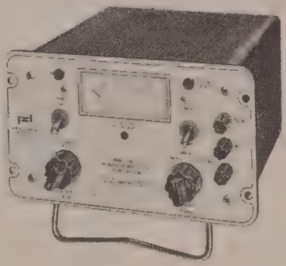
TECHNICAL DATA

LABORATORY BENCH POWER SUPPLIES

• Laboratory workhorse power supplies with over 15 years of field history • Continuously adjustable voltage, current or current limiting controls with limiter or current mode indicating lamps • No FRI generating SCR or switching circuits • Modular package construction suitable for bench or rack mounting • Processed under a "Predictable Reliability" Program for 5-year minimum operation to published specifications. This program features: Avalanche-controlled rectifiers 100% stress testing of transistors, pre-aged zener references with maximum I/F noise specifications, computer grade capacitors, low T.C. 1% tin oxide resistors in critical circuits, etc. • Suppliers are burned in under full load for a minimum of 50 hours prior to test.

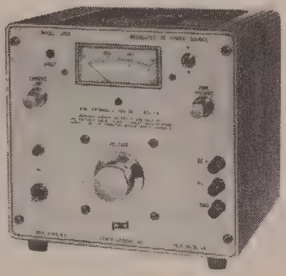
MODEL 6010

0-20V • 1.5A
0-50V • 1.0A
0-60V • 0.5A



MODEL 5030

0-33 VDC
0-3A
0-50 VDC
0-2A



Model	Voltage	Current Amps	Voltage Regulation	Current Regulation	Ripple Pk to Pk mV
6010△	0-20/ 50/60	1.5/ 1.0/ 0.5	0.005% +1 mV	better than 500μA	1.0
5030	0-33/50	3/2	0.01% +1 mV/A	adj. current limit	3
5015T	0-50	0-1.5	+0.01% or 3 mV†	current limit only	1.0
4050	*0-40	0-5.0	0.01% +3 mV	current limit only	3.0
1120S	0-120	0-1.0	0.01% +3 mV	current limit only	1.0

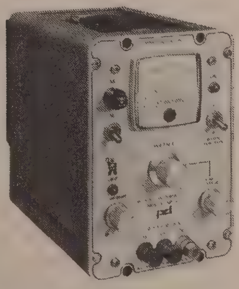
† Whichever is greater * Built-in adj. overvoltage crowbar
△ Uniply® Technqiue. Model 6050C uses digital display.

MODEL 4050

0-40 VDC
0-5A

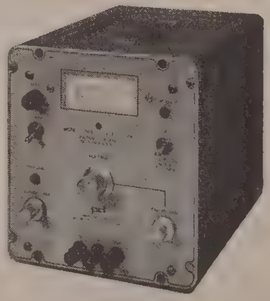
MODEL 5015T

0-50 VDC
0-1.5A



MODEL 1120S

0-120 VDC
0-1.0A



POWER DESIGNS

POWER DESIGNS INC.
1700 SHAMES DRIVE ■ WESTBURY, N.Y. 11590
Tel: 516-333-6200 ■ TWX 510-222-6561

QUICK SELECTION: DC-DC CONVERTERS

1 WATT SINGLE & DUAL OUTPUT

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	PRICE
401	5 VDC±10%	5 VDC±5%	100 mA	$34.00
402	5 VDC±10%	12 VDC±5%	80 mA	34.00
403	5 VDC±10%	15 VDC±5%	65 mA	34.00
404	12 VDC±10%	5 VDC±5%	100 mA	34.00
405	12 VDC±10%	12 VDC±5%	80 mA	34.00
406	12 VDC±10%	15 VDC±5%	65 mA	34.00
407	5 VDC±10%	±12 VDC±5%	±40 mA	38.00
408	5 VDC±10%	±15 VDC±5%	±33 mA	38.00
409	12 VDC±10%	±12 VDC±5%	±40 mA	38.00
410	12 VDC±10%	±15 VDC±5%	±33 mA	38.00
411	5 VDC±10%	±12 VDC±5%	±40 mA	38.00
412	5 VDC±10%	±15 VDC±5%	±33 mA	38.00
413	12 VDC±10%	±12 VDC±5%	±40 mA	38.00
414	12 VDC±10%	±15 VDC±5%	±33 mA	38.00
501	5 VDC±10%	5 VDC±5%	100 mA	39.00
502	5 VDC±10%	12 VDC±5%	80 mA	39.00
503	5 VDC±10%	15 VDC±5%	65 mA	39.00
504	5 VDC±10%	±12 VDC±5%	80 mA	46.00
505	5 VDC±10%	±15 VDC±5%	65 mA	46.00
506	12 VDC±10%	5 VDC±5%	100 mA	39.00
507	12 VDC±10%	12 VDC±5%	80 mA	39.00
508	12 VDC±10%	15 VDC±5%	65 mA	39.00
509	12 VDC±10%	±12 VDC±5%	80 mA	46.00
510	12 VDC±10%	±15 VDC±5%	65 mA	46.00

2 WATT SINGLE & DUAL OUTPUT

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	PRICE
421	5 VDC±10%	5 VDC±5%	250 mA	$42.00
422	5 VDC±10%	12 VDC±5%	160 mA	42.00
423	5 VDC±10%	15 VDC±5%	130 mA	42.00
424	12 VDC±10%	5 VDC±5%	250 mA	42.00
425	12 VDC±10%	12 VDC±5%	160 mA	42.00
426	12 VDC±10%	15 VDC±5%	130 mA	42.00
427	5 VDC±10%	±12 VDC±5%	±80 mA	46.50
428	5 VDC±10%	±15 VDC±5%	±65 mA	46.50
429	12 VDC±10%	±12 VDC±5%	±80 mA	46.50
430	12 VDC±10%	±15 VDC±5%	±65 mA	46.50
431	5 VDC±10%	±12 VDC±5%	±80 mA	46.50
432	5 VDC±10%	±15 VDC±5%	±65 mA	46.50
433	12 VDC±10%	±12 VDC±5%	±80 mA	46.50
434	12 VDC±10%	±15 VDC±5%	±65 mA	46.50
441	5 VDC±10%	5 VDC±5%	250 mA	$44.00
442	5 VDC±10%	12 VDC±5%	160 mA	44.00
443	5 VDC±10%	15 VDC±5%	130 mA	44.00
444	12 VDC±10%	5 VDC±5%	250 mA	44.00
445	12 VDC±10%	12 VDC±5%	160 mA	44.00
446	12 VDC±10%	15 VDC±5%	130 mA	44.00
447	5 VDC±10%	±12 VDC±5%	±80 mA	48.50
448	5 VDC±10%	±15 VDC±5%	±65 mA	48.50
449	12 VDC±10%	±12 VDC±5%	±80 mA	48.50
450	12 VDC±10%	±15 VDC±5%	±65 mA	48.50

2 WATT SINGLE & DUAL OUTPUT

	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	PRICE
NEW	461	5 VDC±10%	5 VDC±4%	250 mA	$52.00
NEW	462	5 VDC±10%	8 VDC±4%	250 mA	52.00
NEW	463	5 VDC±10%	12 VDC±4%	160 mA	52.00
NEW	464	5 VDC±10%	15 VDC±4%	130 mA	52.00
NEW	465	5 VDC±10%	21 VDC±4%	95 mA	52.00
NEW	466	12 VDC±16%	5 VDC±4%	250 mA	52.00
NEW	467	12 VDC±16%	8 VDC±4%	250 mA	52.00
NEW	468	12 VDC±16%	12 VDC±4%	160 mA	52.00
NEW	469	12 VDC±16%	15 VDC±4%	130 mA	52.00
NEW	470	12 VDC±16%	21 VDC±4%	95 mA	52.00
NEW	471	24 VDC±16%	5 VDC±4%	250 mA	52.00
NEW	472	24 VDC±16%	8 VDC±4%	250 mA	52.00
NEW	473	24 VDC±16%	12 VDC±4%	160 mA	52.00
NEW	474	24 VDC±16%	15 VDC±4%	130 mA	52.00
NEW	475	24 VDC±16%	21 VDC±4%	95 mA	52.00
NEW	476	28 VDC±14%	5 VDC±4%	250 mA	52.00
NEW	477	28 VDC±14%	8 VDC±4%	250 mA	52.00
NEW	478	28 VDC±14%	12 VDC±4%	160 mA	52.00
NEW	479	28 VDC±14%	15 VDC±4%	130 mA	52.00
NEW	480	28 VDC±14%	21 VDC±4%	95 mA	52.00
NEW	481	48 VDC−12/+16%	5 VDC±4%	250 mA	52.00
NEW	482	48 VDC−12/+16%	8 VDC±4%	250 mA	52.00
NEW	483	48 VDC−12/+16%	12 VDC±4%	160 mA	52.00
NEW	484	48 VDC−12/+16%	15 VDC±4%	130 mA	52.00
NEW	485	48 VDC−12/+16%	21 VDC±4%	95 mA	52.00
NEW	486	5 VDC±10%	±12 VDC±2%	±80 mA	56.00
NEW	487	5 VDC±10%	±15 VDC±2%	±65 mA	56.00
NEW	488	12 VDC±16%	±12 VDC±2%	±80 mA	56.00
NEW	489	12 VDC±16%	±15 VDC±2%	±65 mA	56.00
NEW	490	24 VDC±16%	±12 VDC±2%	±80 mA	56.00
NEW	491	24 VDC±16%	±15 VDC±2%	±65 mA	56.00
NEW	492	28 VDC±14%	±12 VDC±2%	±80 mA	56.00
NEW	493	28 VDC±14%	±15 VDC±2%	±65 mA	56.00
NEW	494	48 VDC−12/+16%	±12 VDC±2%	±80 mA	56.00
NEW	495	48 VDC−12/+16%	±15 VDC±2%	±65 mA	56.00

5 WATT SINGLE OUTPUT

	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	PRICE
NEW	710	7 to 32 VDC	5 VDC±2%(adj)	1000 mA	$62.00

6 WATT DUAL OUTPUT

	MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT	PRICE
NEW	623	5 VDC±10%	±12 VDC±5%	±250 mA	$69.00
NEW	624	5 VDC±10%	±15 VDC±5%	±250 mA	69.00
NEW	625	5 VDC±10%	±18 VDC±5%	±165 mA	69.00

POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

5 WATT SINGLE & DUAL OUTPUT				
MODEL NUMBER	**INPUT VOLTAGE**	**OUTPUT VOLTAGE**	**OUTPUT CURRENT**	**PRICE**
801	5 VDC ± 10%	5 VDC ± 1%	1000 mA	$79.00
802	12 VDC ± 10%	5 VDC ± 1%	1000 mA	79.00
803	24 VDC ± 10%	5 VDC ± 1%	1000 mA	79.00
804	28 VDC ± 10%	5 VDC ± 1%	1000 mA	79.00
805	48 VDC ± 10%	5 VDC ± 1%	1000 mA	79.00
806	5 VDC ± 10%	9 VDC ± 1%	550 mA	79.00
807	12 VDC ± 10%	9 VDC ± 1%	550 mA	79.00
808	24 VDC ± 10%	9 VDC ± 1%	550 mA	79.00
809	28 VDC ± 10%	9 VDC ± 1%	550 mA	79.00
810	48 VDC ± 10%	9 VDC ± 1%	550 mA	79.00
811	5 VDC ± 10%	12 VDC ± 1%	450 mA	79.00
812	12 VDC ± 10%	12 VDC ± 1%	450 mA	79.00
813	24 VDC ± 10%	12 VDC ± 1%	450 mA	79.00
814	28 VDC ± 10%	12 VDC ± 1%	450 mA	79.00
815	48 VDC ± 10%	12 VDC ± 1%	450 mA	79.00
816	5 VDC ± 10%	15 VDC ± 1%	350 mA	79.00
817	12 VDC ± 10%	15 VDC ± 1%	350 mA	79.00
818	24 VDC ± 10%	15 VDC ± 1%	350 mA	79.00
819	28 VDC ± 10%	15 VDC ± 1%	350 mA	79.00
820	48 VDC ± 10%	15 VDC ± 1%	350 mA	79.00
821	5 VDC ± 10%	± 12 VDC ± 1%	± 230 mA	84.00
822	12 VDC ± 10%	± 12 VDC ± 1%	± 230 mA	84.00
823	24 VDC ± 10%	± 12 VDC ± 1%	± 230 mA	84.00
824	28 VDC ± 10%	± 12 VDC ± 1%	± 230 mA	84.00
825	48 VDC ± 10%	± 12 VDC ± 1%	± 230 mA	84.00
826	5 VDC ± 10%	± 15 VDC ± 1%	± 170 mA	84.00
827	12 VDC ± 10%	± 15 VDC ± 1%	± 170 mA	84.00
828	24 VDC ± 10%	± 15 VDC ± 1%	± 170 mA	84.00
829	28 VDC ± 10%	± 15 VDC ± 1%	± 170 mA	84.00
830	48 VDC ± 10%	± 15 VDC ± 1%	± 170 mA	84.00

10 WATT SINGLE & DUAL OUTPUT				
MODEL NUMBER	**INPUT VOLTAGE**	**OUTPUT VOLTAGE**	**OUTPUT CURRENT**	**PRICE**
901	5 VDC ± 10%	5 VDC ± 1%	2000 mA	$99.00
902	12 VDC ± 10%	5 VDC ± 1%	2000 mA	99.00
903	24 VDC ± 10%	5 VDC ± 1%	2000 mA	99.00
904	28 VDC ± 10%	5 VDC ± 1%	2000 mA	99.00
905	48 VDC ± 10%	5 VDC ± 1%	2000 mA	99.00
906	5 VDC ± 10%	9 VDC ± 1%	1200 mA	99.00
907	12 VDC ± 10%	9 VDC ± 1%	1200 mA	99.00
908	24 VDC ± 10%	9 VDC ± 1%	1200 mA	99.00
909	28 VDC ± 10%	9 VDC ± 1%	1200 mA	99.00
910	48 VDC ± 10%	9 VDC ± 1%	1200 mA	99.00
911	5 VDC ± 10%	12 VDC ± 1%	900 mA	99.00
912	12 VDC ± 10%	12 VDC ± 1%	900 mA	99.00
913	24 VDC ± 10%	12 VDC ± 1%	900 mA	99.00
914	28 VDC ± 10%	12 VDC ± 1%	900 mA	99.00
915	48 VDC ± 10%	12 VDC ± 1%	900 mA	99.00
916	5 VDC ± 10%	15 VDC ± 1%	700 mA	99.00
917	12 VDC ± 10%	15 VDC ± 1%	700 mA	99.00
918	24 VDC ± 10%	15 VDC ± 1%	700 mA	99.00
919	28 VDC ± 10%	15 VDC ± 1%	700 mA	99.00
920	48 VDC ± 10%	15 VDC ± 1%	700 mA	99.00
921	5 VDC ± 10%	± 12 VDC ± 1%	± 450 mA	104.00
922	12 VDC ± 10%	± 12 VDC ± 1%	± 450 mA	104.00
923	24 VDC ± 10%	± 12 VDC ± 1%	± 450 mA	104.00
924	28 VDC ± 10%	± 12 VDC ± 1%	± 450 mA	104.00
925	48 VDC ± 10%	± 12 VDC ± 1%	± 450 mA	104.00
926	5 VDC ± 10%	± 15 VDC ± 1%	± 350 mA	104.00
927	12 VDC ± 10%	± 15 VDC ± 1%	± 350 mA	104.00
928	24 VDC ± 10%	± 15 VDC ± 1%	± 350 mA	104.00
929	28 VDC ± 10%	± 15 VDC ± 1%	± 350 mA	104.00
930	48 VDC ± 10%	± 15 VDC ± 1%	± 350 mA	104.00

10 WATT TRIPLE OUTPUT				
MODEL NUMBER	**INPUT VOLTAGE**	**OUTPUT VOLTAGE**	**OUTPUT CURRENT**	**PRICE**
931	5 VDC ± 10%	5VDC ± 1% ± 15VDC ± 1%	1A ± 165 mA	$124.00
932	12 VDC ± 10%	5VDC ± 1% ± 15VDC ± 1%	1A ± 165 mA	124.00
933	24 VDC ± 10%	5VDC ± 1% ± 15VDC ± 1%	1A ± 165 mA	124.00
934	28 VDC ± 10%	5VDC ± 1% ± 15VDC ± 1%	1A ± 165 mA	124.00
935	48 VDC ± 10%	5VDC ± 1% ± 15VDC ± 1%	1A ± 165 mA	124.00
936	5 VDC ± 10%	5VDC ± 1% ± 12VDC ± 1%	1A ± 200 mA	124.00
937	12 VDC ± 10%	5VDC ± 1% ± 12VDC ± 1%	1A ± 200 mA	124.00
938	24 VDC ± 10%	5VDC ± 1% ± 12VDC ± 1%	1A ± 200 mA	124.00
939	28 VDC ± 10%	5VDC ± 1% ± 12VDC ± 1%	1A ± 200 mA	124.00
940	48 VDC ± 10%	5VDC ± 1% ± 12VDC ± 1%	1A ± 200 mA	124.00
941	5 VDC ± 10%	5VDC ± 1% + 12VDC ± 1% − 5VDC ± 1%	1A 300 mA 100 mA	124.00
942	12 VDC ± 10%	5VDC ± 1% + 12VDC ± 1% − 5VDC ± 1%	1A 300 mA 100 mA	124.00
943	24 VDC ± 10%	5VDC ± 1% + 12VDC ± 1% − 5VDC ± 1%	1A 300 mA 100 mA	124.00
944	28 VDC ± 10%	5VDC ± 1% + 12VDC ± 1% − 5VDC ± 1%	1A 300 mA 100 mA	124.00
945	48 VDC ± 10%	5VDC ± 1% + 12VDC ± 1% − 5VDC ± 1%	1A 300 mA 100 mA	124.00

15 WATTS TO 50 WATTS SINGLE OUTPUT				
MODEL NUMBER	**INPUT VOLTAGE**	**OUTPUT VOLTAGE**	**OUTPUT CURRENT**	**PRICE**
700	9.5 TO 40 VDC	3 VDC ± 1%	3A	$88.00
701	8 TO 40 VDC	3 VDC ± 1%	5A	109.00
702	9.5 TO 40 VDC	5 VDC ± 1%	3A	88.00
703	8 TO 40 VDC	5 VDC ± 1%	5A	109.00
704	8 TO 40 VDC	6 VDC ± 1%	4A	109.00
705	14 TO 40 VDC	12 VDC ± 1%	2A	88.00
706	14 TO 40 VDC	12 VDC ± 1%	4A	109.00
707	17 TO 40 VDC	15 VDC ± 1%	1.5A	88.00
708	17 TO 40 VDC	15 VDC ± 1%	3A	109.00

25 WATTS SINGLE OUTPUT				
MODEL NUMBER	**INPUT VOLTAGE**	**OUTPUT VOLTAGE**	**OUTPUT CURRENT**	**PRICE**
711	20 to 72 VDC	5 VDC ± 1%	5A	$149.00
712	20 to 72 VDC	6 VDC ± 1%	4.5A	149.00
713	20 to 72 VDC	12 VDC ± 1%	2.5A	149.00
714	20 to 72 VDC	15 VDC ± 1%	2A	149.00

POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

QUICK SELECTION CHARTS: SWITCHING POWER SUPPLIES

SINGLE OUTPUT MODELS

MODEL NO.	OUTPUT VOLT/TOL	OUTPUT CURRENT	MAX. OUTPUT POWER	EFFICIENCY	FORM FACTOR	PRICE
125	5 VDC ±2%	5A	25W	80%	MODULE	$104.00
126	9 VDC ±2%	2.8A	25W	80%	MODULE	$104.00
127	12 VDC +2%	2A	25W	80%	MODULE	$104.00
128	14 VDC ±2%	1.7A	25W	80%	MODULE	$104.00
1030-1A	5 VDC ADJ	6A	30W	80%	P.C. BOARD	$94.00
1030-1B	5 VDC ADJ	6A	30W	80%	OPEN FRAME	$104.00
1030-1C	5 VDC ADJ	6A	30W	80%	ENCLOSED	$114.00
1030-2A	12 VDC ADJ	2.5A	30W	80%	P.C. BOARD	$94.00
1030-2B	12 VDC ADJ	2.5A	30W	80%	OPEN FRAME	$104.00
1030-2C	12 VDC ADJ	2.5A	30W	80%	ENCLOSED	$114.00
1030-3A	15 VDC ADJ	2A	30W	80%	P.C. BOARD	$94.00
1030-3B	15 VDC ADJ	2A	30W	80%	OPEN FRAME	$104.00
1030-3C	15 VDC ADJ	2A	30W	80%	ENCLOSED	$114.00
1030-4A	24 VDC ADJ	1.2A	30W	80%	P.C. BOARD	$94.00
1030-4B	24 VDC ADJ	1.2A	30W	80%	OPEN FRAME	$104.00
1030-4C	24 VDC ADJ	1.2A	30W	80%	ENCLOSED	$114.00
1040-1	5 VDC ADJ	8A	40W	80%	P.C. BOARD	$64.00
1040-2	12 VDC ADJ	3A	40W	80%	P.C. BOARD	$64.00
1040-3	15 VDC ADJ	2.5A	40W	80%	P.C. BOARD	$64.00
1040-4	24 VDC ADJ	1.7A	40W	80%	P.C. BOARD	$64.00
1040-5	28 VDC ADJ	1.5A	40W	80%	P.C. BOARD	$64.00
1050-1	5 VDC ADJ	10A	50W	80%	P.C. BOARD	$109.00
1050-2	12 VDC ADJ	4A	50W	80%	P.C. BOARD	$109.00
1050-3	15 VDC ADJ	3.4A	50W	80%	P.C. BOARD	$109.00
1050-4	24 VDC ADJ	2A	50W	80%	P.C. BOARD	$109.00

SINGLE OUTPUT MODELS

MODEL NO.	OUTPUT VOLT/TOL	OUTPUT CURRENT	MAX. OUTPUT POWER	EFFICIENCY	FORM FACTOR	PRICE
1060-1A	5 VDC ADJ	12A	60W	80%	P.C. BOARD	$115.00
1060-1B	5 VDC ADJ	12A	60W	80%	OPEN FRAME	$127.00
1060-1C	5 VDC ADJ	12A	60W	80%	ENCLOSED	$137.00
1060-2A	12 VDC ADJ	5A	60W	80%	P.C. BOARD	$115.00
1060-2B	12 VDC ADJ	5A	60W	80%	OPEN FRAME	$127.00
1060-2C	12 VDC ADJ	5A	60W	80%	ENCLOSED	$137.00
1060-3A	15 VDC ADJ	4A	60W	80%	P.C. BOARD	$115.00
1060-3B	15 VDC ADJ	4A	60W	80%	OPEN FRAME	$127.00
1060-3C	15 VDC ADJ	4A	60W	80%	ENCLOSED	$137.00
1060-4A	24 VDC ADJ	2.5A	60W	80%	P.C. BOARD	$115.00
1060-4B	24 VDC ADJ	2.5A	60W	80%	OPEN FRAME	$127.00
1060-4C	24 VDC ADJ	2.5A	60W	80%	ENCLOSED	$137.00
1100-1	5 VDC ADJ	20A	100W	80%	P.C. BOARD	$169.00
1100-2	12 VDC ADJ	9A	100W	80%	P.C. BOARD	$169.00
1100-3	15 VDC ADJ	8A	100W	80%	P.C. BOARD	$169.00

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MODEL NO.	OUTPUT NO. 1		OUTPUT NO. 2		MAX. OUTPUT POWER	EFFICIENCY	FORM FACTOR	PRICE
DUAL OUTPUT MODELS								
	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT				
225	+5 VDC ±2%	4A	−5 VDC ±5%	1A	25W	80%	MODULE	$109.00
226	+12 VDC ±2%	1.8A	−12 VDC ±5%	1.8A	25W	80%	MODULE	$109.00
227	+15 VDC ±2%	1.8A	−15 VDC ±5%	1.8A	25W	80%	MODULE	$109.00
2050-1	+5 VDC ADJ	8A	−5 VDC (1)	2A	50W	75%	P.C. BOARD	$119.00
2050-2	+12 VDC ADJ	3A	−12 VDC (1)	2A	50W	75%	P.C. BOARD	$119.00
2050-3	+15 VDC ADJ	3A	−15 VDC (1)	2A	50W	75%	P.C. BOARD	$119.00
2040-2A	+5 VDC ADJ	8A	−5 VDC ±3%	4A	60W	80%	P.C. BOARD	$125.00
2040-2B	+5 VDC ADJ	8A	−5 VDC ±3%	4A	60W	80%	OPEN FRAME	$135.00
2040-2C	+5 VDC ADJ	8A	−5 VDC ±3%	4A	60W	80%	ENCLOSED	$147.00
2040-3A	+12 VDC ADJ	3A	−12 VDC ±3%	2A	60W	80%	P.C. BOARD	$125.00
2040-3B	+12 VDC ADJ	3A	−12 VDC ±3%	2A	60W	80%	OPEN FRAME	$135.00
2040-3C	+12 VDC ADJ	3A	−12 VDC ±3%	2A	60W	80%	ENCLOSED	$147.00
2040-4A	+15 VDC ADJ	2A	−15 VDC ±3%	2A	60W	80%	P.C. BOARD	$125.00
2040-4B	+15 VDC ADJ	2A	−15 VDC ±3%	2A	60W	80%	P.C. BOARD	$135.00
2040-4C	+15 VDC ADJ	2A	−15 VDC ±3%	2A	60W	80%	P.C. BOARD	$147.00
2060-1A	+5 VDC ADJ	6A	+24 VDC ±5%	0.5A (2.5A pk)	60W	80%	P.C. BOARD	$125.00
2060-1B	+5 VDC ADJ	6A	+24 VDC ±5%	0.5A (2.5A pk)	60W	80%	OPEN FRAME	$135.00
2060-1C	+5 VDC ADJ	6A	+24 VDC ±5%	0.5A (2.5A pk)	60W	80%	ENCLOSED	$147.00
2060-2A	+5 VDC ADJ	8A	+12 VDC ±5%	1.6A (3.1A pk)	60W	80%	P.C. BOARD	$125.00
2060-2B	+5 VDC ADJ	8A	+12 VDC ±5%	1.6A (3.1A pk)	60W	80%	OPEN FRAME	$135.00
2060-2C	+5 VDC ADJ	8A	+12 VDC ±5%	1.6A (3.1A pk)	60W	80%	ENCLOSED	$147.00
3050-7	+5 VDC ADJ	5A	+24 VDC ±5%	1.7A (2.5A pk)	60W	70%	P.C. BOARD	$119.00
3050-8	+5 VDC ADJ	5A	+12 VDC ±5%	4A (6A pk)	60W	70%	P.C. BOARD	$119.00
3050-9	+5 VDC ADJ	5A	+24 VDC ±5%	2.5A (3.5A pk)	60W	70%	P.C. BOARD	$119.00

MODEL NO.	OUTPUT NO. 1		OUTPUT NO. 2		OUTPUT NO. 3		MAX. OUTPUT POWER	EFFI-CIENCY	FORM FACTOR	PRICE
TRIPLE OUTPUT MODELS										
	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT				
325	+5 VDC ±2%	4A	+12 VDC ±4%	0.2A	−12 VDC ±4%	0.2A	25W	70%	MODULE	$109.00
326	+5 VDC ±2%	4A	+15 VDC ±4%	0.2A	−15 VDC ±4%	0.2A	25W	70%	MODULE	$109.00
3030-1	+5 VDC ADJ	3A	+12 VDC ±5%	0.5A	−12 VDC ±5%	0.5A	30W	65%	P.C. BOARD	$ 69.00
3030-2	+5 VDC ADJ	3A	+15 VDC ±5%	0.5A	−15 VDC ±5%	0.5A	30W	65%	P.C. BOARD	$ 69.00
3045-1	+5 VDC ADJ	3A	+12 VDC ±5%	2A	−12 VDC ±5%	0.5A	40W	75%	P.C. BOARD	$ 69.00
3045-2	+5 VDC ADJ	3A	+12 VDC ±5%	2A	−12 VDC ±5%	0.5A	40W	75%	P.C. BOARD	$ 79.00
3045-3	+5 VDC ADJ	3A	+12 VDC ±5%	2A	− 5 VDC ±5%	0.5A	40W	75%	P.C. BOARD	$ 69.00
3050-1	+5 VDC ADJ	6A	+12 VDC ±5%	1A	−12 VDC ±5%	1A	50W	70%	P.C. BOARD	$119.00
3050-2	+5 VDC ADJ	6A	+15 VDC ±5%	1A	−15 VDC ±5%	1A	50W	70%	P.C. BOARD	$119.00
3050-3	+5 VDC ADJ	6A	+12 VDC ±5%	2A (3A pk)	−12 VDC ±5%	2A	50W	70%	P.C. BOARD	$119.00
3050-4	+5 VDC ADJ	6A	+15 VDC ±5%	2A (3A pk)	−15 VDC ±5%	2A	50W	70%	P.C. BOARD	$119.00
3050-5	+5 VDC ADJ	6A	− 5 VDC ±5%	0.1A	+12 VDC ±5%	3A (5A pk)	50W	70%	P.C. BOARD	$119.00
3050-6	+5 VDC ADJ	6A	+12 VDC ±5%	3A (5A pk)	−12 VDC ±5%	0.2A	50W	70%	P.C. BOARD	$119.00
3060-1	+5 VDC ADJ	6A	+12 VDC ±5%	3A (5A pk)	−12 VDC ±5%	1A	60W	70%	P.C. BOARD	$135.00
3060-2	+5 VDC ADJ	6A	+15 VDC ±5%	3A (5A pk)	−15 VDC ±5%	1A	60W	70%	P.C. BOARD	$135.00
3065-1	+5 VDC ADJ	8A	+12 VDC ±5%	0.1A	−12 VDC ±5%	0.1A	65W	70%	P.C. BOARD	$179.00
3065-2	+5 VDC ADJ	8A	+15 VDC ±5%	0.1A	−15 VDC ±5%	0.1A	65W	70%	P.C. BOARD	$179.00
3065-3	+5 VDC ADJ	6A	+12 VDC ADJ	0.1A	−12 VDC ±5%	0.1A	65W	70%	P.C. BOARD	$189.00
3075-1	+5 VDC ±5%	6A	+12 VDC ±5%	4A	−12 VDC ±6%	1A	75W	70%	P.C. BOARD	$119.00
3075-2	+5 VDC ±5%	6A	+12 VDC ±5%	4A	− 5 VDC ±6%	1A	75W	70%	P.C. BOARD	$119.00
3075-3	+5 VDC ±5%	6A	+24 VDC ±5%	2A	−12 VDC ±6%	1A	75W	70%	P.C. BOARD	$119.00
3100-1	+5 VDC ADJ	15A	+12 VDC ±5%	1A	−12 VDC ±5%	1A	100W	65%	P.C. BOARD	$199.00
3100-2	+5 VDC ADJ	15A	+15 VDC ±5%	1A	−15 VDC ±5%	1A	100W	65%	P.C. BOARD	$199.00
3100-3	+5 VDC ADJ	10A	+12 VDC ±5%	3A	−12 VDC ±5%	1A	100W	65%	P.C. BOARD	$199.00

POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

QUAD OUTPUT MODELS

MODEL NO.	OUTPUT NO. 1		OUTPUT NO. 2		OUTPUT NO. 3	
	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT
4027-1	+5 VDC ADJ	4A	−2.5 to −15 VDC	0.1 to 0.5A	+15 VDC ±4%	0.5A
4027-2	+5 VDC ADJ	4A	−2.5 to −15 VDC	0.1 to 0.5A	+12 VDC ±4%	0.5A
4043-1	+5 VDC ADJ	3A	−5 VDC ±1%	0.3A	+12 VDC ±5%	2A
4050-1	+5 VDC ADJ	6A	−5 VDC ±5%	1A	+12 VDC ±5%	2A (3A pk)
4050-2	+5 VDC ADJ	6A	−5 VDC ±5%	1A	+15 VDC ±5%	2A (3A pk)
4070-1	+5 VDC ADJ	6A	−12 VDC ±5%	1A	+12 VDC ±5%	1A
4070-2	+5 VDC ADJ	6A	−15 VDC ±5%	1A	+15 VDC ±5%	1A
4075-1	+5 VDC ±5%	6A	+12 VDC ±5%	2A	−12 VDC ±5%	1A
4075-2	+5 VDC ±5%	6A	+12 VDC ±5%	2A	−12 VDC ±5%	1A
4075-3	+5 VDC ±5%	6A	+12 VDC ±5%	2A	−12 VDC ±5%	1A
4100-1	+5 VDC ADJ	10A	−5 VDC ±3%	10A	+12 VDC ±5%	1.5A
4100-2	+5 VDC ADJ	10A	−5 VDC ±3%	10A	+15 VDC ±5%	1.5A
4100-3	+5 VDC ADJ	10A	−5 VDC ±3%	10A	+12 VDC ±5%	3A
4100-4	+4 VDC ADJ	10A	−5 VDC ±3%	10A	+15 VDC ±5%	3A
4110-1	+5 VDC ADJ	10A	+12 VDC ±5%	3A	−12 VDC ±5%	3A
4110-2	+5 VDC ADJ	10A	+12 VDC ±5%	3A	−12 VDC ±5%	3A
4110-3	+5 VDC ADJ	10A	+12 VDC ±5%	3A	−12 VDC ±5%	3A
4110-4	+5 VDC ADJ	10A	+12 VDC ±5%	3A	−12 VDC ±5%	3A
4110-5	+5 VDC ADJ	10A	12 VDC (iso) ±5%	4A	−12 VDC ±5%	0.5A

FIVE OUTPUT MODELS

MODEL NO.	OUTPUT NO. 1		OUTPUT NO. 2		OUTPUT NO. 3	
	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT	VOLT/TOL	CURRENT
5100-1	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+12 VDC ±5%	1.5A
5100-2	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+15 VDC ±5%	1.5A
5100-3	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+12 VDC ±5%	2A
5100-4	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+15 VDC ±5%	2A
5110-1	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+12 VDC ±5%	1A
5110-2	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+15 VDC ±5%	1A
5110-3	+5 VDC ADJ	10A	−5 VDC ±3%	1A	+12 VDC ±5%	1A

QUAD OUTPUT MODELS

OUTPUT NO. 4		MAX. OUTPUT POWER	EFFI-CIENCY	FORM FACTOR	PRICE
VOLT/TOL	CURRENT				
−15 VDC ±4%	0.5A	30W	70%	P.C. BOARD	$135.00
−12 VDC ±4%	0.5A	30W	70%	P.C. BOARD	$135.00
−12 VDC ±5%	0.3A	40W	75%	P.C. BOARD	$69.00
−15 VDC ±5%	1A	60W	70%	P.C. BOARD	$139.00
−15 VDC ±5%	1A	60W	70%	P.C. BOARD	$139.00
+24 VDC ±5%	1.5A (3A pk)	70W	70%	P.C. BOARD	$145.00
+24 VDC ±5%	1.5A (3A pk)	70W	70%	P.C. BOARD	$145.00
12 VDC (iso) ±5%	2A	75W	70%	P.C. BOARD	$129.00
5 VDC (iso) ±5%	2A	75W	70%	P.C. BOARD	$129.00
24 VDC (iso) ±5%	2A	75W	70%	P.C. BOARD	$129.00
−12 VDC ±5%	1.5A	100W	70%	P.C. BOARD	$169.00
−15 VDC ±5%	1.5A	100W	70%	P.C. BOARD	$169.00
−12 VDC ±5%	3A	100W	70%	P.C. BOARD	$169.00
−15 VDC ±5%	3A	100W	70%	P.C. BOARD	$169.00
12 VDC (iso) ±5%	3A	100W	70%	P.C. BOARD	$169.00
24 VDC (iso) ±5%	2A	100W	70%	P.C. BOARD	$169.00
15 VDC (iso) ±5%	3A	100W	70%	P.C. BOARD	$169.00
5 VDC (iso) ±5%	3A	100W	70%	P.C. BOARD	$169.00
−5 VDC ±5%	0.25A	100W	70%	P.C. BOARD	$169.00

FIVE OUTPUT MODELS

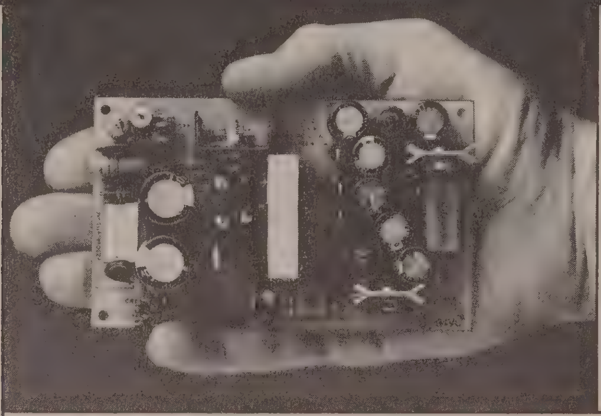
OUTPUT NO. 4		OUTPUT NO. 5		MAX. OUTPUT POWER	EFFI-CIENCY	FORM FACTOR	PRICE
VOLT/TOL	CURRENT	VOLT/TOL	CURRENT				
−12 VDC ±5%	1.5A	12 to 30 VDC	0.4 to 1A	100W	70%	P.C. Board	$179.00
−15 VDC ±5%	1.5A	12 to 30 VDC	0.4 to 1A	100W	70%	P.C. Board	$179.00
−12 VDC ±5%	2A	12 to 30 VDC	0.4 to 1A	100W	70%	P.C. Board	$179.00
−15 VDC ±5%	2A	12 to 30 VDC	0.4 to 1A	100W	70%	P.C. Board	$179.00
−2.5 to −12 VDC	0.2 to 1A	24 VDC ±5%	2.5A (4A pk)	100W	70%	P.C. Board	$179.00
−2.5 to −15 VDC	0.2 to 1A	24 VDC ±5%	2.5A (4A pk)	100W	70%	P.C. Board	$179.00
−2.0 to −12 VDC	0.2 to 1A	12 VDC ±5%	3A (4A pk)	100W	70%	P.C. Board	$179.00

NEW FROM POWER GENERAL
NEW PRODUCTS — SWITCHING SUPPLIES

POWER GENERAL
A SUBSIDIARY OF **UNITRODE** CORPORATION

ULTRA MINIATURE
30 WATT SWITCHING POWER SUPPLIES
TRIPLE OUTPUT, LOW NOISE
ALL OUTPUTS FULLY REGULATED

3030 SERIES



FEATURES

- 5, +12, and −12 (or +15 and −15) VDC outputs fully regulated
- Low output noise
- 90–130 VAC or 180–250 VAC input
- Small size — light weight
- Designed to meet VDE, UL, and CSA safety standards

APPLICATIONS

- Analog systems
- Digital systems
- Analog/Digital systems
- Microprocessor based systems
- General-purpose power supply

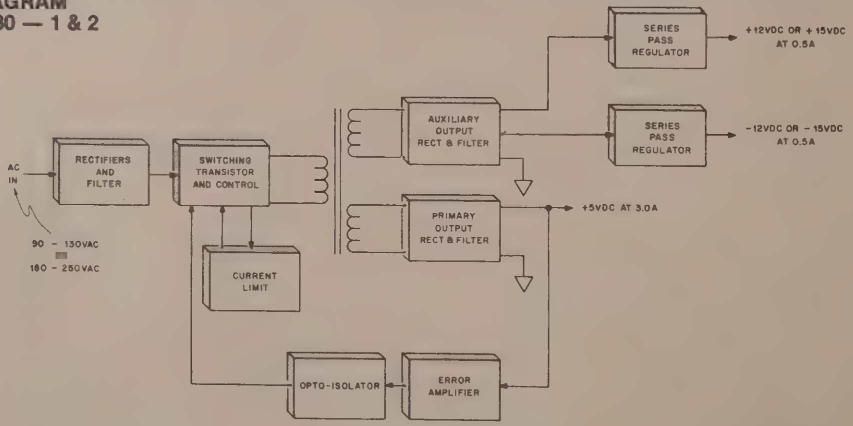
GENERAL DESCRIPTION

This new series of power supplies features triple outputs delivering a total of 30 watts of continuous output power. All outputs are low noise and tightly regulated for use in analog/digital applications where these characteristics are essential.

Low cost, light weight, and high performance make the Model 3030 an ideal choice for OEM applications where space is at a premium. The Model 3030 is designed to meet the safety requirements of UL, CSA, VDE, and IEC.

Advanced circuit design and manufacturing techniques permit a low price, yet high-grade components are used throughout. Each power supply undergoes a rigorous computerized test and burn-in program before delivery.

BLOCK DIAGRAM
MODEL 3030 — 1 & 2


SERIES PASS REGULATOR
+12VDC OR +15VDC AT 0.5A
AUXILIARY OUTPUT RECT & FILTER
SERIES PASS REGULATOR
−12VDC OR −15VDC AT 0.5A
RECTIFIERS AND FILTER
SWITCHING TRANSISTOR AND CONTROL
AC IN
PRIMARY OUTPUT RECT & FILTER
+5VDC AT 3.0A
90 – 130VAC
180 – 250VAC
CURRENT LIMIT
OPTO-ISOLATOR
ERROR AMPLIFIER

POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

NEW FROM POWER GENERAL
NEW PRODUCTS — SWITCHING SUPPLIES

POWER GENERAL
A SUBSIDIARY OF **UNITRODE** CORPORATION

WORLD'S SMALLEST 40 WATT SWITCHERS SINGLE, TRIPLE & QUAD OUTPUTS

1040, 3045, 4043 SERIES

Model 3045-1
5V @ 3A, +12V @ 2A (5A pk), −12V @ 0.5A

SIZE—3"W x 5"L x 1.8"H
WEIGHT—8 OZ
$27.50 OEM QTY

FEATURES

- Small size, light weight
- Designed to meet UL, CSA, VDE & IEC safety standards
- 75% efficiency
- 90 to 130 VAC or 180 to 250 VAC user selectable input

APPLICATIONS

- CRT terminals
- Disc drive systems
- Microcomputers
- Portable equipment
- General purpose power supply

GENERAL DESCRIPTION

The 1040, 3045 and 4043 series of power supplies, are comprised of a number of single, triple and quad output models capable of delivering 40 watts of continuous output power.

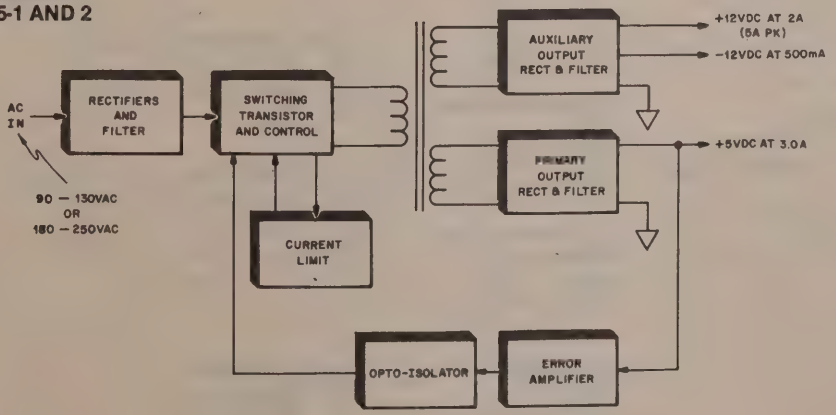
Their low cost, light weight and high performance features offer the OEM user a power supply which can satisfy the majority of today's CRT, disk-drive, microprocessor and mixed analog/logic applications. Their small size and high efficiency makes these power supplies an ideal choice for portable equipment, microcomputers or peripherals where space is a premium.

All models are designed to meet the safety requirements of UL, CSA, VDE and IEC.

The model 3045-2 is a direct replacement of similar units offered by other manufacturers, but the Power General unit offers higher output current capabilities, to facilitate easy and non-costly end user system upgrade.

Although priced low, due to advanced circuit and manufacturing techniques, high grade components are used, and an extensive computerized test and burn-in program accompanies each unit.

BLOCK DIAGRAM
MODEL 3045-1 AND 2


AC IN
90 — 130VAC OR 180 — 250VAC
RECTIFIERS AND FILTER
SWITCHING TRANSISTOR AND CONTROL
CURRENT LIMIT
AUXILIARY OUTPUT RECT & FILTER
+12VDC AT 2A (5A PK)
−12VDC AT 500mA
PRIMARY OUTPUT RECT & FILTER
+5VDC AT 3.0A
OPTO-ISOLATOR
ERROR AMPLIFIER

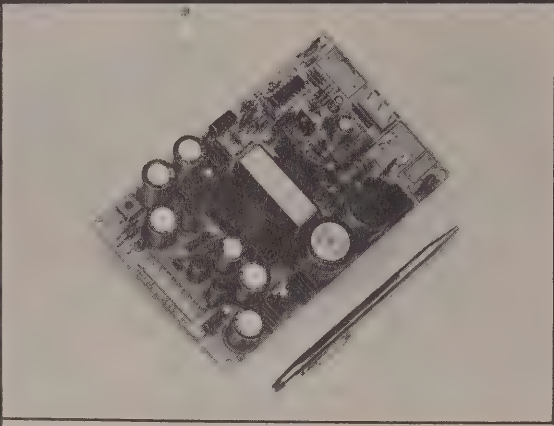
POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

NEW FROM POWER GENERAL
NEW PRODUCTS — SWITCHING SUPPLIES

POWER GENERAL
A SUBSIDIARY OF **UNITRODE** CORPORATION

WORLDS SMALLEST 75 WATT, TRIPLE OUTPUT SWITCHING POWER SUPPLY

3075 SERIES



FEATURES:
- 90–130 VAC or 180–250 VAC Input
- Designed to meet VDE, UL, and CSA safety standards
- 70% efficiency
- 4000 VAC isolation
- Small size, light weight
- Convection cooled

APPLICATIONS:
- Microcomputer systems
- Disk drives
- CRT terminals
- Digital/Analog circuits
- General purpose power supply

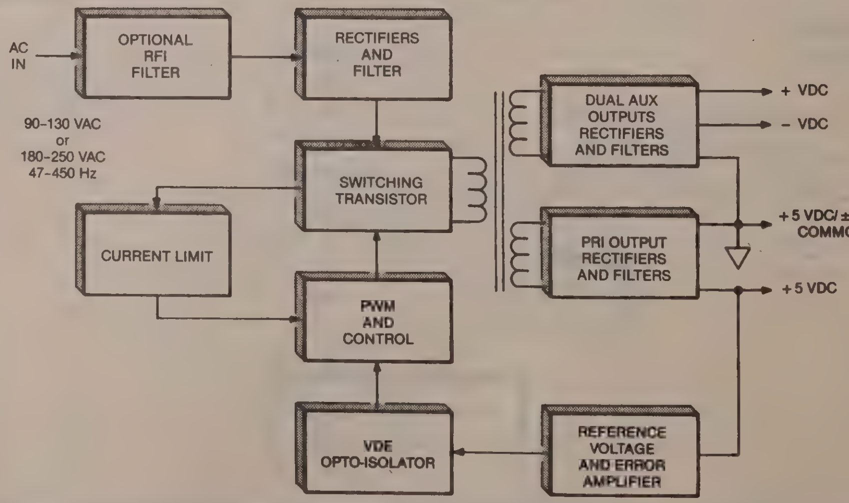
GENERAL DESCRIPTION

Power Generals' 3075 series are compact, triple output, 75-watt switching power supplies. Each model is designed to conform with UL, CSA and VDE safety standards. Input to output isolation is 4000 volts, hold-up time is 32 msec. minimum and efficiency is 70%. Input voltage ranges of 90 to 130 VAC or 180 to 250 VAC are available as a factory wired option. Cooling is by natural convection.

Utilizing state of the art integrated PWM design techniques and high quality components, these supplies offer high performance and reliability in a small, light weight single P.C. board form-factor. Each unit must pass a stringent test and burn-in program prior to shipment.

Their high level of reliable operating performance compact design, and generous OEM discounts, make the 3075 series an excellent choice for a wide variety of applications.

BLOCK DIAGRAM


AC IN
OPTIONAL RFI FILTER
RECTIFIERS AND FILTER
90–130 VAC or 180–250 VAC 47–450 Hz
SWITCHING TRANSISTOR
CURRENT LIMIT
PWM AND CONTROL
VDE OPTO-ISOLATOR
DUAL AUX OUTPUTS RECTIFIERS AND FILTERS
+ VDC
– VDC
+5 VDC/± VDC COMMON
PRI OUTPUT RECTIFIERS AND FILTERS
+5 VDC
REFERENCE VOLTAGE AND ERROR AMPLIFIER

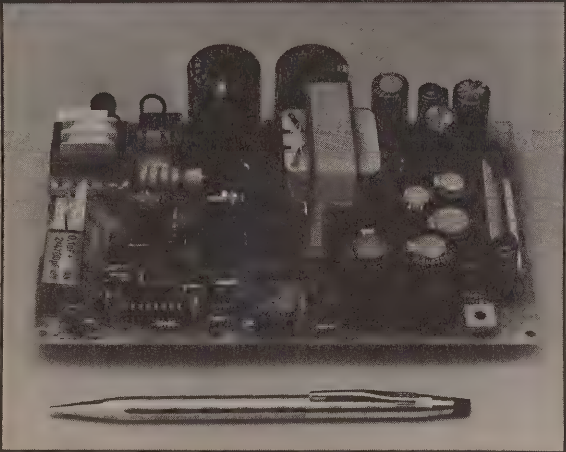
POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

NEW FROM POWER GENERAL
NEW PRODUCTS — SWITCHING SUPPLIES

POWER GENERAL
A SUBSIDIARY OF **UNITRODE** CORPORATION

WORLD'S SMALLEST 75 WATT QUAD OUTPUT SWITCHING POWER SUPPLIES

4075 SERIES



FEATURES

- 5, +12, −12, and 5, 12, or 24VDC isolated outputs
- Designed to meet VDE, US, CSA safety standards
- 70% efficiency
- Small size, light weight
- 90-130 or 180-250 VAC input
- Convection cooled

APPLICATIONS

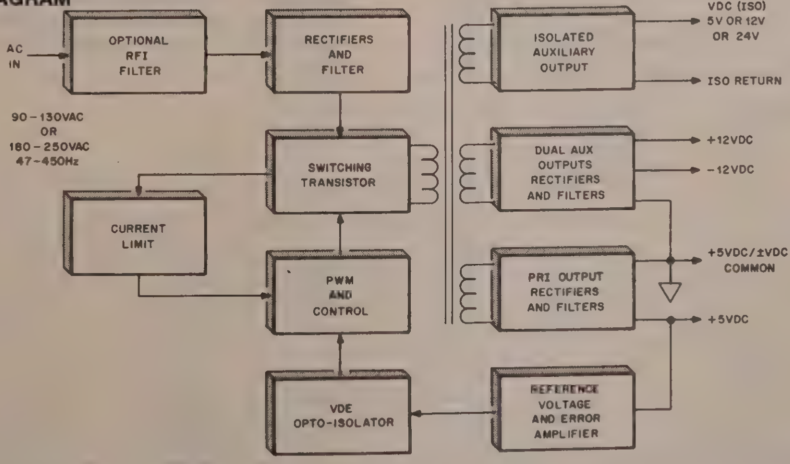
- Microcomputers
- CRT Terminals
- Disk Drives
- Digital/Analog Circuits
- General Purpose Power Supply

GENERAL DESCRIPTIONS

Power General's 4075 series are quad output power supplies capable of providing 75 watts of continuous power within the specified voltages and currents. These power supplies are designed to meet the safety requirements of VDE, UL, and CSA despite their small size and light weight. All models have one of their outputs totally isolated and floating, an ideal characteristic for systems which integrate a disk drive and must eliminate system component interference. These floating outputs will also accept the peak pulsed loads required by most applications.

By using state-of-the-art integrated PWM techniques and high-quality discrete components, these power supplies offer an excellent choice for the quality-minded OEM, since each unit is put through Power General's proven quality control and burn-in programs.

SERIES 4075
BLOCK DIAGRAM


AC IN
OPTIONAL RFI FILTER
RECTIFIERS AND FILTER
ISOLATED AUXILIARY OUTPUT
VDC (ISO) 5V OR 12V OR 24V
ISO RETURN
90 - 130VAC OR 180 - 250VAC 47 - 450Hz
SWITCHING TRANSISTOR
DUAL AUX OUTPUTS RECTIFIERS AND FILTERS
+12VDC
-12VDC
CURRENT LIMIT
PWM AND CONTROL
PRI OUTPUT RECTIFIERS AND FILTERS
+5VDC/±VDC COMMON
+5VDC
VDE OPTO-ISOLATOR
REFERENCE VOLTAGE AND ERROR AMPLIFIER

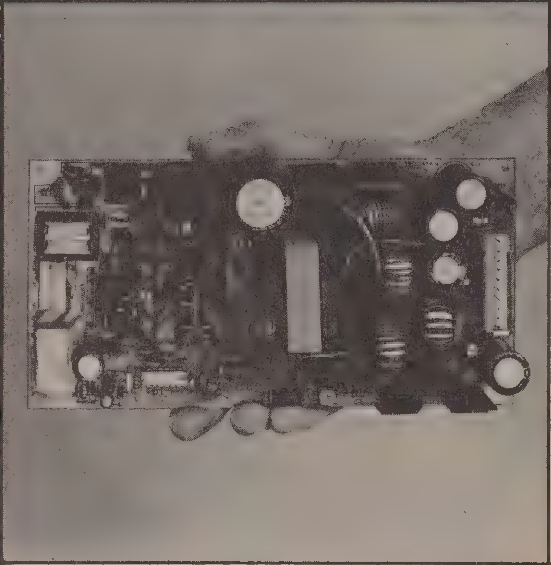
POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

NEW FROM POWER GENERAL
NEW PRODUCTS — SWITCHING SUPPLIES

POWER GENERAL
A SUBSIDIARY OF **UNITRODE** CORPORATION

WORLD'S SMALLEST 100 WATT QUAD OUTPUT SWITCHING POWER SUPPLIES

4110 SERIES



FEATURES

- Designed to meet VDE, IEC, UL and CSA safety specifications
- Isolated output for pulsed load
- 90–130VAC or 180–250VAC input user selectable
- Convection cooled — No external heat sinking
- Small size and light weight

APPLICATIONS

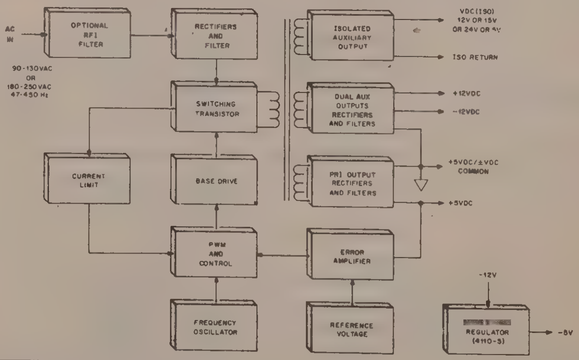
- Microprocessor based systems
- CRT terminals
- Disk based systems
- Mixed analog/digital subsystems
- MS/systems
- General purpose power supply

GENERAL DESCRIPTION

The 4110 series of quad output power supplies are capable of delivering 100 watts of continuous output power, with convection cooling, within the voltage-current rating of each output. Small in size and lightweight, these supplies are oriented for today's electronic system needs, and they are designed to comply with national and international safety standards such as UL, CSA, VDE and IEC. Along with the standard outputs, each model has an extra, completely isolated output of either 5V, 12V, 15V or 24V, capable of driving disk drives, printers or other pulsed load electromechanical devices, thus eliminating interference with system integrated CRTs or other sensitive system circuits.

Although the price has been kept low by using advanced circuit and manufacturing techniques, no compromise in performance was made. The components used throughout are high grade, and extensive computerized tests and burn-in programs are performed on each unit.

BLOCK DIAGRAM SERIES 4110


AC IN
90-130VAC OR 180-250VAC 47-450 Hz
OPTIONAL RFI FILTER
RECTIFIERS AND FILTER
SWITCHING TRANSISTOR
CURRENT LIMIT
BASE DRIVE
PWM AND CONTROL
FREQUENCY OSCILLATOR
ISOLATED AUXILIARY OUTPUT
VDC (ISO) 12V OR 15V OR 24V OR 5V
ISO RETURN
DUAL AUX OUTPUTS RECTIFIERS AND FILTERS
+12VDC
−12VDC
PRI OUTPUT RECTIFIERS AND FILTERS
+5VDC/±VDC COMMON
+5VDC
ERROR AMPLIFIER
REFERENCE VOLTAGE
−12V
REGULATOR (4110-5)
−5V

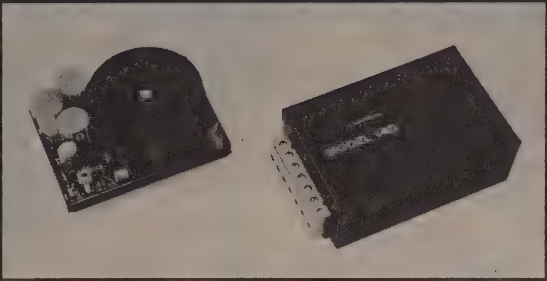
POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

NEW FROM POWER GENERAL
NEW PRODUCTS — LINEAR SUPPLIES

POWER GENERAL
A SUBSIDIARY OF **UNITRODE** CORPORATION

3.5 TO 15 WATT NONENCAPSULATED LINEAR AC/DC MODULES LOW CASE TEMP. RISE HIGH MTBF

140, 240 SERIES



FEATURES

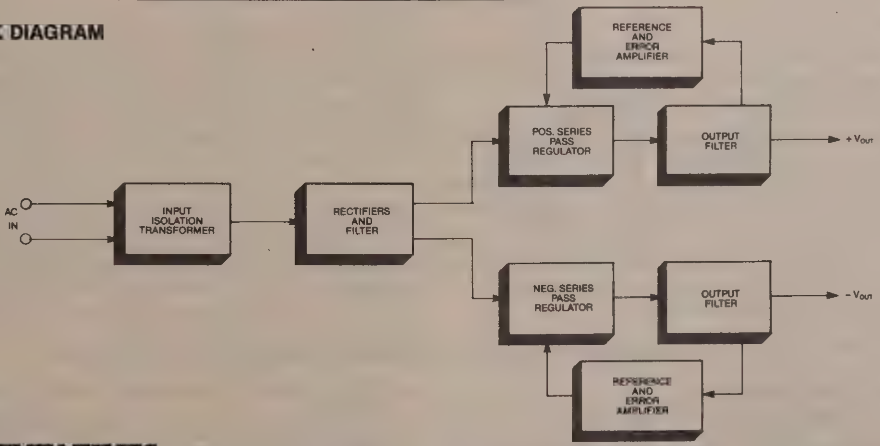
- REPAIRABLE, nonencapsulated, construction
- Low case temperature rise
- 120,000 hour MTBF
- P.C. Mount or Chassis Mount Models
- Continuous short circuit protection
- Plug-in compatible with competing Power Products, Semiconductor Circuits and Acopian models

GENERAL DESCRIPTION

Power Generals 140/240 Series is a family of high reliability AC/DC linear power supplies. Featuring an MTBF of 120,000 hours; their nonencapsulated, metal cased design allows the easy repair of rare component failures by the OEM or Power General, at about one-third the cost of scrapping the entire unit. Convection cooling of this mechanical design results in a lower case temperature rise, significantly improving reliability. Each unit must pass stringent testing and an eight hour burn-in prior to shipment.

Units are available with single outputs of 5, 12, 15 or 24 VDC and dual outputs of ± 12 or ± 15 VDC. All models are available for either P.C. board or chassis mount and are capable of either series or parallel operation. The 140/240 series is plug-in compatible with competing encapsulated units available from Power Products, Semiconductor Circuits, Acopian, etc.

BLOCK DIAGRAM


REFERENCE AND ERROR AMPLIFIER
POS. SERIES PASS REGULATOR
OUTPUT FILTER
+ V_OUT
AC IN
INPUT ISOLATION TRANSFORMER
RECTIFIERS AND FILTER
NEG. SERIES PASS REGULATOR
OUTPUT FILTER
– V_OUT
REFERENCE AND ERROR AMPLIFIER

SALES REPRESENTATIVES

Alabama	205-539-8476
Arizona	602-994-5153
California	714-998-8200 800-874-3821 408-945-1250 415-369-3677
Colorado	303-799-6063
Connecticut	203-678-0123
Delaware	800-336-3747
Florida	305-724-1027 305-587-7146 813-924-7415
Georgia	919-722-9445
Idaho	208-343-3753
Illinois	312-991-2144
Indiana	614-459-1280
Iowa	319-365-8071
Kansas	913-831-0555
Kentucky	614-459-1280
Maine	617-828-6216
Maryland	800-336-3747
Michigan	313-644-0173 616-459-4425
Minnesota	612-888-7011
Mississippi	919-722-9445
Missouri	314-839-0800
Montana	206-353-1833
Nebraska	314-839-0800
Nevada	408-945-1250 415-369-3677
New Hampshire	617-828-6216
New Jersey	201-826-8050
New Mexico	602-994-5153
New York	516-422-2500 201-624-4408 716-467-4538
North Carolina	919-722-9445
North Dakota	612-888-7011
Ohio	614-459-1280
Oklahoma	214-343-3786 713-462-1432
Oregon	503-649-5388
Pennsylvania	215-631-1414 614-459-1280
Rhode Island	617-828-6216
South Carolina	919-722-9445
South Dakota	612-888-7011
Tennessee	919-722-9445
Texas	214-343-3786 713-462-1432 512-835-0980
Utah	303-799-6063
Vermont	617-828-6216
Virginia	703-591-1300 800-572-0405
Washington	206-353-1833
West Virginia	614-459-1280
Wisconsin	312-991-2144
CANADA	
Calgary	403-236-3697
Montreal	514-747-1217
Toronto	416-245-3600
Ottawa	613-237-3852
Vancouver	604-224-6922
Winnepeg	204-895-2064

POWER GENERAL 152 WILL DRIVE, CANTON, MA 02021 TWX: 710-348-0200 TELEPHONE: (617) 828-6216

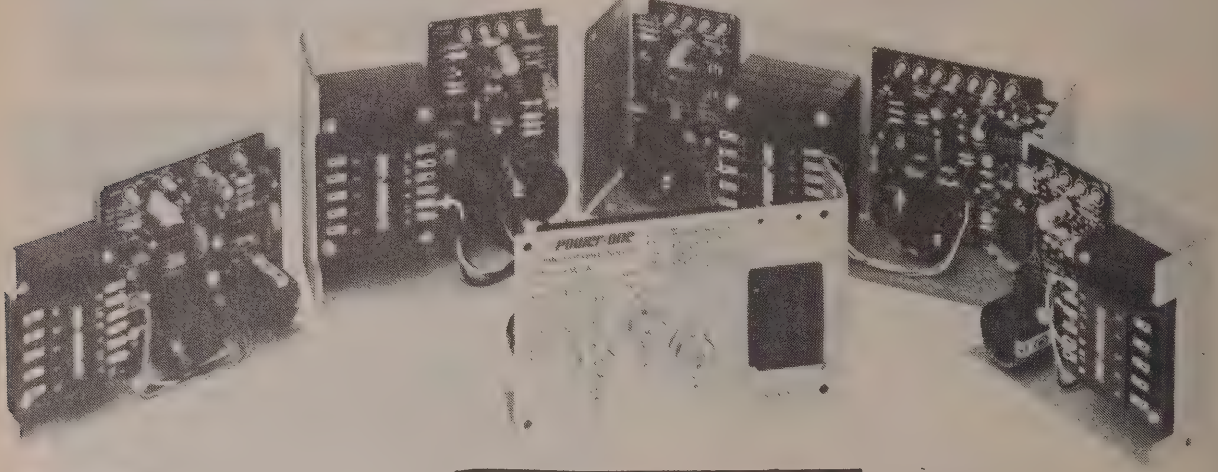
"Innovators in Power Supply Technology"

POWER-ONE D.C. POWER SUPPLIES

Power-One, Inc. • Power One Drive • Camarillo, CA 93010 • Phone: 805/987-8741 • 805/987-3891 • TWX: 910-336-1297
outside Calif. call Toll Free 1-800-235-5943

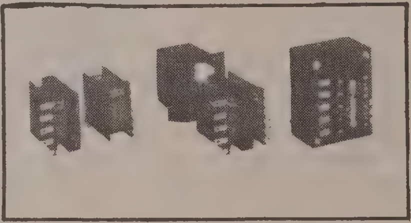
International Series
Open-Frame Linears

THE NEW WORLD STANDARD IN D.C. POWER SUPPLIES



FEATURES

- VDE TRANSFORMER CONSTRUCTION
- WORLDWIDE AC INPUT CAPABILITIES 100/120/220/230/240 VAC
- MEETS DOMESTIC AND FOREIGN SAFETY STANDARDS - UL, CSA, IEC, VDE, BPO, ECMA, CEE
- INDUSTRY STANDARD PACKAGES



Power-One's patented International Series transformers feature separate, fully enclosed, primary and secondary coils. Meets safety requirements of VDE, UL, CSA, BPO, IEC, CEE, and ECMA.

DESCRIPTION

POWER-ONE's new International Series is the first and only high reliability D.C. power supply series designed for products sold throughout the world's major electronics markets.

The International Series can be used anywhere, for almost any application. It meets the most important safety requirements of UL, CSA, IEC, VDE, BPO, ECMA, and CEE. Also, each unit provides the AC input ranges needed for worldwide operation: 100, 120, 220, 230, and 240 volts, 47 to 63 Hz. This multi-range input capability reduces customer inventory and service requirements since only one standard off-the-shelf power supply is needed, regardless of the product's final destination. These are exclusive features of the International Series, and are not available on any competitive standard model.

In an effort to meet the world's toughest safety regulations, POWER-ONE achieved a technological breakthrough in power transformer design. Our new patented winding process features separate, fully enclosed primary and secondary windings. This unique construction complies with the most respected regulatory safety agency specifications, worldwide.

The end result is that product acceptance throughout the world is greatly simplified for domestic and foreign equipment manufacturers. The International Series power supplies comply with the major body of regulatory safety agencies responsible for product safety in virtually all of the major world markets. Its compatibility with world safety standards, combined with dramatically increased flexibility, results in far greater potential for international acceptance of your products.

MEETS SAFETY AGENCY REQUIREMENTS THROUGHOUT THE WORLD

Why compliance is so important!

For years electronic equipment manufacturers have found that safety requirements for most of the world's electronics markets are significantly different than those established in the USA by Underwriters Laboratories (UL). Also, there is little consistency in the requirements among the world's regulatory safety agencies. This has created almost impossible compliance problems for designers who are developing products for worldwide distribution.

Recognizing this dilemma, POWER-ONE initiated an extensive R&D program aimed at producing the first D.C. power supply line that truly meets the world's toughest safety requirements. The innovative new International Series—the solution to the difficult problem of gaining worldwide acceptance for your products.

SAFETY AGENCIES WORLDWIDE

The following regulatory agency specifications have gained industry-wide acceptance as the most important to comply with when designing products for the world's major electronics markets. The International Series meets or exceeds the leakage current, creepage distance, and dielectric withstand test requirements of these safety agency specifications:

UL 1012
UL 478
CSA 22.2 No. 143
CSA 22.2 No. 154
IEC 380 Class I
IEC 380 Class II
IEC 435 Class I
IEC 435 Class II
VDE 0730 Part 2P Class I
VDE 0730 Part 2P Class II
VDE 0804 Class I
VDE 0804 Class II
BPO Tech. Guide No. 26
ECMA-57 Class I
ECMA-57 Class II
CEE-10 Part 2P Class I
CEE-10 Part 2P Class II

INTERNATIONAL SERIES DESIGN STANDARDS:

Leakage Current, Line to Ground: 5.0μa Max.

Safety Spacings,
Live Parts to Dead Metal: 9.0 mm
Other Than Field Terminals: 5.25 mm

Dielectric Withstand Voltage,
Input to Ground: 3750 VAC
Input to Outputs: 3750 VAC
Outputs to Ground: 500 VAC

"Innovators in Power Supply Technology"

POWER-ONE D.C. POWER SUPPLIES

Phone or write for new brochure... see what it takes to set a new standard for the world!

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outside Calif. call Toll Free 1-800-235-5943

International Series

Open-Frame Linears

MEETS INTERNATIONAL SAFETY REQUIREMENTS THROUGHOUT THE WORLD

SPECIFICATIONS

AC Input:	100/120/220/240 VAC +10% −13%. 47-63 Hz.Tolerance for 230 VAC operation is +15%, −10%. Derate output current 10% for 50 Hz operation.
DC Output:	See Voltage/Current Rating Chart. Adjustment range ±5% minimum.
Line Regulation:	±.05% for a 10% line change.
Load Regulation:	±.05% for a 50% load change.
Output Ripple:	5V through 15V models: 5.0 mV PK-PK maximum; 24V and 28V models: 0.2% PK-PK maximum.
Transient Response:	50μ seconds for a 50% load change.
Short Circuit and Overload Protection:	Automatic current limit/foldback.
Overvoltage Protection:	Provided on 5V outputs where indicated. Set at 6.2V ±0.4V. Other outputs use optional overvoltage protectors OVP-12 and OVP-24.

Stability:	±0.3% for 24 hours after warm-up.	
Temperature Rating:	0°C to 50°C full-rated, derated linearly to 40% at 70°C.	
Temperature Coefficient:	.01%/°C typical, .03%/°C maximum.	
Efficiency: (typical)	5V outputs:	45%
	12V and 15V outputs:	55%
	24V and 28V outputs:	60%
Vibration:	Per MIL-STD-810C, Method 514, Procedure X	
Shock:	Per MIL-STD-810C, Method 516, Procedure V	
EMI/RFI:	These linear power supplies have inherently low conducted and radiated noise levels. For most system applications they will meet the requirements of FCC Docket 20780 for Class A equipment and VDE 0871 for Class A equipment without additional noise filtering.	

VOLTAGE/CURRENT RATING CHART

SINGLE OUTPUT MODELS

Model	Voltage/ Current	Case Size	Price (1–24)
2 VOLTS			
HB2-3-A	2V @ 3A	B	$ 34.95
HC2-6-A	2V @ 6A	C	54.95
HD2-12-A	2V @ 12A	D	84.95
HE2-18-A	2V @ 18A	E	119.95
5 VOLTS			
HA5-1.5/OVP-A*	5V @ 1.5A	B	$ 27.95
HB5-3/OVP-A*	5V @ 3A	B	32.95
HC5-6/OVP-A*	5V @ 6A	C	54.95
HN5-9/OVP-A*	5V @ 9A	N	74.95
HD5-12/OVP-A*	5V @ 12A	D	84.95
HE5-18/OVP-A*	5V @ 18A	E	119.95
F5-25/OVP-A*	5V @ 25A	F	154.95
G5-35/OVP-A*	5V @ 35A	F	194.95
CP197-A*	5V @ 50A	F	224.95
12 VOLTS			
HA15-0.9-A	12V @ 0.9A	B	$ 27.95
HB12-1.7-A	12V @ 1.7A	B	32.95
HC12-3.4-A	12V @ 3.4A	C	49.95
HN12-5.1-A	12V @ 5.1A	N	69.95
HD12-6.8-A	12V @ 6.8A	D	79.95
HE12-10.2-A	12V @ 10.2A	E	109.95
F15-15-A	12V @ 16A	F	154.95
15 VOLTS			
HA15-0.9-A	15V @ 0.9A	B	$ 27.95
HB15-1.5-A	15V @ 1.5A	B	32.95
HC15-3-A	15V @ 3A	C	49.95
HN15-4.5-A	15V @ 4.5A	N	69.95
HD15-6-A	15V @ 6A	D	79.95
HE15-9-A	15V @ 9A	E	109.95
F15-15-A	15V @ 15A	F	154.95
24 VOLTS			
HA24-0.5-A	24V @ 0.5A	B	$ 27.95
HB24-1.2-A	24V @ 1.2A	B	32.95
HC24-2.4-A	24V @ 2.4A	C	49.95
HN24-3.6-A	24V @ 3.6A	N	69.95
HD24-4.8-A	24V @ 4.8A	D	79.95
HE24-7.2-A	24V @ 7.2A	E	109.95
F24-12-A	24V @ 12.A	F	154.95
28 VOLTS			
HA24-0.5-A	28V @ 0.5A	B	$ 27.95
HB28-1-A	28V @ 1A	B	32.95
HC28-2-A	28V @ 2A	C	49.95
HN28-3-A	28V @ 3A	N	69.95
HD28-4-A	28V @ 4A	D	79.95
HE28-6-A	28V @ 6A	E	109.95
F24-12-A	28V @ 10A	F	154.95
48 VOLTS			
HB48-0.5-A	48V @ 0.5A	B	$ 34.95
HC48-1-A	48V @ 1A	C	54.95
HD48-3-A	48V @ 3A	D	84.95
HE48-4-A	48V @ 4A	E	119.95
180/200 VOLTS			
HB200-0.12-A	175-210V @ 0.12A	B	$ 39.95
250 VOLTS			
HB250-0.1-A	250V @ 0.1A	B	$ 39.95

*INCLUDES OVERVOLTAGE PROTECTION.

DUAL OUTPUT MODELS

Model	Output #1	Output #2	Case Size	Price (1–24)
±5 VOLTS				
HAA5-1.5/OVP-A	5V @ 1.5A*	−5V @1.5A*	AA	$ 49.95
HBB5-3/OVP-A	5V @ 3A*	−5V @3A*	BB	64.95
HCC5-6/OVP-A	5V @ 6A*	−5V @ 6A*	CC	96.95
±12 TO 15 VOLTS				
HAD12-0.4-A	12V @ 0.4A	−12V @ 0.4A	B	36.95
HAD15-0.4-A	15V @ 0.4A	−15V @ 0.4A	B	32.95
HAA15-0.8-A	12V @ 1A OR 15V @ 0.8A	−12V @ 1A OR −15V @ 0.8A OR −5V @ 0.4A	AA	42.95
HBB15-1.5-A	12V @ 1.7A OR 15V @ 1.5A	−12V @ 1.7A OR −15V @ 1.5A OR −5V @ 0.7A	BB	54.95
HCC15-3-A	12V @ 3.4A OR 15V @ 3A	−12V @ 3.4A OR −15V @ 3A	CC	87.95
HDD15-5-A	12V TO 15V@ 5A	(−) 12V TO 15V@5A	E	129.95
5 VOLTS AND 9 TO 15 VOLTS (Isolated Outputs)				
HAA512-A	5V @ 2A*	9 TO 15V @ 0.5A	AA	$ 49.95
HBB512-A	5V @ 3A*	9 TO 15V @ 1.25A	BB	59.95
HCC512-A	5V @ 6A*	9 TO 15V @ 2.5A	CC	94.95
±18 TO 24 VOLTS				
HAA24-0.6-A	18-20V @ 0.4A OR 24V @ 0.6A	(−)18-20V @ 0.4A OR −24V @ 0.6A	AA	42.95
HBB24-1.2-A	18-20V @ 0.9A OR 24V @ 1.2A	(−)18-20V @ 0.9A OR −24V @ 1.2A	BB	54.95
HOC24-2.4-A	18-20V @ 1.8A OR 24V @ 2.4A	(−)18-20V @ 1.8A OR −24V @ 2.4A	CC	87.95

TRIPLE OUTPUT MODELS

Model	Output #1	Output #2	Output #3	Case Size	Price (1–24)
HTAA-16W-A	5V @ 2A*	9 TO 15V @ 0.4A	(−)9 TO 15V @0.4A OR −5V @ 0.4A	AA	$ 54.95
HBAA-40W-A	5V @ 3A*	12V @ 1A OR 15V @ 0.8A	−12V @1A OR −15V @ 0.8A OR −5V @ 0.4A	BAA	75.95
HCAA-60W-A	5V @ 6A*	12 TO 15V @ 1A	(−)12 TO 15V @ 1A OR −5V @ 0.4A	D	89.95
HCBB-75W-A	5V @ 6A*	12V @ 1.7A OR 15V @ 1.5A	−12V @ 1.7A OR −15V @ 1.5A OR −5V @ 0.7A	CBB	99.95
CP131-A	5V @ 8A*	12V @ 1.7A OR 15V @ 1.5A	−12V @ 1.7A OR −15V @ 1.5A OR −5V @ 0.7A	131	119.95
HDBB-105W-A	5V @ 12A*	12V @ 1.7A OR 15V @ 1.5A	−12V @ 1.7A OR −15V @ 1.5A OR −5V @ 0 7A	DBB	134.95
HDCC-150W-A	5V @ 12A*	12V @ 3.4A OR 15V @ 3A	−12V @ 3.4A OR −15V @ 3A	DCC	154.95

DISK-DRIVE MODELS

Model	Output #1	Output #2	Output #3	Output #4	Output #5	Case Size	Price (1–24)
CP340-A	5V @ 0.5A/ 0.7A PK*	12V @ 0 9A/ 1.8A PK				CP340-A	$ 44 95
CP205-A	5V @ 1.A*	−5V @ 0.5A*	24V @ 1 5A/ 1 7A PK			BAA	75 95
CP510-A	5V @ 6A*	12V @ 2.5A/ 7.5A PK				CP510-A	79 95
CP323-A	5V @ 2A*					N	79 95
CP162-A	5V @ 3A*	−5V @ 0.6A*	24V @ 5A/6A PK			131	129 95
CP498-A	5V @ 6A*	12V @ 5A/ 10A PK	−12V @ 0.5A OR −5V @ 0.25A			131	129 95
CP379-A	5V @ 6A*	−5V @ 1.2A OR −12V @ 1.2A	24V @ 3.5A/ 8A PK			131	129 95
CP503-A	5V @ 6A*	12V @ 1.2A	−12V @ 0 8A	24V @ 2 5A/ 4APK		CBB	129 95
CP384-A	5V @ 9A*	−5V @ 1.2A OR −12V @ 1.2A	24V @ 2A/ 8A PK			131	129 95

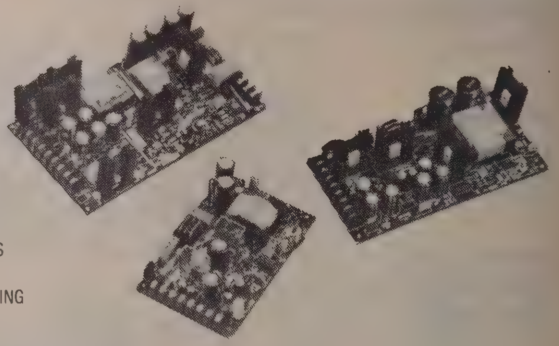
"Innovators in Power Supply Technology"

POWER-ONE D.C. POWER SUPPLIES

Switching Products Division
833 Flynn Road • Camarillo, CA 93010 • Phone: 805 / 482-0757. • Western Union: 752083

International Series
Open-Frame Switchers

SINGLE AND MULTIPLE OUTPUT MODELS, WITH WORLDWIDE CAPABILITIES



FEATURES

- EFFICIENT, RELIABLE, ECONOMICAL
- 11 MODELS, 40 TO 250 WATTS
- UP TO 5 TIGHTLY REGULATED OUTPUTS
- VDE CONSTRUCTION
- MEETS DOMESTIC AND INTERNATIONAL SAFETY:
  - 3750 VAC ISOLATION
  - VDE SAFETY SPACINGS
- MEETS DOMESTIC AND INTERNATIONAL EMI:
  - FCC DOCKET 20780, CLASS A
  - VDE 0871 / 6.78, CLASS A
- TÜV CERTIFIED TO:
  - VDE 0804 IEC 380
  - VDE 0805 (Proposed) IEC 435
  - VDE 0806
- WORLDWIDE AC INPUT, 90-132 / 180-264 VAC, USER SELECTABLE
- POPULAR INDUSTRY STANDARD PACKAGES
- UL RECOGNIZED, CSA CERTIFIED
- FULL LOAD BURN-IN AND THERMAL CYCLING
- 2 YEAR WARRANTY

Description

Multioutput switchers designed for personal computers, disk-drives, intelligent terminals, word processors and other systems targeted for worldwide distribution.

High capacity 5V outputs easily handle the increased demand of today's 5V-only logic chips, while tightly regulated auxiliary outputs provide the high surge current capability required by disk-drives and printers.

All models meet the world's toughest safety and EMI standards resulting in easier system approval and international marketing.

SPECIFICATIONS

AC Input	90-132 VAC or 180-264 VAC, user selectable. 47-63 HZ, single phase.
DC Outputs:	See Voltage / Current Rating Charts.
Brown-Out Protection:	Regulation is maintained down to 90 / 180 VAC.
Hold-Up Time:	20 msec minimum at full rated load and nominal AC input voltage.
Efficiency:	Measured at full rated output power and nominal AC input voltage: 70% ± 5%
Regulation Characteristics:	See Voltage / Current Rating Charts. Line: Measured over a 90-132 VAC or 180-264 VAC line change. Load: Measured by varying the load current from 60% of full rated to either 20% or 100% of full rated.
Cross Regulation:	Cross regulation specifies the maximum voltage change when the +5V output load current is varied from 75% of full rated to either 50% or 100% of full rated.
Output Noise and Ripple:	0.3% RMS, 1% PK-PK maximum.
Transient Response:	Main 5V output only. Recovery Time: 500μsec typical for a 50-100% load change.
Output Overload Protection:	Fully protected against output overload and short circuit.
Overvoltage Protection:	Provided on +5V outputs.
Reverse Voltage Protection:	Fully protected from damage due to application of reverse polarity voltage across DC output terminals.
Input Protection:	AC input line fuse provided. Internally located.
Inrush Current:	Internally limited by thermistor.
Temperature Rating:	Operating: 0°C to +70°C. Storage -55°C to +85°C
Temperature Coefficient:	±0.03%/°C typical, ±0.05%/°C maximum.
Vibration:	Per Mil-Std-810C, Method 514, Procedure X, Catagory G-1.
Shock:	Per Mil-Std-810C, Method 516, Procedure V.
Warranty:	2 years.

OPTIONS

Input/Output Connectors:	Barrier terminal blocks standard on all models. Consult factory for optional connector styles.
Safety Covers:	Available for SPL130 and SPL200 series models.
User Specified Outputs:	Output voltage and current ratings may be configured to user specified requirements. Consult factory for details.

VOLTAGE / CURRENT RATING CHARTS

SPL40 SERIES $105 SINGLE QUANTITY
40 WATTS CONTINUOUS

MODEL	VOLTAGE	CURRENT	INITIAL SETTING TOLERANCE	LINE REGULATION	LOAD REGULATION	CROSS REGULATION
SPL40 -4000	+5V	5A	ADJUSTABLE NOTE A	±0.1%	±0.5%	N A
	+12V	0.5A	±4% NOTE B	±0.1%	±1%	N A
	-12V	0.5A	±4% NOTE B	±0.1%	±1%	N A
	5V	0.5A	±4% NOTE B	±0.1%	±1%	N A

SPL53 SERIES $125 SINGLE QUANTITY
80 WATTS CONTINUOUS

MODEL	VOLTAGE	CURRENT	INITIAL SETTING TOLERANCE	LINE REGULATION	LOAD REGULATION	CROSS REGULATION
SPL53 -4000	+5V	8A	ADJUSTABLE NOTE A	±0.1%	±1%	N/A
	+12V	2.5A/ 5A PK	ADJUSTABLE NOTE D	±0.1%	±1%	N A
	-12V	0.6A	±4% NOTE B	±0.1%	±1%	N/A
	-5V	0.6A	±4% NOTE B	±0.1%	±1%	N/A
SPL53 -4101	+5V	8A	ADJUSTABLE NOTE A	±0.1%	±1%	N A
	+12V	1.2A	±4% NOTE B	±0.1%	±1%	N/A
	-12V	0.6A	±4% NOTE B	±0.1%	±1%	N/A
	+24V	1.5A/ 3A PK	±5% NOTE C	±0.2%	±5%	±5%

SPL53 SERIES (continued)

MODEL	VOLTAGE	CURRENT	INITIAL SETTING TOLERANCE	LINE REGULATION	LOAD REGULATION	CROSS REGULATION
SPL53 -4102	+5V	8A	ADJUSTABLE NOTE A	±0.1%	±1%	N/A
	+12V	1.2A	±4% NOTE B	±0.1%	±1%	N/A
	+12V	2.5A/ 5A PK	±5% NOTE C	±0.2%	±5%	±5%
	-12V	0.6A	±4% NOTE B	±0.1%	±1%	N/A

SPL65 SERIES $150 SINGLE QUANTITY
85 WATTS CONTINUOUS, 95 WATTS PEAK

MODEL	VOLTAGE	CURRENT	INITIAL SETTING TOLERANCE	LINE REGULATION	LOAD REGULATION	CROSS REGULATION
SPL65 -5000	+5V	8A	ADJUSTABLE NOTE A	±0.1%	±1%	N/A
	+12V	1.2A	±4% NOTE B	±0.1%	±1%	N A
	-12V	1.2A	±4% NOTE B	±0.1%	±1%	N A
	+24V	1.2A 1.5A PK	±4% NOTE B	±0.1%	±1%	N A
	-5V	0.5A	±4% NOTE B	±0.1%	±1%	N A

NOTES
A. Voltage level adjustable from 4.75V to OVP trip point.
B. Fully regulated output, voltage fixed (3 terminal regulator).
C. Quasi-regulated output.
D Fully regulated output, voltage adjustable ±5% minimum.
E. The sum of the +5V and *Aux I* load currents must not exceed 20A.
F. The sum of the +5V and *Aux I* load currents must not exceed 35A.

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POWER-ONE D.C. POWER SUPPLIES

Switching Products Division

833 Flynn Road • Camarillo, CA 93010 • Phone: 805/482-0757. • Western Union: 752083

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International Series

Open-Frame Switchers

MEETS THE WORLD'S TOUGHEST SAFETY AND EMI STANDARDS

VOLTAGE/CURRENT RATING CHARTS (continued)

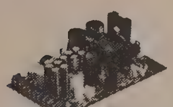
SPL130 SERIES $198 SINGLE QUANTITY
130 WATTS CONTINUOUS, 150 WATTS PEAK

MODEL	VOLTAGE	CURRENT	INITIAL SETTING TOLERANCE	LINE REGULATION	LOAD REGULATION	CROSS REGULATION
SPL130-4102P	+5V	20A NOTE E	ADJUSTABLE NOTE A	±0.1%	±1%	N A
	+12V AUX I	4A 6A PK	±5% NOTE C	±0.2%	±1%	±5%
	-12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	5V	1.5A	±4% NOTE B	±0.1%	±1%	N A
SPL130-4101P	+5V	20A NOTE F	ADJUSTABLE NOTE A	±0.1%	±1%	N A
	+12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	-12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	+24V AUX I	2A 4A PK	±5% NOTE C	±0.2%	±5%	±5%
SPL130-4100P	+5V	20A NOTE E	ADJUSTABLE NOTE A	±0.1%	±1%	N/A
	+12V AUX I	4A/ 6A PK	±5% NOTE C	±0.2%	±3%	±5%
	+12V	1.5A	±4% NOTE B	±0.1%	±1%	N/A
	-12V	1.5A	±4% NOTE B	±0.1%	±1%	N/A

SPL200 SERIES $270 SINGLE QUANTITY
200 WATTS CONTINUOUS, 250 WATTS PEAK

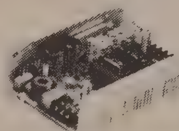
MODEL	VOLTAGE	CURRENT	INITIAL SETTING TOLERANCE	LINE REGULATION	LOAD REGULATION	CROSS REGULATION
SPL200-4100P	+5V	35A NOTE F	ADJUSTABLE NOTE A	±0.1%	±1%	N/A
	+12V AUX I	4A/ 8A PK	±5% NOTE C	±0.2%	±3%	±3%
	-12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	-5V	1.5A	±4% NOTE B	±0.1%	±1%	N A
SPL200-5200P	+5V	35A NOTE F	ADJUSTABLE NOTE A	±0.1%	±1%	N A
	+12V AUX I	4A/ 8A PK	±5% NOTE C	±0.2%	±3%	±3%
	-12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	-5V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	+24V	4A 6A PK	±5% NOTE C	±0.2%	±5%	±5%
SPL200-5100P	+5V	35A NOTE F	ADJUSTABLE NOTE A	±0.1%	±1%	N/A
	+12V AUX I	4A 8A PK	±5% NOTE C	±0.2%	±3%	±3%
	+12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	-12V	1.5A	±4% NOTE B	±0.1%	±1%	N A
	-5V	1.5A	±4% NOTE B	±0.1%	±1%	N A

Single Output Switchers



SPL53 CASE

SPL40 CASE



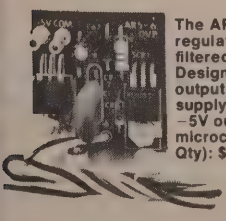
SPL250 CASE

FEATURES

- 5V TO 28V
- 40W TO 250W
- 115/230 VAC INPUT
- MEETS INTERNATIONAL SAFETY AND EMI SPECS
- VDE CONSTRUCTION
- UL, CSA APPROVED
- 2 YEAR WARRANTY

MODEL	VOLTAGE	CURRENT	PRICE (UNIT QTY.)
5 Volts			
SPL 40-1005	5V	8A	$95.00
SPL 53-1005	5V	16A	120.00
SPL130-1005	5V	26A	170.00
SPL250-1005	5V	50A	250.00
12-15 Volts			
SPL 40-1012	12-15V	3.3A/2.7A	$95.00
SPL 53-1012	12-15V	6.7A/5.3A	120.00
SPL130-1012	12-15V	11A/9A	170.00
SPL250-1012	12-15V	21A/17A	250.00
24-28 Volts			
SPL 40-1024	24-28V	1.6A/1.4A	$95.00
SPL 53-1024	24-28V	3.3A/2.8A	120.00
SPL130-1024	24-28V	5.5A/4.5A	170.00
SPL250-1024	24-28V	10A/7A	250 00

−5V Sub-Regulator Module



AR5-0.6/OVP

The AR5-0.6/OVP will provide a −5V regulated output from any −7V to −30V filtered DC source. Designed to be connected to the negative output of any multiple output power supply, the AR5-0.6/OVP will supply the −5V output required in many microcomputer applications. Price (Unit Qty): $10.95

Custom Designs

POWER-ONE is an experienced manufacturer of custom power supplies for high-quantity applications requiring special electrical and mechanical configurations. We excell at open frame multiple output designs, regulated or unregulated.

Overvoltage Protection

OVP-24

OVP-12

These optional Overvoltage Protection modules are available for use with any power supply NOT supplied with built-in OVP. Each is adjustable from 6.4V to 34V and should be used when maximum load protection is of prime importance.

Mounting holes are provided on all power supplies to accommodate these modules, which mount within the specified outline dimensions of each supply.

OVP-12 For use on all models except E & F case sizes (when used on ±9V thru ±15V models, one OVP-12 protects both outputs): Price Unit Qty: $7.95

OVP-24 For use on E & F case models: Price Unit Qty: $14.95

Dimension Chart

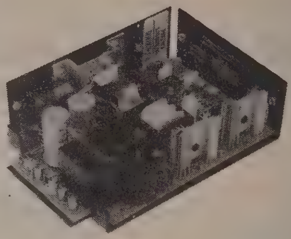
Case Size	Dimension Inches	Case Size	Dimension Inches	Case Size	Dimension Inches	Case Size	Dimension Inches
B	4.87 x 4.0 x 1.62	CBB	11.0 x 4.87 x 2.75	SWITCHERS, MULTIPLE OUTPUT		SWITCHERS, SINGLE OUTPUT	
C	5.62 x 4.87 x 2.5	DBB	14.25 x 4.87 x 2.75	SPL40	6.30 × 3.92 × 2.00	SPL40	5.75 × 3.92 × 2.20
N	7.0 x 4.87 x 2.75	DCC	15.0 x 4.88 x 3.75	SPL53	8.25 × 4.25 × 2.10	SPL53	8.25 × 4.25 × 2.20
D	9.0 x 4.87 x 2.75	131	11.0 x 4.87 x 2.75	SPL65	9.00 × 5.00 × 2.10	SPL130	8.90 × 5.00 × 2.45
E	14.0 x 4.87 x 2.75	CP340-A	5.5 x 4.0 x 1.62	SPL130	10.50 × 5.00 × 2.45	SPL250	12.00 × 4.94 × 2.45
F	16.75 x 4.87 x 5.0	CP510-A	8.25 x 4.87 x 2.75	SPL200	13.00 × 5.00 × 2.45		
AA	6.5 x 4.0 x 1.62	OVP-12	1.6 x 1.6 x 0.7				
BB	7.0 x 4.87 x 2.5	OVP-24	2.8 x 2.0 x 0.9				
CC	9.38 x 4.87 x 2.75	AR5-0.6/OVP	1.5 x 1.55 x 0.8				
BAA	10.25 x 4.0 x 2.5						

POWER PAC INC.

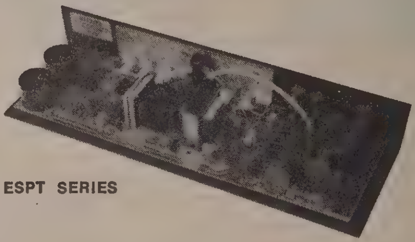
OPEN FRAME SWITCHING POWER SUPPLIES
ESP SINGLE OUTPUT
ESPT MULTIPLE OUTPUT

FEATURES:

- Highest efficiencies
- Latest high performance monolithic pulse width circuit design
- Open frame construction — convection cooled
- Dual input 115/230 VAC — 50/60 Hz
- Wide AC input ranges — brown out protection
- Up to 4 regulated outputs
- Choice of voltage and current on all outputs up to maximum rated power
- State of the art EMI filtering
- 24 hour burn in
- 5 year warranty



ESP SERIES



ESPT SERIES

SPECIFICATIONS:

Input Voltage:	90/130 or 180/260 VAC 47/63 Hz. Jumper or barrier strip selectable.
Output Voltage/Current:	See rating in table.
Voltage Adjustment:	±5% or 0.5 VDC Minimum.
Regulation: (Single Output)	Line: ±0.1% for specified input range. Load: ±0.1% for 100% load change.
Regulation: (Multiple Output)	Line: ±0.2% for specified input range. Load: Output #1 (+5V): ±0.2% for 100% load change. Output #2 (−5V): ±5% for 100% load change; ±3% for cross regulation. Output #3 (+12V/+15V): ±0.2% for 100% load change. Output #4 (−12V/−15V): ±0.2% for 100% load change.
Ripple & Noise:	50 mV peak to peak maximum.
Efficiency:	70-80%.
Operating Temperature:	0°C to +70°C. Derate 2%/°C over 50°C.
Temperature Coefficient:	0.02%/°C over temperature range.
Storage Temperature:	−55°C to +85°C.
Transient Response:	300 μsec for 50% to 100% load change to recover within 1% of voltage set point. 500 μsec for a multiple output.
Overload Protection:	Automatic current limit.
Overvoltage Protection:	Standard on all models.
Soft Start:	Standard on all models.
In Rush Current Limit:	Standard on all models.
Remote Sense:	Standard on all models.
Hold-up:	16 msec minimum after loss of input voltage measured at full load and nominal input.
Overshoot:	No voltage spikes on turn-on, turn-off or power failure.
Remote Shutdown:	Single Output.
Minimum Load: (Multiple Output)	15% minimum loading required on Output #1 to maintain regulation on Outputs #2, 3 & 4.

SINGLE OUTPUT

ESP3 SERIES — 4⅞ x 4⅝ x 2 $75.00 **ESP4 SERIES — 6¼ x 4⅞ x 2⅜ $90.00**

Model	Voltage VDC ±5%	Current Amperes	Model	Voltage VDC ±5%	Current Amperes
ESP3-5	5	6	ESP4-5	5	10
ESP3-12	12	3	ESP4-12	12	5
ESP3-15	15	2.4	ESP4-15	15	4
ESP3-24	24	1.5	ESP4-24	24	2.5
ESP3-28	28	1.3	ESP4-28	28	2

ESP5 SERIES—7¼ x 4⅞ x 2¾ $165.00 **ESP7 SERIES—14½ x 4⅞ x 2¾ $270.00**

Model	Voltage VDC ±5%	Current Amperes	Model	Voltage VDC ±5%	Current Amperes
ESP5-5	5	20	ESP7-5	5	50
ESP5-12	12	10	ESP8-5	5	75
ESP5-15	15	8	ESP7-12	12	30
ESP5-24	24	5	ESP7-24	24	15
ESP5-28	28	4			

MULTIPLE OUTPUT

MAX. CONTINUOUS OUTPUT POWER — 100W SIZE — 10½ x 5 x 2½ $210.00

Model	Output #1	Output #2	Output #3	Output #4
ESPT3-12	+5V 15A	−5V 2.0A	+12V 1.2A	−12V 1.2A
ESPT3-15	+5V 15A	−5V 2.0A	+15V 0.8A	−15V 0.8A
ESPT3-XX	* 15A	* 2.0A	* 1.2A	* 1.2A

MAX. CONTINUOUS OUTPUT POWER — 200W SIZE — 115 x 5 x 2½ $310.00

ESPT4-12	+5V 25A	−5V 4.0A	+12V 4.0A	−12V 4.0A
ESPT4-15	+5V 25A	−5V 4.0A	+15V 3.2A	−15V 3.2A
ESPT4-XX	* 25A	* 4.0A	* 4.0A	* 4.0A

* Custom Units — Minimum Order 200 Units.

At no time must average power exceed the maximum continuous output power.

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POWER PAC INC.

OPEN FRAME LINEAR DISK DRIVE POWER SUPPLIES EDD DISK DRIVE

FEATURES:

- Designed to power mosk disk memory systems Floppy disk — fixed disk — multiple drives
- 5¼ inch, 8 inch, fixed disk media 9 models — includes drive controller power
- Dual input 115/230 Volt — 50/60 Hz
- No 50 Hz derating
- Open frame construction Electrostatic shield
- Highest quality computer grade components 24-hour burn-in
- 5 year warranty
- UL recognized

SPECIFICATIONS:

Input Voltage:	105-125/210-250 VAC, 47-440 Hz
Output Voltage/Current:	See ratings in table.
Output Adj:	±5%
Regulation:	±0.15% line and load combined.
Ripple:	3 mV Peak to Peak
Transient Response:	50 μsec, full load to ½ load
Stability:	±.2% for 24 hrs. after ½ hr. warm-up
Temperature Coefficient:	Better than .025%/°C
Temperature Derating:	3%/°C above 50°C
Temperature — Operating:	0-70°C
Temperature — Storage:	−40° C to +85° C
Overload Protection:	All outputs protected by foldback type current limiting circuit. Automatic recovery upon removal of overload. Foldback is delayed on 24 volt output, to allow turn on surge normally encountered.
Overvoltage Protection:	OV Protection, factory set to trip from 5.8 to 7.0 VDC, is provided on both the plus and minus 5 volt outputs.
Shielding:	Electrostatic shield between primary and secondary of transformer
Cooling:	Convection cooled
Mechanical Dimensions:	For specific details of outline and mounting dimensions see PPI 82-06 Mechanical Data Handbook.

OPTION: Perforated cover

EDD DISK DRIVE

Model	Output #1		Output #2		Output #3		Case	Size	Application	Price
	Volts	Amps	Volts	Amps	Volts	Amps				
EDD-08	5V	0.5A 1.7A Pk	+12V	1.2A 1.8 Pk	—		1DA	4 x 5½ x 1⅝	Floppy-Disk 5¼″ Media	$ 55
EDD-09	5V	2.0A	+12V	4.0A	—		BCC	7 x 4⅞ x 2¾	Floppy-Disk 5¼″ Media	87
EDD1	5V	1.0A	−5V	0.5A	+24V	1.5A 1.7A Pk	1BA	10¼ x 4 x 2½	Floppy-Disk 8″ Media	87
EDD2	5V	2.5A	−5V	0.5A	+24V	1.5A 1.7A Pk	3D	9 x 4⅞ x 2¾	Floppy-Disk 8″ Media	110
EDD3	5V	3.0A	−5V	0.5A	+24V	3.0A 3.4A Pk	6G	11 x 4⅞ x 2¾	Floppy-Disk 8″ Media	115
EDD4	5V	3.0A	−5V	0.6A	+24V	5.0A 6.0A Pk	6G	11 x 4⅞ x 2¾	Floppy-Disk 8″ Media	135
EDD5	5V	6.0A	−12V or − 5V	0.8A 0.8A	+24V	3.5A 5.5A Pk	6G	11 x 4⅞ x 2¾	Winchester Fixed Disk	135
EDD6	5V	9.0A	−12V or − 5V	0.8A 0.8A	+24V	0.7A 4.5A Pk	6G	11 x 4⅞ x 2¾	Winchester Fixed Disk	140
EDD7	5V	12.0A	−12V or − 5V	0.8A 0.8A	+24V	3.5A 5.5A Pk	4E	16¾ x 4⅞ x 4	Winchester Fixed Disk	175
EDD10	5V −5V	6.0A 0.5A	12V −12V	1.2A 1.0A	+24V	2.5A 6.0A Pk	9DD	14 x 4⅞ x 2¾	Winchester Fixed Disk	225

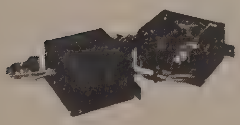
CUSTOM POWER SUPPLIES

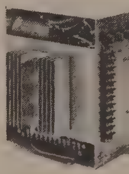
Power Pac is one of the leading manufacturers of OEM Custom Power Supplies.

If our standard products do not fit your requirement, our experienced staff of engineers and designers are available to design to your exact requirement.

Our power supply applications vary from Medical Electronics, CRT Terminal, Disk Drive, Process Controls, Microprocessor, Main Frame Computers, Printers, Computer Peripheral, Recording Studio, Dental Electronics, Photo-typesetter, Word Processing to Industrial Control.

All supplies are designed to meet rigid quality and reliability requirements and are qualified to meet Underwriter Laboratories, Canadian Standards Association and European VDE Specifications.





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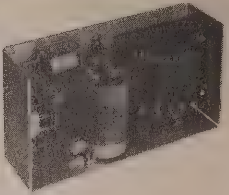
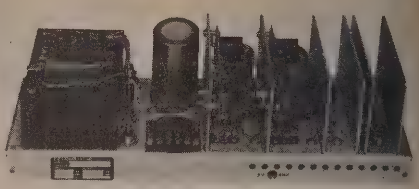
POWER PAC INC.

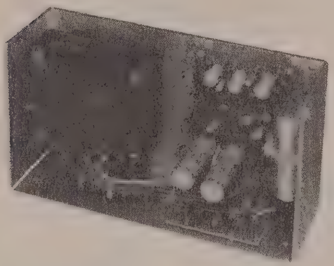
OPEN FRAME LINEAR
EP SINGLE OUTPUT





FEATURES:

- Most popular universal power supply series
- Open frame construction — convection cooled
- Dual input 115/230 Volt — 50/60 Hz
- Electrostatic shield
- Highest quality computer grade components
- Built-in short circuit protection with automatic recovery
- Optional over-voltage protection
- 24 hour burn-in
- 5 year warranty
- UL recognized



SPECIFICATIONS:

Input Voltage:	105/125 or 210/250 VAC, 47/440 Hz
Output Voltage/Current:	See rating in table I. Current ratings are for 57/440 Hz. Derate 10% at 50 Hz
Output Adj. Range:	±5% or .5 VDC minimum
Regulation:	±0.15% Line & Load combined
Ripple:	1.5 mV RMS, 5 mV pk-pk max
Stability:	±0.1% for 8 hours after warm-up
Temperature Operating:	0°C to +71°C continuous
Temperature Derating:	Derate 2%/°C above 40°C
Temperature Coefficient:	Better than 0.03%/°C
Transient Response:	50 μsec for a 50% load change to recover within ±10 mV band
Cooling:	Convection cooled
Overload Protection:	Built-in foldback type current limit circuit to protect against overload and short circuit condition, with automatic recovery. Set to operate at 120 to 135% of full load current at 40°C.
Overvoltage Protection:	Built-in SCR crowbar set at 120-130% of nominal output. (120-140% on EP6A and EP1B)
Remote Sense:	Standard on size 2C and larger
Output Polarity:	Floating, either side may be grounded
Shielding:	Electrostatic shield between primary and secondary of transformer
Mechanical Dimension:	For specific details of outline and mounting dimensions see PPI 82-06 Mechanical Data Handbook.

EP SINGLE OUTPUT

Model	Voltage VDC ±5%	Current Amperes	Case	Price	
				No-OV	W-OV
EP1B SERIES — 4⅞ x 4 x 1⅝					
EP1B-5	5	3.0	1B	$ 32	$ 37
EP1B-6	6	3.0	1B	32	37
EP1B-12	12	1.7	1B	32	37
EP1B-15	15	1.5	1B	32	37
EP1B-24	24	1.2	1B	32	37
EP1B-28	28	1.0	1B	32	37
EP8CC SERIES — 7 x 4⅞ x 2¾					
EP8CC-5	5	9.0	8CC	$ 73	$ 80
EP8CC-6	6	8.5	8CC	73	80
EP8CC-12	12	5.1	8CC	73	80
EP8CC-15	15	4.5	8CC	73	80
EP8CC-24	24	3.3	8CC	73	80
EP8CC-28	28	3.0	8CC	73	80
EP9DD SERIES — 14 x 4⅞ x 2¾					
EP9DD-5	5	18	9DD	$121	$133
EP9DD-6	6	18	9DD	121	133
EP9DD-12	12	10.8	9DD	121	133
EP9DD-15	15	9.5	9DD	121	133
EP9DD-24	24	7.2	9DD	121	133
EP9DD-28	28	6.0	9DD	121	133
EP4EE SERIES — 16¾ x 4⅞ x 4⅞					
EP4EE-5	5	35	4EE	$200	$216
EP4EE-6	6	32	4EE	200	216
EP4EE-12	12	16	4EE	200	216
EP4EE-15	15	15	4EE	200	216
EP4EE-24	24	12	4EE	200	216
EP4EE-28	28	11	4EE	200	216

Model	Voltage VDC ±5%	Current Amperes	Case	Price	
				No-OV	W-OV
EP2C SERIES — 5⅝ x 4⅞ x 2½					
EP2C-5	5	6.0	2C	$ 56	$ 63
EP2C-6	6	6.0	2C	56	63
EP2C-12	12	3.4	2C	56	63
EP2C-15	15	3.0	2C	56	63
EP2C-24	24	2.4	2C	56	63
EP2C-28	28	2.0	2C	56	63
EP3D SERIES — 9 x 4⅞ x 2¾					
EP3D-5	5	12	3D	$ 96	$103
EP3D-6	6	12	3D	96	103
EP3D-12	12	6.8	3D	96	103
EP3D-15	15	6.0	3D	96	103
EP3D-24	24	5.0	3D	96	103
EP3D-28	28	4.4	3D	96	103
EP4E SERIES — 16¾ x 4⅞ x 4⅞					
EP4E-5	5	25	4E	$170	$184
EP4E-6	6	23	4E	170	184
EP4E-12	12	15	4E	170	184
EP4E-15	15	14	4E	170	184
EP4E-24	24	11	4E	170	184
EP4E-28	28	10	4E	170	184
EP5F SERIES — 16¾ x 10 x 4⅞					
EP5F-5	5	50	5F	$266	$290
EP5F-6	6	46	5F	266	290
EP5F-12	12	30	5F	266	290
EP5F-15	15	28	5F	266	290
EP5F-24	24	22	5F	266	290
EP5F-28	28	20	5F	266	290

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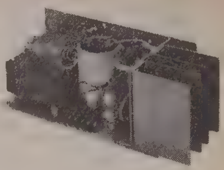
POWER PAC INC.

OPEN FRAME LINEAR EPD DUAL EPT/UPS TRIPLE OUTPUTS

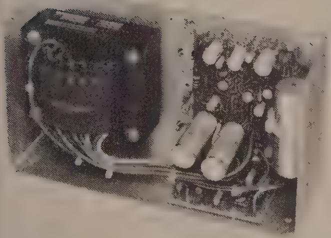


FEATURES:

- Most popular universal power supply series
- Open frame construction — convection cooled
- Dual input 115/230 Volt — 50/60 Hz
- Electrostatic shield
- Highest quality computer grade components
- Built-in short circuit protection with automatic recovery
- Optional over-voltage protection
- 24 hour burn-in
- 5 year warranty
- UL recognized

SPECIFICATIONS:

Input Voltage:	105/125 or 210/250 VAC, 47/440 Hz
Output Voltage/Current:	See rating in table I. Current ratings are for 57/440 Hz. Derate 10% at 50 Hz
Output Adj. Range:	±5% or .5 VDC minimum
Regulation:	±0.15% Line & Load combined
Ripple:	1.5 mV RMS, 5 mV pk-pk max
Stability:	±0.1% for 8 hours after warm-up
Temperature Operating:	0°C to +71°C continuous
Temperature Derating:	Derate 2%/°C above 40°C
Temperature Coefficient:	Better than 0.03%/°C
Transient Response:	50 µsec for a 50% load change to recover within ±10 mV band
Cooling:	Convection cooled
Overload Protection:	Built-in foldback type current limit circuit to protect against overload and short circuit condition, with automatic recovery. Set to operate at 120 to 135% of full load current at 40°C.
Overvoltage Protection:	Built-in SCR crowbar set at 120-130% of nominal output. (120-140% on EP6A and EP1B)
Remote Sense:	Standard on size 2C and larger
Output Polarity:	Floating, either side may be grounded
Shielding:	Electrostatic shield between primary and secondary of transformer
Mechanical Dimension:	For specific details of outline and mounting dimensions see PPI 82-06 Mechanical Data Handbook.



EPD DUAL OUTPUT

Model	Output #1		Output #2		Case	Size	Price	
	Volts	Amps	Volts	Amps			No-OV	W-OV
EPD1BB-5/9-15	5V	2.0A	−9 to −15V	0.5A	1BB	4¾ x 4 x 2¼	$ 52	$ 57
EPD1BB-12/15	12 to 15V	0.7A	−12 to −15V	0.7A	1BB	4¾ x 4 x 2¼	52	57
EPD7H-5	5V	3.0A	−5V	3.0A	7H	7 x 4⅞ x 2¾	70	75
EPD7H-6	6V	2.5A	−6V	2.5A	7H	7 x 4⅞ x 2¾	70	75
EPD7H-12	12V	1.7A	−12V	1.7A	7H	7 x 4⅞ x 2¾	70	75
EPD7H-15	15V	1.5A	−15V	1.5A	7H	7 x 4⅞ x 2¾	70	75
EPD7H-5/9-15	5V	3.0A	−9 to −15V	1.3A	7H	7 x 4⅞ x 2¾	70	75
EPD3D-5	5V	6.0A	−5V	6.0A	3D	9 x 4⅞ x 2¾	100	107
EPD3D-6	6V	5.0A	−6V	5.0A	3D	9 x 4⅞ x 2¾	100	107
EPD3D-12	12V	3.4A	−12V	3.4A	3D	9 x 4⅞ x 2¾	100	107
EPD3D-15	15V	3.0A	−15V	3.0A	3D	9 x 4⅞ x 2¾	100	107
EPD3D-5/9-15	5V	6.0A	−9 to −15V	2.5A	3D	9 x 4⅞ x 2¾	100	107
EPD9DD-12	12V	5.0A	−12V	5.0A	9DD	14 x 4⅞ x 2¾	130	140
EPD9DD-15	15V	5.0A	−15V	5.0A	9DD	14 x 4⅞ x 2¾	130	140
EPD4D-36	36V	4.0A	−36V	4.0A	4D	15 x 6⅛ x 5	205	220

EPT/UPS TRIPLE OUTPUT

Model	Output #1		Output #2		Output #3		Case	Size	Price	
	Volts	Amps	Volts	Amps	Volts	Amps			No-OV	W-OV
UPS 4	5V	1.0A	12V	0.25A	(−) 5-12V	0.25A	CA	4¾ x 3⅜ x 3⅜	$ —	$ 57
EPT1AA-12	5V	2.0A	12V	0.4A	−12V	0.4A	AA	6½ x 4 x 1⅝	60	72
EPT 1-24	5V	2.0A	24V	1.5A	−24V	1.5A	1BC	12 x 5⅞ x 5½	128	140
UPS 1	5V	3.0A	12V	0.6A	−12V or 5V	0.6A 0.4A	7H	7 x 4⅞ x 2¾	—	102
EPT5-12/15	5V	3.0A	12V or 15V	1.0A 0.8A	−12V or −15V or 5V	1.0A 0.8A 0.4A	1BA	10¼ x 4 x 2½	85	97
UPS 3	5V	3.0A	12V	1.2A	− 9V or 5V	1.5A 0.8A	3D	9 x 4⅞ x 2¾	—	114
EPT1-12	5V	3.0A	12V	1.5A	−12V	1.5A	3D	9 x 4⅞ x 2¾	105	117
EPT1-15	5V	3.0A	15V	1.3A	−15V	1.3A	3D	9 x 4⅞ x 2¾	105	117
EPT2-24	5V	3.0A	24V	3.0A	−24V	3.0A	2BC	12 x 6 x 6	200	220
EPT2-12	5V	6.0A	12V	1.7A	−12V	1.7A	6G	11 x 4⅞ x 2¾	128	140
EPT2-15	5V	6.0A	15V	1.5A	−15V	1.5A	6G	11 x 4⅞ x 2¾	128	140
EPT3-12	5V	6.0A	12V	3.0A	−12V	3.0A	4E	16¾ x 4⅞ x 4⅞	158	171
EPT3-15	5V	6.0A	15V	2.8A	−15V	2.8A	4E	16¾ x 4⅞ x 4⅞	158	171
UPS 2	5V	7.0A	12V	1.0A	− 9V or 5V	1.2A 0.75A	3D	9 x 4⅞ x 2¾	—	138
EPT9DD-12	5V	12.0A	12V	1.7A	−12V	1.7A	9DD	14 x 4⅞ x 2¾	150	162
EPT9DD-15	5V	12.0A	15V	1.5A	−15V	1.5A	9DD	14 x 4⅞ x 2¾	150	162
EPT4-12	5V	12.0A	12V	3.4A	−12V	3.4A	4E	16¾ x 4⅞ x 4⅞	188	208
EPT4-15	5V	12.0A	15V	3.0A	−15V	3.0A	4E	16¾ x 4⅞ x 4⅞	188	208
EPT6-12	5V	18.0A	12V	1.5A	−12V	1.5A	6BD	13 x 5 x 4¾	175	195

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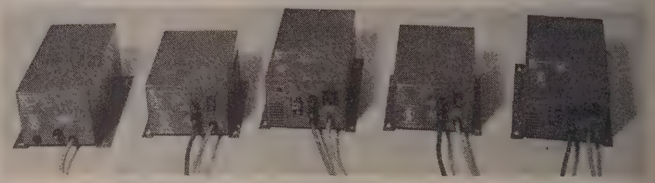
POWER PAC INC.

WALL MOUNT BASIC AND CONSTANT VOLTAGE OUTPUT BATTERY BACK-UP AND BATTERY CHARGER

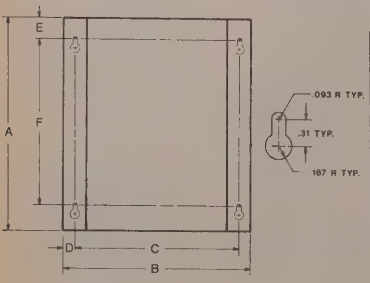


FEATURES:

- Most popular universal power sources
- Wall mount construction
- Convection cooled
- Highest quality computer grade components
- Short circuit protected
- Battery charger/back-up
- Highest efficiencies
- 24 hourn burn-in
- 10 year warranty
- UL 1012 listed
- CSA approved

SPECIFICATIONS:

Input Voltage:	117/234 VAC ±10% 60 Hz Fuse protected. Lighted on/off switch.	
Regulation:	Basic DC models.	Constant Voltage models.
Line:	DC output is proportional to input line changes.	±1%
Load:	10% (20-100% load change)	5% (25-100% load change)
Ripple: (Line Frequency)	5% RMS	0.5% RMS
Efficiency:	80-90%	
Operating Temperature:	0-50 C	
Battery Back-Up:	Battery Charger and Back-up System charges batteries at 1.5 amp maximum rate, monitors Line, DC Output and Battery voltages and will automatically switch in battery system when Line or DC Output voltage falls below specification. When fault is cleared, the Power Source will switch back to normal operation and charge batteries.	
Transient Response:	50 ms for 50 to 100% load change for output to recover within rated voltage. (400 ms for constant voltage models).	
Overload:	150 to 300% of rated output current for one second at turn on.	
Overload Protection:	Automatic current limit is inherent in constant voltage models restricting short circuit current to a safe value. Output returns to normal upon removal of overload. Basic DC output models are fuse protected.	
Polarity:	Isolation between primary and secondary. Positive or negative ground.	
Input Connection:	Standard 3-wire cord 6 ft. long. Right angle molded plug.	
Output Connections:	Barriers or cable.	
Mounting:	All models are designed for wall mounting or stand alone. All models available without cover for installation in key systems.	



	KS3	KS5	KS7
	4¾″ high	5¾″ high	5¼″ high
A	9	12	12
B	7½	7½	10½
C	6¾	6¾	9¾
D	⅜	⅜	⅜
E	⅞	⅞	⅞
F	7	10	10

BASIC D.C. OUTPUT

MODEL	RATING		CASE	PRICE
KSA4-4	24 Volts DC	4.0 Amps	KS3	$170.00
KSA4-7	24 Volts DC	7.0 Amps	KS5	$265.00
KSA4-15	24 Volts DC	15.0 Amps	KS7	$340.00
KSA8-2	48 Volts DC	2.0 Amps	KS3	$170.00
KSA8-4	48 Volts DC	4.0 Amps	KS5	$265.00
KSA8-8	48 Volts DC	8.0 Amps	KS7	$340.00

BASIC DC OUTPUT WITH BATTERY BACK-UP & CONTROL CIRCUIT

MODEL	RATING		CASE	PRICE
KSB4-4	24 Volts DC	4.0 Amps	KS5	$230.00
KSB4-7	24 Volts DC	7.0 Amps	KS5	$325.00
KSB4-15	24 Volts DC	15.0 Amps	KS7	$400.00
KSB8-2	48 Volts DC	2.0 Amps	KS5	$230.00
KSB8-4	48 Volts DC	4.0 Amps	KS5	$325.00
KSB8-8	48 Volts DC	8.0 Amps	KS7	$400.00

CONSTANT DC OUTPUT

MODEL	RATING		CASE	PRICE
KSC4-4	24 Volts DC	4.0 Amps	KS3	$190.00
KSC4-7	24 Volts DC	7.0 Amps	KS5	$295.00
KSC4-15	24 Volts DC	15.0 Amps	KS7	$380.00
KSC8-2	48 Volts DC	2.0 Amps	KS3	$190.00
KSC8-4	48 Volts DC	4.0 Amps	KS5	$295.00
KSC8-8	48 Volts DC	8.0 Amps	KS7	$380.00

CONSTANT DC OUTPUT WITH BATTERY BACK-UP & CONTROL CIRCUIT

MODEL	RATING		CASE	PRICE
KSD4-4	24 Volts DC	4.0 Amps	KS5	$250.00
KSD4-7	24 Volts DC	7.0 Amps	KS5	$355.00
KSD4-15	24 Volts DC	15.0 Amps	KS7	$440.00
KSD8-2	48 Volts DC	2.0 Amps	KS5	$250.00
KSD8-4	48 Volts DC	4.0 Amps	KS5	$355.00
KSD8-8	48 Volts DC	8.0 Amps	KS7	$440.00

The following options are available on special order.

1. Multiple DC outputs
2. AC outputs
3. Non Standard DC outputs

Power Pac Inc. is a privately held company founded in 1971 and devoted solely to the design and manufacture of Power Sources. Our business philosophy is to produce a conservatively-designed, high-quality product at a competitive price.

In addition to our OEM product lines designed and manufactured for the Electronic Industry we have introduced a complete line of Power Sources to satisfy the Key/PBX Telephone System and Telephone Interconnected Industry. These Power Sources are UL 1012 approved for Telephone Interconnect and will meet the requirements of the FCC.

Basic DC Output models are used when the DC output voltage need not be regulated.

Constant Voltage models are used when the DC output voltage must be input line regulated and have a moderate degree of load regulation.

Higher degrees of Input line and Output load regulation may be obtained by including either Linear or Switching regulators. Consult factory for details.

Battery Charger circuits are available for all models and are designed to charge and control Back-up Battery systems. These circuits will charge at maximum rate of 1.5 amps and will maintain a trickle charge of approximately 0.5 amps. Other charge rates are available.

Included with the battery Charger is a Control Circuit that will automatically monitor the input line, the DC output voltage and the battery voltage. When the output voltage drops below a preset value due to low input line voltage or loss of input line voltage, the Control Circuit will automatically switch in the Back-Up Battery system and monitor battery voltage. When the battery voltage drops below a preset value the Control Circuit will shut the system off. When the input line voltage returns to a normal level the system will be turned on and the battery will be charged. This complete battery Back-up System is available as a separate model. Consult factory for details.

If our standard products do not fit your requirement, our experienced staff of engineers and designers are available to design to your exact requirement.

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PACKAGED POWER®

1984-85

SHORT-FORM POWER SUPPLY CATALOG

- Linear Power Supplies
- Switching Power Supplies
- DC/DC Converters

COMPUTER PRODUCTS™
POWER CONVERSION

POWER PRODUCTS DIVISION—POMPANO BEACH, FLORIDA
STEVENS-ARNOLD DIVISION—SOUTH BOSTON, MASSACHUSETTS
COMPOWER DIVISION—SAN JOSE, CALIFORNIA
POWER PRODUCTS LIMITED—REPUBLIC OF IRELAND

COMPUTER PRODUCTS
POWER CONVERSION

COMPOWER DIVISION
2220 LUNDY AVENUE
SAN JOSE, CA 95131
TELEPHONE (408) 942-1434 • TELEX: 172760

PACKAGED POWER

$54.50 OEM QTY.

50-90W Multi Output Switchers

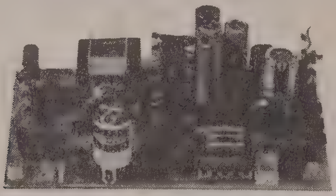
- 3 and 4 Outputs
- Input Filter
- Power Foldback Protected
- Designed to VDE 0806
- 50 mV P-P Max. Ripple
- Soft-Start

MAX. (1) WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	INPUT FILTER	MODEL NO. (2)	PKG.	PRICE	
								1-9	100's
50	+5V @ 6A	+12V @ 1A*	−12V @ 1A*	——	✓	80003-01	BA	$159.00	$111.30
50	+5V @ 6A	+12V @ 1A*	−5V @ 0.5A*	——	✓	80003-02	BA	159.00	111.30
65	+5V @ 5A	+12V @ 2A* (Adjustable)	−12V @ 1A*	−5V @ 0.5A*	✓	80004-01	BB	187.00	138.90
65	+5V @ 5A	+12V @ 2A* (Adjustable)	−15V @ 1A*	−5V @ 0.5A*	✓	80004-02	BB	187.00	138.90
90	+5V @ 6A	+12V @ 1A*	+12V @ 2.5A†	−12V @ 1A*	✓	80005-01	CB	229.00	168.30
90	+5V @ 6A	+12V @ 1A*	+24V @ 1.25A†	−12V @ 1A*	✓	80005-02	CB	229.00	168.30
90	+5V @ 6A	+12V @ 1A*	+12V @ 2.5A†	−5V @ 0.5A*	✓	80005-03	CB	229.00	168.30
90	+5V @ 6A	+12V @ 1A*	+24V @ 1.25A†	−5V @ 0.5A*	✓	80005-04	CB	229.00	168.30

(1) User May Draw up to Current Shown for Each Output, but Total Watts May Not Exceed Maximum Shown.
(2) All Models are Designed to VDC 0806.
* Linear Post Regulator on Output.
† ±10% Regulation with High Peak Capability for Disk Drive.

PACKAGE DIMENSIONS		
BA	7.75 x 4.25 x 2.40 In. (max.)	(197 x 108 x 61 mm)
BB	7.75 x 4.25 x 2.40 In. (max.)	(197 x 108 x 61 mm)
CB	8.36 x 4.25 x 2.40 In. (max.)	(212.3 x 108 x 61 mm)

NOTE: Molex Connectors.



$39.90 OEM QTY.

40/50W Multi Output Switchers

- 3 and 4 Outputs
- 75% Efficiency
- Soft-Start
- 32 mS Holdup Time
- Power Foldback Protected
- Input Transient Protected

MAX. (1) WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	INPUT FILTER	MODEL NO. (2)	PKG.	PRICE	
								1-9	100's
40	+5V @ 3.5A	+12V @2A (3A PEAK)	−12V @ 1A*	——	✓	80013-01	HH	$141.00	$ 98.70
40	+5V @ 3.5A	+12V @2A (3A PEAK)	−5V @ 250 mA*	——	✓	80013-02	HH	141.00	98.70
40	+5V @ 3A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*		80009-01	AA	141.00	98.70
40	+5V @ 3A	+15V @ 1A*	−15V @ 1A*	−5V @ 250 mA*		80009-02	AA	141.00	98.70
40	+5V @ 3A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*		80010-01	AB	141.00	98.70
40	+5V @ 3A	+15V @ 1A*	−15V @ 1A*	−5V @ 250 mA*		80010-02	AB	141.00	98.70
50	+5V @ 5A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*		80009-04	AA	152.00	106.40
50	+5V @ 5A	+15V @ 1A*	−15V @ 1A*	−5V @ 250 mA*		80009-05	AA	152.00	106.40
50	+5V @ 5A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*		80010-04	AB	152.00	106.40
50	+5V @ 5A	+15V @ 1A*	−15V @ 1A*	−5V @ 250 mA*		80010-05	AB	152.00	106.40

S100 BUS POWER SUPPLIES

MAX. (1) WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	INPUT FILTER	MODEL NO. (2)	PKG.	1-9	100's
40	+8V @ 3A	+16V @ 1A	−16V @ 1A	−5V @ 250 mA*		80009-03	AA	141.00	98.70
40	+8V @ 3A	+16V @ 1A	−16V @ 1A	−5V @ 250 mA*		80010-03	AB	141.00	98.70
50	+8V @ 5A	+16V @ 1A	−16V @ 1A	−5V @ 250 mA*		80009-06	AA	152.00	106.40
50	+8V @ 5A	+16V @ 1A	−16V @ 1A	−5V @ 250 mA*		80010-06	AB	152.00	106.40

(1) User May Draw up to Current Shown for Each Output, but Total Watts May Not Exceed Maximum Shown.
(2) 80013 Series Designed to VDE 0806.
* Linear Post Regulator on Output.

PACKAGE DIMENSIONS		
AA	5.93 x 3.83 x 2.40 In. (max.)	(150.6 x 97.3 x 61 mm)
AB	5.93 x 3.83 x 2.40 In. (max.)	(150.6 x 97.3 x 61 mm)
HH	6.30 x 3.94 x 2.40 In. (max.)	(160 x 100.1 x 61 mm)

NOTE: AA: Barrier Strip Connector.
AB: Molex Connector.
HH: Molex Connector.

- All 5 Volt Outputs Overvoltage Protected.
- Operating Temperature Range: 0°C to 70°C. Full Rating up to 60°C. From 60°C to 70°C, derate Linearly to 50% of Full Rating.
- All models feature power foldback output protection, input transient protection, 30 KHz switching rate, soft-start, no turn-on overshoot and 32 msec. hold-up time.
- Input Voltage Range: User-Selectable from 90 VAC to 135 VAC or 180 VAC to 270 VAC. Single-Wire Jumper.
- All models are UL Recognized® and CSA Certified.

TWO-YEAR WARRANTY

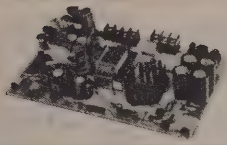
All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS™
POWER CONVERSION

COMPOWER DIVISION
2220 LUNDY AVENUE
SAN JOSE, CA 95131
TELEPHONE (408) 942-1434 • TELEX: 172760

PACKAGED POWER

$55.40
OEM
QTY.



30-150W Single Output Switchers

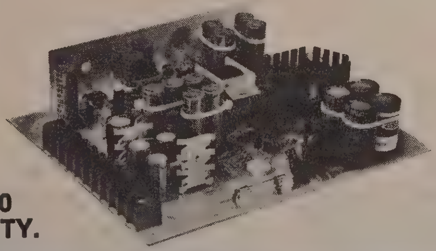
- OVP Crowbar On All Outputs
- Soft-Start
- 75% Efficiency
- 32 mS Holdup Time
- 50 mV P-P Max. Ripple
- Power Foldback Protected

MAX. WATTS	OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION LINE	REGULATION LOAD	OVP	RIPPLE AND NOISE (MAX.)	INPUT FILTER	MODEL NO. (1)	PKG.	PRICE 1-9	PRICE 100's
30	5V	6A	±0.2%	±0.5%	✓	50 mV P-P	✓	80007-01	JJ	$155.00	$108.50
60	12V	5A	±0.2%	±0.5%	✓	50 mV P-P	✓	80007-02	JJ	168.10	114.30
60	15V	4A	±0.2%	±0.5%	✓	50 mV P-P	✓	80007-03	JJ	168.10	114.30
60	24V	2.5A	±0.2%	±0.5%	✓	50 mV P-P	✓	80007-04	JJ	168.10	114.30
60	5V	12A	±0.2%	±0.5%	✓	50 mV P-P		80011-01	KK	215.00	150.50
100	12V	8A	±0.2%	±0.5%	✓	50 mV P-P		80011-02	KK	215.00	150.50
100	15V	6A	±0.2%	±0.5%	✓	50 mV P-P		80011-03	KK	215.00	150.50
100	24V	4A	±0.2%	±0.5%	✓	50 mV P-P		80011-04	KK	215.00	150.50
150	5V	30A	±0.2%	±1.0%	✓	50 mV P-P	✓	80012-01	LL	299.00	209.30
150	12V	12A	±0.2%	±1.0%	✓	50 mV P-P	✓	80012-02	LL	299.00	209.30
150	15V	10A	±0.2%	±1.0%	✓	50 mV P-P	✓	80012-03	LL	299.00	209.30
150	24V	6A	±0.2%	±1.0%	✓	50 mV P-P	✓	80012-04	LL	299.00	209.30

NOTE: (1) 80007 and 80012 Series Designed to VDE 0806.

PACKAGE DIMENSIONS		
JJ	5.00 x 4.00 x 2.40 In. (max.)	(127 x 101.6 x 61mm)
KK	8.38 x 5.10 x 2.40 In. (max.)	(212.9 x 129.5 x 61 mm)
LL	8.68 x 6.35 x 2.40 In. (max.)	(220.5 x 161.1 x 61 mm)

NOTE: JJ: Molex Connector.
KK, LL: Barrier Strip Connector.



$39.00
OEM QTY.

85/90W Multi Output Switchers

- 4 and 5 Outputs
- Soft-Start
- Power Foldback Protected
- 30 KHz Switching
- No Turn-On Overshoot

MAX. (1) WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	OUTPUT #5	INPUT FILTER	MODEL NO.	PKG.	PRICE 1-9	PRICE 100's
UNIVERSAL SERIES										
85	+5V @ 6A	+12V @ 3A*	+24V @ 2A*	−12V @ 1A*	−5V @ 0.5A*		80006-01	FF	$236.00	$165.20
85	+5V @ 6A	+15V @ 3A*	+24V @ 2A*	−15V @ 1A*	−5V @ 0.5A*		80006-02	FF	236.00	165.20
SMALL BUSINESS SYSTEM SERIES (2)										
90	+5V @ 7A	+12V @ 2.5A	+12V @ 1A*	−12V @ 1A*	——	✓	80001-01	GG	$234.00	$163.80
90	+5V @ 7A	+24V @ 1.25A	+12V @ 1A*	−12V @ 1A*	——	✓	80001-02	GG	234.00	163.80
90	+5V @ 7A	+12VDC @ 3A	+12V @ 1.25A*	−12V @ .75A*	——	——	70021	GG	75.00	70.00

(1) User May Draw up to Current Shown for Each Output, but Total Watts May Not Exceed Maximum Shown.
(2) Designed to VDE 0806.
* Linear Post Regulator on Output.

PACKAGE DIMENSIONS		
FF	7.75 x 6.50 x 2.40 In. (max.)	(196.9 x 165.1 x 61 mm)
GG	8.50 x 4.88 x 2.40 In. (max.)	(215.9 x 124 x 61 mm)

NOTE: FF: Barrier Strip Connector
GG: Molex Connector

- All 5 Volt Outputs Overvoltage Protected.
- Operating Temperature Range: 0°C to 70°C. Full Rating up to 60°C. From 60°C to 70°C, derate Linearly to 50% of Full Rating.
- All models feature power foldback output protection, input transient protection, 30 KHz switching rate, soft-start, no turn-on overshoot and 32 msec. hold-up time.
- Input Voltage Range: User-Selectable from 90 VAC to 135 VAC or 180 VAC to 270 VAC. Single-Wire Jumper.
- All models are UL Recognized and CSA Certified.

TWO-YEAR WARRANTY

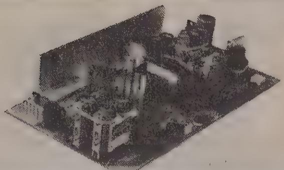
All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS
POWER CONVERSION

COMPOWER DIVISION
2220 LUNDY AVENUE
SAN JOSE, CA 95131
TELEPHONE (408) 942-1434 • TELEX: 172760

PACKAGED POWER

$58.60 OEM QTY.



65-90W Multi Output Switchers

- 3 and 5 Outputs
- Input Filter
- Soft-Start
- 50 mV P-P Max. Ripple
- 32 mSec Hold-Up

MAX. (1) WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	OUTPUT #5	INPUT FILTER	MODEL NO.	PKG.	PRICE	
									1-9	100's
65	+5V @ 6A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*	+12V @ 2.5A†	✓	80002-01	DD	$187.00	$130.90
65	+5V @ 6A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*	+24V @ 1.25A†	✓	80002-02	DD	187.00	130.90
75	+5V @ 6A	+12V @ 3.5A* (5A Peak) Adjust. ±5%	−12V @ 1A*	——	——		80002-03	DD	229.00	160.30
90	+5V @ 6A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*	+12V @ 2.5A†	✓	80002-04	DD	229.00	160.30
90	+5V @ 6A	+12V @ 1A*	−12V @ 1A*	−5V @ 0.5A*	+24V @ 1.25A†	✓	80002-05	DD	229.00	160.30

(1) User May Draw up to Current Shown for Each Output, but Total Watts May Not Exceed Maximum Shown.
* Linear Post Regulator on Output.
† ±10% Regulation with High Peak Capability for Disk Drive.

PACKAGE DIMENSIONS		
DD	9.45 x 5.00 x 2.40 In. (max.)	(240 x 127 x 61 m))

NOTE: Edge Connector (outputs).
Molex Connector (input).

$105.00 OEM QTY.

150W Multi Output Switchers

- 5 Outputs
- 75% Efficiency
- OVP on 5V Output
- 30 KHz Switching

MAX. (1) WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	OUTPUT #5	MODEL NO.	PKG.	PRICE	
								1-9	100's
150	+5V @ 15A	+12V @ 3A†	+12V @ 2A*	−12V @ 1A*	−5V @ 150 mA*	80008-01	EE	$315.00	$220.50
150	+5V @ 15A	+24V @ 3A†	+12V @ 2A*	−12V @ 1A*	−5V @ 150 mA*	80008-03	EE	315.00	220.50
150	+5V @ 15A	+12V @ 3A†	+24V @ 2A*	−12V @ 1A*	−5V @ 150 mA*	80008-05	EE	315.00	220.50
150	+5V @ 15A	+12V @ 3A†	+24V @ 3A†	−12V @ 1A*	−5V @ 150 mA*	80008-06	EE	315.00	220.50

(1) User May Draw up to Current Shown for Each Output, but Total Watts May Not Exceed Maximum Shown.
* Linear Post Regulator on Output.
† ±10% Regulation with High Peak Capability for Disk Drive.

PACKAGE DIMENSIONS		
EE	10.18 x 4.75 x 2.40 In. (max.)	(258.6 x 120.7 x 61 mm)

NOTE: Barrier Strip Connectors

- All 5 Volt Outputs Overvoltage Protected.
- Operating Temperature Range: 0°C to 70°C. Full Rating up to 60°C. From 60°C to 70°C, derate Linearly to 50% of Full Rating.
- All models feature power foldback output protection, input transient protection, 30 KHz switching rate, soft-start, no turn-on overshoot and 32 msec. hold-up time.
- Input Voltage Range: User-Selectable from 90 VAC to 135 VAC or 180 VAC to 270 VAC. Single-Wire Jumper.
- All models are UL Recognized ® and CSA Ⓢ Certified.

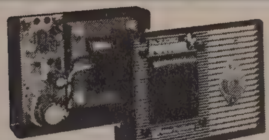
TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS
POWER CONVERSION

POWER PRODUCTS DIVISION
2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
TELEPHONE (305) 975-7660 • TWX 510-956-3098

PACKAGED POWER



Open-Frame Linear Power Supplies

- User-Selectable Input Voltage: 100/115/220/230/240 VAC
- Up to 65% Efficiency
- Split-Bobbin Transformers
- 1500 VAC Isolation
- Designed to Meet UL & CSA

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		RIPPLE AND NOISE	CASE SIZE	MODEL NUMBER	PRICE	
		LINE*	LOAD				1-9	100's
SINGLE OUTPUT MODELS								
5V	3A	±.05%	±.05%	1.0 mV RMS	B	PL110	$ 40.00	$ 34.00
	6A	±.05%	±.05%	1.0 mV RMS	C	PL111	60.00	51.00
	9A	±.05%	±.05%	1.0 mV RMS	N	PL112	78.00	66.30
	12A	±.05%	±.05%	1.0 mV RMS	D	PL113	90.00	76.50
	18A	±.05%	±.05%	1.0 mV RMS	E	PL114	125.00	106.25
12V	1.8A	±.05%	±.05%	1.0 mV RMS	B	PL120	40.00	34.00
	3.4A	±.05%	±.05%	1.0 mV RMS	C	PL121	60.00	51.00
	6.8A	±.05%	±.05%	1.0 mV RMS	D	PL122	90.00	76.50
	10.2A	±.05%	±.05%	1.0 mV RMS	E	PL123	125.00	106.25
15V	1.5A	±.05%	±.05%	1.0 mV RMS	B	PL130	40.00	34.00
	3A	±.05%	±.05%	1.0 mV RMS	C	PL131	60.00	51.00
	6A	±.05%	±.05%	1.0 mV RMS	D	PL132	94.00	79.90
	9A	±.05%	±.05%	1.0 mV RMS	E	PL133	135.00	114.75
24V	1.2A	±.05%	±.05%	1.0 mV RMS	B	PL140	40.00	34.00
	2.4A	±.05%	±.05%	1.0 mV RMS	C	PL141	60.00	51.00
	4.8A	±.05%	±.05%	1.0 mV RMS	D	PL142	95.00	80.75
	7.2A	±.05%	±.05%	1.0 mV RMS	E	PL143	135.00	114.75
DUAL OUTPUT MODELS								
±12V	±1A	±.05%	±.05%	1.0 mV RMS	AA	PL150	49.00	41.65
	±1.8A	±.05%	±.05%	1.0 mV RMS	BB	PL151	68.00	57.80
	±3.4A	±.05%	±.05%	1.0 mV RMS	CC	PL152	96.00	81.60
±15V	±0.8A	±.05%	±.05%	1.0 mV RMS	AA	PL160	49.00	41.65
	±1.5A	±.05%	±.05%	1.0 mV RMS	BB	PL161	68.00	57.80
	±3.0A	±.05%	±.05%	1.0 mV RMS	CC	PL162	96.00	81.60
TRIPLE OUTPUT MODELS								
5V/±12V	3/±1A	±.05%	±.05%	1.0 mV RMS	BB	PL170	86.00	73.10
	6/±1.8A	±.05%	±.05%	1.0 mV RMS	CBB	PL171	105.00	89.25
	12/±1.8A	±.05%	±.05%	1.0 mV RMS	CBB	PL172	130.00	110.50
5V/±15V	3/±0.8A	±.05%	±.05%	1.0 mV RMS	BB	PL180	86.00	73.10
	6/±1.5A	±.05%	±.05%	1.0 mV RMS	CBB	PL181	105.00	89.25
	12/±1.5A	±.05%	±.05%	1.0 mV RMS	CBB	PL182	130.00	110.50
FLOPPY DISK DUAL OUTPUT MODELS								
5V/9-12V	7/1.2A	±.05%	±.05%	1.0 mV RMS	N	PL190	92.00	78.20
5V/24V	2.2/1.2A (2.4A PK)	±.05%	±.05%	1.0 mV RMS	BB	PL191	90.00	76.50
	2.2/2.4A (4.2A PK)	±.05%	±.05%	1.0 mV RMS	BB	PL192	110.00	93.50
12V/−12V	4A (6.5A PK)/.15A (0.5A PK)	±.05%	±.05%	1.0 mV RMS	BB	PL193	95.00	80.75

* Per ±10% Input Change

INPUT VOLTAGE RANGES

NOMINAL INPUT	INPUT VOLTAGE RANGE
100 VAC	90-110 VAC
115 VAC	105-125 VAC
220 VAC	200-240 VAC
230 VAC	210-264 VAC
240 VAC	210-264 VAC

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF 0°C TO 70°C AND STORAGE TEMPERATURE RANGE OF −25°C TO +85°C

TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

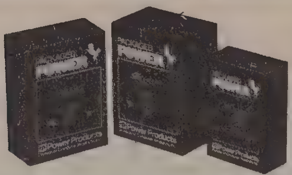
PACKAGE DIMENSIONS

CASE	DIMENSIONS INCHES (LxWxH)	DIMENSIONS MM (LxWxH)	MOUNTING SURFACES
B	4.88 x 4.00 x 1.62	123.9 x 101.6 x 41.1	3
C	5.62 x 4.88 x 2.50	142.7 x 123.9 x 63.5	3
D	9.00 x 4.88 x 2.75	228.6 x 123.9 x 69.8	4
E	14.00 x 4.88 x 2.75	355.6 x 123.9 x 69.8	4
N	7.00 x 4.88 x 2.75	177.8 x 123.9 x 69.8	4
AA	6.50 x 4.00 x 1.63	165.1 x 101.6 x 41.1	3
BB	7.00 x 4.88 x 2.50	177.8 x 123.9 x 63.5	3
CC	9.38 x 4.88 x 2.75	238.3 x 123.9 x 69.8	4
CBB	11.00 x 4.88 x 2.75	279.4 x 123.9 x 69.8	4

COMPUTER PRODUCTS
POWER CONVERSION

POWER PRODUCTS DIVISION
2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
TELEPHONE (305) 975-7660 • TWX 510-956-3098

PACKAGED POWER®



Linear Power Modules

- Power to 15 Watts
- Excellent Regulation
- Low Ripple and Noise
- Single, Dual, Triple Outputs
- Compact Encapsulated Package

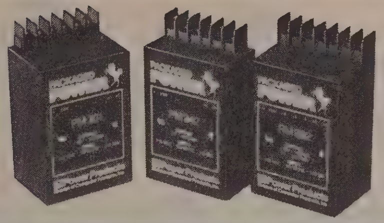
OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		RIPPLE AND NOISE	CASE SIZE	MODEL NUMBER	PRICE	
		LINE	LOAD				1-9	100's
PC-MOUNTABLE PM500 SERIES								
5V	250 mA	±.02%	±.04%	1.0 mV RMS	B1	PM533	$ 64.00	$ 44.80
	250 mA	±.05%	±.05%	0.5 mV RMS	H	PM529	53.00	37.10
	500 mA	±.02%	±.04%	1.0 mV RMS	B1	PM534	71.00	49.70
	1000 mA	±.02%	±.04%	1.0 mV RMS	B2	PM542	94.00	65.80
	2000 mA	±.02%	±.05%	1.0 mV RMS	B3	PM545	118.00	82.60
10V	120 mA	±.02%	±.02%	0.5 mV RMS	A	PM587	53.00	37.10
12V	100 mA	±.02%	±.02%	0.5 mV RMS	A	PM563	53.00	37.10
	240 mA	±.02%	±.02%	0.5 mV RMS	B2	PM515	71.00	49.70
	400 mA	±.02%	±.02%	1.0 mV RMS	B3	PM516	94.00	65.80
	600 mA	±.02%	±.02%	1.0 mV RMS	B3	PM517	112.00	78.40
15V	100 mA	±.02%	±.02%	0.5 mV RMS	A	PM576	53.00	37.10
	200 mA	±.02%	±.02%	0.5 mV RMS	B2	PM554	71.00	49.70
	350 mA	±.02%	±.02%	1.0 mV RMS	B3	PM555	94.00	65.80
	500 mA	±.02%	±.02%	1.0 mV RMS	B3	PM556	112.00	78.40
18V	65 mA	±.02%	±.02%	1.0 mV RMS	A	PM560	53.00	37.10
20V	60 mA	±.02%	±.02%	1.0 mV RMS	A	PM574	53.00	37.10
24V	50 mA	±.02%	±.02%	1.0 mV RMS	A	PM585	53.00	37.10
	100 mA	±.02%	±.02%	1.0 mV RMS	B2	PM566	71.00	49.70
	200 mA	±.02%	±.02%	1.0 mV RMS	B3	PM567	94.00	65.80
	400 mA	±.02%	±.02%	1.0 mV RMS	B3	PM568	118.00	82.60
28V	40 mA	±.02%	±.02%	1.0 mV RMS	A	PM562	53.00	37.10
±12V	±25 mA	±.20%	±.20%	2.0 mV RMS	B1	PM509	56.00	39.20
	±50 mA	±.02%	±.02%	0.5 mV RMS	B1	PM510	64.00	44.80
	±120 mA	±.02%	±.02%	0.5 mV RMS	B1	PM536	71.00	49.70
	±240 mA	±.02%	±.02%	0.5 mV RMS	B2	PM537	94.00	65.80
	±400 mA	±.02%	±.02%	0.5 mV RMS	B3	PM597	118.00	82.60
±15V	±25 mA	±.20%	±.20%	2.0 mV RMS	B1	PM538	56.00	39.20
	±65 Am	±.02%	±.02%	0.5 mV RMS	B1	PM553	64.00	44.80
	±100 mA	±.02%	±.02%	0.5 mV RMS	B1	PM505	71.00	49.70
	±150 mA	±.02%	±.02%	0.5 mV RMS	B2	PM570	83.00	58.10
	±200 mA	±.02%	±.02%	0.5 mV RMS	B2	PM565	94.00	65.80
	±350 mA	±.02%	±.02%	1.0 mV RMS	B3	PM501	118.00	82.60
±18V	±25 mA	±.20%	±.20%	1.0 mV RMS	B1	PM511	56.00	39.20
	±50 mA	±.02%	±.02%	0.5 mV RMS	B2	PM512	64.00	44.80
	±100 mA	±.02%	±.02%	0.5 mV RMS	B2	PM513	71.00	49.70
±24V	±50 mA	±.02%	±.02%	0.5 mV RMS	B1	PM531	71.00	49.70
	±100 mA	±.02%	±.02%	0.5 mV RMS	B2	PM514	94.00	65.80
5V/±12V	300/±180 mA	±.02%	±.05%/±.02%	0.5 mV RMS	B2	PM595	112.00	78.40
	500/±120 mA	±.02%	±.05%/±.02%	0.5 mV RMS	B2	PM591	112.00	78.40
	1000/±150 mA	±.02%	±.10%/±.02%	1.0/0.5 mV RMS	B3	PM592	154.00	107.80
5V/±15V	300/±150 mA	±.02%	±.05%/±.02%	0.5 mV RMS	B2	PM594	112.00	78.40
	500/±100 mA	±.02%	±.05%/±.02%	0.5 mV RMS	B2	PM590	112.00	78.40
	1000/±150 mA	±.02%	±.10%/±.02%	1.0/0.5 mV RMS	B3	PM593	154.00	107.80

All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS™
POWER CONVERSION

POWER PRODUCTS DIVISION
2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
TELEPHONE (305) 975-7660 • TWX 510-956-3098

PACKAGED POWER



Linear Power Modules (cont.)

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION LINE	REGULATION LOAD	RIPPLE AND NOISE	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
CHASSIS-MOUNTABLE PM300 SERIES								
5V	500 mA	±.05%	±.01%	2.0 mV RMS	C1	PM334	$ 81.00	$ 56.70
	1000 mA	±.05%	±.15%	2.0 mV RMS	C1	PM342	104.00	72.80
	2000 mA	±.05%	±.15%	2.0 mV RMS	C2	PM345	128.00	89.60
12V	240 mA	±.05%	±.05%	1.0 mV RMS	C1	PM315	81.00	56.70
	400 mA	±.05%	±.05%	1.0 mV RMS	C2	PM316	104.00	72.80
	600 mA	±.05%	±.05%	1.0 mV RMS	C2	PM317	123.00	86.10
15V	200 mA	±.05%	±.05%	1.0 mV RMS	C1	PM354	81.00	56.70
	350 mA	±.05%	±.05%	1.0 mV RMS	C2	PM355	104.00	72.80
	500 mA	±.05%	±.05%	1.0 mV RMS	C2	PM356	123.00	86.10
24V	100 mA	±.05%	±.05%	1.0 mV RMS	C1	PM366	81.00	56.70
	200 mA	±.05%	±.05%	1.0 mV RMS	C1	PM367	104.00	72.80
	400 mA	±.05%	±.05%	1.0 mV RMS	C2	PM368	128.00	89.60
±12V	±120 mA	±.05%	±.05%	1.0 mV RMS	C1	PM336	81.00	56.70
	±240 mA	±.05%	±.05%	1.0 mV RMS	C1	PM337	104.00	72.80
	±400 mA	±.05%	±.05%	1.0 mV RMS	C2	PM397	128.00	89.60
±15V	±100 mA	±.05%	±.05%	1.0 mV RMS	C1	PM302	81.00	56.70
	±200 mA	±.05%	±.05%	1.0 mV RMS	C1	PM365	104.00	72.80
	±350 mA	±.05%	±.05%	1.0 mV RMS	C2	PM301	128.00	89.60
	±500 mA	±.05%	±.05%	1.0 mV RMS	C2	PM396	154.00	107.80
5V/±12V	300/±180 mA	±.05%	±.10% / ±.05%	1.0 mV RMS	C1	PM395	123.00	86.10
	500/±120 mA	±.05%	±.10% / ±.05%	1.0 mV RMS	C1	PM391	123.00	86.10
	1000/±150 mA	±.02%	±.10% / ±.02%	1.0/0.5 mV RMS	C2	PM392	164.00	114.80
5V/±15V	300/±150 mA	±.05%	±.10% / ±.05%	1.0 mV RMS	C1	PM394	123.00	86.10
	500/±100 mA	±.05%	±.10% / ±.05%	1.0 mV RMS	C1	PM390	123.00	86.10
	1000/±150 mA	±.02%	±.10% / ±.02%	1.0/0.5 mV RMS	C2	PM393	164.00	114.80

CASE DIMENSIONS		
A	2.25 x 1.75 x 1.00 Inches	(57.2 x 44.5 x 25.4 mm)
B1	3.50 x 2.50 x 0.88 Inches	(88.9 x 63.5 x 22.4 mm)
B2	3.50 x 2.50 x 1.25 Inches	(88.9 x 63.5 x 31.8 mm)
B3	3.50 x 2.50 x 1.62 Inches	(88.9 x 63.5 x 41.1 mm)
C1	4.00 x 2.70 x 1.45 Inches	(101.6 x 68.6 x 36.8 mm)
C2	4.00 x 2.70 x 2.00 Inches	(101.6 x 68.6 x 50.8 mm)
H	3.00 x 2.00 x 1.00 Inches	(76.2 x 50.8 x 25.4 mm)

	INPUT VOLTAGE	SUFFIX
LINEAR POWER MODULE OPTIONS	115 ±10 VAC	(NONE)
	100 ±10 VAC	J
	220 ±20 VAC	D
	240 ±20 VAC	K

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF −25°C TO +71°C AND STORAGE TEMPERATURE RANGE OF −25°C to +85°C

Recognized by Underwriters Laboratories, Inc.

Certified by Canadian Standards Association

TWO-YEAR WARRANTY

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COMPUTER PRODUCTS
POWER CONVERSION

POWER PRODUCTS DIVISION
2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
TELEPHONE (305) 975-7660 • TWX 510-956-3098

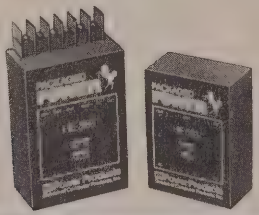
PACKAGED POWER

Hybrid Power Modules

- Power to 15 Watts
- Switcher Efficiency
- OVP on 5V Output
- Linear Regulation
- Wide Input Voltage Range

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION*		RIPPLE AND NOISE	CASE SIZE	MODEL NUMBER	PRICE	
		LINE	LOAD				1-9	100's
PC-MOUNTABLE HM500 SERIES								
5V	3.00A	±0.05%	±0.1%	50 mV P-P	B2	HM530	$147.00	$102.90
12V	1.25A	±0.05%	±0.1%	50 mV P-P	B2	HM503	147.00	102.90
15V	1.00A	±0.05%	±0.1%	50 mV P-P	B2	HM504	147.00	102.90
±12V	±600 mA	±0.1%	±0.1%	50 mV P-P	B2	HM551	147.00	102.90
±15V	±500 mA	±0.1%	±0.1%	50 mV P-P	B2	HM552	147.00	102.90
CHASSIS-MOUNTABLE HM300 SERIES								
5V	3.00A	±0.05%	±0.2%	100 mV P-P	C1	HM330	$157.00	$109.90
12V	1.25A	±0.05%	±0.1%	100 mV P-P	C1	HM303	157.00	109.90
15V	1.00A	±0.05%	±0.1%	100 mV P-P	C1	HM304	157.00	109.90
±12V	±600 mA	±0.05%	±0.1%	100 mV P-P	C1	HM351	157.00	109.90
±15V	±500 mA	±0.05%	±0.1%	100 mV P-P	C1	HM352	157.00	109.90

* Linear post regulator on all outputs.



Switching Power Modules

- 25 and 30 Watts
- High Efficiency
- Good Regulation
- Current Limited
- Most Watts Per Cubic Inch

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		RIPPLE AND NOISE	CASE SIZE	MODEL NUMBER	PRICE	
		LINE	LOAD				1-9	100's
PC-MOUNTABLE HE500 SERIES								
12V	2.2A	±0.1%	±0.1%	100 mV P-P	B2	HE583	$188.00	$131.60
15V	1.8A	±0.1%	±0.1%	100 mV P-P	B2	HE584	188.00	131.60
PC-MOUNTABLE: NEW SERIES								
5V	5.0A	±0.1%	±0.1%	100 mV P-P	B2	HE560*	$145.00	$101.50
	5.0A	±0.1%	±0.1%	100 mV P-P	B2	HE561	175.00	122.50
5V	6.0A	±0.1%	±0.1%	100 mV P-P	B2	HE570*	165.00	115.50
	6.0A	±0.1%	±0.1%	100 mV P-P	B2	HE571	195.00	136.50
5/±12V	4A/±400mA	±0.1%	±0.1%	100 mV P-P	B3	HE576*	175.00	122.50
	4A/±400mA	±0.1%	±0.1%	100 mV P-P	B3	HE577	205.00	143.50
5/±15V	4A/±330mA	±0.1%	±0.1%	100 mV P-P	B3	HE578*	175.00	122.50
	4A/±330mA	±0.1%	±0.1%	100 mV P-P	B3	HE579	205.00	143.50
CHASSIS-MOUNTABLE HE300 SERIES†								
12V	2.2A	±0.1%	±0.1%	100 mV P-P	C1	HE383*	$199.00	$139.30
15V	1.8A	±0.1%	±0.1%	100 mV P-P	C1	HE384*	199.00	139.30
CHASSIS-MOUNTABLE: NEW SERIES†								
5V	5.0A	±0.1%	±0.1%	100 mV P-P	C1	HE360*	$155.00	$108.50
	5.0A	±0.1%	±0.1%	100 mV P-P	C1	HE361	185.00	129.50
5V	6.0A	±0.1%	±0.1%	100 mV P-P	C1	HE370*	175.00	122.50
	6.0A	±0.1%	±0.1%	100 mV P-P	C1	HE371	205.00	143.50
5/±12V	4A/±400mA	±0.1%	±0.1%	100 mV P-P	C2	HE376*	185.00	129.50
	4A/±400mA	±0.1%	±0.1%	100 mV P-P	C2	HE377	215.00	150.50
5/±15V	4A/±330mA	±0.1%	±0.1%	100 mV P-P	C2	HE378*	185.00	129.50
	4A/±330mA	±0.1%	±0.1%	100 mV P-P	C2	HE379	215.00	150.50

* These models are without filter and shield.
All other models have 6-sided continuous copper shield and Pi + Balun input filter.

† All chassis mountable models have remote sensing.

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COMPUTER PRODUCTS
POWER CONVERSION

POWER PRODUCTS DIVISION
2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
TELEPHONE (305) 975-7660 • TWX 510-956-3098

PACKAGED POWER

Switching Power Supplies

- Power to 100 Watts
- High Efficiency
- Low Ripple and Noise
- Remote Sensing on 5V Outputs
- OVP on 5V Outputs

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		RIPPLE AND NOISE	CASE SIZE	MODEL NUMBER	PRICE	
		LINE	LOAD				1-9	100's
CHASSIS-MOUNTABLE HE200 SERIES								
5V	10A	±0.1%	±0.1%	25 mV P-P	D	HE237	$261.00	$208.80
5V	20A	±0.1%	±0.1%	50 mV P-P	E	HE252	359.00	287.20
12V to 15V	3A	±.02%	±0.1%	20 mV P-P	D	HE212	261.00	208.80
24V to 30V	1.5A	±.02%	±0.1%	20 mV P-P	D	HE224	261.00	208.80
±12V to ±15V	±1.5A	±.02%	±.05%	10 mV P-P	D	HE215	261.00	208.80

OPTIONS

HYBRID POWER MODULES HM500/300 SERIES		SWITCHING POWER MODULES HE500/300 SERIES		SWITCHING POWER MODULES NEW HE500/300 SERIES		SWITCHING POWER SUPPLIES HE200 SERIES	
INPUT VOLTAGE	SUFFIX	INPUT VOLTAGE	SUFFIX	INPUT VOLTAGE	SUFFIX	INPUT VOLTAGE	SUFFIX
90-130 VAC	(NONE)	100-130 VAC	(NONE)	90-130 VAC	(NONE)	90-130 VAC	(NONE)
180-260 VAC	E	200-260 VAC	E	180-260 VAC	E	180-260 VAC	E

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF −25°C TO +71°C AND STORAGE TEMPERATURE RANGE OF −25°C to +85°C

CASE DIMENSIONS		
B2	3.50 x 2.50 x 1.25 Inches	(88.9 x 63.5 x 31.8 mm)
C1	4.00 x 2.70 x 1.45 Inches	(101.6 x 68.6 x 36.8 mm)
D	6.50 x 4.50 x 1.50 Inches	(165.1 x 114.3 x 38.1 mm)
E	6.50 x 4.50 x 3.19 Inches	(165.1 x 114.3 x 81 mm)

TWO-YEAR WARRANTY

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COMPUTER PRODUCTS™
POWER CONVERSION

POWER PRODUCTS DIVISION
2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
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PACKAGED POWER®

Switching Power Supplies

50-200 WATT SERIES

- Jumper Selectable 115/230 VAC Input
- Designed to Meet FCC, VDE Class A EMI
- Designed to Meet, UL, CSA and VDE
- 70% Efficiency Minimum
- Remote Sense on Single Output Models
- Short Circuit Protection
- Soft Start
- Single, Dual, Triple and Quad Output Models

MAX. WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	INPUT EMI FILTER	MODEL NUMBER	PKG.	PRICE	
								1-9	100's
SINGLE OUTPUT MODELS									
50	5V @ 10A				√	HE201	J1		
50	12V @ 4A				√	HE202	J1		
50	15V @ 3.3A				√	HE203	J1		
50	24V @ 2A				√	HE204	J1		
100	5V @ 20A				√	HE214	J1		
100	12V @ 8.5A				√	HE216	J1		
100	15V @ 7A				√	HE217	J1		
100	24V @ 4.5A				√	HE218	J1		
DUAL OUTPUT MODELS									
50	5V @ 8A	−5V @ 2A			√	HE205	J1		
50	12V @ 3A	−12V @ 2A			√	HE206	J1		
50	15V @ 3A	−15V @ 2A			√	HE207	J1		
100	5V @ 16A	−5V @ 4A			√	HE219	J2		
100	12V @ 7A	−12V @ 3A			√	HE220	J2		
100	15V @ 6A	−15V @ 3A			√	HE221	J2		
TRIPLE OUTPUT MODELS									
50	5V @ 6A	+12V @ 1A	−12V @ 1A		√	HE208	J1		
50	5V @ 6A	+15V @ 1A	−15V @ 1A		√	HE209	J1		
100	5V @ 12A	+12V @ 1.5A	−12V @ 1.5A		√	HE222	J2		
100	5V @ 12A	+15V @ 1.5A	−15V @ 1.5A		√	HE225	J2		
QUAD OUTPUT MODELS									
70	5V @ 6A	−5V @ 1A	+12V @ 2A (3A)	−12V @ 1A	√	HE210	J1		
70	5V @ 6A	−5V @ .5A	+12V @ 1.5A	−12V @ 1A	√	HE211	J1		
70	5V @ 6A	24V @ 1.5A (3A)	+12V @ 1A	−12V @ 1A	√	HE213	J1		
100	5V @ 12A	+12V @ 3A	−12V @ 3A	−5V @ 2A	√	HE226	J2		
100	5V @ 12A	+12V @ 3A	−12V @ 3A	+24V @ 1A	√	HE227	J2		
100	5V @ 12A	+15V @ 3A	−15V @ 3A	−5V @ 2A	√	HE228	J2		
100	5V @ 12A	+15V @ 1A	−15V @ 3A	+24V @ 1A	√	HE229	J2		

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POWER CONVERSION

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2981 GATEWAY DRIVE
POMPANO BEACH, FL 33069-4803
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PACKAGED POWER

Switching Power Supplies
50-200 WATT SERIES

MAX. WATTS	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	INPUT EMI FILTER	MODEL NUMBER	PKG.	PRICE	
								1-9	100's
SINGLE OUTPUT MODELS									
150	5V @ 30A				√	HE230	J2		
150	12V @ 12.5A				√	HE231	J2		
150	15V @ 10A				√	HE232	J2		
150	24V @ 6.5A				√	HE233	J2		
200	5V @ 40A				√	HE244	J3		
200	12V @ 17A				√	HE245	J3		
200	15V @ 13.5A				√	HE246	J3		
200	24V @ 8.5A				√	HE247	J3		
DUAL OUTPUT MODELS									
150	5V @ 24A	−5V @ 6A			√	HE234	J3		
150	12V @ 10A	−12V @ 5A			√	HE235	J3		
150	15V @ 9A	−15V @ 5A			√	HE236	J3		
TRIPLE OUTPUT MODELS									
150	5V @ 20A	+12V @ 1.5A	−12V @ 1.5A		√	HE238	J3		
150	5V @ 20A	+15V @ 1.5A	−15V @ 1.5A		√	HE239	J3		
QUAD OUTPUT MODELS									
150	5V @ 20A	+12V @ 3A	−12V @ 3A	−5V @ 3A	√	HE240	J3		
150	5V @ 20A	+12V @ 3A	−12V @ 3A	+24V @ 1.5A	√	HE241	J3		
150	5V @ 20A	+15V @ 3A	−15V @ 3A	−5V @ 3A	√	HE242	J3		
150	5V @ 20A	+15V @ 3A	−15V @ 3A	+24V @ 1.5A	√	HE243	J3		

OTHER SPECIFICATIONS

Ripple and Noise 20MHz BW	1% P-P Max.
Line/Load Regulation	±0.2%
Hold-up Time	30mS
Input Voltage Range, 115 VAC	90-130 VAC
Input Voltage Range, 230 VAC	180-260 VAC
Input Frequency	47-450 Hz.
Operating Temperature	0°-71°C

CASE DIMENSIONS

Package JI	4.88 x 7.00 x 2.70 Inches
Package J2	4.88 x 9.00 x 2.70 Inches
Package J3	4.88 x 12.00 x 2.70 Inches

* Does not include connector.
Please Consult Factory for Custom Models.

TWO-YEAR WARRANTY

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POWER CONVERSION

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2981 GATEWAY DRIVE
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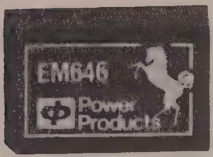
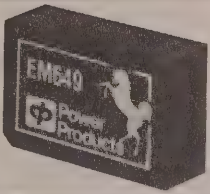
PACKAGED POWER®





DC/DC Converters

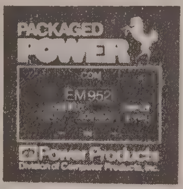
24-PIN DIP COMPATIBLE ECONOMY

- Power to 1.5 Watts
- Unregulated Outputs
- 70% Efficiency
- Internal Input Filtering Available

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION LINE*	REGULATION LOAD†	REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
ECONOMY EM600 SERIES WITH INPUT FILTER									
5V	5V/220 mA	1.2%	8%	90 mA P-P	70%	F	EM621	$40.00	$28.00
	12V/125 mA	1.2%	8%	90 mA P-P	70%	F	EM623	40.00	28.00
	15V/100 mA	1.2%	8%	90 mA P-P	70%	F	EM624	40.00	28.00
12V	5V/220 mA	1.2%	8%	90 mA P-P	70%	F	EM631	40.00	28.00
	12V/125 mA	1.2%	8%	90 mA P-P	70%	F	EM633	40.00	28.00
	15V/100 mA	1.2%	8%	90 mA P-P	70%	F	EM634	40.00	28.00
5V	±12V/±62 mA	1.2%	8%	90 mA P-P	70%	F	EM671	42.00	29.40
	±15V/±50 mA	1.2%	8%	90 mA P-P	70%	F	EM672	42.00	29.40
12V	±12V/±62 mA	1.2%	8%	90 mA P-P	70%	F	EM681	42.00	29.40
	±15V/±50 mA	1.2%	8%	90 mA P-P	70%	F	EM682	42.00	29.40
ECONOMY EM600 SERIES WITHOUT INPUT FILTER									
5V	5V/220 mA	1.2%	8%	2500 mA P-P	70%	F	EM641	$36.00	$25.20
	12V/125 mA	1.2%	8%	2500 mA P-P	70%	F	EM643	36.00	25.20
	15V/100 mA	1.2%	8%	2500 mA P-P	70%	F	EM644	36.00	25.20
12V	5V/220 mA	1.2%	8%	2500 mA P-P	70%	F	EM646	36.00	25.20
	12V/120 mA	1.2%	8%	2500 mA P-P	70%	F	EM648	36.00	25.20
	15V/100 mA	1.2%	8%	2500 mA P-P	70%	F	EM649	36.00	25.20
5V	±12V/±62 mA	1.2%	8%	2500 mA P-P	70%	F	EM691	38.00	26.60
	±15V/±50 mA	1.2%	8%	2500 mA P-P	70%	F	EM692	38.00	26.60
12V	±12V/±62 mA	1.2%	8%	2500 mA P-P	70%	F	EM696	38.00	26.60
	±15V/±50 mA	1.2%	8%	2500 mA P-P	70%	F	EM697	38.00	26.60

* Per 1.0% Change in Input Voltage.
† From 100% Load to 20% Load.

PACKAGED POWER
EM951
OUTPUT
INPUT
Power Products
Division of Computer Products, Inc.



DC/DC Converters

LOW-COST UNREGULATED

- Power to 9 Watts
- Pi Input Filter
- Excellent Isolation
- High Efficiency

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION LINE*	REGULATION LOAD†	REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
ECONOMY EM900 SERIES									
5V	5V/1000 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM901	$71.00	$49.70
	12V/600 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM903	71.00	49.70
	15V/500 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM904	71.00	49.70
12V	5V/1000 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM911	71.00	49.70
	12V/600 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM913	71.00	49.70
	15V/500 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM914	71.00	49.70
5V	±12V/±375 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM951	76.00	53.20
	±15V/±300 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM952	76.00	53.20
12V	±12V/±375 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM961	76.00	53.20
	±15V/±300 mA	1.2%	8%	75 mA P-P	70%-85%	G	EM962	76.00	53.20

* Per 1.0% Change in Input Voltage.
† From 100% Load to 20% Load.

All Prices and Specifications Subject to Change Without Notice.

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POWER CONVERSION

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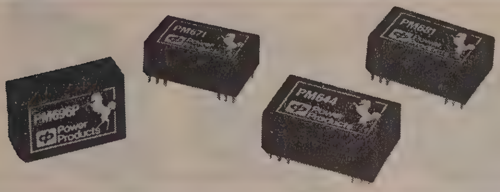
PACKAGED POWER



DC/DC Converters

24-PIN DIP COMPATIBLE

- Power to One Watt
- Regulated Outputs
- Low Ripple and Noise
- Internal Input Filtering Available

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION LINE	REGULATION LOAD	REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
PM600 SERIES WITH INTERNAL FILTER									
5V	5V/100 mA	±0.3%	±0.4%	15 mA P-P	50%	F	PM621	$48.00	$33.60
	12V/80 mA	±0.3%	±0.4%	15 mA P-P	50%	F	PM623	48.00	33.60
	15V/65 mA	±0.3%	±0.4%	15 mA P-P	50%	F	PM624	48.00	33.60
12V	5V/100 mA	±0.3%	±0.4%	45 mA P-P	50%	F	PM631	48.00	33.60
	12V/80 mA	±0.3%	±0.4%	45 mA P-P	50%	F	PM633	48.00	33.60
	15V/65 mA	±0.3%	±0.4%	45 mA P-P	50%	F	PM634	48.00	33.60
5V	±12V/±40 mA	±0.3%	±0.4%	15 mA P-P	50%	F	PM671	52.00	36.40
	±15V/±33 mA	±0.3%	±0.4%	15 mA P-P	50%	F	PM672	52.00	36.40
12V	±12V/±40 mA	±0.3%	±0.4%	45 mA P-P	50%	F	PM681	52.00	36.40
	±15V/±33 mA	±0.3%	±0.4%	45 mA P-P	50%	F	PM682	52.00	36.40
PM600 SERIES UNFILTERED									
5V	5V/100 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM641	$43.00	$30.10
	12V/80 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM643	43.00	30.10
	15V/65 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM644	43.00	30.10
12V	5V/100 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM646	43.00	30.10
	12V/80 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM648	43.00	30.10
	15V/65 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM649	43.00	30.10
5V	±12V/±40 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM691	46.00	32.20
	±15V/±33 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM692	46.00	32.20
12V	±12V/±40 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM696	46.00	32.20
	±15V/±33 mA	±0.3%	±0.4%	1500 mA P-P	50%	F	PM697	46.00	32.20

DC/DC Converters

TELECOMMUNICATIONS

- 78% Efficiency
- 35 to 70 VDC Input Range
- Input Surge Protected
- Pi Input Filter
- Six-Sided Continuous Shield

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION LINE	REGULATION LOAD	REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
5 WATT TELECOM TC900 SERIES									
48V	5V/1000 mA	±0.2%	±0.1%	30 mA P-P	78%	G	TC941	$119.00	$83.30
	12V/420 mA	±0.2%	±0.1%	30 mA P-P	78%	G	TC943	119.00	83.30
	15V/335 mA	±0.2%	±0.1%	30 mA P-P	78%	G	TC944	119.00	83.30

CASE DIMENSIONS		
F	1.25 x 0.80 x 0.4 Inches	(31.8 x 20.3 x 9.8 mm)
G	2.00 x 2.00 x 0.4 Inches	(50.8 x 50.8 x 9.8 mm)

OPTIONS	PM600 SERIES DC/DC CONVERTERS	OPTION	SUFFIX
		EXTERNAL BALANCE PIN	P
		ALTERNATE PIN CONFIGURATION	R

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF −25°C TO +71°C AND STORAGE TEMPERATURE RANGE OF −25°C to +85°C

TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS
POWER CONVERSION

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DC/DC Converters

3 WATT

- Excellent Regulation
- Low Ripple and Noise
- 500 VDC Isolation
- No Derating to 71°C
- 3 Available Pin-Outs

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION LINE	REGULATION LOAD	REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
3-WATT GENERAL PURPOSE PM700 SERIES									
5V	5V/600 mA	±0.02%	±0.04%	32 mA P-P	60%	G	PM701	$81.00	$56.70
	12V/250 mA	±0.02%	±0.04%	31 mA P-P	60%	G	PM703	81.00	56.70
	15V/200 mA	±0.02%	±0.04%	30 mA P-P	60%	G	PM704	81.00	56.70
12V	5V/600 mA	±0.02%	±0.04%	24 mA P-P	60%	G	PM711	81.00	56.70
	12V/250 mA	±0.02%	±0.04%	23 mA P-P	60%	G	PM713	81.00	56.70
	15V/200 mA	±0.02%	±0.04%	22 mA P-P	60%	G	PM714	81.00	56.70
24V	5V/600 mA	±0.02%	±0.04%	22 mA P-P	60%	G	PM721	81.00	56.70
	12V/250 mA	±0.02%	±0.04%	22 mA P-P	60%	G	PM723	81.00	56.70
	15V/200 mA	±0.02%	±0.04%	21 mA P-P	60%	G	PM724	81.00	56.70
28V	5V/600 mA	±0.02%	±0.04%	21 mA P-P	60%	G	PM731	81.00	56.70
	12V/250 mA	±0.02%	±0.04%	21 mA P-P	60%	G	PM733	81.00	56.70
	15V/200 mA	±0.02%	±0.04%	20 mA P-P	60%	G	PM734	81.00	56.70
48V	5V/600 mA	±0.02%	±0.04%	21 mA P-P	60%	G	PM741	81.00	56.70
	12V/250 mA	±0.02%	±0.04%	20 mA P-P	60%	G	PM743	81.00	56.70
	15V/200 mA	±0.02%	±0.04%	19 mA P-P	60%	G	PM744	81.00	56.70
5V	±12V/±125 mA	±0.02%	±0.02%	34 mA P-P	60%	G	PM751	86.00	60.20
	±15V/±100 mA	±0.02%	±0.02%	33 mA P-P	60%	G	PM752	86.00	60.20
12V	±12V/±125 mA	±0.02%	±0.02%	25 mA P-P	60%	G	PM761	86.00	60.20
	±15V/±100 mA	±0.02%	±0.02%	24 mA P-P	60%	G	PM762	86.00	60.20
24V	±12V/±125 mA	±0.02%	±0.02%	23 mA P-P	60%	G	PM771	86.00	60.20
	±15V/±100 mA	±0.02%	±0.02%	22 mA P-P	60%	G	PM772	86.00	60.20
28V	±12V/±125 mA	±0.02%	±0.02%	22 mA P-P	60%	G	PM781	86.00	60.20
	±15V/±100 mA	±0.02%	±0.02%	21 mA P-P	60%	G	PM782	86.00	60.20
48V	±12V/±125 mA	±0.02%	±0.02%	21 mA P-P	60%	G	PM791	86.00	60.20
	±15V/±100 mA	±0.02%	±0.02%	20 mA P-P	60%	G	PM792	86.00	60.20

CASE DIMENSIONS		
G	2.00 x 2.00 x 0.4 Inches	(50.8 x 50.8 x 9.8 mm)

INPUT VOLTAGE RANGES		
INPUT VOLTAGE	DERATE 2.5%/°C FROM 50°C to 71°C	NO DERATING −25°C to +71°C
5V	4.4-6.5V	4.5-5.5V
12V	10.56-15.6V	10.8-13.2V
24V	21.12-31.2V	21.6-26.4V
28V	24.64-36.4V	25.2-30.8V
48V	42.24-62.4V	43.2-52.8V

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF −25°C TO +71°C AND STORAGE TEMPERATURE RANGE OF −40°C to +125°C

TWO-YEAR WARRANTY

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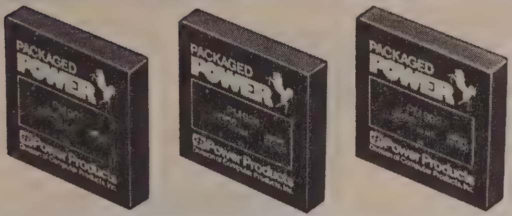

DC/DC Converters
HIGH PERFORMANCE

- Power 5 to 6 Watts
- High Efficiency
- Excellent Regulation
- EMI/RFI Six-Sided Shielding
- 3 Available Pin-Outs

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION LINE	REGULATION LOAD	REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE 1-9	PRICE 100's
5-WATT HIGH-PERFORMANCE PM900 SERIES									
5V	5V/1000 mA	±.02%	±.04%	54 mA P-P	61%	G	PM901	$107.00	$74.90
	12V/470 mA	±.02%	±.04%	61 mA P-P	61%	G	PM903	107.00	74.90
	15V/400 mA	±.02%	±.04%	64 mA P-P	61%	G	PM904	107.00	74.90
12V	5V/1000 mA	±.02%	±.04%	22 mA P-P	61%	G	PM911	107.00	74.90
	12V/470 mA	±.02%	±.04%	26 mA P-P	61%	G	PM913	107.00	74.90
	15V/400 mA	±.02%	±.04%	27 mA P-P	61%	G	PM914	107.00	74.90
24V	5V/1000 mA	±.02%	±.04%	22 mA P-P	61%	G	PM921	107.00	74.90
	12V/470 mA	±.02%	±.04%	25 mA P-P	61%	G	PM923	107.00	74.90
	15V/400 mA	±.02%	±.04%	27 mA P-P	61%	G	PM924	107.00	74.90
28V	5V/1000 mA	±.02%	±.04%	22 mA P-P	61%	G	PM931	107.00	74.90
	12V/470 mA	±.02%	±.04%	25 mA P-P	61%	G	PM933	107.00	74.90
	15V/400 mA	±.02%	±.04%	26 mA P-P	61%	G	PM934	107.00	74.90
48V	5V/1000 mA	±.02%	±.04%	22 mA P-P	61%	G	PM941	107.00	74.90
	12V/470 mA	±.02%	±.04%	25 mA P-P	61%	G	PM943	107.00	74.90
	15V/400 mA	±.02%	±.04%	27 mA P-P	61%	G	PM944	107.00	74.90
5V	±12V/±230 mA	±.02%	±.02%	58 mA P-P	62%	G	PM951	112.00	78.40
	±15V/±190 mA	±.02%	±.02%	60 mA P-P	62%	G	PM952	112.00	78.40
12V	±12V/±230 mA	±.02%	±.02%	24 mA P-P	62%	G	PM961	112.00	78.40
	±15V/±190 mA	±.02%	±.02%	25 mA P-P	62%	G	PM962	112.00	78.40
24V	±12V/±230 mA	±.02%	±.02%	24 mA P-P	62%	G	PM971	112.00	78.40
	±15V/±190 mA	±.02%	±.02%	25 mA P-P	62%	G	PM972	112.00	78.40
28V	±12V/±230 mA	±.02%	±.02%	23 mA P-P	62%	G	PM981	112.00	78.40
	±15V/±190 mA	±.02%	±.02%	24 mA P-P	62%	G	PM982	112.00	78.40
48V	±12V/±230 mA	±.02%	±.02%	24 mA P-P	62%	G	PM991	112.00	78.40
	±15V/±190 mA	±.02%	±.02%	25 mA P-P	62%	G	PM992	112.00	78.40

INPUT VOLTAGE RANGES VS. PERCENTAGE OF RATED OUTPUT LOAD

INPUT VOLTAGE	5V	12V	24V	28V	48V
100% Load	4.65-5.5V	11.16-13.2V	22.32-26.4V	26.04-30.8V	44.64-52.8V
80% Load	4.50-6.0V	10.80-14.4V	21.60-28.8V	25.20-33.6V	43.20-57.6V
60% Load	4.40-6.5V	10.56-15.6V	21.12-31.2V	24.64-36.4V	42.24-62.4V

CASE DIMENSIONS		
G	2.00 x 2.00 x 0.4 Inches	(50.8 x 50.8 x 9.8 mm)

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF −25°C TO +71°C AND STORAGE TEMPERATURE RANGE OF −40°C to +125°C

TWO-YEAR WARRANTY

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DC/DC Converters

HIGH PERFORMANCE

- Power 10 to 12 Watts
- High Efficiency
- Excellent Regulation
- EMI/RFI Six-Sided Shielding

INPUT VOLTAGE	OUTPUT VOLTAGE/mA	REGULATION		REFLECTED RIPPLE	EFFICIENCY	CASE SIZE	MODEL NUMBER	PRICE	
		LINE	LOAD					1-9	100's
10 WATT HIGH-PERFORMANCE PM800 SERIES									
5V	5V/2000 mA	±.02%	±.05%	108 mA P-P	61%	B1	PM801	$130.00	$91.00
	12V/940 mA	±.02%	±.05%	122 mA P-P	61%	B1	PM803	130.00	91.00
	15V/800 mA	±.02%	±.05%	130 mA P-P	61%	B1	PM804	130.00	91.00
12V	5V/2000 mA	±.02%	±.05%	45 mA P-P	61%	B1	PM811	130.00	91.00
	12V/940 mA	±.02%	±.05%	51 mA P-P	61%	B1	PM813	130.00	91.00
	15V/800 mA	±.02%	±.05%	54 mA P-P	61%	B1	PM814	130.00	91.00
24V	5V/2000 mA	±.02%	±.05%	32 mA P-P	61%	B1	PM821	130.00	91.00
	12V/940 mA	±.02%	±.05%	36 mA P-P	61%	B1	PM823	130.00	91.00
	15V/800 mA	±.02%	±.05%	38 mA P-P	61%	B1	PM824	130.00	91.00
28V	5V/2000 mA	±.02%	±.05%	33 mA P-P	61%	B1	PM831	130.00	91.00
	12V/940 mA	±.02%	±.05%	37 mA P-P	61%	B1	PM833	130.00	91.00
	15V/800 mA	±.02%	±.05%	39 mA P-P	61%	B1	PM834	130.00	91.00
48V	5V/2000 mA	±.02%	±.05%	32 mA P-P	61%	B1	PM841	130.00	91.00
	12V/940 mA	±.02%	±.05%	36 mA P-P	61%	B1	PM843	130.00	91.00
	15V/800 mA	±.02%	±.05%	38 mA P-P	61%	B1	PM844	130.00	91.00
5V	±12V/±525 mA	±.02%	±.02%	132 mA P-P	62%	B1	PM851	135.00	94.50
	±15V/±412 mA	±.02%	±.02%	130 mA P-P	62%	B1	PM852	135.00	94.50
12V	±12V/±525 mA	±.02%	±.02%	55 mA P-P	62%	B1	PM861	135.00	94.50
	±15V/±412 mA	±.02%	±.02%	54 mA P-P	62%	B1	PM862	135.00	94.50
24V	±12V/±525 mA	±.02%	±.02%	39 mA P-P	62%	B1	PM871	135.00	94.50
	±15V/±412 mA	±.02%	±.02%	38 mA P-P	62%	B1	PM872	135.00	94.50
28V	±12V/±525 mA	±.02%	±.02%	40 mA P-P	62%	B1	PM881	135.00	94.50
	±15V/±412 mA	±.02%	±.02%	39 mA P-P	62%	B1	PM882	135.00	94.50
48V	±12V/±525 mA	±.02%	±.02%	39 mA P-P	62%	B1	PM891	135.00	94.50
	±15V/±412 mA	±.02%	±.02%	38 mA P-P	62%	B1	PM892	135.00	94.50

INPUT VOLTAGE RANGES VS. PERCENTAGE OF RATED OUTPUT LOAD

INPUT VOLTAGE	5V	12V	24V	28V	48V
100% Load	4.65-5.5V	11.16-13.2V	22.32-26.4V	26.04-30.8V	44.64-52.8V
80% Load	4.50-6.0V	10.80-14.4V	21.60-28.8V	25.20-33.6V	43.20-57.6V
60% Load	4.40-6.5V	10.56-15.6V	21.12-31.2V	24.64-36.4V	42.24-62.4V

CASE DIMENSIONS		
B1	3.50 x2.50 x 0.88 Inches	(88.9 x 63.5 x 22.4 mm)

ALL MODELS HAVE OPERATING TEMPERATURE RANGE OF −25°C TO +71°C AND STORAGE TEMPERATURE RANGE OF −40°C to +125°C

TWO-YEAR WARRANTY

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POWER CONVERSION

STEVENS-ARNOLD DIVISION
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WP24S05/5000U
Stevens-Arnold

DC/DC Converters 25 Watt Ultra-Wide Input Range

ISO-PAK® SINGLE OUTPUT

- 4:1 Input Range
- Efficiency to 85%
- Direct Output Paralleling
- Adjustable Output ±10%
- Remote On-Off Control
- 100 kHz Switching
- Isolated

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC	5000 mA	±0.5%	±0.5%	77%	U	629	WP24S05/5000U	$209.00	$146.30
6 VDC	4500 mA	±0.5%	±0.5%	78%	U	629	WP24S06/4500U	209.00	146.30
12 VDC	2500 mA	±0.5%	±0.5%	84%	U	629	WP24S12/2500U	209.00	146.30
15 VDC	2000 mA	±0.5%	±0.5%	85%	U	629	WP24S15/2000U	209.00	146.30

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC	5000 mA	±0.5%	±0.5%	77%	U	629	WP48S05/5000U	$209.00	$146.30
6 VDC	4500 mA	±0.5%	±0.5%	78%	U	629	WP48S06/4500U	209.00	146.30
12 VDC	2500 mA	±0.5%	±0.5%	84%	U	629	WP48S12/2500U	209.00	146.30
15 VDC	2000 mA	±0.5%	±0.5%	85%	U	629	WP48S15/2000U	209.00	146.30

INPUT VOLTAGE RANGES	
NOMINAL	INPUT RANGE
24 VDC	9-36 VDC
48 VDC	20-72 VDC

CASE DIMENSIONS		
U	4.56 x 2.56 x .83 In.	(116 x 65 x 21 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD.

TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS™
POWER CONVERSION

STEVENS-ARNOLD DIVISION
7 ELKINS STREET
SOUTH BOSTON, MA 02127
TELEPHONE (607) 268-1170 • TWX 710-339-0855

PACKAGED POWER

DC/DC Converters 15 & 30 Watt Wide Input Range

ISO-PAK® SINGLES & DUALS

- 2:1 Input Range
- Economically Priced
- Efficiency to 86%
- Remote On-Off Control
- 100 kHz Switching Frequency
- Isolated Output

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC	3000 mA	±1%	±1%	75%	XC	639	WR12S05/3000XC	$119.00	$ 83.30
	3000 mA	±1%	±1%	77%	XC	639	WR24S05/3000XC	119.00	83.30
	3000 mA	±1%	±1%	77%	XC	639	WR48S05/3000XC	119.00	83.30
	5000 mA	±1%	±1%	75%	U	639	WR12S05/5000U	159.00	111.30
	5000 mA	±1%	±1%	77%	U	639	WR24S05/5000U	159.00	111.30
	5000 mA	±1%	±1%	78%	U	639	WR48S05/5000U	159.00	111.30
12 VDC	1250 mA	±1%	±1%	78%	XC	639	WR12S12/1250XC	119.00	83.30
	1250 mA	±1%	±1%	80%	XC	639	WR24S12/1250XC	119.00	83.30
	1250 mA	±1%	±1%	80%	XC	639	WR48S12/1250XC	119.00	83.30
	2500 mA	±1%	±1%	78%	U	639	WR12S12/2500U	159.00	111.30
	2500 mA	±1%	±1%	80%	U	639	WR24S12/2500U	159.00	111.30
	2500 mA	±1%	±1%	81%	U	639	WR48S12/2500U	159.00	111.30
15 VDC	1000 mA	±1%	±1%	78%	XC	639	WR12S15/1000XC	119.00	83.30
	1000 mA	±1%	±1%	80%	XC	639	WR24S15/1000XC	119.00	83.30
	1000 mA	±1%	±1%	80%	XC	639	WR48S15/1000XC	119.00	83.30
	2000 mA	±1%	±1%	78%	U	639	WR12S15/2000U	159.00	111.30
	2000 mA	±1%	±1%	80%	U	639	WR24S15/2000U	159.00	111.30
	2000 mA	±1%	±1%	81%	U	639	WR48S15/2000U	159.00	111.30
±12 VDC	±625 mA	±0.2%	±1%	82%	XC	635	WR12D12/625XC	125.00	87.50
	±625 mA	±0.2%	±1%	84%	XC	635	WR24D12/625XC	125.00	87.50
	±625 mA	±0.2%	±1%	86%	XC	635	WR48D12/625XC	125.00	87.50
	±1250 mA	±0.2%	±1%	82%	U	635	WR12D12/1250U	169.00	118.30
	±1250 mA	±0.2%	±1%	84%	U	635	WR24D12/1250U	169.00	118.30
	±1250 mA	±0.2%	±1%	86%	U	635	WR24D12/1250U	169.00	118.30
±15 VDC	±500 mA	±0.2%	±1%	82%	XC	635	WR12D15/500XC	125.00	87.50
	±500 mA	±0.2%	±1%	84%	XC	635	WR24D15/500XC	125.00	87.50
	±500 mA	±0.2%	±1%	86%	XC	635	WR48D15/500XC	125.00	87.50
	±1000 mA	±0.2%	±1%	82%	U	635	WR12D15/1000U	169.00	118.30
	±1000 mA	±0.2%	±1%	84%	U	635	WR12D15/1000U	169.00	118.30
	±1000 mA	±0.2%	±1%	86%	U	635	WR12D15/1000U	169.00	118.30

INPUT VOLTAGE RANGES	
NOMINAL	INPUT RANGE
12 VDC	9-18 VDC
24 VDC	18-36 VDC
48 VDC	36-72 VDC

CASE DIMENSIONS		
U	4.56 x 2.56 x 0.83 In.	(116 x 65 x 21 mm)
XC	3.0 x 2.56 x 0.83 In.	(76 x 65 x 21 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD

TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS™
POWER CONVERSION

STEVENS-ARNOLD DIVISION
7 ELKINS STREET
SOUTH BOSTON, MA 02127
TELEPHONE (607) 268-1170 • TWX 710-339-0855

PACKAGED POWER

DC/DC Converters 15 Watt Wide Input Range

ISO-PAK® TRIPLE OUTPUT

- 2:1 Input Range
- Economically Priced
- Efficiency to 82%
- 100 kHz Switching Frequency
- Short-Circuit Protected
- Isolated Output

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
+5 VDC ±12 VDC	SEE TABLE 1 BELOW	±0.5%	±3.0%	78%	XC	640	ES12T12/310X	$119.00	$ 83.30
		±0.5%	±3.0%	80%	XC	640	ES24T12/310X	119.00	83.30
		±0.5%	±3.0%	82%	XC	640	ES48T12/310X	119.00	83.30
+5 VDC ±15 VDC	SEE TABLE 1 BELOW	±0.5%	±3.0%	78%	XC	640	ES12T15/250X	119.00	83.30
		±0.5%	±3.0%	80%	XC	640	ES24T15/250X	119.00	83.30
		±0.5%	±3.0%	82%	XC	640	ES48T15/250X	119.00	83.30
+5 VDC +12 VDC −5 V	SEE TABLE 1 BELOW	±0.5%	±3.0%	78%	XC	640	ES12T05/500X	119.00	83.30
		±0.5%	±3.0%	80%	XC	640	ES24T05/500X	119.00	83.30
		±0.5%	±3.0%	82%	XC	640	ES48T05/500X	119.00	83.30

TABLE 1

OUTPUT LOADING & PROTECTION TABLE

OUTPUT	OUTPUT VOLTAGE	OUTPUT CURRENT			OVP (±5%)
		MIN.	NOM.	MAX.	
1	+5V	250 mA	1.5A	2.0A	6.8V
2 & 3	+12V or −12V	100 mA	310 mA	500 mA	15.0V
2 & 3	+15V or −15V	100 mA	250 mA	500 mA	18.0V
2 & 3	+12V, −5V	.1/.1A	.31/.5A	.5/.5A	6.8V

NOTES:
1. Max. total power from all outputs limited to 15 watts. No output may exceed max. current shown.
2. Min. current on each output required to maintain regulation spec.
3. Load regulation is specified from min. to nom. load on each output with nom. load on other outputs.
4. Will not cause the equipment to fail FCC requirements.
5. Specifications apply at 25°C ambient.

CASE DIMENSIONS		
XC	3.0 x 2.56 x 0.83 In.	(76 x 65 x 21 mm)

INPUT VOLTAGE RANGES	
NOMINAL	INPUT RANGE
12 VDC	9-18 VDC
24 VDC	18-36 VDC
48 VDC	36-72 VDC

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD

TWO-YEAR WARRANTY

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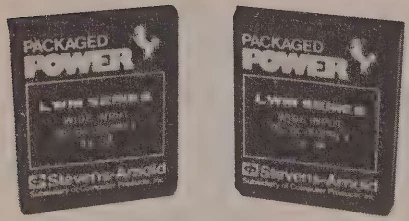
POWER CONVERSION

STEVENS-ARNOLD DIVISION
7 ELKINS STREET
SOUTH BOSTON, MA 02127
TELEPHONE (607) 268-1170 • TWX 710-339-0855

PACKAGED POWER®

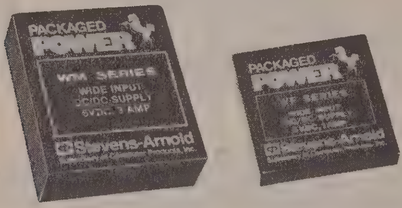


DC/DC Converters 15-45 Watt High Power Density

SWITCH-PAK® SINGLE OUTPUT

- Ultra Wide Input
- 4:1 Input Range
- 75 kHz Switching Frequency
- Efficiency to 89%
- Low Profile
- Non-Isolated

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC	3000 mA	±0.5%	±0.5%	80%	XA	642	LWM12S05/3000XA	$ 89.00	$ 62.30
	5000 mA	±0.5%	±0.5%	80%	XC	642	LWM12S05/5000XC	101.00	70.70
12 VDC	2000 mA	±0.5%	±0.5%	85%	XA	642	LWM24S12/2000XA	89.00	62.30
	3500 mA	±0.5%	±0.5%	87%	XC	642	LWM24S12/3500XC	101.00	70.70
15 VDC	1500 mA	±0.5%	±0.5%	87%	XA	642	LWM24S15/1500XA	89.00	62.30
	3000 mA	±0.5%	±0.5%	89%	XC	642	LWM24S15/5000XC	101.00	70.70



DC/DC Converters 5-50 Watt Ultra-Wide Input Range

SWITCH-PAK® SINGLE OUTPUT

- 4:1 Input Range
- Efficiency to 88%
- Non-Isolation
- Six-Sided Sheilding

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC	1000 mA	±0.5%	±1.0%	75%	Z	632	WF12S05/1000Z	$ 65.00	$ 45.50
	3000 mA	±1.0%	±1.0%	75%	X	618	WM7-40S05/3000X	91.00	72.80
	5000 mA	±1.0%	±1.0%	75%	U	618	WM7-40S05/5000U	124.00	99.20
12 VDC	2000 mA	±1.0%	±1.0%	85%	X	618	WM14-40S12/2000X	91.00	72.80
	4000 mA	±1.0%	±1.0%	85%	U	618	WM14-40S12/4000U	124.00	99.20
15 VDC	1500 mA	±1.0%	±1.0%	88%	X	618	WM17-40S15/1500X	91.00	72.80
	3000 mA	±1.0%	±1.0%	85%	U	618	WM17-40S15/3000U	124.00	99.20

INPUT VOLTAGE RANGES	
NOMINAL	INPUT RANGE
12 VDC	7-32 VDC (WF)
12 VDC	7-40 VDC (WM/LWM)
24 VDC	14-40 VDC (WM/LWM)
24 VDC	17-40 VDC (WM/LWM)

CASE DIMENSIONS		
U	2.56 x 4.56 x .83 In.	(65 x 116 x 21 mm)
X	3.0 x 2.56 x 0.75 In.	(76 x 65 x 19 mm)
Z	2.0 x 2.0 x 0.38 In.	(51 x 51 x 9.6 mm)
XA	2.56 x 3.0 x 0.38 In.	(65 x 76 x 9.6 mm)
XC	2.56 x 3.0 x 0.83 In.	(65 x 76 x 21 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD

TWO-YEAR WARRANTY

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COMPUTER PRODUCTS™
POWER CONVERSION

STEVENS-ARNOLD DIVISION
7 ELKINS STREET
SOUTH BOSTON, MA 02127
TELEPHONE (607) 268-1170 • TWX 710-339-0855

PACKAGED POWER

PACKAGED POWER
M SERIES
SINGLE OUTPUT
DC/DC CONVERTER
5VDC, 2 AMP
Stevens-Arnold
PACKAGED POWER
F SERIES
DC/DC CONVERTER
5VDC, 1 AMP
Stevens-Arnold

DC/DC Converters 1-25 Watt High Performance

ISO-PAK® SINGLE OUTPUT

- Linear Performance
- Low Noise
- Isolated
- Regulated
- Six-Sided Shielding
- Efficiency to 71%

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC	200 mA	±1.0%	±1.0%	46%	W	607	H*S05/200W	$ 54.00	$ 43.20
	600 mA	±0.1%	±0.2%	60%	Z	606	F*S05/600Z	94.00	65.80
	1000 mA	±0.1%	±0.1%	67%	Z	606	F*S05/1000Z	108.00	75.60
	2000 mA	±0.2%	±0.2%	65%	X	608	M*S05/2000X	130.00	104.00
	5000 mA	±0.2%	±0.2%	63%	V	609	P*S05/5000V	250.00	175.00
12 VDC	125 mA	±1.0%	±1.0%	56%	W	607	H*S12/125W	54.00	43.20
	300 mA	±0.1%	±0.2%	65%	Z	606	F*S12/300Z	94.00	65.80
	500 mA	±0.1%	±0.1%	67%	Z	606	F*S12/500Z	108.00	75.60
	1000 mA	±0.2%	±0.2%	71%	X	608	M*S12/1000X	130.00	104.00
	2000 mA	±0.2%	±0.2%	67%	V	609	P*S12/2000V	250.00	175.00
15 VDC	100 mA	±0.1%	±1.0%	59%	W	607	H*S15/100W	54.00	43.20
	200 mA	±0.1%	±0.2%	60%	Z	606	F*S15/200Z	94.00	65.80
	350 mA	±0.1%	±0.1%	69%	Z	606	F*15/350Z	108.00	75.60
	670 mA	±0.2%	±0.2%	71%	X	608	M*S15/670X	130.00	104.00
	1600 mA	±0.2%	±0.2%	66%	V	609	P*S15/1600V	250.00	175.00

NOTE: P Series not available with 5 Volt Input.
* Select Desired Nominal Input Voltage (Table Below) and Insert in Place of Asterisk to Complete Model Number.

INPUT VOLTAGE RANGES	
NOMINAL	
5 VDC	4.5-5.5 VDC
12 VDC	10-14.5 VDC
24 VDC	21-28 VDC
28 VDC	24-32 VDC
48 VDC	42-56 VDC

CASE DIMENSIONS		
V	6.32 x 4.32 x .81 In.	(161 x 110 x 21 mm)
W	1.0 x 2.0 x 0.38 In.	(25 x 51 x 9.6 mm)
X	3.0 x 2.56 x 0.75 In.	(76 x 65 x 19 mm)
Z	2.0 x 2.0 x 0.38 In.	(51 x 51 x 9.6 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD

TWO-YEAR WARRANTY

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COMPUTER PRODUCTS
POWER CONVERSION

STEVENS-ARNOLD DIVISION
7 ELKINS STREET
SOUTH BOSTON, MA 02127
TELEPHONE (607) 268-1170 • TWX 710-339-0855

PACKAGED POWER

DC/DC Converters High Performance

ISO-PAK® DUAL OUTPUT

- Linear Performance
- Low Noise
- Isolated
- Regulated
- Six-Sides Shielding
- Efficiency to 71%

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
±12 VDC	±310 mA	±0.1%	±0.1%	65%	L	641	BA*D12/310L	$101.00	$ 70.70
±15 VDC	±250 mA	±0.1%	±0.1%	66%	L	641	BA*D15/250L	101.00	70.70

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
±12 VDC	±60 mA	±0.07%	±0.07%	52%	Z	602	A*D12/60Z	$ 96.00	$ 66.50
	±150 mA	±0.07%	±0.07%	65%	Z	602	A*D12/150Z	110.00	77.00
	±330 mA	±0.1%	±0.1%	65%	X	637	N*D12/330X	133.00	106.40
	±830 mA	±0.1%	±0.1%	67%	V	609	R*D12/830V	260.00	182.00
±15 VDC	±60 mA	±0.07%	±0.07%	57%	Z	602	A*D15/60Z	96.00	66.50
	±150 mA	±0.07%	±0.07%	67%	Z	602	A*D15/150Z	110.00	77.00
	±330 mA	±0.1%	±0.1%	71%	X	637	N*D15/330X	133.00	106.40
	±830 mA	±0.1%	±0.1%	69%	V	609	R*D15/830V	260.00	182.00

NOTE: R Series not available with 5 Volt Input.
* Select Desired Nominal Input Voltage (Table Below) and Insert in Place of Asterisk to Complete Model Number.

INPUT VOLTAGE RANGES	
NOMINAL	
5 VDC	4.5-5.5 VDC
12 VDC	10-14.5 VDC
24 VDC	21-28 VDC
28 VDC	24-32 VDC
48 VDC	42-56 VDC

CASE DIMENSIONS		
V	6.32 x 4.32 x .81 In.	(161 x 110 x 21 mm)
L	1.95 x 1.95 x 0.88 In.	(51 x 51 x 22 mm)
X	3.0 x 2.56 x 0.75 In.	(76 x 65 x 19 mm)
Z	2.0 x 2.0 x 0.38 In.	(51 x 51 x 9.6 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD

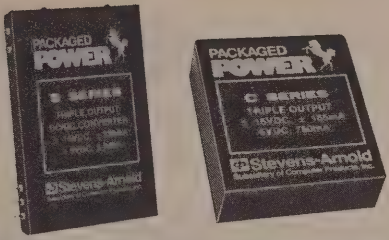
TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

COMPUTER PRODUCTS
POWER CONVERSION

STEVENS-ARNOLD DIVISION
7 ELKINS STREET
SOUTH BOSTON, MA 02127
TELEPHONE (607) 268-1170 • TWX 710-339-0855

PACKAGED POWER



DC/DC Converters 10 & 25 Watt High Performance

ISO-PAK® TRIPLE OUTPUT

- Linear Performance
- Low Noise
- Isolated
- Regulated
- Six-Sided Shielding
- Efficiency to 71%

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL. EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
5 VDC ±12 VDC	750/±165 mA	±0.1%	±0.1%	51%	X	604	C05T12/165X	$160.00	$112.00
	750/±165 mA	±0.1%	±0.1%	51%	X	604	C12T12/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	51%	X	604	C24T12/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	51%	X	604	C28T12/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	51%	X	604	C48T12/165X	160.00	112.00
5 VDC ±15 VDC	750/±165 mA	±0.1%	±0.1%	54%	X	604	C05T15/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	54%	X	604	C12T15/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	54%	X	604	C24T15/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	54%	X	604	C28T15/165X	160.00	112.00
	750/±165 mA	±0.1%	±0.1%	54%	X	604	C48T15/165X	160.00	112.00
5 VDC ±12 VDC	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	60%	V	609	S12T12/330V	298.00	208.60
	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	65%	V	609	S24T12/330V	298.00	208.60
	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	63%	V	609	S28T12/330V	298.00	208.60
	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	65%	V	609	S48T12/330V	298.00	208.60
5 VDC ±15 VDC	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	61%	V	609	S12T15/330V	298.00	208.60
	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	65%	V	609	S24T15/330V	298.00	208.60
	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	64%	V	609	S28T15/330V	298.00	208.60
	3000/±330 mA	±0.2% ±0.1%	±0.2% ±0.1%	65%	V	609	S48T15/330V	298.00	208.60

NOTE: S Series not available with 5 Volt Input.

INPUT VOLTAGE RANGES	
NOMINAL	INPUT RANGE
5 VDC	4.5-5.5 VDC
12 VDC	10-14.5 VDC
24 VDC	21-28 VDC
28 VDC	24-32 VDC
48 VDC	42-56 VDC

CASE DIMENSIONS		
V	6.32 x 4.32 x .81 In.	(161 x 110 x 21 mm)
X	3.0 x 2.56 x 0.75 In.	(76 x 65 x 19 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD.

TWO-YEAR WARRANTY

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COMPUTER PRODUCTS™
POWER CONVERSION

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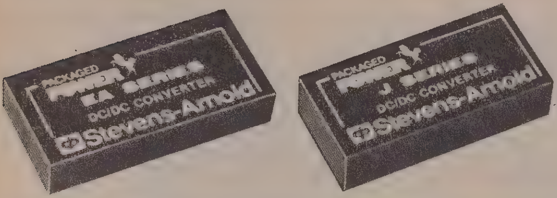
PACKAGED POWER®



Economy DC/DC Converters

ISO-PAK® SINGLE & DUAL OUTPUT

- 1.8 to 6 Watts
- Isolated
- Low Cost
- Low Prfofile (.376″)
- Compact Size
- Efficiency to 80%

OUTPUT VOLTAGE	OUTPUT CURRENT	REGULATION		FL EFF.	CASE SIZE	DATA SHEET NO.	MODEL SERIES	PRICE	
		LINE	LOAD					1-9	100's
±15 VDC	±60 mA	1%/1%	±0.5%	60%	R	603	EA*D15/60R	$ 57.00	$ 39.00
	±200 mA	1%/1%	±10%	80%	W	619	J*D15/200W	69.00	48.30
±18 VDC	±70 mA	1%/1%	±10%	75%	R	626	EJ*D18/70R	51.00	35.70
	±165 mA	1%/1%	±10%	80%	W	619	J*D18/165W	69.00	48.30
5 VDC	200 mA	1%/1%	±10%	65%	R	626	EK*S05/200R	49.00	34.10
	1000 mA	1%/1%	±10%	75%	W	619	K*S05/1000W	69.00	48.30
12 VDC	500 mA	1%/1%	±10%	75%	W	619	K*S12/500W	69.00	48.30

NOTE: Other Input/Output Combinations Available — Consult Factory.
* Select Desired Nominal Input Voltage (Table Below) and Insert in Place of Asterisk to Complete Model Number.

INPUT VOLTAGE RANGES	
NOMINAL	INPUT RANGE
5 VDC	4.65-5.5 VDC (EA)
5 VDC	4.5-5.5 VDC (K, EK, J, EJ)

CASE DIMENSIONS		
R	2.0 x 1.0 x 0.38 In.	(51 x 25 x 9.6 mm)
W	2.0 x 1.0 x 0.38 In.	(51 x 25 x 9.6 mm)

OTHER VOLTAGE AND CURRENT COMBINATIONS AVAILABLE — PLEASE CONSULT FACTORY.
OPERATING TEMPERATURE RANGE: −25°C TO +71°C. NO DERATING.
100% BURN-IN @ FULL LOAD

We Specialize in Specials

Design Capabilities

- **1 to 150 Watts**
- **Single & Multiple Outputs**
- **Standard, Wide, or Ultra-Wide Input Ranges**
- **Encapsulated, Cased or Open-Card Design**
- **Special Options to Standard Products**

WE OFFER THE LEADING EDGE OF TECHNOLOGY IN DESIGN AND PERFORMANCE.

FOR MORE INFORMATION CONTACT OUR APPLICATIONS DEPT. AT 617-268-1170 OR THE LOCAL SALES OFFICE NEAREST YOU.

TWO-YEAR WARRANTY

All Prices and Specifications Subject to Change Without Notice.

ORDERING INFORMATION

Please use this information when ordering any of the products featured on the preceding 25 pages.

ORDER HOTLINES

For immediate order placement call the appropriate Order Hotline:

Compower Division
(408) 942-1434 (Western Time)

Power Products Division
(305) 975-7660 (Eastern Time)

Stevens-Arnold Division
(617) 268-1170 (Eastern Time)

Local Distributor Information
(617) 933-0237 (Eastern Time)

ORDER PLACEMENT

When ordering any product in this catalog, be sure to specify the complete part number or model number, including suffix letter if you desire a non-standard input voltage and/or pin configuration. Orders may be placed with your local distributor, area field sales representative (see list in manufacturer's directory) or directly with the factory.

For small quantity orders contact your closest distributor or local sales representative. For information regarding your closest distributor call (617) 933-0237. When ordering products directly from the factory, place each order separately with the division that manufactures those products; products made by the Power Products Division are *not* available through Stevens-Arnold or Compower and vice versa. Orders may be placed by mail, telephone, Telex or TWX.

PRICES

All prices quoted are F.O.B. manufacturer in U.S. dollars. Applicable federal, state, and local taxes are extra. Prices subject to change without notice.

DISCOUNTS

Substantial discounts are available for large quantities. Consult your area representative or contact the manufacturer directly for quantity pricing.

TERMS

Terms of payment are 30 days from date of shipment subject to prior credit approval.

MINIMUM ORDER

Minimum net billing per order . . . $50.00.

QUOTATIONS

Price and delivery quotations made by Power Products Division, Stevens-Arnold Division, Compower Division, or their authorized field sales representatives are valid for thirty (30) days, unless specified otherwise.

DELIVERY

All orders placed with Power Products Division, Stevens-Arnold Division, Compower Division, or their authorized field sales representatives are acknowledged within one week after receipt of customer's written purchase order by a Customer Acknowledgement copy of the Sales Order form. The copy contains all information pertinent to the sale including standard terms and conditions, plus the scheduled shipping date. Unless a specific method of shipment is indicated by the customer, the best available method will be used.

WARRANTY

All products carry a TWO-YEAR warranty against defects in materials and workmanship.

SPECIAL AND CUSTOM PRODUCTS

We manufacture many special and custom power supplies and DC/DC converters. For further help on your requirement call one of our divisions or your local sales office.

COMPUTER PRODUCTS
POWER CONVERSION

COMPOWER DIVISION

2220 LUNDY AVENUE • SAN JOSE, CA 95131 • (408) 942-1434

POWER PRODUCTS DIVISION

2981 S.W. 14TH STREET • POMPANO BEACH, FL 33069-4803 • (305) 975-7660

STEVENS-ARNOLD DIVISION

7 ELKINS STREET • SOUTH BOSTON, MA 02127 • (617) 268-1170

POWER PRODUCTS LIMITED

YOUGHAL, COUNTY CORK • REPUBLIC OF IRELAND • (024) 9-3130

Power Systems, Inc.

12 TOBEY ROAD, BLOOMFIELD, CT 06002 • (203) 243-0357
TWX #710 - 425 - 8778

Custom Designed Power Supplies

Feature: Optimum Performance
Systems Interface
Cost Effectiveness

Specifications

The custom designed supply provides the correct current ratings for each output voltage, at proper temperature ratings for your systems' cooling provisions. The final design is checked out under actual system operating conditions. The system designer may specify adjustment pots, in the desired location for the outputs that require this feature. Also, the custom supply can provide the exact amount of extra current for those optional "expansion" features.

Configuration Control

Form and fit are tailored to employ the available space in the most efficient way. We can use flat assemblies or rectangular modules, fully enclosed or open, match cabinet fittings, bend around corners and mount in any plane. It provides for functional human-engineering as well as aesthetic considerations.

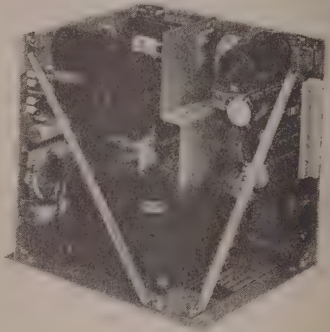
Thermal Design Options

The custom supply can take maximum advantage of the cooling methods designed into the cabinet or housing. It can "sink" heat into sheet metal, or place fins in optimum convection areas. Often the supply includes a fan which ventilates the entire cabinet. 115 VAC for fans is available regardless of the input voltage used (115 or 230 VAC).

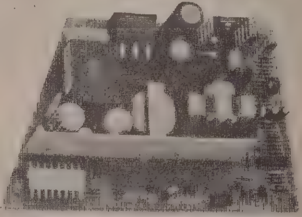
Input/Output Connections

Custom designed power supplies allow the system designer to locate input and output connectors for minimum cabling and ease of assembly. Choices include plated-edge pcb or pin-type connectors, flying-lead cables, solder terminals or barrier-terminal blocks.

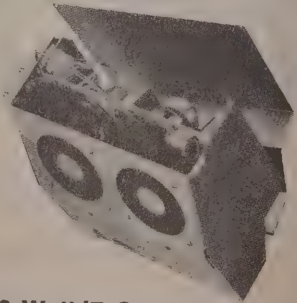
250 Watt Avg. 800 Watt Peak/ 3 Output Printer Power Supply



214 Watt/5 Output Ticketing Terminal



50 Watt/3 Output Terminal Power Supply with Synch.



450 Watt/7 Output High Speed Ticketing Terminal

150 Watt/3 Output with PFS Multi-User Microcomputer

System Related Features

System interface logic of many types is a highly useful advantage that is easy to obtain in a custom design. Standard TTL logic may signal AC power failure, DC power failure, DC power good (one or all outputs), remote inhibit one or all outputs and remote turn-on or off. Choice of digital or analog functions to remote program an output voltage.

Example #1 Complete AC to DC power system with AC PWR Fail, DC PWR Good, Remote Sense, external inhibit and AC fan power.

Example #2 CRT terminal logic supply. To eliminate any interference with the display, we synchronize the switching frequency to the horizontal retrace.

Agency Approvals

PSI designs to meet applicable UL and CSA standards as well as FCC and VDE Safety and EMI/RFI standards. Cards listing Power Systems model numbers already approved by UL and CSA are available upon request. Several supplies have been approved by TUV Rhineland as being compliant with VDE and IEC Safety Standards.

Cost Effectiveness

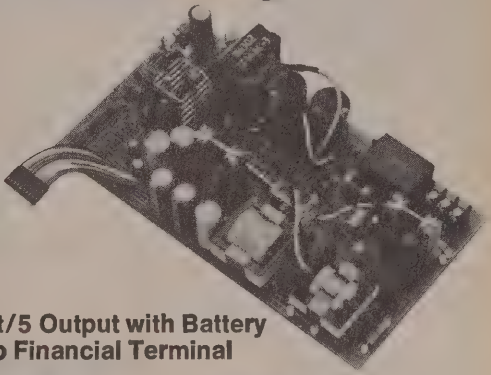
A higher-power rated "catalog" supply is often needed to compensate for current reduction by derating at higher temperatures. Prices often include unnecessary features. Front-end costs are generally required for a custom design program. When amortized over the total quantity for the product life, this becomes insignificant. The end result of a custom designed power supply is a form, fit and function that exactly matches the needs of the system, thereby optimizing system performance and cost.

Our application engineers will be happy to assist in writing specifications, advising on configuration design or reviewing cost tradeoffs. Send for a free copy of "Guidelines for Custom Specifications" by contacting our offices or your nearest sales representative.

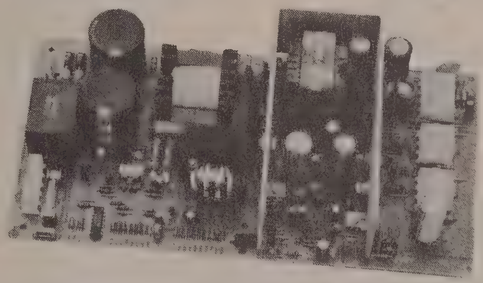
Power Systems, Inc.

12 Tobey Road/Bloomfield, CT 06002
Area Code 203-243-0357 TWX #710-425-8778

750 Watt Computer Supply



81 Watt/5 Output with Battery Backup Financial Terminal



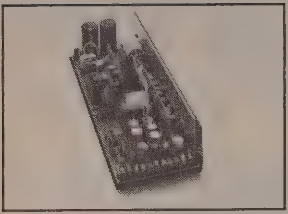
170 Watt/3 Output IBM 3270 Compatible Controller

73 Watt/2 Output Dual Disk Power Supply

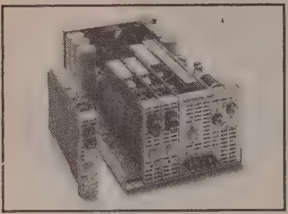
90 Watt/4 Output with Synch Terminal Power Supply

Table of Contents

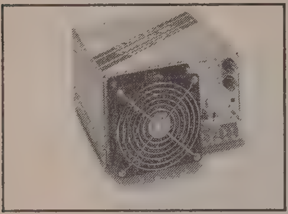
Page No.



ValuSwitcher™—Economical Series of Multiple Output AC to DC Switching Power Supplies—44 Models from 50 to 400 Watts with Up to 5 Outputs—2 to 48 Volts 3•1729

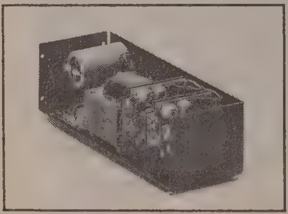


MultiMod™—High Power Series of Multiple Output AC to DC Switching Power Supplies—300 to 1000 Watts with Up to 7 Outputs—2 to 48 Volts 3•1733

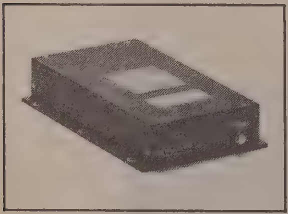


SuperSwitcher™—High Power Single Output Box Switchers—240 to 1700 Watts from 2 to 48 Volts—Over 100 Models Available 3•1737

PowerSystems™—Flexible Building Block Approach for Your Total System Requirements Using ValuSwitchers,™ MultiMods™ and SuperSwitchers™ for: True Redundancy, or Up to 14 Outputs and 2400 Watts per System or Parallel Operation for High Current Requirements Up to 3400 Watts 3•1741



OEM II—Economical Series of Linear Power Supplies—AC to DC Single and Multiple Outputs—4.5 to 25.2 Volts and 5 to 550 Watts 3•1740



HP—Linear Power Supplies Designed to Meet MIL-E-5400—3 Phase 400 Hz Input—50 to 950 Watts 3•1744

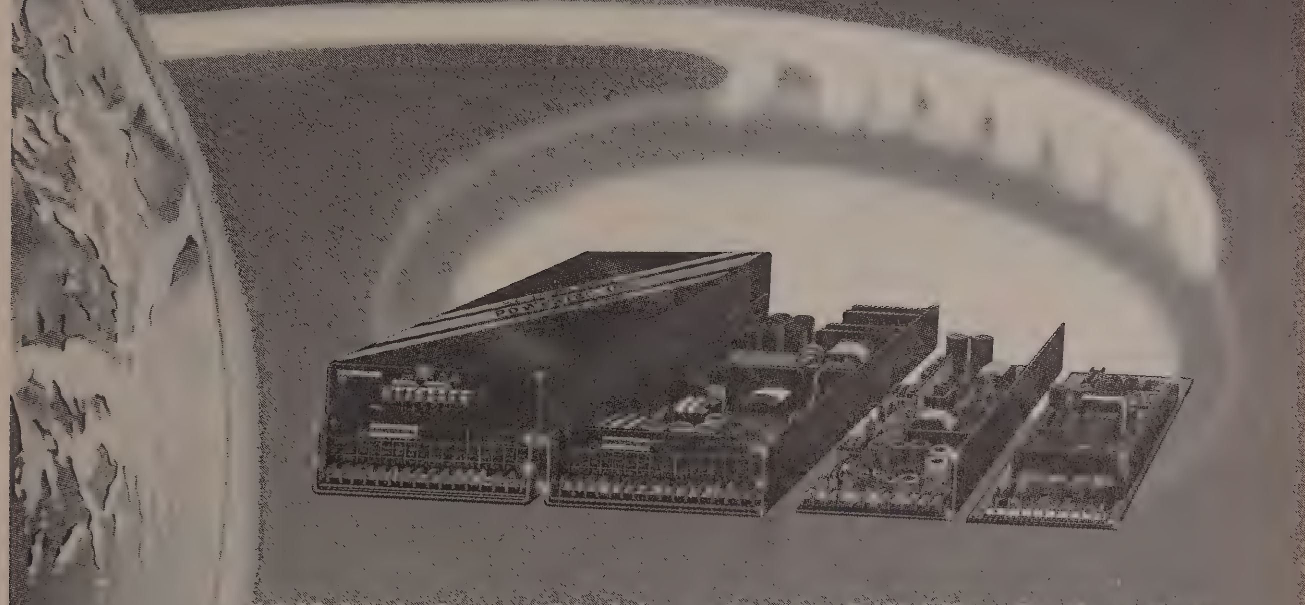
POWERTEC

The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

We call them ValuSwitchers.™

You'll Call Them Value Switchers The World Over.



44 Multiple Output Models 50 to 400 Watts

- VDE, IEC, CSA, UL Safety Specs
- FCC & VDE EMI Option
- Fully Regulated All Outputs
  OR
- Fully Regulated Main Output and Semi-regulated Auxiliaries up to 4 Outputs
- Field Strappable 115/230 VAC
- Extended Input Voltage Range: 90-132/180-264 VAC, 47-440 Hz
- Brown-out Below 85 or 170 VAC
- OVP with Crowbar and Inverter Shutdown
- Remote Sense
- Reverse Voltage Protection
- Soft-start Circuit
- Power Fail Signal Option
- Inhibit
- Hold-up Exceeds 20 ms
- Cover Option
- 100% Burn-in
- Powertec's 18 Years of Proven Value

March, 1984 (VS8)

Quality, Reliability, Performance at an Economical Price.

The ValuSwitcher family is Powertec's economical series of switching power supplies, both open frame and enclosed. ValuSwitchers are designed for low and medium power applications (50-400 watts). They are an extension of the SuperSwitcher™ family (400-1700 watts) introduced over ten years ago and the MultiMod™ multiple output switcher family (300-1000 watts).

Designated Series 19, ValuSwitchers offer a fully regulated main output and a choice of fully regulated or semi-regulated auxiliary outputs. OVP is standard on the main output, optional on the others. Additional options include a power fail signal, EMI filter and cover.

Common mode input filtering, logic inhibit, AC undervoltage inhibit and remote sense are all standard features.

Reliability, quality, and performance which have long characterized SuperSwitchers are also hallmarks of the ValuSwitchers. And at a price that offers the best DC power supply value in the industry.

POWERTEC

The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

Selector Guide-Multiple Outputs

See MultiMod™ Family (Series 6) For Other Multiple Output Switchers To 1000 Watts.

MODEL NUMBER	OUTPUT RATINGS (CONVECTION COOLED)^{4}					LOAD REGULATION (PERCENTAGE)		Initial Output Voltage Tolerance (Adj.)^{8}(±%)^{9}	
	TOTAL POWER^{1,2,3,4}	VOLTS/AMPS^{1,12} @ 50°C^{3}							
		#1 (MAIN)	#2	#3	#4	#1 (MAIN)	#2-4	#1 (MAIN)	#2-4
TRIPLE OUTPUTS—Use quad output models. Outputs may be deleted from quad output models for volume requirements.									
Quad Output		5	12	12	12	Volts (DC)			
19A-E01	50	+5V/7A	+12V/1A	−12V/1A	+12V/1A	±0.3	±1.0	Adj.	±5
19A-E00	60	+5V/7A	+12V/1A	−12V/1A	+12V/1A	±0.3	±2.5	Adj.	±5
19C-E01	150	+5V/25A	+12V/4A^{18}	−12V/4A	+12V/4A^{18}	±0.2	±0.2	Adj.	Adj.
19C-E00	170	+5V/25A	+12V/4A	−12V/4A	+12V/4A	±0.2	±2.5	Adj.	±5
6E5-BBB-17^{5}	300	±5V/40A	±12V/6A	±12V/6A	±12V/6A	±0.2	±0.2	Adj.	Adj.
19E-E00	350	+5V/40A	+12V/6A	−12V/6A	+12V/6A	±0.2	±2.5	Adj.	±5
6F5-BBB-17^{5}	400	±5V/50A	±12V/6A	±12V/6A	±12V/6A	±0.2	±0.2	Adj.	Adj.
19F-E00	400	+5V/50A	+12V/6A	−12V/6A	+12V/6A	±0.2	±2.5	Adj.	±5
Quad Output		5	12	12	5	Volts (DC)			
19A-A01	50	+5V/7A	+12V/1A	−12V/1A	−5V/1A	±0.3	±1.0	Adj.	±5
19A-A00	60	+5V/7A	+12V/1A	−12V/1A	−5V/1A	±0.3	±2.5	Adj.	±5
19C-A01	150	+5V/25A	+12V/4A	−12V/4A	−5V/4A	±0.2	±0.2	Adj.	Adj.
19C-A00	170	+5V/25A	+12V/4A	−12V/4A	−5V/4A	±0.2	±2.5	Adj.	±5
6E5-BBA-17^{5}	300	±5V/40A	±12V/6A	±12V/6A	±5V/6A	±0.2	±0.2	Adj.	Adj.
19E-A00	350	+5V/40A	+12V/6A	−12V/6A	−5V/4A	±0.2	±2.5	Adj.	±5
6F5-BBA-17^{5}	400	±5V/50A	±12V/6A	±12V/6A	±5V/6A	±0.2	±0.2	Adj.	Adj.
19F-A00	400	+5V/50A	+12V/6A	−12V/6A	−5V/4A	±0.2	±2.5	Adj.	±5
Quad Output		5	12	12	24	Volts (DC)			
19A-B01	50	+5V/7A	+12V/1A	−12V/1A	+24V/1A	±0.3	±1.0	Adj.	±5
19A-B00	60	+5V/7A	+12V/1A	−12V/1A	+24V/1A	±0.3	±2.5	Adj.	±5
19C-B01	150	+5V/25A	+12V/4A	−12V/4A	+24V/2A	±0.2	±0.2	Adj.	Adj.
19C-B00	170	+5V/25A	+12V/4A	−12V/4A	+24V/2 & 4A^{17}	±0.2	±2.5	Adj.	±5
6E5-BBD-17^{5}	300	±5V/40A	±12V/6A	±12V/6A	±24V/6A	±0.2	±0.2	Adj.	Adj.
19E-B00	350	+5V/40A	+12V/6A	−12V/6A	+24V/2 & 6A^{17}	±0.2	±2.5	Adj.	±5
6F5-BBD-17^{5}	400	±5V/50A	±12V/6A	±12V/6A	±24V/6A	±0.2	±0.2	Adj.	Adj.
19F-B00	400	+5V/50A	+12V/6A	−12V/6A	+24V/2 & 6A^{17}	±0.2	±2.5	Adj.	±5
Quad Output		5	15	15	5	Volts (DC)			
19A-C01	50	+5V/7A	+15V/1A	−15V/1A	−5V/1A	±0.3	±1.0	Adj.	±5
19A-C00	60	+5V/7A	+15V/1A	−15V/1A	−5V/1A	±0.3	±2.5	Adj.	±5
19C-C01	150	+5V/25A	+15V/4A	−15V/4A	−5V/4A	±0.2	±0.2	Adj.	Adj.
19C-C00	170	+5V/25A	+15V/4A	−15V/4A	−5V/4A	±0.2	±2.5	Adj.	±5
6E5-CCA-17^{5}	300	±5V/40A	±15V/6A	±15V/6A	±5V/6A	±0.2	±0.2	Adj.	Adj.
19E-C00	350	+5V/40A	+15V/6A	−15V/6A	−5V/4A	±0.2	±2.5	Adj.	±5
6F5-CCA-17^{5}	400	±5V/50A	±15V/6A	±15V/6A	±5V/6A	±0.2	±0.2	Adj.	Adj.
19F-C00	400	+5V/50A	+15V/6A	−15V/6A	−5V/4A	±0.2	±2.5	Adj.	±5
Quad Output		5	15	15	24	Volts (DC)			
19A-D01	50	+5V/7A	+15V/1A	−15V/1A	+24V/1A	±0.3	±1.0	Adj.	±5
19A-D00	60	+5V/7A	+15V/1A	−15V/1A	+24V/1A	±0.3	±2.5	Adj.	±5
19C-D01	150	+5V/25A	+15V/4A	−15V/4A	+24V/2A	±0.2	±0.2	Adj.	Adj.
19C-D00	170	+5V/25A	+15V/4A	−15V/4A	+24V/2 & 4A^{17}	±0.2	±2.5	Adj.	±5
6E5-CCD-17^{5}	300	±5V/40A	±15V/6A	±15V/6A	±24V/6A	±0.2	±0.2	Adj.	Adj.
19E-D00	350	+5V/40A	+15V/6A	−15V/6A	+24V/2 & 6A^{17}	±0.2	±2.5	Adj.	±5
6F5-CCD-17^{5}	400	±5V/50A	±15V/6A	±15V/6A	±24V/6A	±0.2	±0.2	Adj.	Adj.
19F-D00	400	+5V/50A	+15V/6A	−15V/6A	+24V/2 & 6A^{17}	±0.2	±2.5	Adj.	±5
Quad Output		8	16	16	24	Volts (DC)			
19A-G00	60	+8V/7A	+16V/1A	−16V/1A	+24V/1A	±0.3	±2.5	Adj.	±5
19C-G00	170	+8V/20A	+16V/4A	−16V/4A	+24V/2 & 4A^{17}	±0.2	±2.5	Adj.	±5
19E-G00	350	+8V/40A	+16V/6A	−16V/6A	+24V/2 & 6A^{17}	±0.2	±2.5	Adj.	±5
19F-G00	400	+8V/45A	+16V/6A	−16V/6A	+24V/2 & 6A^{17}	±0.2	±2.5	Adj.	±5

ORDER INFORMATION
Model/Product Description, Definitions

Standard Options

19C - A00 - ABCDE - SXXXX

Series
Case Size
Output Voltage Combinations
- A. 5, 12, 12, 5
- B. 5, 12, 12, 24
- C. 5, 15, 15, 5
- D. 5, 15, 15, 24
- E. 5, 12, 12, 12
- G. 8, 16, 16, 24
- S. Others to 5 outputs.

Custom Options
E: Factory Wired for 230 VAC Input
D: Power Fail—Option
C: Case or Cover^{15}—Option
B: EMI Filter—Option
A: OVP on Auxiliary Outputs—Option
0: Regulation
- 0—Full^{7} regulation on main output: Semi^{6}-regulated on all others
- 1—Full^{7} regulation on all outputs

March, 1984 (VS8)

All specifications are subject to change without notice.

Powertec Series 19 Specifications

See SuperSwitcher™ Family (Series 9) For Single Output Switchers From 400 To 1700 Watts.

AC INPUT

Nominal—115/230 VAC, field selectable,[14] 47 to 440 Hz[16]

Operating range—90-132 or 180-264 VAC.

Brown-out—Below 85 or 170 VAC.

Inrush current—For units that have been off for 0.5 hour, the maximum thermistor-limited inrush current is less than: 15 amps peak for the 19A, 35 amps peak for the 19C, and 50 amps peak for the 19E.

Undervoltage inhibit—Protected against malfunction due to AC undervoltage operation.

DC OUTPUTS

Adjustments—Only the fully[7] regulated outputs (VDC) are adjustable up to ±5% (except the 19A auxiliaries which are nonadjustable).

Initial tolerance, auxiliaries—Tolerance of all semi[6]-regulated outputs and all 19A fully[7] regulated auxiliary outputs is ±5% of nominal with all outputs at 50% load and main output set at 5.0 VDC.

Line regulation—±0.2% over an input range of 90-132/180-264 VAC at 100% of rated load.

Load regulation—All outputs will operate from no-load to full-load. However, proper operation of the auxiliaries requires that the main output be loaded to at least 10% of its 50°C rating. Regulation is measured statically between 20% and 100% of the 50°C rated output. For this measurement, all semi[6]-regulated outputs not under test should have 20%[19] loads. Fully[7] regulated auxiliaries need not be loaded.

	Main Output			Auxiliary Output			
	19A	19C	19E/F 6E/F	19A	19C	19E/19F	6E/6F
FULL[7]	±0.3%	±0.2%	±0.2%	±1.0%	±0.2%	N.A.	±0.2%
SEMI[6]	±0.3%	±0.2%	±0.2%	±2.5%	±2.5%	±2.5%	N.A.

Dynamic response—A step load change of ±25% of rated maximum will cause a regulated output to deviate no more than 2%, with recovery to 0.5% in less than 400μ sec.

Efficiency—Typically exceeds 75%.

Thermal regulation—±0.02%/°C, fully regulated outputs. ±0.05%/°C, semi-regulated outputs.

Cross regulation—Measured with the output under test loaded at 20% of rated max. while the load on any other output is varied from 50% to 100% of rated max.

	Main (Varying auxiliary)	Auxiliary (Varying main)	Auxiliary (Varying auxiliary)
FULL[7]	±0.1%	±0.1%	±0.1%
SEMI[6]	±0.5%	±2.5%	±0.5%

Ripple and Noise—Any output, 0.5% max. RMS ripple. Typically 1.0% P-P measured with a 20MHz scope via X1 probe, having 4″ max. return lead.

Hold-up time—Fully loaded outputs will remain within regulation for 20 msec. minimum from the last nominal line voltage peak.

OVER VOLTAGE PROTECTION

Main output—Both crowbar OVP and inverter shutdown OVP standard on all models.

Auxiliary outputs—19A: Not available. 19C: OVP shutdown available on regulated outputs only (Option A). 19E/19F: OVP shutdown on auxiliary outputs (Option A). Standard on 6E/6F auxiliaries. Remove AC input for 30 sec. to restore operation.

Range—OVP ranges are factory fixed as follows:[13]

5 VDC: 5.5-6.9 VDC	15 VDC: 16-20 VDC
8 VDC: 9.5-10.9 VDC	24 VDC: 25-29 VDC
12 VDC: 13-16 VDC	24 VDC: 31-32 VDC (19E, 19F only)

REVERSE VOLTAGE PROTECTION

Semi-regulated—Protected to rated current.

Fully regulated—Main output protected to rated current. All others protected to 1 amp continuously or full rated current momentarily.

LOADING vs. TEMPERATURE

Convection cooling—100% rated loads from 0°C to 50°C. Derate linearly to 50% at 70°C.

Forced air cooling—100% rated loads at 70°C with 400 LFM air directed along unit (excluding 6F & 19F).

REMOTE SENSING

Standard on +5 VDC output and 6E/6F auxiliaries. Can accommodate 0.25 VDC cable-drop. Open sense protection is provided. (Not available on 19A.)

CURRENT LIMITING

Main output and fully regulated auxiliary outputs are protected against overload and short circuits by fold-back current limiting. Semi-regulated auxiliaries are protected against continuous shorts.

POWER FAIL

Option D: A TTL compatible logic low signal will occur at least 2 ms before the loss of output following the loss of AC input.

LOGIC INHIBIT

All outputs will be shut off by the application of a TTL compatible logic low signal to the inhibit terminal.

SAFETY

Meets the test specifications listed below. UL submittals are automatic for standard units; check with factory for current status on any model. Powertec has been granted self-certification status by CSA. CSA logo available upon request.

UL 114, UL 478, UL 1012
CSA 22.2-143, CSA 22.2-154
IEC 380[10] IEC 435[10]
VDE 730[10] VDE 804[10] VDE 0806[10]

Hipot—3500 VDC Input to Output. 2100 VDC Input to Case. 700 VDC Output to Case.

Creepage/Clearance—3mm primary to secondary. 4mm primary to case.

Leakage—Less than 1 mA input to case.

Grounding—Case ground terminal provided.

Insulation—Exceeds 10 MΩ at 500 VDC.

EMI

Option B allows these units to meet the conducted EMI requirements of FCC Rule 15J (Docket 20780) and VDE 0871 as shown.

	19A	19C	*19E/19F/6E/6F
FCC	Class A	Class B	Class B
VDE	—	Class A	Class A

*Preliminary

WARRANTY—1 year

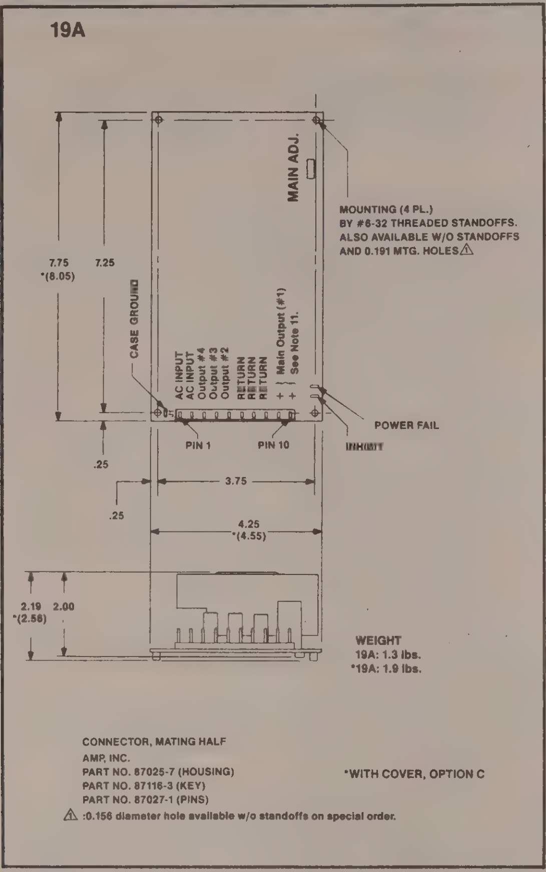
NOTES:

1. Maximum continuous output power may not exceed the product of rated current and voltage specified in the Selector Guide at indicated temperatures as measured at the output terminals.
2. Max. total power of all outputs combined.
3. Above 50°C, current and power ratings derate linearly to 50% at 70°C.
4. Higher current and power ratings attainable with moving air. Consult Factory. (Excludes 6F and 19F models.)
5. Outputs for 6E and 6F are floating (i.e., outputs may be wired for either plus or minus and may be paralleled).
6. Semi-regulated outputs. "Semi" have less circuitry in order to improve cost. Load regulation is sufficient for many requirements.
7. Fully regulated outputs. "Full" have additional circuitry to assure better regulation than the semi-regulated outputs.
8. Output voltage adjustable to ±5% of specified nominal.
9. Output voltage non-adjustable. Initial voltage within ±% tolerance indicated.
10. Class 1 non-SELV: Meets European safety requirements except in cases where a system does not provide for grounding, or where the possibility exists that an operator (maintenance personnel excepted) can come into physical contact with the power supply or its load terminals.
11. Must be connected (wired) to the load in parallel.
12. Higher peak current ratings may be obtained. Contact Factory.
13. Trip occurs within the applicable range.
14. Units shipped are strapped for 115 VAC input. Customer may change for use at 230 VAC.
15. Cover standard with 6F and 19F, optional on all others.
16. 6F and 19F operate at 47-63 Hz only, except on special order.
17. Line/load regulation, ripple and noise typically double at the higher current rating indicated.
18. To increase output current: Outputs No. 2 and No. 4 may be paralleled. Contact Factory for details.
19. Outputs will operate at lower load conditions with degraded regulation.

March, 1984 (VS8)

Contact Factory to Obtain Powertec's Free Loose-Leaf Binder/Catalog to Which You May Add This and Other Product Brochures Which Are Published Monthly.

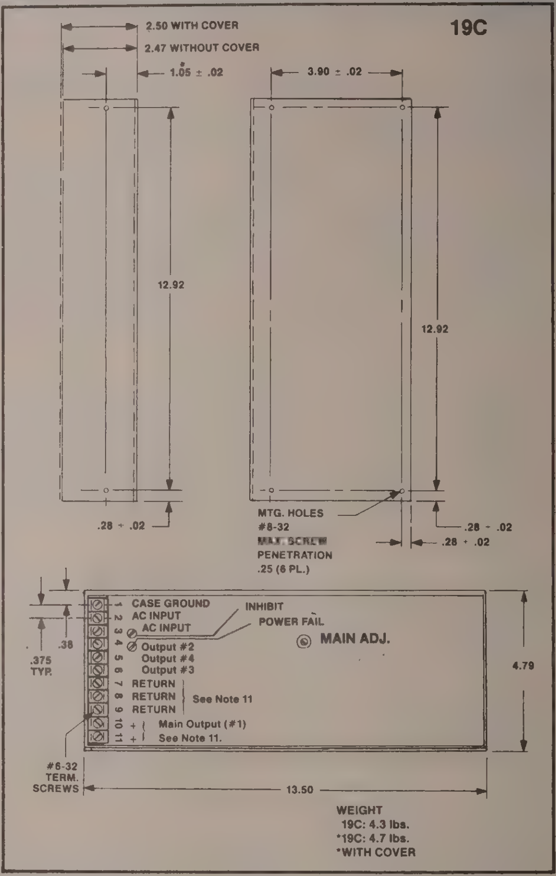
Outline and Mounting Dimensions


19A
MAIN ADJ.
MOUNTING (4 PL.)
BY #6-32 THREADED STANDOFFS.
ALSO AVAILABLE W/O STANDOFFS
AND 0.191 MTG. HOLES
7.75
*(8.05)
7.25
CASE GROUND
AC INPUT
AC INPUT
Output #4
Output #3
Output #2
RETURN
RETURN
RETURN
+ +
Main Output (#1)
See Note 11.
POWER FAIL
INHIBIT
PIN 1
PIN 10
.25
3.75
.25
4.25
*(4.55)
2.19
*(2.58)
2.00
WEIGHT
19A: 1.3 lbs.
*19A: 1.9 lbs.

CONNECTOR, MATING HALF
AMP, INC.
PART NO. 87025-7 (HOUSING)
PART NO. 87116-3 (KEY)
PART NO. 87027-1 (PINS)

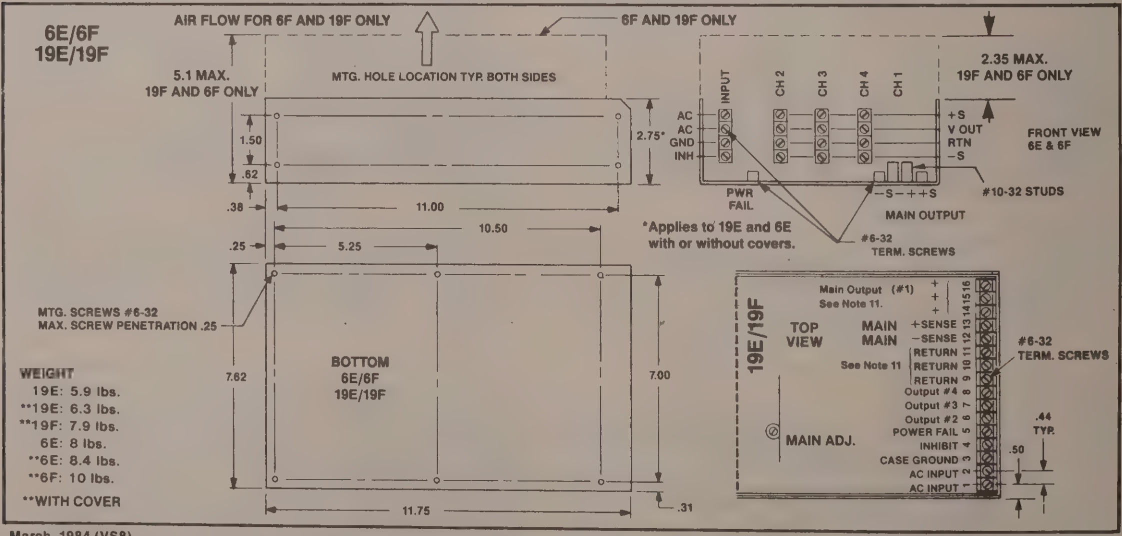
*WITH COVER, OPTION C

⚠ :0.156 diameter hole available w/o standoffs on special order.


19C
2.50 WITH COVER
2.47 WITHOUT COVER
1.05 ± .02
3.90 ± .02
12.92
12.92
.28 ± .02
MTG. HOLES
#8-32
MAX. SCREW
PENETRATION
.25 (6 PL.)
.28 ± .02
.28 ± .02
1 CASE GROUND
2 AC INPUT
3 AC INPUT
4 Output #2
5 Output #4
6 Output #3
7 RETURN
8 RETURN
9 RETURN
10 +
11 +
See Note 11
Main Output (#1)
See Note 11.
INHIBIT
POWER FAIL
MAIN ADJ.
.38
.375
TYP.
4.79
#6-32
TERM.
SCREWS
13.50

WEIGHT
19C: 4.3 lbs.
*19C: 4.7 lbs.
*WITH COVER

Contact Factory to Obtain Powertec's Free Loose-Leaf Binder/Catalog to Which You May Add This and Other Product Brochures Which Are Published Monthly.


6E/6F
19E/19F
AIR FLOW FOR 6F AND 19F ONLY
6F AND 19F ONLY
5.1 MAX.
19F AND 6F ONLY
MTG. HOLE LOCATION TYP. BOTH SIDES
1.50
.62
2.75*
.38
11.00
10.50
.25
5.25
MTG. SCREWS #6-32
MAX. SCREW PENETRATION .25
7.62
BOTTOM
6E/6F
19E/19F
7.00
11.75
.31
INPUT
CH 2
CH 3
CH 4
CH 1
AC
AC
GND
INH
+S
V OUT
RTN
−S
2.35 MAX.
19F AND 6F ONLY
FRONT VIEW
6E & 6F
PWR
FAIL
−S− + +S
#10-32 STUDS
MAIN OUTPUT
*Applies to 19E and 6E
with or without covers.
#6-32
TERM. SCREWS
19E/19F
TOP
VIEW
MAIN
MAIN
Main Output (#1)
See Note 11.
+
+
+
+SENSE
−SENSE
RETURN
RETURN
RETURN
See Note 11
Output #4
Output #3
Output #2
POWER FAIL
INHIBIT
CASE GROUND
AC INPUT
AC INPUT
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
#6-32
TERM. SCREWS
.44
TYP.
.50
MAIN ADJ.

WEIGHT
19E: 5.9 lbs.
**19E: 6.3 lbs.
**19F: 7.9 lbs.
6E: 8 lbs.
**6E: 8.4 lbs.
**6F: 10 lbs.
**WITH COVER

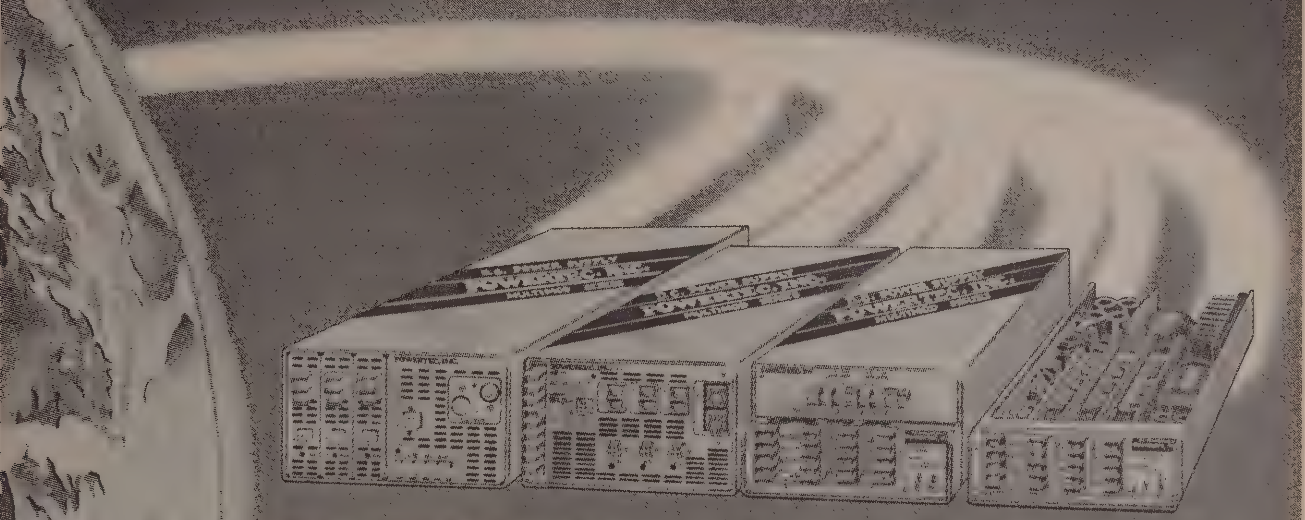
March, 1984 (VS8)

POWERTEC
The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

MultiMod™ Multiple Output Switchers.

The Custom Alternative The World Over.



300 to 1000 Watt Power Supplies With Up To 7 Outputs 2 to 48 Volts.

- Standard Off-The-Shelf Delivery
- VDE, IEC, CSA, UL Safety Specs
- FCC and VDE EMI Specs
- All Outputs Switching and Fully Isolated
- Field Selectable 115/230 VAC
- Efficiency Typically 75%
- Remote Sense
- Fully Regulated
- Extended Input Voltage Range: 90-132/165-265 VAC, 47-63 Hz
- Full Power Outputs at 50°C; Derates Linearly to 50% at 70°C
- OVP with Crowbar & Inverter Shut-down
- Power Fail Signal
- Logic Inhibit
- Soft Start
- Brown Out of 85 or 160 VAC
- Reverse Voltage Protection
- 100% Burn-in
- Powertec's 18 Years of Proven Value

MM6 April, 1984

Multi Modular Construction Using Standard Switching Plug-In Modules.

MultiMod™ is a new concept in multiple output modular switching power supplies providing an alternative to costly customs. It allows you to choose your voltage/current combinations from a large selection of standard switching power supplies and standard auxiliary output modules, and we do the rest.

The MultiMod switchers have 2 to 7 fully regulated outputs, which consist of one main output and 1 to 3 fully isolated plug-in output modules. These output modules are off-the-shelf standards which the designer can select as building blocks to provide his ideal voltage/current combinations. He is assured of dependable delivery of supplies which exactly match his unique requirements. And MultiMods operate with proven field reliability because they are put together with standard building blocks produced in high volume.

Main outputs use only pure switch mode design. All auxiliaries are also available as fully switching. Thus, the designer can be assured of maximum efficiency and minimum thermal stress. Post-linear regulated auxiliaries are also available.

Multiple outputs are available from 2 through 48 volts with modules rated from 12 to 750 watts. Total output ratings available are 300, 400, 600, 850 and 1000 watts.

POWERTEC

The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

Selector Guide–Multiple Outputs

See ValuSwitcher™ Family (19 Series) For Other Multiple Output Switchers.

The MultiMod™ is a new concept in multiple output switching power supplies providing 2 to 7 outputs. A building block approach using a selection of flexible "power packages" and standard plug-in output modules provides voltage/current outputs tailored to your specific requirements. The power supply is delivered totally assembled and tested, using the output modules you have selected to meet your needs.

- Select the "power package" that meets your total output power requirements (300 to 1000 watts) by referring to the "Power Package Selector Guide."
- Select the output with the highest output power by referring to the "Main Output Selector Guide."
- Select lower power outputs (auxiliary plug-in modules) by referring to the "Auxiliary Module Selector Guides."
- Each power package accommodates one main output plus space for up to three one-space-wide auxiliary modules.
- One-space-wide auxiliary modules are available with 1 and 2 isolated outputs.
- Column Two of the "Main Output Selector Guide" indicates the quantity of one-space-wide auxiliary modules that may be used with the main output indicated.
- "Auxiliary Spaces Occupied" column of the "Auxiliary Module Selector Guide" indicates the quantity of spaces each auxiliary module occupies (1 to 3 spaces).
- See "Order Information" (Page 3) for more details.

POWER PACKAGE SELECTOR GUIDE

Model Designation	Total Package Output Power[1,2,3]	Max. Power[1] 50°C		Max. No. Aux. Modules[13]	Number Of Outputs[7]	Dimensions
		Main	Auxs.[4]			
6E	300[5]	200[5]	200[5]	3	1 to 4	2.75″ x 7.62″ x 11.75″
6F	400	250	200	3	1 to 4	5″ x 7.62″ x 11.75″
6JA	600	384	250	3	1 to 6	5″ x 8″ x 11″
6JB	600	528	250	2	1 to 5	5″ x 8″ x 11″
6L	850	768	360	3	1 to 7	5″ x 8″ x 14.83″
6M	1000	768	360	3	1 to 7	5″ x 8″ x 14.83″

MAIN OUTPUT SELECTOR GUIDE

Model No.	Auxiliary[13] Spaces Available	Main Output Ratings				Load Regulation %	Ripple & Noise % P-P
		Volts[16]	Amps[1,2,3]				
			50°C	60°C	70°C		
6JA2-XXX-17	3	2	70	53	35	0.5	2.5
6JB2-XX-17	2	2	100	75	50	0.5	2.5
6L2-XXX-17	3	2	200	150	100	0.5	2.5
6M2-XXX-17	3	2	200	150	100	0.5	2.5
6E5-XXX-17	3	5	40[5]	30[5]	20[5]	0.2	2.0
6F5-XXX-17	3	5	50	37	25	0.2	2.0
6JA5-XXX-17	3	5	60	45	30	0.2	1.0
6JB5-XX-17	2	5	90	68	45	0.2	1.0
6L5-XXX-17	3	5	150	113	75	0.2	1.0
6M5-XXX-17	3	5	150	113	75	0.2	1.0
6JA12-XXX-17	3	12	28	21	14	0.2	1.0
6JB12-XX-17	2	12	42	32	21	0.2	1.0
6L12-XXX-17	3	12	62	47	31	0.2	1.0
6M12-XXX-17	3	12	62	47	31	0.2	1.0
6JA15-XXX-17	3	15	24	18	12	0.2	1.0
6JB15-XX-17	2	15	34	26	17	0.2	1.0
6L15-XXX-17	3	15	50	38	25	0.2	1.0
6M15-XXX-17	3	15	50	38	25	0.2	1.0
6JA24-XXX-17	3	24	16	12	8	0.2	1.0
6JB24-XX-17	2	24	22	17	11	0.2	1.0
6L24-XXX-17	3	24	32	24	16	0.2	1.0
6M24-XXX-17	3	24	32	24	16	0.2	1.0

AUXILIARY MODULES SELECTOR GUIDE —SINGLE OUTPUTS

Module Designation[11]	Applicable Models[12]	Output Ratings				Load Regulation % [15]	Ripple & Noise % P-P	Aux. Spaces Occupied[8]
		Volts[16]	Amps[1,2,3]					
			50°C	60°C	70°C			
F	6E, 6F	2	6	4.5	3.0	0.2	3.0	1
F	6J, 6L, 6M	2	10	7.5	5.0	0.2	2.5	1
M	6J, 6L, 6M	2	50	37.5	25.0	0.2	2.5	2
A	6E, 6F	5	6	4.5	3.0	0.2	2.0	1
A	6J, 6L, 6M	5	10	7.5	5.0	0.2	1.0	1
B	6E, 6F	12	6	4.5	3.0	0.2	2.0	1
B	6J, 6L, 6M	12	10	7.5	5.0	0.2	1.0	1
C	6E, 6F	15	6	4.5	3.0	0.2	2.0	1
C	6J, 6L, 6M	15	10	7.5	5.0	0.2	1.0	1
D	6E, 6F	24	6	4.5	3.0	0.2	2.0	1
D	6J, 6L, 6M	24	5	3.8	2.5	0.2	1.0	1
G	6E, 6F	48	3	2.25	1.5	0.2	2.0	1
G	6J, 6L, 6M	48	5	3.75	2.5	0.2	1.0	1

AUXILIARY MODULES SELECTOR GUIDE —DUAL OUTPUTS

Module Designation[11]	Applicable Models[12]	Output Ratings				Load Regulation % [15]	Ripple & Noise % P-P	Aux. Spaces Occupied[8]
		Volts[16]	Amps[1,2,3]					
			50°C	60°C	70°C			
R	6JA & 6JB	12	5	3.8	2.5	0.2	1.0	1
		12	5	3.8	2.5	0.2	1.0	1
T	6JA & 6JB	15	5	3.8	2.5	0.2	1.0	1
		15	5	3.8	2.5	0.2	1.0	1

NOTE: 3.3 volts main outputs and auxiliary outputs are available upon request. Contact Factory.

NOTES:

1. Maximum continuous output power may not exceed the product of rated current and voltage specified in the Selector Guide at indicated temperatures as measured at the output terminals.
2. Higher peak current ratings may be obtained. Contact Factory.
3. Maximum output power at 50°C of combined main and auxiliaries may not exceed the total package power indicated.
4. The combined power for all auxiliaries may not exceed power rating indicated.
5. Higher current and power ratings attainable with moving air (6E only).
6. "M" Auxiliary: Substitute "operating load current" for "rated max."
7. Number of outputs is determined by the output plug-in modules selected.
8. Number of spaces occupied by auxiliary module. Due to mechanical factors, 6JA and 6JB power packages are limited to no more than 2 "R" or "T" modules. Total number of outputs possible, including main, is therefore 6 and 5 outputs respectively.
9. 6J, 6L, 6M: Factory strapped for 230 VAC input. 6E, 6F: Factory strapped for 115 VAC input. Customer may change input strapping.
10. Class 1 Non-SELV: Meets European safety requirements except in cases where a system does not provide for grounding, or where the possibiltiy exists that an operator (maintenance personnel excepted) can come into physical contact with the power supply or its load terminals.
11. The Designation only represents the voltage and current output specs provided (NOT THE LOCATION). Powertec must determine the location of the auxiliaries.
12. Model (Power Package) in which the auxiliary module specifications are applicable.
13. Number of one-space-wide spaces available for auxiliary modules. Corresponds to "Auxiliary Spaces Occupied" column of the Auxiliary Module Selector Guide.
14. CSA logo added upon request. Powertec has been granted self-certification status by CSA.
15. When maximum auxiliary power is being used as shown in the Power Package Selector Guide, the load on the main output must be the following minimum percentage of the "Total Package Output Power" rating at 50°C: (6E:8%), (6F:6.5%), (6J:10%), (6L, 6M:7.5%). Lacking the above, auxiliary output voltages will decrease. Less minimum power on the main is required with reduced auxiliary loads.
16. Other voltages available on special order.

MM6 April,1984

All specifications are subject to change without notice.

Order Information and Specifications

See SuperSwitcher™ Family (9 Series) For Single Output Switchers From 400 to 1700 Watts.

ORDER INFORMATION/SPECIFICATION
Model/Product Description—Options

Standard Options

6 J A 5-B B D-1 7 X-B C D P G 2 3 4 5-SXXXX

MultiMod™ Series Designation
Package/Power
Additional Designation Indicated on some main outputs
Channel #1 Main Output Voltage 5V @ 60A
Auxiliary Module[11] 12V @ 10A
Auxiliary Module[11] 12V @ 10A
Auxiliary Module[11] 24V @ 5A
Safety Specs (-1, or -2)

-1. Available all models
Meets UL 114, UL 478, UL 1012, CSA 22.2-143,[14] CSA 22.2-154[14]
Hipot—Input to Output: 2100 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC
Creepage/Clearance—Primary to Secondary: 2.4 mm
Primary to Case: 2.4 mm
Case Grounded, Insulation Resistance—10M Ω
Leakage—1mA (3mA with Option B)

-2. Available all models
Meets all -1 specifications plus the following: Class I Non-SELV: VDE 730,[10] VDE 804,[10] VDE 806,[10] IEC 380,[10] IEC 435[10]
Hipot—Input to Output: 3500 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC
Creepage/Clearance—Primary to Secondary: 3 mm
Primary to Case: 3 mm
Case Grounded, Insulation Resistance —10M Ω
Leakage—1mA (3mA with Option B)

Custom Options & Modified Standards
5: Parallel Option (Contact Factory)
4: Factory Wired 230 VAC (6E & 6F)
3: CSA Logo[14]
2: Reverse Fan: 6J, 6L, 6M
G: Power Good Option (6L & 6M only)
P: Ball-bearing Fan
D: Power Fail Option (all models)
C: Cover Option: Applicable to 6E only, standard on others.
B: EMI Filter—

6E, 6F, 6J meet FCC 20780 Class B and VDE 0871 Class A.

6L and 6M (non-strappable 165-265 VAC input, version "3" only) meet FCC 20780 Class B and VDE 0871 Class A.

X: Powertec assigned revision letter when applicable.
7: **Input Voltages** (3 or 7)
3. 165 to 265 VAC (47-63 Hz); 6L, 6M only
7. 90 to 132 VAC (47-63 Hz) and 180 to 264 VAC (47-63 Hz) field selectable: 6E, 6F, 6JA, 6JB, 6L, 6M

Note: For 400 Hz operation contact factory.

SPECIFICATIONS

SAFETY and INPUT VOLTAGE
(See "Order Information" above.)

AC INPUTS

Brown Out—Regulates through short term line dips to at least 85 or 160 VAC.

Inrush Current—Limited to 4X operating current to prevent nuisance tripping of protective circuit breakers and fuses.

Turn On Time—0.2 sec. max. for power up.

Undervoltage Inhibit—Protected against malfunction due to AC undervoltage operation.

DC OUTPUTS

Adjustment—Output adjustable ±10% of nominal voltage except for 6E, 6F, 6J auxiliaries which are ±5%. Initial setting to ±1% of nominal voltage.

Line Regulation—
6J, 6L, 6M: 5 mV or 0.1% over input range.
6E and 6F: ±0.2% over input range.

Load Regulation—10 mV or 0.2% at any load up to 100% of rated load with remote sense connected; 0.2 mV/amp with internal sense; auxiliary modules with internal sense are 3 mV/amp.

Dynamic Response—A step load change of ±25% of rated max[6] will cause a max. deviation of 3%. Output will recover to within 0.1% of nominal in 400μsec.

Thermal Regulation—±0.02%/°C over operating range.

Ripple & Noise—See Selector Guide on page 2. Measured on 20 MHz scope via X1 probe having 4 inch maximum return lead.

Hold-up Time—Fully loaded outputs remain within regulation for 20 msec. minimum for the 6E and 6F following the last line voltage peak, measured from either 115 VAC or 230 VAC. Other values of hold-up are noted as follows:

HOLD-UP TIME vs. INPUT VOLTAGE (6JA, 6JB, 6L, 6M)

V_{in} CODE	7		3, 7			
NOMINAL VAC	90	115	165	180	208	230
HOLD-UP (msec.)	10	30	5	10	20	30

Efficiency—Exceeds 75% typically.

Loading vs. Temperature—100% rated load from 0 to 50°C. Derate linearly to 50% at 70°C.

Current Limiting—Foldback type, with automatic recovery upon removal of overload.

OVER VOLTAGE PROTECTION

OVP Inverter Shut-down (Standard)—All outputs: Initiates inverter shut-down and latches supply off. Trip point at output terminals are factory set within the following windows:

NOMINAL OUTPUT	2V	5V	12V	15V	24V	48V
TRIP WINDOW	2.8-3.2V	6.5-6.9V	14-16V	17-19V	27-29V	54-57V

Remove AC input for 30 sec. to restore operation.

OVP Crowbar—An SCR crowbar across the output terminals short circuits output to protect load against excessive voltage. Standard on main output only.

REVERSE VOLTAGE PROTECTION

Main outputs protected up to rated load. Auxiliary outputs protected to 50% rated load.

REMOTE SENSE

Separate sense terminals will accommodate a cable drop of 0.5 VDC. (See Note 1.) Internal circuitry protects load if sense lines are opened or shorted.

Margining: Fixed internal resistors can be installed to permit adjustment up to ±10% for main output. Contact factory regarding auxiliaries.

POWER FAIL SIGNAL

(Option)—Following the loss of AC input, a TTL compatible signal referenced to the negative terminal of the main output will change from high to low at least 2 msec. before the loss of output.

POWER GOOD SIGNAL (Standard Option of 6L and 6M)

(Option)—A TTL compatible signal referenced to the main negative output terminal will change from high to low if the output voltage deviates more than ±4% from nominal.

LOGIC INHIBIT

A TTL high signal referenced to the negative output terminal inhibits the output. A TTL low, or open input, enables the output.

Total Power Supply: Shutdown all outputs when main output is inhibited. Standard on all models.

Auxiliary Output: 6L, 6M: Total shutdown of individual output. 6J: Less than 1 volt.

WARRANTY—1 year

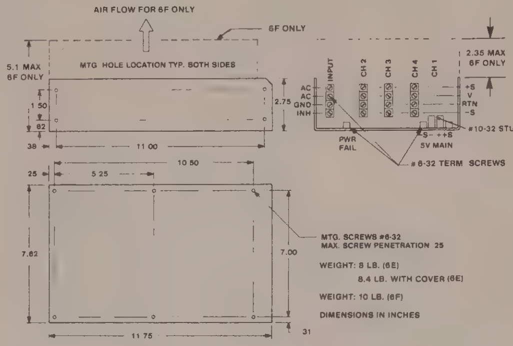
MM6 April, 1984

Contact Factory to Obtain Powertec's Free Loose-Leaf Binder/Catalog to Which You May Add This and Other Product Brochures Which Are Published Monthly.

MultiMod Package Specifications

See SuperSwitcher™ Family (9 Series) For Single Output Switchers From 400 to 1680 Watts.
See ValuSwitcher™ Family (19 Series) For Other Multiple Output Switchers From 50 to 400 Watts.

MODEL 6E/6F

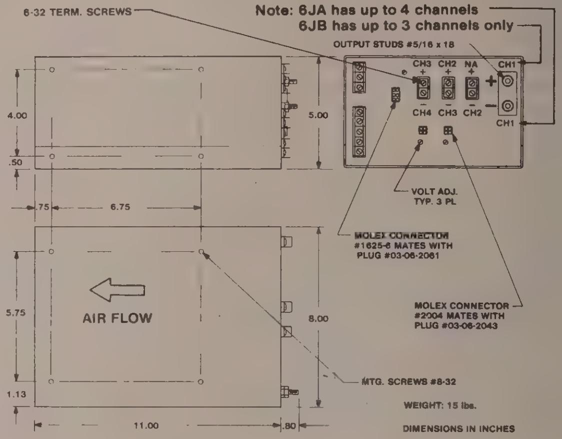

AIR FLOW FOR 6F ONLY
6F ONLY
5.1 MAX 6F ONLY
MTG HOLE LOCATION TYP. BOTH SIDES
1 50
62
38
11 00
2.75
AC
AC
GND
INH
INPUT
CH 2
CH 3
CH 4
CH 1
2.35 MAX 6F ONLY
+S
V
RTN
-S
#10-32 STUDS
PWR FAIL
S- ++S
5V MAIN
# 6-32 TERM SCREWS
10 50
25
5 25
7.62
7.00
11 75
31
MTG. SCREWS #6-32
MAX. SCREW PENETRATION 25

WEIGHT: 8 LB. (6E)
8.4 LB. WITH COVER (6E)

WEIGHT: 10 LB. (6F)

DIMENSIONS IN INCHES

MODEL 6JA/6JB


6-32 TERM. SCREWS
OUTPUT STUDS #5/16 x 18
CH3
CH2
NA
CH1
CH4
CH3
CH2
CH1
+
−
4.00
.50
5.00
.75
6.75
5.75
AIR FLOW
8.00
1.13
11.00
.80
VOLT ADJ. TYP. 3 PL
MOLEX CONNECTOR #1625-6 MATES WITH PLUG #03-06-2061
MOLEX CONNECTOR #2004 MATES WITH PLUG #03-06-2043
MTG. SCREWS #8-32

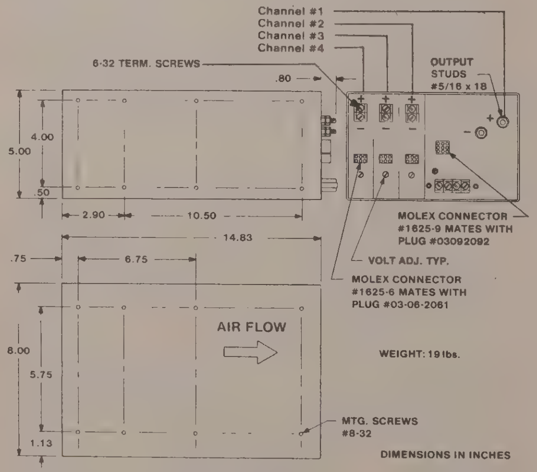
Note: 6JA has up to 4 channels
6JB has up to 3 channels only

WEIGHT: 15 lbs.

DIMENSIONS IN INCHES

NOTE: The locations for the specified auxiliaries must be determined by Powertec.

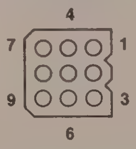
MODEL 6L/6M


Channel #1
Channel #2
Channel #3
Channel #4
6-32 TERM. SCREWS
.80
OUTPUT STUDS #5/16 x 18
+
−
4.00
5.00
.50
2.90
10.50
14.83
.75
6.75
AIR FLOW
8.00
5.75
1.13
MOLEX CONNECTOR #1625-9 MATES WITH PLUG #03092092
VOLT ADJ. TYP.
MOLEX CONNECTOR #1625-6 MATES WITH PLUG #03-06-2061
MTG. SCREWS #8-32

WEIGHT: 19 lbs.

DIMENSIONS IN INCHES

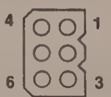
6L/6M MAIN



FUNCTION JACK (MOLEX) PIN-OUTS

1. +Sense
2. Program
3. Program
4. −Sense
5. N/C
6. Inhibit
7. N/C
8. N/C
9. N/C

6J MAIN, 6L/6M AUXILIARIES



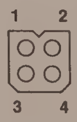
6J MAIN (CH.1)

1. +Sense
2. Program
3. Program
4. - Sense
5. N/C
6. Inhibit

6L/6M AUXILIARIES

1. +Sense
2. N/C
3. N/C
4. −Sense
5. N/C
6. Inhibit

6J AUXILIARIES



1. +Sense
2. −Sense
3. Inhibit
4. N/C

Contact Factory to Obtain Powertec's Free Loose-Leaf Binder/Catalog to Which You May Add This and Other Product Brochures Which Are Published Monthly.

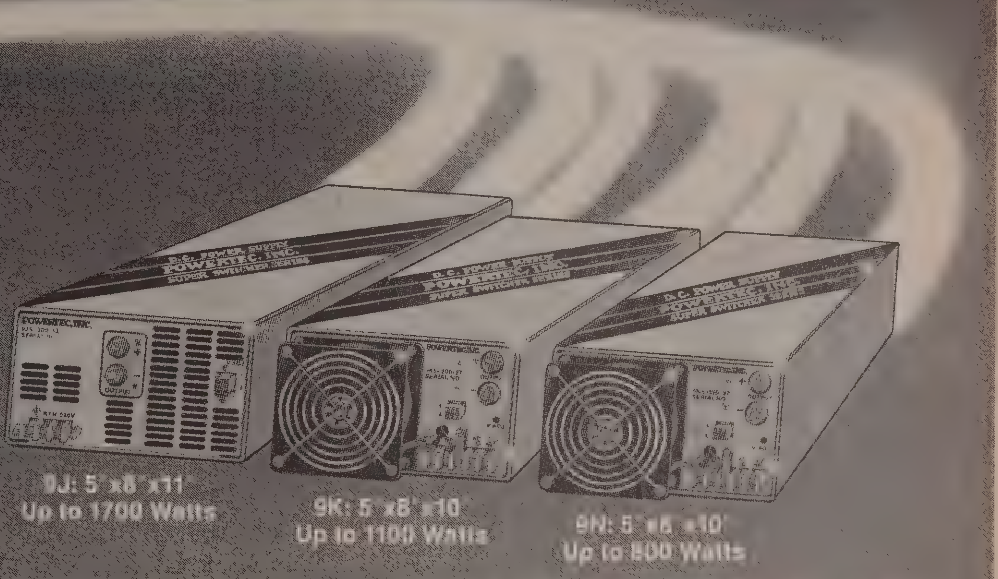
MM6 April,1984

POWERTEC
The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

SuperSwitcher™

The Proven Industry Standard The World Over.



9J: 5″x8″x11″
Up to 1700 Watts

9K: 5″x8″x10″
Up to 1100 Watts

9N: 5″x8″x10″
Up to 800 Watts

Single and Multiple Outputs
240 to 1700 Watts
2 to 48 Volts—124 Models

- Class I SELV Approved*: VDE 730, VDE 804, VDE 806
- Class I SELV Approved*: IEC 380, IEC 435
- CSA Certified*: CSA 22.2-143, CSA 22.2-154
- UL Recognized*: UL 114, UL 478, UL 1012
- FCC & VDE EMI Specs
- 115/230 Field Strappable
- All Outputs Switching
- Full Power Outputs at 50°C
- Automatic Thermal Shut-down Protection
- Remote Sense
- Fully Regulated and Fully Isolated Outputs
- Extended Input Voltage Range: 90-132 VAC & 165-265 VAC, 47-63 Hz
- Brown Out Below 85 or 160 VAC
- Efficiency Typically 75%
- OVP with Crowbar & Inverter Shut-down
- Power Fail Signal
- Inhibit
- Soft Start
- Reverse Voltage Protection
- 100% Dynamic Burn-in: AC cycled on & off, Full load to no load to short circuit cycling
- Standard Off-The-Shelf Delivery
- Powertec's 18 Years of Proven Value

March 1984 (SS7)

VDE & IEC Approved* to Class I SELV
CSA Certified*
UL Recognized*

SuperSwitcher is a Powertec first, developed over ten years ago. Today, it is the most second-sourced high power switching power supply on the market.

It's grown to a series consisting of more than 120 models, with both single and multiple outputs, ranging from 2 to 48 volts, and 300 to 1700 watts. Most models are the 5″ x 8″ x 10″ fan cooled box.

Reconfigured to meet the Safety Extra Low Voltage (SELV) requirements of the tough European safety specifications, the new 9N & 9K models are setting new standards of performance for high power switchers. The new designs offer *8 mm spacing* and 5300 VDC hipot capability. Add to this optional *internal* EMI filters to meet either FCC or VDE noise specifications in a 5″ x 8″ x 10″ package, and you can see how Powertec is leading the way. Need more power? Just give us 1″ and you can have the 9J, a real brute dependably delivering up to 1700 watts in a 5″ x 8″ x 11″ package. With a host of standard features and standard options, of course.

Too good to be true? Not from Powertec. We deliver. We set the standard for others to copy. But then, that's what creating a standard is all about.

* Most Models

POWERTEC

The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

Selector Guide—Single Outputs

See MultiMod™ Family (Series 6) for 300 to 1000 Watt Multiple Output Switchers

MODEL NUMBER[2]	OUTPUT RATINGS[1]				LOAD REGU-LATION ± %	RIPPLE & NOISE % P-P
	VOLTS	MAX. AMPS @ 50°C	MAX. AMPS @ 60°C	MAX. AMPS @ 70°C		
2 VOLT SINGLE OUTPUT						
9N2-120-27	2	120	90	60	0.5	2.5
9N2-160-27	2	160	120	80	0.5	2.5
9N2-200-27	2	200	150	100	0.5	2.5
9K2-300-27	2	300	225	150	0.5	2.5
9J2-400-23	2	400	300	200	0.5	2.5
3.3 VOLT SINGLE OUTPUT						
9N3-120-27	3.3	120	90	60	0.3	1.5
9N3-160-27	3.3	160	120	80	0.3	1.5
9N3-200-27	3.3	200	150	100	0.3	1.5
9K3-300-27	3.3	300	225	150	0.3	1.5
9J3-400-23	3.3	400	300	200	0.3	1.5
5 VOLT SINGLE OUTPUT						
9N5-90-27	5	90	68	45	0.2	1.0
9N5-120-27	5	120	90	60	0.2	1.0
9N5-150-27	5	150	113	75	0.2	1.0
9K5-200-27	5	200	150	100	0.2	1.0
9J5-300-23	5	300	225	150	0.2	1.0
12 VOLT SINGLE OUTPUT						
9N12-40-27	12	40	30	20	0.2	1.0
9N12-50-27	12	50	38	25	0.2	1.0
9N12-62-27	12	62	47	31	0.2	1.0
9K12-90-27	12	90	68	45	0.2	1.0
9J12-130-23	12	130	98	65	0.2	1.0

MODEL NUMBER[2]	OUTPUT RATINGS[1]				LOAD REGU-LATION ± %	RIPPLE & NOISE % P-P
	VOLTS	MAX. AMPS @ 50°C	MAX. AMPS @ 60°C	MAX. AMPS @ 70°C		
15 VOLT SINGLE OUTPUT						
9N15-32-27	15	32	24	16	0.2	1.0
9N15-40-27	15	40	30	20	0.2	1.0
9N15-50-27	15	50	38	25	0.2	1.0
9K15-70-27	15	70	53	35	0.2	1.0
9J15-105-23	15	105	79	53	0.2	1.0
24 VOLT SINGLE OUTPUT						
9N24-20-27	24	20	15	10	0.2	1.0
9N24-26-27	24	26	20	13	0.2	1.0
9N24-32-27	24	32	24	16	0.2	1.0
9K24-45-27	24	45	34	23	0.2	1.0
9J24-70-23	24	70	53	35	0.2	1.0
28 VOLT SINGLE OUTPUT						
9N28-17-27	28	17	13	9	0.2	1.0
9N28-22-27	28	22	17	11	0.2	1.0
9N28-28-27	28	28	21	14	0.2	1.0
9K28-38-27	28	38	29	19	0.2	1.0
9J28-60-23	28	60	45	30	0.2	1.0
48 VOLT SINGLE OUTPUT						
9N48-10-27	48	10	8	5	0.2	1.0
9N48-13-27	48	13	10	7	0.2	1.0
9N48-16-27	48	17	12	8	0.2	1.0
9K48-23-27	48	23	18	12	0.2	1.0
9J48-36-23	48	36	27	18	0.2	1.0

Other voltages may be available upon request.

Standard Options[8]

9N5-150-37X-JBDGALRTMP-2345 SXXXX

SuperSwitcher Designation

Package/Power

Output Voltage

Output Current

Safety Specs (-1, -2, or -3)

-1. Available in the 9J, 9K, and 9N
Meets UL 114, UL 478, UL 1012, CSA 22.2-143, CSA 22.2-154
Hipot—Input to Output: 2100 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC
Creepage/Clearance—Primary to Secondary: 2.4 mm
Primary to Case: 2.4 mm
Case Grounded, Insulation Resistance—10MΩ
Leakage—1mA (3mA with Option B or F)

-2. Available in the 9J, 9K and 9N
Meets all -1 specifications plus the following:
Class I non-SELV: VDE 730[4], VDE 804[4], VDE 806[4], IEC 380[4], IEC 435[4]
Hipot—Input to Output: 3500 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC
Creepage/Clearance—Primary to Secondary: 3 mm
Primary to Case: 3 mm
Case Grounded, Insulation Resistance—10MΩ
Leakage—1mA (3mA with Option B or F)

-3. Available in the 9K and 9N
Meets all -1 and -2 specifications plus the following:
Class I SELV: VDE 730, VDE 804, VDE 806, IEC 380, IEC 435
Hipot—Input to Output: 5300 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC
Creepage/Clearance—Primary to Secondary: 8 mm
Primary to Case: 4 mm
Case Grounded, Insulation Resistance—10MΩ
Leakage—1mA (3mA with Option B or F)

Input Voltages (3, 7, or 9)

3. 165 to 265 VAC (47-63 Hz)[7]: 9J, 9K, 9N

7. 90 to 132 VAC (47-63 Hz)[7] and 180 to 264 VAC (47-63 Hz)[7] field selectable: 9K, 9N only

9. 90 to 132 VAC (47-63 Hz)[7]: 9J only. 9K, 9N use 7 above.

Powertec assigned revision letter when applicable.

Custom Options & Modified Standard

5: Parallel Option[5]: 9J, 9K, 9N

4: Factory Wired 230 VAC: 9K, 9N

3: CSA Logo: 9J, 9K, 9N

2: Reverse Fan: 9J, 9K, 9N

P: Ball-bearing Fan: 9J, 9K, 9N

M: Margining: 9J, 9K, 9N

T: Multiple Studs: 9J, 9K, 9N
(See package drawing)

R: Inverted Inhibit: 9J, 9K, 9N

L: Surge Current Limit: 9K, 9N
(Standard in 9J)

A: OVP Crowbar: 9J (9K, 9N see "J" option)

G: Power Good: 9J (9K, 9N see "J" option)

D: Power Fail: 9J (9K, 9N see "J" option)

B: EMI Filter (B or F):
B. FCC 20780 Class A: 9J[6] 9K[6] 9N
F. FCC 20780 Class B: 9K[6] 9N
VDE 0871 Class A: 9J[3,6], 9K[6] 9N

Note: VDE 0871 Class B—all models require external filter.

J: Power Fail—Power Good—OVP Crowbar combined into a single option for the 9K, 9N models only.

March 1984 (SS7)

All specifications are subject to change without notice.

Powertec Series 9 Specifications

See ValuSwitcher™ Family (Series 19) for 50 to 400 Watt Multiple Output Switchers

INPUT VOLTAGE (See "Order Information/Specification"—Page 2.)

SAFETY (See "Order Information/Specification"—Page 2.)

AC INPUT

Brown Out—Regulates through short term line dips to at least 85 or 160 VAC.

Inrush Current—For units (9K, 9N) that have been off for 0.5 hour the maximum inrush current is less than 4x the operating current.

Surge Current Limit (Standard: 9J. Option: 9K, 9N)—Limits inrush current to the maximum steady state line current. See Options—Page 2.

Turn On Time—0.2 sec. max. for power up of standard unit. 1 sec. max. with surge current option.

Undervoltage Inhibit—Protected against malfunction due to AC undervoltage operation.

DC OUTPUT

Adjustment—Output adjustable ±10% of nominal voltage. Initial setting to ±1% of nominal voltage.

Line Regulation—5 mV or 0.1% over input range.

Load Regulation—10 mV or 0.2% at any load up to 100% of rated load with remote sense connected, 0.2 mV/amp with internal sense.

Dynamic Response—A step load change of ±25% of rated max. will cause a max. deviation of 3%. Output will recover to within 0.1% of nominal in 400μsec. typically.

Thermal Regulation—±0.02%°C over operating range.

Ripple & Noise—1% or 50 mV, whichever is greater, P-P maximum measured on 20 MHz scope via X1 probe having 4 inch maximum return lead.

Hold-up Time—Fully loaded outputs remain within regulation for 30 msec. minimum following the last line voltage peak, measured from either 115 VAC or 230 VAC. Other values of hold-up are noted below:

HOLD-UP TIME vs. INPUT VOLTAGE

V_{in} CODE	7, 9		3, 7			
NOMINAL VAC	90	115	165	180	208	230
HOLD-UP (msec.)*	10	30	5	10	20	30

*Typical hold-up times exceed those given above.

Efficiency—Exceeds 75% typically.

Loading vs. Temperature—100% rated load from 0-50°C. Derate linearly to 50% at 70°C.

Current Limiting—Foldback type, factory set at 105% to 125% of nominal, with automatic recovery (except for 2 volt outputs) upon removal of overload. Short circuit current limited to 10 to 50% of rated load current. For parallel operation see Note 5 and Option 5—Page 2.

OVER VOLTAGE PROTECTION

OVP Inverter Shut-down (Standard)—Initiates inverter shut-down and latches supply off. Trip point at output terminals are factory set within the following windows:

NOMINAL OUTPUT	2V	3.3V	5V	12V	15V	24V	28V	48V
TRIP WINDOW	2.8-3.2V	4.5-5.0V	6.5-6.9V	14-16V	17-19V	27-29V	31-33V	54-57V

OVP Crowbar (Option)—An SCR crowbar across the output terminals short circuits output to protect load against excessive voltage.
Remove AC input for 30 sec. to restore operation.

REVERSE VOLTAGE PROTECTION

Output protected up to rated load.

REMOTE SENSE

Separate sense terminals will accommodate a cable drop of 0.5 VDC. (See Note 1.) Internal circuitry protects load if sense lines are opened or shorted. +sense on J1-1, −sense on J1-4.

REMOTE OUTPUT PROGRAMMING

An external potentiometer, or resistors, or an external voltage source may be connected for remote control of output voltage.

LOGIC INHIBIT

(Standard)—A TTL high signal referenced to the negative output terminal inhibits the main DC output. A TTL low, or open input, enables the output. Input to J1-6.

AVAILABLE OPTIONS (See "Order Information/Specification"—Page 2.)

EMI (See Standard Option "B" or "F"—Page 2.)

POWER FAIL SIGNAL

(Option)—Following the loss of AC input, a TTL compatible signal referenced to the negative output terminal will change from high to low typically 5 msec. (but not less than 2 msec.) before the loss of output. Signal on J1-5.

POWER GOOD SIGNAL

(Option)—A TTL compatible signal referenced to the negative output terminal will change from high to low if the output voltage deviates more than ± 3 to 5% from nominal. Signal on J1-2.

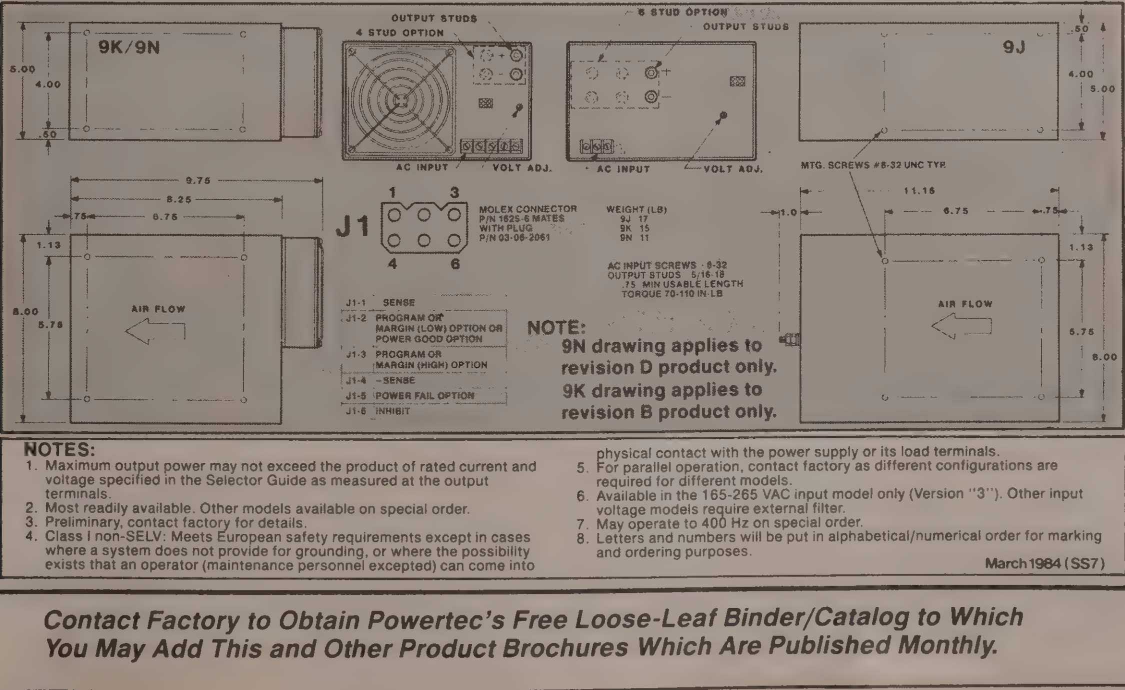
INVERTED INHIBIT

(Option)—Inverse of standard logic inhibit. Input to J1-6.

MARGINING

(Option)—Permits fixed step adjustment of output voltage by ±10% minimum.

WARRANTY—1 year.



MOLEX CONNECTOR
P/N 1625-6 MATES
WITH PLUG
P/N 03-06-2061

WEIGHT (LB)
9J 17
9K 15
9N 11

AC INPUT SCREWS · 8-32
OUTPUT STUDS 5/16-18
.75 MIN USABLE LENGTH
TORQUE 70-110 IN-LB

J1-1	SENSE
J1-2	PROGRAM OR MARGIN (LOW) OPTION OR POWER GOOD OPTION
J1-3	PROGRAM OR MARGIN (HIGH) OPTION
J1-4	−SENSE
J1-5	POWER FAIL OPTION
J1-6	INHIBIT

NOTE:
9N drawing applies to revision D product only.
9K drawing applies to revision B product only.

NOTES:

1. Maximum output power may not exceed the product of rated current and voltage specified in the Selector Guide as measured at the output terminals.
2. Most readily available. Other models available on special order.
3. Preliminary, contact factory for details.
4. Class I non-SELV: Meets European safety requirements except in cases where a system does not provide for grounding, or where the possibility exists that an operator (maintenance personnel excepted) can come into physical contact with the power supply or its load terminals.
5. For parallel operation, contact factory as different configurations are required for different models.
6. Available in the 165-265 VAC input model only (Version "3"). Other input voltage models require external filter.
7. May operate to 400 Hz on special order.
8. Letters and numbers will be put in alphabetical/numerical order for marking and ordering purposes.

March 1984 (SS7)

Contact Factory to Obtain Powertec's Free Loose-Leaf Binder/Catalog to Which You May Add This and Other Product Brochures Which Are Published Monthly.

OEM II Linear Supplies

OEM II Linear Supplies are designed so outputs may be selected to operate over the following ranges: 5 Volts - 4.5 to 6.3V; 15 Volts - 11.4 to 15.8V; 24 Volts - 18.0 to 25.2V.

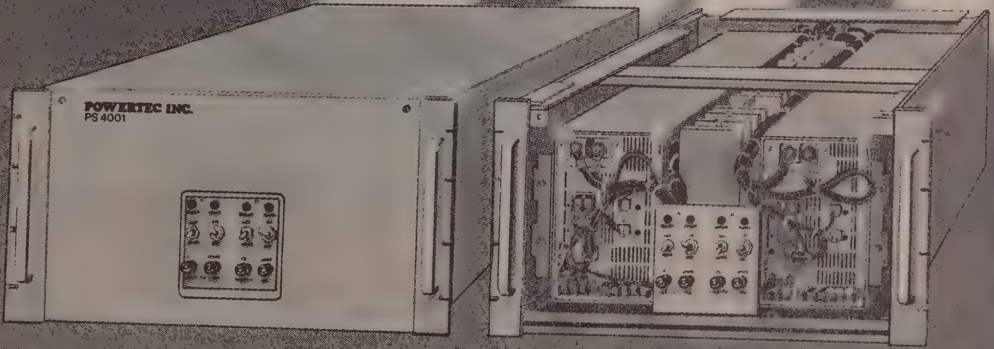
MODEL NUMBER	OUPUT VOLTAGE (NOM-INAL)	OUTPUT RATINGS CONVECTION COOLED[3] AMPS AT AMBIENT TEMP.				REGULATION		RIPPLE & NOISE (mV. RMS)	CASE	CASE DIMENSIONS H x W x D
		40°C	50 C	60°C	70°C	LINE (%)	LOAD (%)			
5 VOLT SINGLE OUTPUT, 4.5 TO 6.3 VOLTS										
2B5-3B	5@	3.0	2.5	2.0	1.5	0.1	0.15	1.5	B	4.87 x 2.07 x 4.0
	6@	2.5	2.0	1.7	1.25					
2C5-6B	5@	6.0	5.0	4.0	3.0	0.1	0.15	1.5	C	4.87 x 2.95 x 5.62
	6@	5.0	4.2	3.4	2.5					
2CC5-9B	5@	9.0	7.5	6.0	4.5	0.1	0.15	1.5	CC	4.87 x 3.2 x 7.0
	6@	7.5	6.2	5.0	3.75					
2D5-12B	5@	12.0	10.0	8.0	6.0	0.1	0.15	1.5	D	4.87 x 3.2 x 9.0
	6@	10.0	8.3	6.7	5.0					
2DD5-18B	5@	18.0	15.0	12.0	9.0	0.1	0.15	1.5	DD	4.87 x 3.2 x 14.0
	6@	16.0	13.3	11.0	8.0					
2E5-25B	5@	25.0	20.75	16.75	12.5	0.1	0.15	1.5	E	4.87 x 4.87 x 16.75
	6@	23.0	19	15.4	11.5					
12-15 VOLT SINGLE OUTPUT, 11.4 TO 15.8 VOLTS										
2B15-1.3B	12@	1.5	1.25	1.0	.75	0.05	0.05	1.5	B	4.87 x 2.07 x 4.0
	15@	1.3	1.0	0.87	0.65					
2C15-2.8B	12@	3.0	2.5	2.0	1.5	0.05	0.05	1.5	C	4.87 x 2.95 x 5.62
	15@	2.8	2.3	1.9	1.4					
2CC15-4.4B	12@	4.8	4.0	3.3	2.4	0.05	0.05	1.5	CC	4.87 x 3.2 x 7.0
	15@	4.4	3.7	3.0	2.2					
2D15-6B	12@	6.5	5.4	4.4	3.25	0.05	0.05	1.5	D	4.87 x 3.2 x 9.0
	15@	6.0	5.0	4.0	3.0					
2DD15-9B	12@	10.0	8.3	6.7	5.0	0.05	0.05	1.5	DD	4.87 x 3.2 x 14.0
	15@	9.0	7.5	6.0	4.5					
2E15-14B	12@	15.0	12.5	10.0	7.5	0.05	0.05	1.5	E	4.87 x 4.87 x 16.75
	15@	14.0	11.6	9.4	7.0					
18-24 VOLT SINGLE OUTPUT, 18.0 TO 25.2 VOLTS										
2B24-1B	18@	1.0	.83	.67	.5	0.05	0.05	1.5	B	4.87 x 2.07 x 4.0
	20@	1.0	.83	.67	.5					
	24@	1.0	.83	.67	.5					
2C24-2.3B	18@	2.0	1.7	1.3	1.0	0.05	0.05	1.5	C	4.87 x 2.95 x 5.62
	20@	2.3	2.0	1.5	1.15					
	24@	2.3	2.0	1.5	1.15					
2CC24-3.7B	18@	3.3	2.7	2.2	1.65	0.05	0.05	1.5	CC	4.87 x 3.2 x 7.0
	20@	3.7	3.0	2.5	1.9					
	24@	3.7	3.0	2.5	1.9					
2D24-5B	18@	4.5	3.7	3.0	2.25	0.05	0.05	1.5	D	4.87 x 3.2 x 9.0
	20@	5.0	4.2	3.4	2.5					
	24@	5.0	4.2	3.4	2.5					
2DD24-7.5B	18@	6.8	5.6	4.5	3.4	0.05	0.05	1.5	DD	4.87 x 3.2 x 14.0
	20@	7.5	6.2	5.0	3.75					
	24@	7.5	6.2	5.0	3.75					
2E24-11B	18@	10.0	8.3	6.7	5.0	0.05	0.05	1.5	E	4.87 x 4.87 x 16.75
	20@	12.0	10.0	8.0	6.0					
	24@	11.0	9.1	7.4	5.5					
DUAL OUTPUT, ±11.4 to 15.8 VOLTS AND ±11.4 to 15.8 VOLTS										
2J15D-.5B 12 TO 15 VOLTS 12 TO 15 VOLTS	12@	0.5	0.4	0.33	0.25	0.05	0.05	1.5	J	4.87 x 2.25 x 4.0
	15@	0.5	0.4	0.33	0.25					
2K15D-1.3B 12 TO 15 VOLTS 12 TO 15 VOLTS	12@	1.5	1.25	1.0	0.75	0.05	0.05	1.5	K	4.0 x 2.98 x 7.88
	15@	1.3	1.0	0.87	0.65					
2L15D-2.8B 12 TO 15 VOLTS 12 TO 15 VOLTS	12@	3.0	2.5	2.0	1.5	0.05	0.05	1.5	L	4.87 x 3.2 x 9.37
	15@	2.8	2.3	1.9	1.4					
TRIPLE OUTPUT, 4.5 to 6.3 VOLTS AND ±11.4 to 15.8 VOLTS AND ±11.4 to 15.8 VOLTS										
2P30-TB 5 VOLTS 12 TO 15 VOLTS 12 TO 15 VOLTS	5@	3.0	2.5	2.0	1.5	0.1	0.15	1.5	P	4.0 x 2.7 x 8.0
	6@	2.5	2.0	1.7	1.25					
	12@	0.5	0.4	0.33	0.25	0.05	0.05	1.5		
	15@	0.5	0.4	0.33	0.25					
2R70-TB 5 VOLTS 12 TO 15 VOLTS 12 TO 15 VOLTS	5@	6.0	5.0	4.0	3.0	0.1	0.15	1.5	R	4.87 x 3.2 x 11.00
	6@	5.0	4.2	3.4	2.5					
	12@	1.5	1.25	1.0	0.75	0.05	0.05	1.5		
	15@	1.3	1.0	0.87	0.65					
2S140-TB 5 VOLTS 12 TO 15 VOLTS 12 TO 15 VOLTS	5@	12.0	10.0	8.0	6.0	0.1	0.15	1.5	S	4.87 x 4.45 x 15.00
	6@	8.0	6.7	5.3	4.0					
	12@	3.0	2.5	2.0	1.5	0.05	0.05	1.5		
	15@	2.8	2.3	1.9	1.4					

NOTES: 1. Other voltages and power levels up to 790 watts are available.
2. Maximum continuous output power must not exceed the product of rated voltage and current as measured at the output terminals.
3. Higher current ratings attainable with moving air. Consult factory.

April 1984

PowerSystems™ by Powertec

The Solution to Your Total System Power Requirements The World Over.



Single and Multiple Outputs 300 to 3400 Watts with up to 14 Outputs Using Standard Switching Power Supplies

- True redundancy with isolation diodes for fault protection
- Parallel operation for high power requirements
- VDE, IEC, CSA, UL Safety Specs
- FCC and VDE EMI Specs
- Field Selectable 115/230 VAC
- Standard 19″ rack for convenience
- Easy power supply installation via hinged-door and "quick-connect" mounting hardware
- Convenient hook-up via standard power cord and AMP FASTON™-type connectors
- Safe "on line" repair/replacement capabilities in redundant system
- Alarm circuitry for power good and power fail
- 100% Burn-in of Power Supplies
- Brown Out of 85 or 160 VAC
- Separate, electrically isolated outputs
- Powertec's 18 Years of Proven Value
- All the proven performance features and specifications of the SuperSwitcher,™ MultiMod™ and ValuSwitcher™ Power Supply Families.

May 1984 (PS1)

Quality, Reliability, Performance and Value Tailored to your System Requirements

PowerSystems™ by Powertec is a highly flexible building block approach for your total system requirements using standard Powertec power supplies from our three families of switchers:

- ValuSwitcher™—44 multiple output models from 50 to 400 Watts with up to 5 outputs—2 to 48 volts.
- MultiMod™—300 to 1000 watt multiple output power supplies with up to 7 outputs—2 to 48 volts.
- SuperSwitcher™—240 to 1700 watt single output power supplies from 2 to 48 volts—over 100 models available.

Powertec is capable of providing the following type of systems:

- True redundancy for 1 to 7 outputs to achieve maximum system reliability (not simply parallel operation).
- Up to 14 outputs and 2400 watts per system.
- Parallel operation for high current requirement on one or more voltages up to 3400 watts.

With PowerSystems,™ individual outputs can be configured to your needs. And all this in a standard 19″ rack mount or custom package that will meet UL, CSA, BT (formerly BPO) on some models, or VDE safety standards as required. PowerSystems™ by Powertec—deliver your total system power requirements.

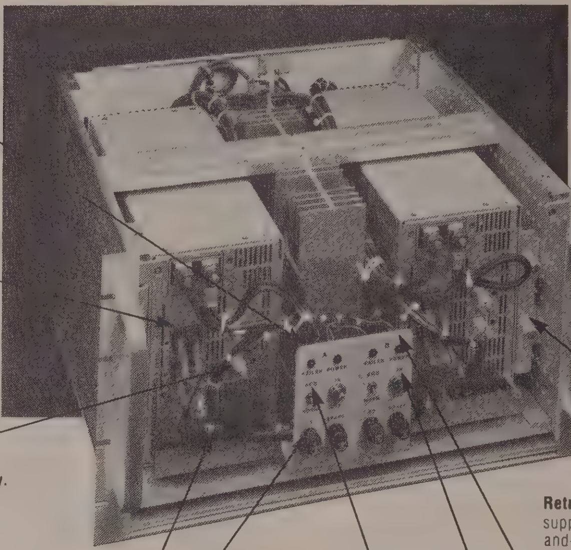
POWERTEC

The Power in DC Power Supplies

Powertec, Inc., 20550 Nordhoff Street, Chatsworth, California 91311-6168 • (818) 882-0004 • TWX 910-494-2092

Powertec PS4001 Features

PowerSystems™—PS4001 consists of two MultiMod™ power supplies configured in parallel redundant mode with current sharing. Parallel redundancy raises the level of system reliability by combining "mirrored" regulated outputs from each of two power supplies via isolation diodes. A detect signal reports and identifies a failed supply. The mechanical/electrical layout and con-



Individual Power Supply Failure Alarm LED Indicator. Lamp turns on upon detection of an undervoltage condition from any output of each supply

Hinged Drop-Down Front Door has easy-to-read wiring layout silk screened on inside of door showing connections with references to color-coded wires. (Not shown.)

AMP FASTON™-Type Connectors and color-coded wire on auxiliary DC outputs and AC inputs of each power supply—minimizes time to replace faulty unit

6JB5-BB-27B MultiMod™ Power Supply.

Retractable Captive Screws secure each power supply to the PowerSystems'™ rack. A simple press-in-and-twist action permits fast power supply removal and installation

Thermal Protection. Each power supply within the system has thermal cutoff protection to prevent damage to the power supply in the event of any condition that results in excessively high temperature within the system.

Individual Power Supply Alarm Cutoff Switch permits deactivation of Power Fail Alarm signal.

Individual Power Supply On/Off LED (Lamp) Indicator. Lamp informs operator that AC input to each supply is present or absent.

Fuses on Front Panel. Each supply (A & B) has "AC" hot input fused. Spare fuse and fuse holder for both supplies permits AC return to be fused in order to meet European safety standards. On domestic models, spare fuse holders are used simply to contain spare fuses.

Individual Power Supply On/Off Switch on Front Panel. Separate AC input to each supply can be switched off via easy access on/off switch on Front Panel, thus keeping service personnel from coming into contact with "hot" AC input

SPECIFICATIONS FOR PS4001

AC INPUT

47-63 Hz (47-400 Hz available as a special).

MODEL	VOLTAGE	
	NOMINAL	RANGE
PS4001	115/230	90-132/180-264 FIELD STRAPPABLE[1]
PS4002	220	180-242
PS4004	240	204-264

Brown Out—Regulates through short term line dips to at least 85 VAC or 160 VAC.

Inrush Current—Limited to 8X peak operating line current to prevent nuisance tripping of protective circuit breakers and fuses.

Turn-on Time—0.2 sec. max. for power-up.

Undervoltage Inhibit—Protected against malfunction due to AC undervoltage operation.

DC OUTPUTS

Regulation & Output Specifications—

OUTPUT	SYSTEM OUTPUT RATING*					REGULATION		
	VOLTS	VO. ADJ.	AMPS			SYSTEM TOLERANCE**	POWER SUPPLIES	
			50°C	60°C	70°C		LINE	LOAD
#1	+ 5.0	± 10%	80	60	40	± 2.5%	1%	0.2%
#2	+ 12.0	± 5%	8	6	4	± 3%	1%	0.2%
#3	12.0	± 5%	8	6	4	± 3%	1%	0.2%

*Total power from system outputs cannot exceed 550 watts. Individual power supplies are 600 watts each.

**Tolerance envelope limits include line, load, temperature, ripple and switching noise. Instrumentation having 20 mHz bandwidth is to be used for this measurement. The loads may be in all combinations. Initial output voltage adjustment better than ±1% of the above readings at room temperature and full load.

System Transient Response—All redundant or non-redundant outputs are to remain within 2% of the initial output specified for a step change (1A/μ sec.) at any output of 20% of load current at any load between 8 to 70 amps on the 5 volt output and between 1 to 8 amps on the ±12 volt outputs both at 50°C.

Thermal Regulation— ±0.02/°C over operating range.

System Ripple and Noise—For all valid static conditions of line and load, the output ripple and noise shall be 20 mV RMS maximum between +5V output and DC return and between DC return and chassis with a 100 ohm ½ watt resistor between chassis and DC return. For the ±12V output the ripple and noise shall be less than 40 mV RMS. Instrumentation for measurement purposes shall be HP3400A True RMS voltmeter or equivalent.

Hold-up Time—Following the last line voltage peak with system under full load.

V_{in} NOMINAL	117		220			
V_{in} ACTUAL	90	115	165	180	208	230
HOLD-UP (msec.)	10	30	5	10	20	30

System Efficiency—Typically exceeds 65% including redundant diode losses.

Current Limiting—

OUTPUT	MAX. CURRENT (AMPS) FOLDBACK KNEE	MAX. SHORT CIRCUIT
+ 5.0V	100	45
+ 12.0V	13	6
- 12.0V	13	6

Automatic recovery upon removal of overload. Outputs can sustain indefinite overload or dead short without damage. Also, power supply system is capable of with standing a short from one output to another without damage.

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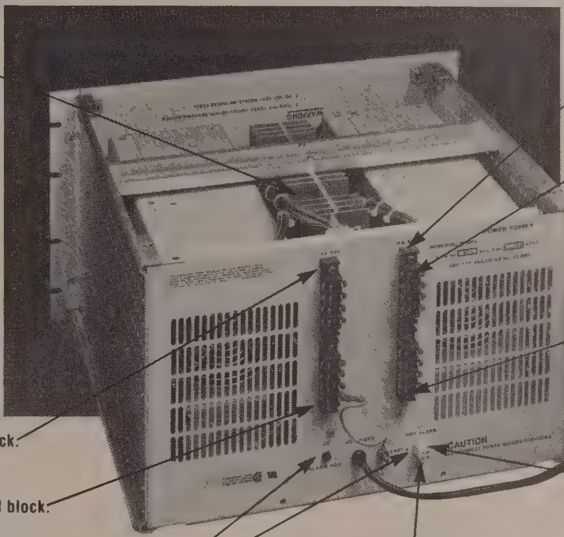
All specifications are subject to change without notice.

and Specifications

struction of the system avoids down time and minimizes time and effort required to replace a defective unit. Independent AC on/off switches for each supply allow for replacement of faulty unit while functional supply continues to support system operation.



Heatsink Mounted Diodes "or" outputs from two MultiMod™ power supplies to achieve parallel redundant operation with current sharing. Diodes are a must in order to isolate each supply's output from its "mirror" output on the other supply. Without the diode isolation, a shorted output capacitor or an OVP crowbar condition on any one of either supply's outputs would cripple system operation. Diodes thus insure that non-malfunctioning outputs continue to power the system reliably despite the presence of faulty output. Rack can be designed without diodes if isolation is not a requirement.

5VDC @ 90A output terminal block.

Multiple Connection Terminal Block. Each terminal block (Beau 73704-7311-7312 or Kulka 4696-04-KT547-KT548) consists of 4 posts. Each post has 4 FASTONS™ for a total of 16 per terminal block (AMP FASTON™-type male terminal tabs are .250"w x .032"t (typically))

−12VDC @ 10A output terminal block.

12VDC @ 10A output terminal block.

Common terminal block.

Inhibit Option. Allows for sequencing

Remote Sense Option. PS4001, PS4002, PS4004 have remote sense from the power supplies connected to system output terminals

DC Power Fail and Alarm. J2 (mates with .08" diameter pin) provides a logic + 5 VDC output signal upon detection of any output 20% or more below the nominal output voltage. J1 (Molex receptacle No. 1261-6 mates with Molex No. 03-09-2061), pins 1-3, provides a relay switch closure. The closure can be used to activate an audible warning device; e.g., buzzer or bell alerting attendant operators of the problem.

Guide/Mating Mounting Pins (2) on the rear panel of each power supply makes installation and mounting of each supply a snap. Mounting hardware and mounting effort are kept to a minimum. (Not shown.)

Current Sharing—5 Volt (Main) Output—System must draw 16 amperes or above on the 5 volt system output for each individual supply to current share within ±20% of nominal. ±12 Volt (Auxiliary) Outputs—System must draw 2 amperes or above on each of these system outputs for each individual auxiliary to current share within ±50% of nominal.

Note: $I\ \text{Nominal} = \frac{I_A + I_B}{2}$

Where I_A and I_B is the current drawn from each individual supply.

ADDITIONAL SPECIFICATIONS

Individual Power Supply Load Regulation, Dynamic Response, Ripple and Noise, Overvoltage Protection, etc. (See specific power supply family brochures.)

ADDITIONAL OPTIONS

Remote Sense, Power Fail, Power Good, Logic Inhibit, etc. (See specific power supply family brochures.)

SAFETY

PS4001 (U.S. and Canadian version)

Meets UL 114, UL 478, UL 1012, CSA 22.2-143, CSA 22.2-154

Hipot—Input to Output: 2100 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC

Creepage/Clearance—Primary to Secondary: 2.4 mm
Primary to Case: 2.4 mm

Case Grounded, Insulation Resistance—10MΩ

Leakage—1mA

PS4002 (European version)

Meets all above specifications plus the following:
Class I non-SELV: VDE 730[2], VDE 804[2], VDE 806[2], IEC 380[2], IEC 435[2]

Hipot—Input to Output: 3500 VDC
Input to Case: 2100 VDC
Output to Case: 700 VDC

Creepage/Clearance—Primary to Secondary: 3 mm
Primary to Case: 3 mm

Case Grounded, Insulation Resistance—10MΩ

Leakage—1mA

PS4004 (United Kingdom version)

Meets BT (formerly BPO) Guide 26

Hipot—Input to Output: 2200 VDC
Input to Case: 2200 VDC

Creepage/Clearance—Primary to Secondary: 3 mm
Primary to Case: 3 mm

Case Grounded, Insulation Resistance—100MΩ

EMI PERFORMANCE (All Models)

FCC 20780 Class B VDE 0871 Class A

DIMENSIONS—19" x 10.47" x 15.125" (not including handles and terminals).

WEIGHT—55 lbs. **WARRANTY**—1 year

NOTES:

1. Individual power supplies are field strappable. Standard 115V three-prong plug provided on line cord.
2. Class I non-SELV: Meets European safety requirements except in cases where a system does not provide for grounding, or where the possibility exists that an operator (maintenance personnel excepted) can come into physical contact with the power supply or its load terminals.

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Contact Factory to Obtain Powertec's Free Loose-Leaf Binder/Catalog to Which You May Add This and Other Product Brochures Which Are Published Monthly.

Powertec HP Series Specifications

SPECIFICATIONS

Input Voltage: 115 VAC±10% line to neutral or 208 VAC line to line, 3ϕ, 400 Hz ±5%. Other 3ϕ, 400Hz inputs available; consult factory. Transient withstand capability per Mil-Std-704, category B.

Output Rating: See Output Rating Chart. All output voltages are adjustable ±5% at full rated output current.

Regulation: See Output Rating Chart. Load regulation is specified for a 5 to 100% load change. Line regulation is specified for a −10% to +10% line change.

Ripple: Maximum ripple is 10 mV p-p with a typical ripple of 3mV p-p. Noise and spikes are 50 mV p-p max.

Transient Response: 50μs maximum recovery time to 0.1% of stabilized voltage for a step load of 1/3 full rated load.

Programming: Automatic ±5% remote voltage margining standard on all units by connecting programming pin to either the positive or negative output leads.

Remote Sensing: Remote sensing capability standard on all units.

Stability: ±1% for 8 hours after warm-up.

Temperature Rating: Continuous operation at full rated load from −55°C to +80°C baseplate temperature. Storage temperature: −62°C to +125°C. Meets Mil-Std-810B, method 501.

Temperature Coefficient: ±0.01%/°C maximum.

Overvoltage Protection: All units feature "crowbar" overvoltage protection factory set at 120% ±5% of nominal output voltage rating.

Output Overload Protection: All units feature electronic foldback over-current protection. Units are fully protected for all overload and short circuit conditions for baseplate temperatures up to 80°C.

Humidity: 95% per Mil-Std-810B, method 507, procedure 1.

Fungus: Per Mil-Std-810B, method 508.

Salt Fog: Per Mil-Std-810B, method 509.

Explosive Atmosphere: Per Mil-Std-810B, method 511, procedure 1.

Vibration: Designed to meet Mil-Std-810B, method 514, procedure 1, curve Z.

Shock: Designed to meet Mil-Std-810B, method 516, procedure 1, curve 516-1.

Isolation Resistance: 500 Megohm minimum between input, output and case.

Construction: All aluminum chassis black anodized per Mil-A-8625, Type II, Class 20. All hardware is stainless steel. Basic component selection is per ANA 400.

INPUT PROTECTION

In that these supplies feature crowbar overvoltage protection, it is imperative that they be protected against excessive input current. Recommended over-current protection is shown in the above table for each of the 3 phases.

AC INPUT

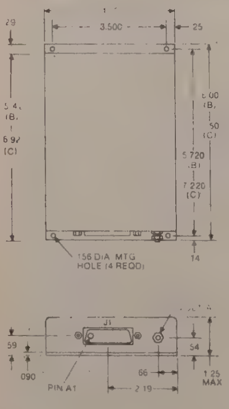
The AC input of Model No. 7F28-34A is wired as a "delta" (3 wire) input. The AC input of all other supplies is wired as a "wye" (4 wire) input. The load represented by these supplies is balanced, however, so that utilizing a "delta" (3 wire) input is fully acceptable with no degradation of performance.

PROGRAMMING

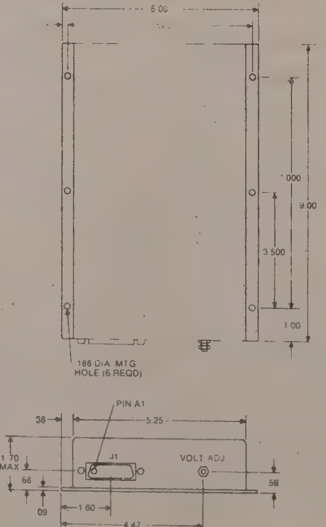
Connecting the programming pin to the positive or negative output terminal will increase or decrease the output voltage by 5% respectively. This is useful at the system level for voltage tolerance testing, noise margin verification, etc.

HP Series Outline Dimensions*

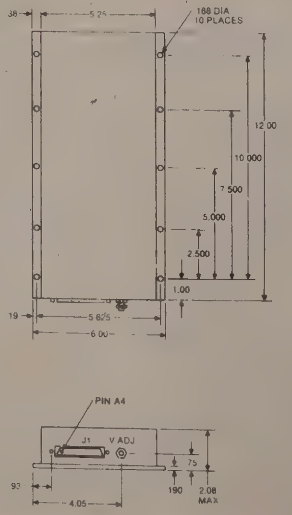
MODEL 7B, C


29
3.500
25
5 41 (B)
6 97 (C)
6 00 (B)
50 (C)
5 720 (B)
7 220 (C)
156 DIA MTG HOLE (4 REQD)
14
J1
59
090
PIN A1
66
2 19
54
1 25 MAX

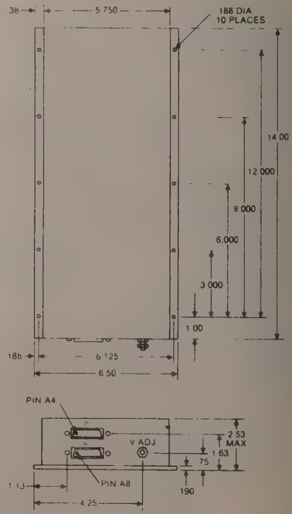
MODEL 7D


6 00
000
9.00
3 500
1 00
188 DIA MTG HOLE (6 REQD)
PIN A1
38
5.25
1 70 MAX
J1
VOLT ADJ
68
09
58
1 60
4.42

MODEL 7E


38
5 25
188 DIA 10 PLACES
12 00
10 000
7 500
5.000
2.500
1.00
19
5 625
6 00
PIN A4
J1
V ADJ
75
93
4.05
190
2.08 MAX

MODEL 7F


38
5 750
188 DIA 10 PLACES
14 00
12 000
9 000
6.000
3 000
1 00
188
6 125
6 50
PIN A4
V ADJ
2 53 MAX
1 63
75
PIN A8
1 13
4 25
190

*Tolerances on all dimensions ± .03 inches.

Selector Guide (Partial)

OUTPUT RATINGS

Model	DC Output		Regulation		Typical Efficiency	Max. Design Dissipation	Recommended Input Protection
	Volts	Amps	Line	Load			
	(1)	—	(2)	(3)	(4)	(5)	—
7B5-7.5	5.0	7.5	0.3%	0.3%	50%	50W	1A
7C5-15	5.0	15.0	0.3%	0.3%	50%	100W	2A
7D5-30	5.0	30.0	0.3%	0.3%	50%	200W	4A
7E5-60A	5.0	60.0	0.3%	0.3%	50%	400W	8A
7F5-120A	5.0	120.0	0.3%	0.3%	50%	800W	15A
7B12-3.7	12.0	3.7	0.1%	0.1%	60%	50W	1A
7C12-8	12.0	8.0	0.1%	0.1%	60%	100W	2A
7D12-16	12.0	16.0	0.1%	0.1%	60%	200W	4A
7E12-32A	12.0	32.0	0.1%	0.1%	60%	400W	8A
7F12-64A	12.0	64.0	0.1%	0.1%	60%	800W	15A
7B15-3.1	15.0	3.1	0.06%	0.06%	60%	50W	1A
7C15-7	15.0	7.0	0.06%	0.06%	60%	100W	2A
7D15-14	15.0	14.0	0.06%	0.06%	60%	200W	4A
7E15-28A	15.0	28.0	0.06%	0.06%	60%	400W	8A
7F15-56A	15.0	56.0	0.06%	0.06%	60%	800W	15A
7B24-2	24.0	2.0	0.06%	0.06%	60%	50W	1A
7C24-5	24.0	5.0	0.06%	0.06%	60%	100W	2A
7D24-10	24.0	10.0	0.06%	0.06%	60%	200W	4A
7E24-20A	24.0	20.0	0.06%	0.06%	60%	400W	8A
7F24-40A	24.0	40.0	0.06%	0.06%	60%	800W	15A
7B28-1.7	28.0	1.7	0.06%	0.06%	60%	50W	1A
7C28-4.2	28.0	4.2	0.06%	0.06%	60%	100W	2A
7D28-8.5	28.0	8.5	0.06%	0.06%	60%	200W	4A
7E28-17A	28.0	17.0	0.06%	0.06%	60%	400W	8A
7F28-34A	28.0	34.0	0.06%	0.06%	60%	800W	15A

(1) Will provide full output current over a ±5% output voltage adjustment range.
(2) Maximum deviation for a full line voltage change (−10% to +10%).
(3) Total deviation for a 5 to 100% load change.
(4) Typical efficiency at nominal line. Efficiency at high line is approximately 5% lower (e.g.: 45% in place of 50%).
(5) Maximum dissipation figure to be utilized for purposes of heat sink selection. See additional information below.

HEAT SINK SELECTION

The smaller units (B, C, D case sizes) are readily cooled utilizing extruded heat sinks and forced air. The larger (E and F) units may also be cooled in this manner but are commonly liquid cooled. Regardless of the cooling method utilized, the heat-sink thermal impedance calculations are identical.

$$\Theta_{c\text{-}m} = \frac{T_c - T_m}{P_d}$$

Where:
Θc-m = Thermal impedance required case-to-cooling medium.
Tm = Maximum temperature of cooling medium in °C.
Tc = Maximum temperature of baseplate (case) = 80°C.
Pd = Maximum dissipated watts (from above table).

In that heat sink thermal impedance information tends to be inconsistent, and dependent upon a large number of variables, it must be empirically confirmed in the system that the baseplate temperature does not exceed 80°C under worst case conditions (full rated power supply load, high line input voltage, maximum cooling medium temperature). Note: Regardless of the actual operating power dissipation, heat sinking must be provided for the power dissipation provided in the above table as this maximum dissipation is reached under short-circuit and overvoltage crowbar conditions.

Connector and Pin Break-Out Information

Case Size	7B, C, D	7E	7F	
Connector ID	J1	J1	J1	J2
Cannon Connector P/N	DBM13W3P	DCM21WA4P	DCM21WA4P	DCM8W8P
Cannon Pin P/N	DM53745-1	DM53745-1	DM53745-1	DM53745-1
Qty. Pins Req'd.	3	4	4	8
Input φ A	2	3,4	A4	
Input φ B	6	1, 2	A3	
Input φ C	7	10, 11	A2	
Input Neut. (not req'd.)	1	5, 6	13, 14	
Chassis Ground	3	12	9	
Positive Output	A3	A3, A4		A1-A4
Negative Output	A2	A1, A2		A5-A8
Positive Sense	5	9	1	
Negative Sense	4	8	2	
Program	10	17	10	
Positive Local Sense	N/A	N/A	4	
Negative Local Sense	N/A	N/A	3	
Spare	8, 9, A1	7, 13-16	5-8, 11, 12, 15-17, A1	None

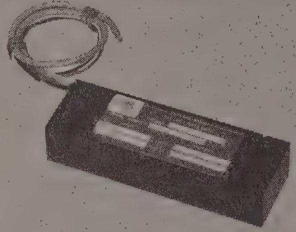
Laser Power Supplies • Fiber Splicers
Laser Diode Pulsers • Laser Simulators

Power Technology Inc.

Power Technology Incorporated

Address correspondence to: Box 9769 Little Rock, Arkansas 72219 501-568-1995
Plant location: 7925 Mabelvale Cutoff Mabelvale, Arkansas 72103 TWX 910-722-7313

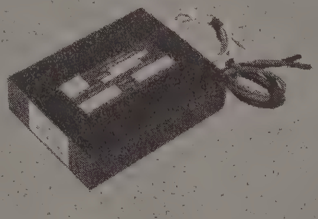
HE/NE LASER POWER SUPPLY



MODEL L23

Many shapes and sizes of this very compact supply are offered to fit a large variety of instrument packages. Numerous options are available, including an inhibit circuit to replace electromechanical relays for BRH compliance. Switching mode regulation provides exceptionally high efficiency while operating a plasma tube with a regulation of ± 1 mA. The high efficiency allows operation with a minimum of heat sink and a minimum of heating within an instrument, increasing the life of heat sensitive components.

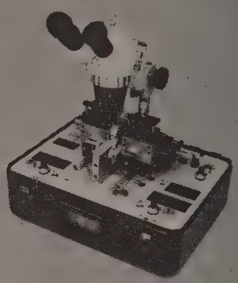
HE/NE LASER POWER SUPPLY



MODEL L92

Features of this product include isolation of the laser tube or leads from the AC line, operation from either 115 or 230VAC by switching one lead, switching mode current regulation for high efficiency, and power output of 5 to 18 W. The L92 is housed in a molded fiberglass case, and fully potted for maximum protection from dust and moisture. Size: 1.15 x 3.30 x 4.25" (29.2 x 83.8 x 108 mm).

The Model L45 same as Model L92 except case dimensions. Contact P.T.I. for further information.



PFS-300 SERIES OPTICAL FIBER SPLICER

Operating from internal batteries or from a variety of external power sources, the PFS-300 Series splicers are ideal universal instruments in the laboratory, out in the field during installations and repairs, or as part of a production line. The combination of ruggedness and rigidity that makes this splicer so versatile has many important ramifications, particularly in the field of single mode lightwave transmissions.

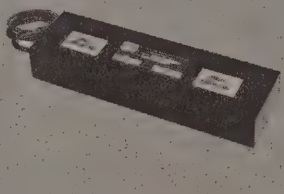
MODEL PFS-240 OPTICAL FIBER SPLICER

Featuring a modular stereo microscope and sturdy aluminum case, 'P.T.I.'s Model PFS-240 provides high level splicing performance, convenience, ease of operation, and ruggedness.

The stereo microscope will satisfy the most critical requirements for high-quality 3-D magnified images. With objectives 2X-4X as standard, rotation of a knurled ring selects either 40X or 80X. A lense attachment of 1.5X allows magnification of 60X to 120X.

Stereo zoom microscope, with magnification of 14X to 90X, provides large flat fields of view, crisply resolved. By rotating a knurled ring, magnifications are variable. A 1.5X lense attachment will allow magnification of 21X to 135X.

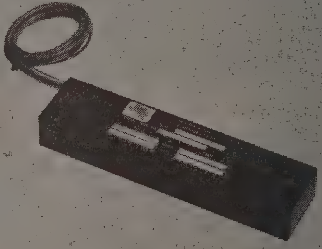
With the added features, our PFS-200 basic design is maintained. See inside page for specifications.



40 AND 75 W HeNe AND CO_2 LASER POWER SUPPLIES

Operating from 115 or 230VAC. All units are housed in black fiberglass cases and are fully potted for maximum protection from dust and moisture. Typical applications of the L87 is 20-25 MW HeNe while the L93 is 10-15 MW HeNe. Typical applications of the CO2 L89 is 75 W input and 40 W input for the L94. L87 and L89 sizes: 1.42 x 2.79 x 9.10" (36 x 69 x 231 mm). L93 and L94 sizes: 1.15 x 2.43 x 8.60" (29.2 x 61.7 x 219 mm).

HE/NE LASER POWER SUPPLY



MODELS L41, L43

This series allows your choice of AC input voltages at 50-400 Hz, which makes it particularly suitable for export. Features include isolation of the laser tube or lead from the AC line, switching mode current regulation, high efficiency, and exceptional compactness for a supply that delivers 4 to 20 W output. All models are housed in black fiberglass cases and are of a fully potted construction for maximum protection from dust and moisture. Size: .945 x 1.445 x 6.05" (24 x 36.7 x 154 mm).

ILM LASER DIODE PULSER

ILM SERIES

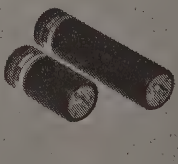
The ILM Series Laser Diode Pulser is designed to drive the ITT Ls 7711 or Laser Diode Labs LDT 350 Series Fiber Coupled laser arrays. An internal power supply allows operation from any available D.C. voltage between 10 and 28 volts. Pulser dimensions and mountings is compatible with close spaced multiple arrays such as the ITT Ls7729, Ls7717, Ls7730, and Laser Diode Labs LDT 391.

LASER DIODE SIMULATOR

CS100

This convenient, easy to use simulator is compact and self contained. It provides a pulsed 1.06 micron infrared signal source simulating a laser. Because of its portability, it is ideally suited to laboratory or field testing of laser systems or fiber optics. A double pulse option allows testing of laser range-finders. Output power is 20 mW at 20 ns and 1.06 microns. Input voltage can be 115 VAC, 230 VAC or 12 VDC.

LASER DIODE PULSER

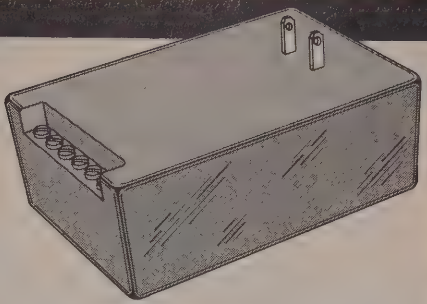


ILC SERIES

The ILC produces more average output power for driving laser diodes at 7 to 200 ns widths than avalanche or SCR pulsers. Models are available for pulse current of 1 through 100A. Fast rise and fall times, with internal clock for pulse rates of 100 through 10,000 PPS. Size: (for internal supply) 1" x 4.25" (25 mm x 108 mm) or 1.25" x 4.25" (32 mm x 108 mm); (with customer supplied external supply) 1" x 2.5" (25 mm x 64 mm) or 1.25" x 2.5" (32 mm x 64 mm).

Precision Components

Wall plug-in POWER SUPPLIES



Precision Components incorporates the latest power conversion technology into all regulated wall plug-in power supplies. Some of the key advantages in using Wall Power Supplies are:

- Product size can be reduced.
- System becomes more reliable because of less heat build-up in product.
- Accelerate product design. Most power supplies available from stock.
- Increase safety due to low input voltage into your product.
- Reduce UL and CSA approval time.

Important features of Precision Components regulated power supplies are:

- **Use of highly reliable power MOS/FET transistors**
- **One year warranty**
- **Designed to meet all UL and CSA requirements**
- **Overcurrent and short circuit protected**
- **Meet FCC Docket 20780 Class B**
- **Storage temperature −55°C. to +85°C.**
- **0°C. to 50°C.—operating temperature**
- **5V. overvoltage protection standard**
- **24 hour cycle burn-in at 55°C. standard on all units**

Dual Output

Input Range: 88-132 VAC
Frequency Range: 47-440Hz
Regulation for all combinations of line and load*
± 1% on main output max.
± 3% on auxiliary outputs

PCI Part Number	Output Volts	Output Current-Amps	Case Size	PARD
25 WATT SERIES				
8102-0001	+5 -5	3.5 .75	3	50 mv P-P
8102-0002	+5 +12	3 .75	3	50 mv P-P
8102-0003	+5 +24	2.5 .5	3	50 mv P-P
8102-0004	+12 -12	1.5 .5	3	50 mv P-P
8102-0005	+15 -15	1.2 .4	3	50 mv P-P
50 WATT SERIES				
8102-0006	+5 -5	7 1.5	3	50 mv P-P
8102-0007	+5 -12	6.5 1.25	3	50 mv P-P
8102-0008	+5 +24	5 1	3	50 mv P-P
8102-0009	+12 -12	3 1	3	50 mv P-P
8102-0010	+15 -15	2.5 .75	3	50 mv P-P

*Minimum load 20% on main output
10% on auxiliary output

Single Output

Input Range: 88-132 VAC
Frequency Range: 47-440Hz
Regulation for all combinations of line and load*
± 1% on main output max.

PCI Part Number	Output Volts	Output Current-Amps	Case Size	PARD
25 WATT SERIES				
8101-0001	+5	4	3	50 mv P-P
8101-0002	+12	2	3	50 mv P-P
8101-0003	+15	1.5	3	50 mv P-P
8101-0004	+24	1	3	50 mv P-P
8101-0005	+48	.5	3	50 mv P-P
50 WATT SERIES				
8101-0006	+5	8	3	50 mv P-P
8101-0007	+12	4	3	50 mv P-P
8101-0008	+15	3	3	50 mv P-P
8101-0009	+24	2	3	50 mv P-P
8101-0010	+48	1	3	50 mv P-P

*Minimum load 20%

Triple Output

Input Range: 88-132 VAC
Frequency Range: 47-440Hz
Regulation for all combinations of line and load*
± 1% on main output max.
± 3% on auxiliary outputs

PCI Part Number	Output Volts	Output Current-Amps	Case Size	PARD
25 WATT SERIES				
8103-0001	5 +12 -12	3 .4 .4	3	50 mv P-P
8103-0002	5 +15 -15	3 .3 .3	3	50 mv P-P
8103-0003	5 +12 -5	3 .5 .75	3	50 mv P-P
50 WATT SERIES				
8103-0004	5 +12 -12	6 .75 .75	3	50 mv P-P
8103-0005	5 +15 -15	6 .6 .6	3	50 mv P-P
8103-0006	+5 +12 -5	6 1 1	3	50 mv P-P

*Minimum load 20% on main output
10% on auxiliary output

OPTIONS

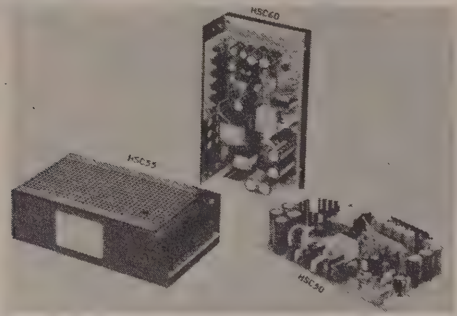
- CUSTOM ENGRAVING
- OUTPUT CORD
- SCREW TERMINALS
- 230V./50 Hz INPUT
- COLOR
- GROUND PIN
- UL AND/OR CSA APPROVAL
- POTTED CONSTRUCTION

Precision Components, inc.
1110 West National Avenue • Addison, IL 60101
1-312 543-6400

QSI QUALIDYNE SYSTEMS, INC.

2256 Main Street, Chula Vista, CA 92011 (619) 429-7440

SWITCHING POWER SUPPLIES, 30 to 125 WATT OUTPUT



Qualidyne "QSC" Series switching power supplies are available in six standard ratings from 30 to 125 Watts output. Input is jumper selectable for nominal 115 or 230 Vac. The table below lists all standard models. Those shown with an asterisk are available from stock. All models feature overvoltage, surge current and short circuit foldback protection. Each unit is completely tested with a minimum 24 hour burn-in at full load and operating temperature. All units have built in EMI filters and are UL approved and meet all European and VDE requirements.

AC INPUT/DC OUTPUT SWITCHING POWER SUPPLIES

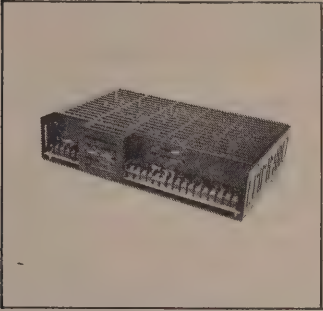
	Input — Vac		Output — Vdc @ Amperes							
Model	47-440 Hz		Main +5	Aux. #1 −5	Aux. #2 +12	Aux. #3 −12	Aux. #4 +12	Aux. #5 +24	Max. Watts	Size L"xW"xH"
QSC30-10	90-135†	170-265*	6.0						30.0	6.3x3.9x1.4
QSC30-20	90-135†	170-265*	3.0	3.0					30.0	6.3x3.9x1.4
QSC30-21	90-135†	170-265*	3.0		1.2				30.0	6.3x3.9x1.4
QSC40-20	90-130	180-260	4.0		3.0				40.0	6.3x3.9x1.8
QSC40-30*	90-130	180-260	4.0	1.0	3.0				40.0	6.3x3.9x1.8
QSC40-31	90-130	180-260	4.0		3.0	1.0			40.0	6.3x3.9x1.8
QSC40-32*	90-130	180-260	4.0		3.0	1.0			40.0	6.3x3.9x1.8
QSC40-40	90-130	180-260	4.0	1.0	3.0	1.0			42.0	6.5x4.1x1.8
QSC40-41	90-130	180-260	4.0		2.0	1.0	1.0		42.0	6.5x4.1x1.8
QSC40-42	90-130	180-260	4.0	1.0	3.0	1.0			45.0	6.3x4.7x1.5
QSC40-43*	90-130	180-260	5.0		3.0	1.0	1.0		45.0	6.3x4.7x1.5
QSC50-20	90-130	180-260	6.0		2.0				50.0	7.7x4.3x1.7
QSC50-30	90-130	180-260	6.0		2.0	1.0			50.0	7.7x4.3x1.7
QSC50-31	90-130	180-260	6.0	1.0	2.0				50.0	7.7x4.3x1.7
QSC50-40	90-130	180-260	6.0	1.0	2.0	1.0			50.0	7.7x4.3x1.7
QSC50-44	90-130	180-260	6.0		2.0	1.0			50.0	7.7x4.3x1.7
QSC55-20	90-130	180-260	6.0		2.5				55.0	8.0x4.5x2.3
QSC55-30	90-130	180-260	6.0	0.5	2.5	1.0			55.0	8.0x4.5x2.3
QSC55-31	90-130	180-260	6.0	0.5	2.5	1.0			55.0	8.0x4.5x2.3
QSC55-40	90-130	180-260	6.0		2.5	1.0			55.0	8.0x4.5x2.3
QSC55-44	90-130	180-260	6.0		2.5	1.0	1.2		55.0	8.0x4.5x2.3
QSC55-45	90-130	180-260	6.0		2.5	1.0	+18V 1.0		55.0	8.0x4.5x2.3
QSC55-47	90-130	180-260	6.0		2.5	1.0		1.5	55.0	8.0x4.5x2.3
QSC55-48	90-130	180-260	6.0		2.5	1.0	+15V 1.0		55.0	8.0x4.5x2.3
QSC60-20	90-130	180-260	6.0		3.0				60.0	8.0x4.5x2.3
QSC60-30	90-130	180-260	6.0		3.0	1.0			60.0	8.0x4.5x2.3
QSC60-31	90-130	180-260	6.0	0.5	3.0				60.0	8.0x4.5x2.3
QSC60-40*	90-130	180-260	6.0	0.5	3.0	1.0			60.0	8.0x4.5x2.3
QSC60-44*	90-130	180-260	6.0		3.0	1.0	1.2		60.0	8.0x4.5x2.3
QSC60-47	90-130	180-260	6.0		3.0	1.0		1.5	60.0	8.0x4.5x2.3
QSC75-30*	90-130	180-260	8.0		3.0	1.0			75.0	7.4x6.2x1.7
QSC75-31	90-130	180-260	8.0	1.0	3.0				75.0	7.4x6.2x1.7
QSC75-32	90-130	180-260	8.0			1.0		2.5	75.0	7.4x6.2x1.7
QSC75-40*	90-130	180-260	8.0	1.0	3.0	1.0			75.0	7.4x6.2x1.7
QSC75-41	90-130	180-260	8.0		3.0	1.0	2.0		75.0	7.4x6.2x1.7
QSC75-42	90-130	180-260	8.0		3.0	1.0		2.5	75.0	7.4x6.2x1.7
QSC75-50	90-130	180-260	8.0	1.0	3.0	1.0	2.0		75.0	7.4x6.2x1.7
QSC75-51	90-130	180-260	8.0	1.0	3.0	1.0		2.5	75.0	7.4x6.2x1.7
QSC80-30	90-130	180-260	10.0		4.0	3.0			80.0	8.0x5.1x2.4
QSC80-31	90-130	180-260	10.0	1.0	4.0				80.0	8.0x5.1x2.4
QSC80-32	90-130	180-260	10.0			3.0		3.0	80.0	8.0x5.1x2.4
QSC80-33	90-130	180-260	10.0		4.0			3.0	80.0	8.0x5.1x2.4
QSC80-40	90-130	180-260	10.0	1.0	4.0	3.0			80.0	8.0x5.1x2.4
QSC80-41*	90-130	180-260	10.0		4.0	1.0	3.0		80.0	8.0x5.1x2.4
QSC80-42	90-130	180-260	10.0		4.0	1.0		3.0	80.0	8.0x5.1x2.4
QSC125-20	90-130	180-260	15.0		5.0				125.0	10.5x5.0x2.5
QSC125-30	90-130	180-260	12.5		4.0	1.0			125.0	10.5x5.0x2.5
QSC125-31	90-130	180-260	12.5	1.0	4.0				125.0	10.5x5.0x2.5
QSC125-34	90-130	180-260	15.0				+15V 4.0	−15V 1.0	125.0	10.5x5.0x2.5
QSC125-40	90-130	180-260	12.5		4.0	1.0	3.5		125.0	10.5x5.0x2.5
QSC125-41	90-130	180-260	12.5		4.0	1.0	3.5		125.0	10.5x5.0x2.5
QSC125-44*	90-130	180-260	12.5		4.0	1.0		4.0	125.0	10.5x5.0x2.5
QSC125-45	90-130	180-260	12.5	1.0	4.0			4.0	125.0	10.5x5.0x2.5
QSC125-46*	90-130	180-260	12.5	1.0	4.0	1.0			125.0	10.5x5.0x2.5

* Off-the-shelf availability. Others available on order. † 47-63 Hz only.

QUALIDYNE SYSTEMS, INC.

2256 Main Street, Chula Vista, CA 92011 (619) 429-7440

SWITCHING POWER SUPPLIES 300 WATTS TO 1800 WATTS



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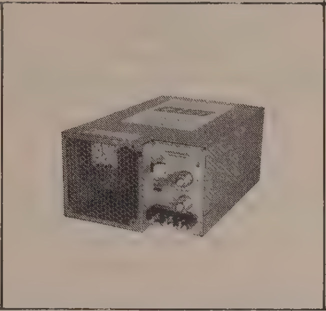

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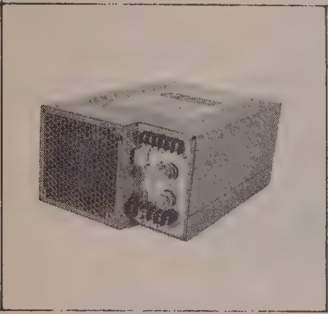

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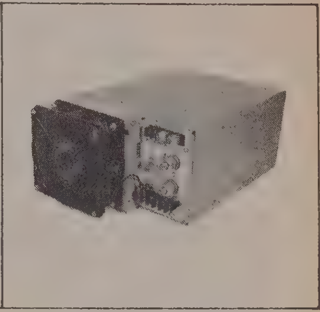


9311C-2F-002

The Qualidyne power supplies listed on this page are all highly efficient switching types for computer related equipment, from 300 to 1500 Watts with single or multiple (up to 5) outputs in many combinations. There are four basic styles and a variety of models within each style. The 3519 model is a low profile unit featuring five outputs which can be used in series or parallel.

The other models shown here have the same basic case dimensions. When a cooling fan is used, only 2″ are added to the case length. The tables illustrate the breadth of line available. There are 9 models in the 4010 line with voltages ranging from as low as 2 at 100 Amps to 48V at 10 Amps. In the tables the figures for the channels indicate the available range (5V/6A to 24V/6A).

Most models feature dual AC input (115/208). Some are designed for DC input and the higher power units are either 115 or 208 Vac input. All Qualidyne power supplies are UL listed and meet all other safety standards (CSA, VDE, IEC, etc.) Efficiency varies with load and cooling method.

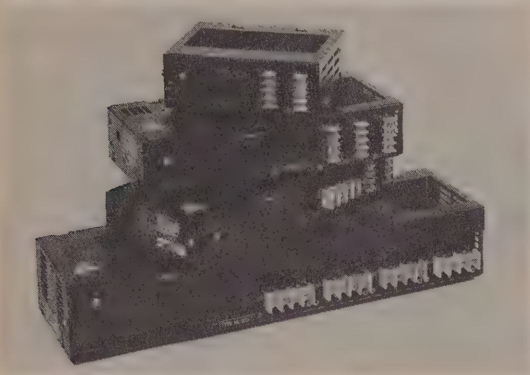
The "X" in the model numbers indicates an option or voltage to be specified. The options are: A = Inhibit Active Hi; B = Inhibit Active Lo; C = Overvoltage crowbar; D = Enable Active Hi; E = Enable Active Lo; F = AC Power Fail; G = DC Power Good; H = 47-440 Hz; J = Current Monitor; M = Provision for system margin test.

Model/ Series	Nominal Input			Output Volts/Amps					Options*										Cooling		Total Power Watts	Nom. Dimen. L″xH″xW″
	Vac	Vac	Vdc	Chan. 1	Chan. 2	Chan. 3	Chan. 4	Chan. 5	A	B	C	D	E	F	G	H	J	M	Conv.	Fan		
3519B-3-XXX	115	208		5/40	24/6	12-15/6Adj	12-15/6Adj	5-15/3Adj											X		250	7.5x2.6x11.8
3519B-3-XXX	115	208		5/40	24/6	12-15/6Adj	12-15/6Adj	5-15/3Adj												X	300	7.5x2.6x11.8
4010X-3-XXX	115	208		Single: 2/100 to 48/10										X					X		500	11.0x5.0x8.0
5010X-3-XXX	115	208		Single: 2/100 to 48/10					X	X	X	X	X	X	X	X	X	X	X		500	11.0x5.0x8.0
5310X-3-XXX	115	208		5/80	12/8-15/15	5/6-24/6			X	X	X	X	X	X	X	X	X	X	X		500	11.0x5.0x8.0
5410X-3-XXX	115	208		5/80	12/6-15/8	12/6-15/8	5/8-24/4		X	X	X	X	X	X	X	X	X	X	X		500	11.0x5.0x8.0
5510X-3-XXX	115	208		5/80	12/6-15/8	12/6-15/8	12/6-24/4	5/4-15/4	X	X	X	X	X	X	X	X	X	X	X		500	11.0x5.0x8.0
6010X-4-XXX			24	Single: 2/200 to 48/15					X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
60101-5-XXX			48	Single: 2/200 to 48/15					X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
6010X-6-XXX			125	Single: 2/200 to 48/15					X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
6010X-3-XXX	115	208		Single: 2/200 to 48/17					X	X	X	X	X	X	X	X	X	X	X		750	11.0x5.0x8.0
8310X-4-XXX			24	5/120	3/15-15/8	5/5-24/5			X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
8310X-5-XXX			48	5/120	3/15-15/8	5/5-24/5			X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
8310X-6-XXX			125	5/120	3/15-15/8	5/5-24/5			X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
8410X-4-XXX			24	5/120	5/15-15/8	12/5-24/5	5/4-15/4		X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
8410X-5-XXX			48	5/120					X	X	X	X	X		X		X	X	X		750	11.0x5.0x8.0
8410X-6-XXX			125	5/120					X	X	X	X	X				X	X	X		750	11.0x5.0x8.0
8210X-3-XXX	115	208		5/120	5/25-24/16				X	X	X	X	X	X	X	X	X	X	X		825	11.0x5.0x8.0
8310X-3-XXX	115	208		5/120	5/13-15/20	5/5-24/8			X	X	X	X	X	X	X	X	X	X	X		825	11.0x5.0x8.0
8410X-3-XXX	115	208		5/120	5/13-15/10	12/5-24/6	5/3-15/6		X	X	X	X	X	X	X	X	X	X	X		825	11.0x5.0x8.0
8510X-3-XXX	115	208		5/120	12/13-15/10	12/6-24/6	12/6-24/6	5/4-24/3	X	X	X	X	X	X	X	X	X	X	X		825	11.0x5.0x8.0
8010X-3-XXX	115	208		Single: 2/250 to 48/20					X	X	X	X	X	X	X	X	X	X	X		1000	11.0x5.0x8.0
Either 115 or 208																						
9311X-2X-XXX		208		5/150	12/13-15/10	12/13-24/6			X	X	X	X	X	X	X	X	X	X		X	1150	13.0x5.0x8.0
9411X-2X-XXX		208		5/150	12/13-15/10	12/13-24/6	12/5-24/3		X	X	X	X	X	X	X	X	X	X		X	1150	13.0x5.0x8.0
9411X-2X-XXX	Custom	208		5/150-5/200	2/30-5/50	12/4-15/4	5/3-24/2.5		X	X	X	X	X	X	X	X	X	X		X	1150	13.0x5.0x8.0
9511X-2X-XXX		208		5/150	12/13-15/10	12/10-24/6	12/6-24/6	5/4-15/3	X	X	X	X	X	X	X	X	X	X		X	1150	13.0x5.0x8.0
9010X-2X-XXX		208		Single: 2/300 to 48/35					X	X	X	X	X	X	X	X	X	X	X		1500	11.0x5.0x8.0
9011X-2X-XXX		208		Single: 2/300 to 48/40					X	X	X	X	X	X	X	X	X	X		X	1800	13.0x5.0x8.0

QUALIDYNE SYSTEMS, INC.

2256 Main Street, Chula Vista, CA 92011 (619) 429-7440

SWITCHING POWER SUPPLIES • ML SERIES



FEATURES

- High Reliability • Flexibility • No main channel load reqd. All outputs independent
- Operate to zero load
- Any number of configurations — up to six outputs
- AC and DC input
- Prototype service — stock to 2 weeks including custom designs • B.T. approval
- Designed for UL, CSA, VDE, BS

The Qualidyne ML Series provides a modular approach to power supply selection and allows the designer to choose from a wide variety of output modules to build the neederd power supply with either AC or DC input. Call for complete details.

CONFIGURED LIMITS

Type Number			Max. Power Watts	O/P 1	O/P 2	O/P 3	O/P 4	O/P 5	O/P 6	Mechanical Sizes (In.)		
A.C. 1/P	D.C. 1/P High	D.C. I/P Low								H	W	L
ML 100C1	ML 100C1DCH	ML 100C1DCL	116	5V-20A	2V-10A					2.36	5.2	11.61
ML 150C2	ML 150C2DCH	ML 150C2DCL	150	12/15V-10A	5V-10A					2.36	5.2	11.61
ML 150C3	ML 150C3DCH	ML 150C3DCL	150	12/15V-10A	12/15V-4A					2.36	5.2	11.61
ML 150C4	ML 150C4DCH	ML 150C4DCL	150	5V-20A	12V-3A					2.36	5.2	11.61
ML 150C6	ML 150C6DCH	ML 150C6DCL	150	5V-20A	24V-3A	5V-3A				2.36	5.2	11.61
ML 150D3	ML 150D3DCH	ML 150D3DCL	150	5V-20A	24V-4A†	12V-3A	12V-3A			2.36	5.2	12.8
ML 150D5	ML 150D5DCH	ML 150D5DCL	150	5V-20A	24V-3A	12V-3A	12V-1.5A*	5V-0.5A		2.36	5.2	12.8
ML 150E1	ML 150E1DCH	ML 150E1DCL	150	5V-20A	24V-3A	12V-3A	12V-3A	5V-1A		2.36	5.2	13.98
ML 200F1	—	—	200	5V-40A						3.15	5.2	11.02
ML 200F2	—	—	224	24/28V-10A						3.15	5.2	11.02
ML 250H1	—	—	240	5V-40A	24V-3A					3.15	5.2	13.39
ML 300L1	—	—	260	5V-20A	5V-10A	12/15V-4A	12/15V-4A			3.15	5.2	
ML 300G1	—	—	300	12/15V-10A	12/15V-10A					3.15	5.2	12.2
ML 300H3	—	—	300	5V-40A	12/15V-10A					3.15	5.2	13.39
ML 300J3	—	—	300	5V-20A	12/15V-10A	12/15V-10A				3.15	5.2	14.57
ML 300J4	—	—	300	5V-40A	12/15V-10A	5V-3A				3.15	5.2	14.59
ML 300K1	—	—	300	5V-40A	12/15V-10A	12/15V-4A				3.15	5.2	15.75
ML 300K2	—	—	300	5V-20A	12/15V-10A	12/15V-10A	24V-4A†			3.15	5.2	15.75
ML 300K3	—	—	300	5V-40A	24V-4A†	12/15V-4A	5V-3A			3.15	5.2	15.75
ML 300K5	—	—	300	5V-40A	24V-8A†	12V-3A	12V-1.5A*	5V-0.5A		3.15	5.2	15.75
ML 300L3	—	—	300	5V-20A	24V-8A†	12V-3A	12V-3A	12V-3A	5V-3A	3.15	5.2	16.93
ML 300M1	—	—	300	5V-40A	24V-8A†	12/15V-4A	12/15V-4A			3.15	5.2	18.11

* These rails have a reduced spec. on line and load reg.
† These rails provide double peak load currents.

INPUT SPECIFICATIONS

Parameter	AC Input	DC Input	
Input Voltage	99-132, 187-264 Vac	High: 38-64 Vdc	Low: 18-32 Vdc
Input Frequency	47-440 Hertz	—	—
Output Power	100-300 Watts	50-150 Watts	50-150 Watts
Hold up (mSec.)	20 (105-198 Vac)	—	—
Inrush current	<18A peak	<20A w/module	<40A w/module
Operating Temperature*	0-70°C in free air	(Derate above 50°C: 2.5%/°C)	
Storage Temperature	−30 +85°C	−30 +85°C	−30 +85°C
RFI		VDE 0871 Class A	
Safety	VDE0804, IEC 380, BS5850, Meets UL & CSA Req.		
Input fuse	Yes	Yes	Yes
Operating Frequency	75 Hz (Nom.)	75 Hz (Nom.)	75 Hz (Nom.)
Start-up time	<0.5 Sec.	<0.5 Sec.	<0.5 Sec.
Efficiency	70-85% depending on configuration	>65% incl. inrush module w/5V output on 150W units	
Psophometric noise filtering	—	>63% (50W unit)	>58% (50W unit)
Thermal Protection	Yes	Std. (150W units), Opt. (50W units)	

* Case temp. must not exceed +70°C.

OUTPUT SPECIFICATIONS

Parameter	Switching		Linear
Output Voltage	2-28V	5-36V	5-30V
Adjustment	Pot.	Pre-set	Fixed
Max. O/P deviation	5%	5%	2%
O/P setting	+50 mV	+3%	+50 mV
Temp. Coeff.	0.02%/°C	0.1%/°C	0.02%/°C
Off load Voltage	As set	As set	As set
Line reg. (−15% +10%)	0.05%	1.0%	0.05%
Load reg. (0-100%)	0.1%	0.5% (10-100%) 1.5% (0-100%)	0.5% 0.1%
Ripple	50 mV	0.1% pk-pk	0.2%
Spike	50 mV pk-pk	—	50 mV +0.5% pk
Transient response	—	—	25 µSec
50-100% load chng.	500 µSec	500 µSec	50 µSec
Overcurrent prot.	Constant	—	Foldback
Overvoltage prot.	—	—	Optional
Nondissip. crowbar	5V std (oth opt)	Optional	—
Surge cap. (10 sec. @ 25%)	—	8A and 16A	—
Remote sense (0.25V/line)	Std.	—	only

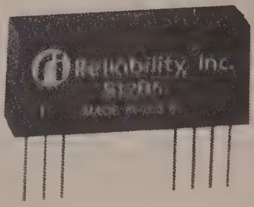
enclosures · capacitors · circuit boards · coils,
chokes, inductors · connectors, electronic · sockets/
terminals · crystals · oscillators · crystal filters
delay lines · panel hardware · displays · lamps/
lights · cooling equipment · filters · generators ·
multimeters · panel meters · oscilloscopes · gra
phic recorde nnections · microwave
components tors/
drives · ba power
supplies, ac · relays ·
solenoids · rs/trimmers
controls/rh ors ·
switches · rs/en
coders · transformers · wire & cable · enclosures
capacitors · circuit boards · coils, chokes, induc
tors · connectors, electronic · sockets/terminals

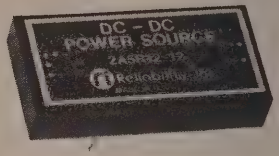
EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

Reliability, Incorporated
POWER SOURCES DIVISION

Reliability, Inc.
SP5
MADE IN U.S.A.





S-PAC/UNREGULATED

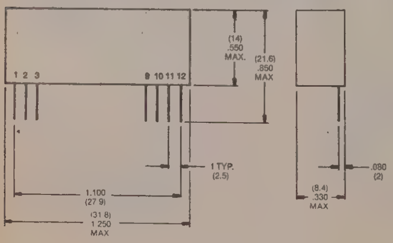
Requiring only .413 square inches of boardspace, the SA/SP Series of 1 watt DC-DC converters provides the ideal solution in applications where local point-of-load voltage distribution is required and space is critical. Designed to operate from power bus levels of 5 or 12 VDC (±10%), the units provide a wide range of isolated output voltages, single and dual, at board level while also isolating the load from the source. This series finds applications in portable equipment and communications devices such as RS-232 interfaces.

Selection Guides

Standard Products				
PART NUMBER	INPUT VOLTAGE VDC (NOM)	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)	PACKAGE
SP5	5	+ or −5	200	A
SP12/12	5	DUAL 12*	80	D
SP15/15	5	DUAL 15*	65	D
S12P5	12	+ or −5	200	A
SA15-15	5	±15	65	C
SA12-12	5	±12	80	C
SA10.5-10.5	5	±10.5	80	C
S12A15-15	12	±15	65	C
S12A12-12	12	±12	80	C
SP10	5	+ or −10	100	A
S12P15/15	12	DUAL 15*	65	D

*Dual isolated (50 VDC) output channels

Pin Connections SA/SP SERIES DC-DC CONVERTERS



Pinouts for SA/SP SERIES only.

PIN	ASSIGNMENT		
	A	D	C
1	+ INPUT	+ INPUT	+ INPUT
2	NC	− OUTPUT 2	− OUTPUT 2
3	NC	+ OUTPUT 2	+ OUTPUT 2
9	NC	NC	NC
10	− OUTPUT	− INPUT 1	− OUTPUT 1
11	+ OUTPUT	+ OUTPUT 1	+ OUTPUT 1
12	− INPUT	− INPUT	− INPUT

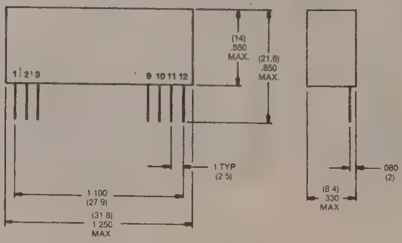
S-PAC/REGULATED

The SPAC(TM) series of single output regulated DC-DC converters provides an economical and space effective solution in applications where local voltage conversion, regulation and isolation are required at point of load. Wherever 5 or 12 VDC power is available, these converters enable the designer to have other positive and negative regulated voltages in a form factor compatible with IC assembly techniques. The units are specifically designed for applications where low ripple and noise are required, as in circuits using OP-AMPS, A/D and D/A converters, RAMS, EPROMS and microprocessors. The SPAC regulated units can be mounted on the board at the point of load, thereby reducing decoupling and noise pickup problems associated with longer power runs.

Selection Guides

Standard Products			
PART NUMBER	INPUT VOLTAGE VDC (NOM)	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)
S5R5	5	+ or −5	100
S5R12	5	+ or −12	80
S5R15	5	+ or −15	65
S12R5	12	+ or −5	100
S12R12	12	+ or −12	80
S12R15	12	+ or −15	65

Pin Connections S5R/S12R SERIES DC-DC CONVERTERS



These pinouts are for all model-types of S5R/S12R series only.

PIN	
1	+ INPUT
2	NC
3	NC
9	NC
10	− OUTPUT
11	+ OUTPUT
12	− INPUT

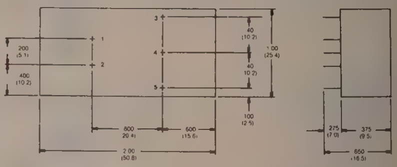
2A-SERIES

The 2A-Series of 2 watt regulated DC-DC converters operates from an input of 5 VDC (±10%) and provides dual outputs of ±12 or ±15 VDC. The series operates with no derating over the full specified temperature range. The units are built with solid tantalum capacitors for enhanced reliability and are 100% burned-in under full load conditions and triple tested. They are designed for low noise analog applications such as A/D, D/A conversion and fiber optic modules.

Selection Guides

Standard Products			
PART NUMBER	INPUT VOLTAGE VDC	OUTPUT VOLTAGE VDC	OUTPUT CURRENT
2A5R12-12	4.5 - 5.5	±12	±75 ma
2A5R15-15	4.5 - 5.5	±15	±60 ma

Pin Connections 2A-SERIES DC-DC CONVERTERS

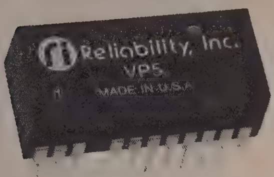


PIN	ASSIGNMENT
1	+ INPUT
2	− INPUT
3	+ OUTPUT
4	COMMON
5	− OUTPUT

RELIABILITY INCORPORATED / P.O. BOX 218370 / HOUSTON, TX 77218 / (713) 492-0550 / TWX: 910-881-1739

Reliability,® Incorporated

POWER SOURCES DIVISION


Reliability, Inc.
VP5
MADE IN U.S.A.

V-PAC/UNREGULATED

The VA/VP series of 1 watt semi-regulated DC-DC converters operates from an input of 5 VDC or 12 VDC (±10%) and makes available at board level a wide range of isolated output voltages, either single or dual. The converters are encapsulated and operate over their full specified temperature range without derating or heatsinking. Solid tantalum capacitors are used in their manufacture for enhanced reliability. They are specifically designed for RS-232 line driver/receiver, OP-AMP, EPROM, EEPROM and negative voltage biasing applications.

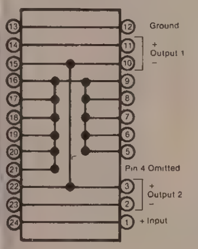
Selection Guides

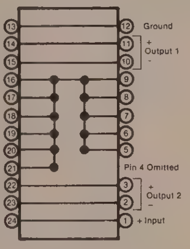
Standard Products

PART NUMBER	INPUT VOLTAGE VDC (NOM)	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)	PACKAGE
VP5	5	+ or −5	200	A
VP10	5	+ or −10	100	A
V12P5	12	+ or −5	200	A
VA10.5-10.5	5	±10.5	80	C
VA12-12	5	±12	80	C
V12A12-12	12	±12	80	C
VA15-15	5	±15	65	C
V12A15-15	12	±15	65	C
VP12/12	5	DUAL 12*	65	D
VP15/15	5	DUAL 15*	65	D
V12P15/15	12	DUAL 15*	65	D

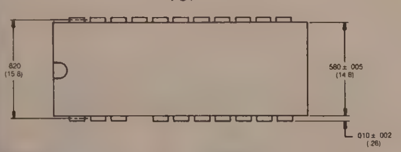
* Dual isolated (50 VDC) output channels.

Pin Connections V-PAC DC-DC CONVERTERS


Ground
+ Output 1 −
Pin 4 Omitted
+ Output 2 −
+ Input


Ground
+ Output 1 −
Pin 4 Omitted
+ Output 2 −
+ Input

TOP


.620 (15.8)
.580 ± .005 (14.8)
.010 ± .002 (.26)

PINOUT A
VP5, V12P5, VP10,
V5R5, V12R5, V5R12,
V12R12, V5R15, V12R15

PINOUT B
V5R5-5
V5R12-12
V5R15-15
V12R12-12
V12R15-15

Reliability, Inc.
V12R5
MADE IN U.S.A.

V-PAC/REGULATED

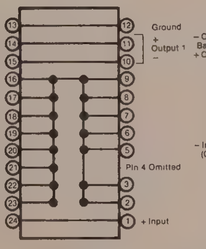
The V5R/V12R series of 1 watt regulated DC-DC converters operates from an input of 5 or 12 VDC (±10%) and makes available at board level a wide range of isolated, regulated, single or dual output voltages. The converters are encapsulated and operate over their full specified temperature range without derating or heatsinking. Solid tantalum capacitors are used in their manufacture for enhanced reliability. They are specifically designed for analog applications such as OP-AMPS, A/D, D/A and F/V converters. They can also be used for negative voltage bias applications.

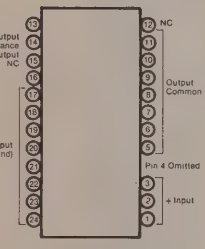
Selection Guides

Standard Products

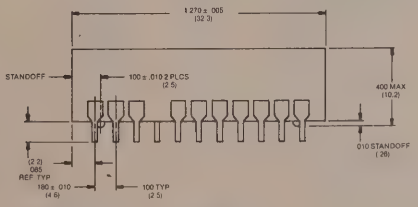
PART NUMBER	INPUT VOLTAGE VDC (NOM)	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)	PACKAGE
V5R5	5	+ or −5	100	A
V12R5	12	+ or −5	100	A
V5R5-5	5	±5	±100	B
V5R12	5	+ or −12	80	A
V12R12	12	+ or −12	80	A
V5R12-12	5	±12	±40	B
V12R12-12	12	±12	±40	B
V5R15	5	+ or −15	65	A
V12R15	12	+ or −15	65	A
V5R15-15	5	±15	±33	B
V12R15-15	12	±15	±33	B

Pin Connections V-PAC DC-DC CONVERTERS


Ground
+ Output 1 −
Pin 4 Omitted
+ Input


NC
− Output
Balance
+ Output
NC
Output Common
− Input (Gnd)
Pin 4 Omitted
+ Input

SIDE

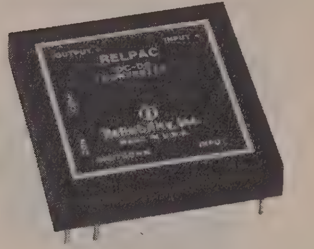

1.270 ± .005 (32.3)
STANDOFF
.100 ± .010 2 PLCS (2.5)
.400 MAX (10.2)
.010 STANDOFF (.26)
(2.2) .085 REF TYP
.180 ± .010 (4.6)
.100 TYP (2.5)

PINOUT C
VA12-12, V12A12-12
VA15-15, V12A15-15
VA10.5-10.5

PINOUT D
VP12/12
VP15/15
V12P15/15

PIN	ASSIGNMENT
1	+ INPUT
2	− INPUT
3	+ OUTPUT
4	− OUTPUT
5	− OUTPUT
6	SHUTDOWN*

* Pin 6 in used for the remote shutdown facility and can be removed if this facility is not required. Its removal will not otherwise affect the operation of the unit.


OUTPUT
INPUT
RELPAC

5-WATT SWITCHING

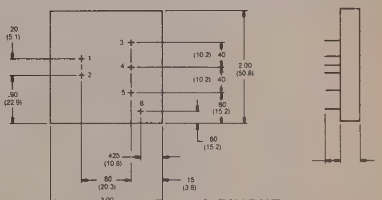
RELPAC™ power sources utilize the latest DC-DC switch mode power conversion technology to provide regulated (.5%, line and load), low noise DC outputs of 5, 12 or 15 volts at typical efficiencies over 70%. Operating specifications remain constant over the full temperature range. The series is designed for battery-powered applications and incorporates remote shutdown circuitry that allows the converter to be put in a standby mode, drawing less than 5 mA input current. An optional external trim feature allows adjustment of the output voltage to tight tolerances and to non-standard voltage levels such as the 5.20 VDC required for ECL circuits. The RELPAC is available in either a plastic or copper (6-sided) compact package and in any one of 3 industry-standard pinout configurations.

Selection Guides

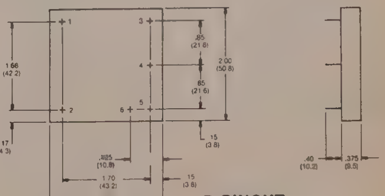
Standard Products

MODEL TYPE	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (mA)	PINOUTS AVAILABLE
5-7•17R-5	5	1000	A, D or W
5-7•17R-12	12	417	A, D or W
5-7•17R-15	15	333	A, D or W
5AS12•36R5	5	1000	A, D or W
5AS12•36R12	12	417	A, D or W
5AS12•36R15	15	333	A, D or W

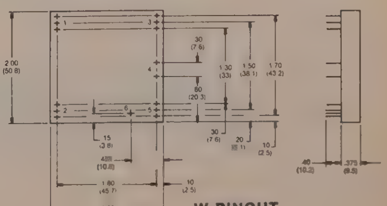
Pin Dimensions and Connections 5-WATT SWITCHING DC-DC CONVERTERS


.20 (5.1)
1
2
3
4
5
6
.90 (22.9)
(10.2) .40
(10.2) .40
2.00 (50.8)
.60 (15.2)
.60 (15.2)
.425 (10.8)
.80 (20.3)
.15 (3.8)
2.00 (50.8)

A-PINOUT


1
2
3
4
5
6
1.66 (42.2)
.17 (4.3)
.85 (21.6)
.85 (21.6)
2.00 (50.8)
.15 (3.8)
.425 (10.8)
1.70 (43.2)
.15 (3.8)
2.00 (50.8)
.40 (10.2)
.375 (9.5)

D-PINOUT

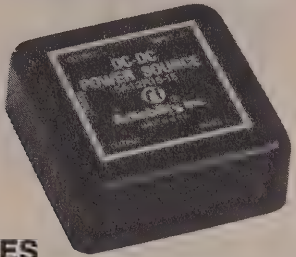

1
2
3
4
5
6
2.00 (50.8)
.30 (7.6)
.80 (20.3)
1.30 (33)
1.50 (38.1)
1.70 (43.2)
.15 (3.8)
.30 (7.6)
.20
.10 (2.5)
1.80 (45.7)
.10 (2.5)
2.00 (50.8)
.40 (10.2)
.375 (9.5)

W-PINOUT

RELIABILITY INCORPORATED / P.O. BOX 218370 / HOUSTON, TX 77218 / (713) 492-0550 / TWX: 910-881-1739

Reliability® Incorporated

POWER SOURCES DIVISION



A-SERIES

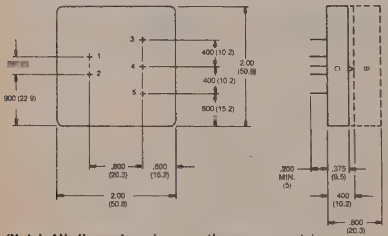
The A-series of regulated DC-DC converters is designed for low noise analog circuitry such as high speed A/D and D/A with buffer memories. The series operates from inputs of 5, 12 or 24 VDC (±10%) with single 5 VDC, dual ±12 and ±15 VDC outputs. All A-series devices operate over their full temperature range with no derating. The series design incorporates enhanced reliability due to the use of tantalum capacitors and 100% burn-in and triple testing during the manufacturing process.

Selection Guides

Standard Products

PART NUMBER	INPUT VOLTAGE RANGE	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)	PACKAGE
3A5R5	4.5-5.5	+ or −5	600	A
3A12R5	10.8-13.2	+ or −5	600	A
3A5R12-12	4.5-5.5	±12	±150	A
3A12R12-12	10.8-13.2	±12	±150	A
3A24R12-12	21.6-26.4	±12	±150	A
3A5R15-15	4.5-5.5	±15	±150	A
3A24R15-15	21.6-26.4	±15	±150	A
5A5R12-12	4.5-5.5	±12	±250	B
5A5R15-15	4.5-5.5	±15	±250	B
5A12R15-15	10.8-13.2	±15	±250	B

Pin Connections A-SERIES DC-DC CONVERTERS

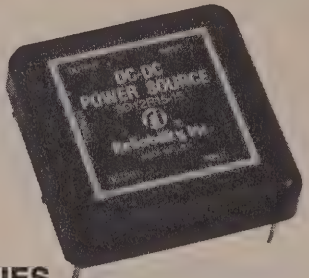


(Note) All dimensions in parentheses are metric.

PIN	SINGLE OUTPUT
1	+ INPUT
2	− INPUT
3	+ OUTPUT
4	− OUTPUT
5	− OUTPUT

PIN	DUAL OUTPUT
1	+ INPUT
2	− INPUT
3	+ OUTPUT
4	COMMON
5	− OUTPUT

ALL A-SERIES MODEL-TYPES



D-SERIES

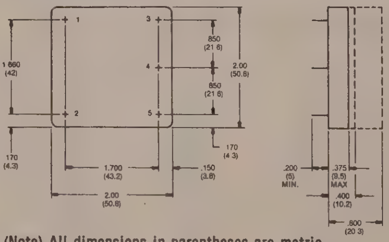
Through the exclusive use of tantalum capacitors in its manufacture, the D-Series of DC-DC converters provides reliability figures above 60K-hours. Additionally, every device receives burn-in and triple testing prior to shipment. This series, operating from an input of 5, 12, or 24 VDC (±10%), supplies single 5, ±12, ±15 VDC outputs. Designed for low noise analog circuitry, these units find applications in D/A, A/D converters, operational and instrument amplifiers, and portable data acquisition equipment.

Selection Guides

Standard Products

PART NUMBER	INPUT VOLTAGE RANGE	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)	PACKAGE
3D5R5	4.5-5.5	+ or −5	600	A
3D12R5	10.8-13.2	+ or −5	600	A
3D5R12-12	4.5-5.5	±12	±150	A
3D12R12-12	10.8-13.2	±12	±150	A
3D5R15-15	4.5-5.5	±15	±150	A
3D12R15-15	10.8-13.2	±15	±150	A
3D24R15-15	21.6-26.4	±15	±150	A
5D5R12-12	4.5-5.5	±12	±250	B
5D5R15-15	4.5-5.5	±15	±250	B

Pin Connections D-SERIES DC-DC CONVERTERS



(Note) All dimensions in parentheses are metric.

PIN	SINGLE OUTPUT
1	+ INPUT
2	− INPUT
3	+ OUTPUT
4	− OUTPUT
5	− OUTPUT

PIN	DUAL OUTPUT
1	+ INPUT
2	− INPUT
3	+ OUTPUT
4	COMMON
5	− OUTPUT

DC-DC
POWER SOURCE
3W5R5

W-SERIES

The W-series is designed for the wider input-voltage range requirements of board level DC-power distribution. The series operates from nominal inputs of 5, 12 or 24 VDC (−10%/+25%) with single and dual output voltages. Outputs feature extremely low noise due to the exclusive use of tantalum capacitors and provide ideal power for battery backed-up systems using high speed A/D and D/A converters with buffer memory. All Reliability DC-DC converters are burned-in and triple tested for increased reliability.

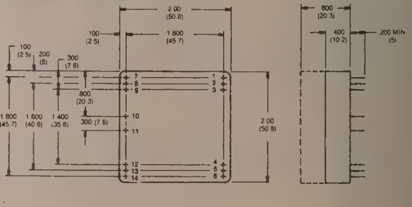
Selection Guides

Standard Products

PART NUMBER	INPUT VOLTAGE RANGE	OUTPUT VOLTAGE VDC	OUTPUT CURRENT MA. (MAX)	PACKAGE
3W5R5	4.5-5.5	+ or −5	600	A
3W12R5	10.8-15	+ or −5	600	A
3W24R5	21.6-30	+ or −5	600	A
3W5R12-12	4.5-5.5	±12	±125	A
3W12R12-12	10.8-15	±12	±125	A
3W24R12-12	21.6-30	±12	±125	A
3W5R15-15	4.5-5.5	±15	±100	A
3W12R15-15	10.8-15	±15	±100	A
3W24R15-15	21.6-30	±15	±100	B
5W5R5	4.5-5.5	+ or −5	1000	B
5W12R5	10.8-15	+ or −5	1000	B
5W24R5	21.6-30	+ or −5	1000	B
5W5R12-12	4.5-5.5	±12	±210	B
5W12R12-12	10.8-15	±12	±210	B
5W24R12-12	21.6-30	±12	±210	B
5W5R15-15	4.5-5.5	±15	±160	B
5W12R15-15	10.8-15	±15	±160	B
5W24R15-15	21.6-30	±15	±160	B

Note: All units available with alternate WD pinout as non-stocked product. Minimum order-qty. applies.

Pin Connections W-SERIES DC-DC CONVERTERS



PIN	SINGLE OUTPUT	DUAL OUTPUT
1-3	+ INPUT	+ INPUT
4-6	− INPUT	− INPUT
7-9	+ OUTPUT	+ OUTPUT
10-11	− OUTPUT	COMMON
12-14	− OUTPUT	− OUTPUT

ALL W-SERIES MODEL-TYPES

Alternate WD Pin Configuration

PIN	SINGLE OUTPUT	PIN	DUAL OUTPUT
1	+ INPUT	1	+ INPUT
2	− INPUT	2	− INPUT
3	+ OUTPUT	3	+ OUTPUT
4	− OUTPUT	4	COMMON
5	− OUTPUT	5	− OUTPUT

ALL WD MODEL-TYPES

RELIABILITY INCORPORATED / P.O. BOX 218370 / HOUSTON, TX 77218 / (713) 492-0550 / TWX: 910-881-1739

NEW WIDE INPUT SWITCHERS

RELIABILITY'S RELPAC™

BATTERY COMPATIBLE DC-DC CONVERTER

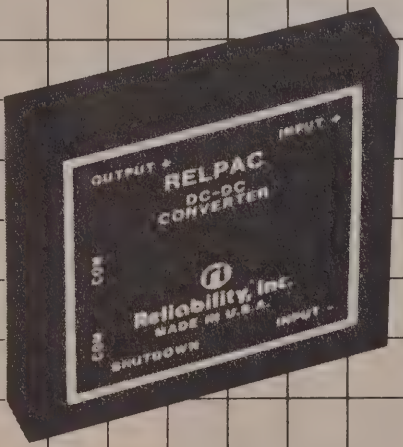
75% EFFICIENCY

OUTPUT +
INPUT +
RELPAC
DC-DC
CONVERTER
COM
Reliability, Inc.
MADE IN U.S.A.
COM
INPUT -
SHUTDOWN

- Battery Compatible
- High Efficiency: 75% Typical
- 500 VDC Isolation
- Wide Input-voltage Range: 12-36 VDC
- Output Current: 5VDC, 1000mA
  12VDC, 425mA
  15VDC, 333mA
- Under voltage lockout set at 10.5 VDC ± 5%
- Low Profile: 2"x2"x.375"
- Low Noise: 20mv true R.M.S.
- Package: Six sided copper (standard)
- Remote Shutdown
- Internal pi filter
- Low Noise: 20mv true R.M.S.

70% EFFICIENCY

- Battery Compatible
- High Efficiency: 70%
- Minimum @ nominal 12VDC
- Wide Input-voltage Range: 7-17 VDC
- Output Current: 5VDC, 1000mA
  12VDC, 425mA
  15VDC, 333mA
- 500 VDC Isolation
- Output Voltage Adjustment; Optional
- Low Profile: 2"x2"x.375"
- Low Noise: 20mv true R.M.S.
- Package: Plastic, (optional Copper Case)
- Remote Shutdown


OUTPUT +
INPUT +
RELPAC
DC-DC
CONVERTER
COM
Reliability, Inc.
MADE IN U.S.A.
COM
INPUT -
SHUTDOWN

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Reliability®

Please contact the factory for further information or assistance to enable us to quote your requirements.

ONE-YEAR WARRANTY

RIFA

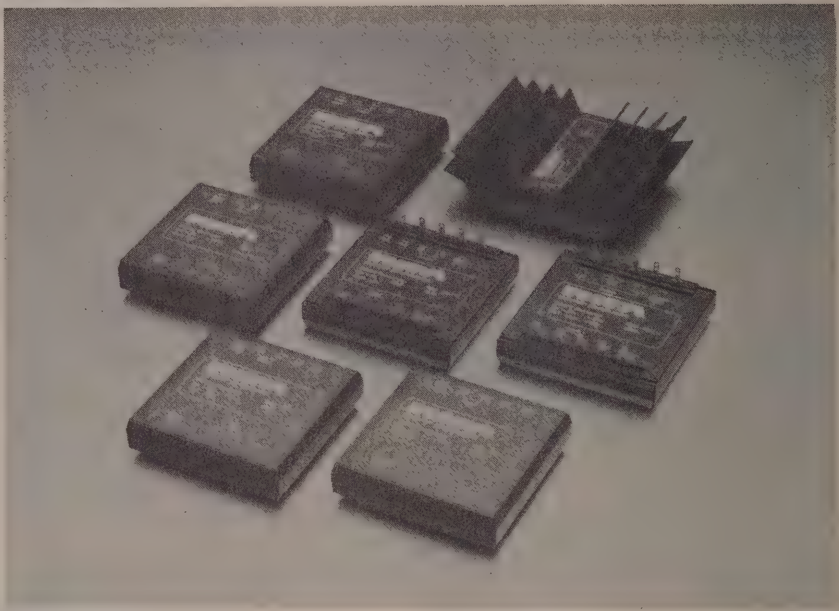
power products **PKA**

DC/DC converters 25—40W

Single, Dual and Triple outputs

- **Switching frequency: 300kHz**
- **Short circuit proof**
- **MTBF at T_{amb} = 45°C: >200 years**
- **No extra components**
- **No extra cooling**
- **Parallelable**
- **PC-card or chassis mountable**
- **Extremely compact: 25W—0.25W/cm^3 (4.1W/in^3), 30W—0.3W/cm^3 (4.9W/in^3)**
- **Extremely light-weight: 100—160 gr. (3.53—5.64 ozs.)**
- **Input voltage ratings:**
  - **+24V (19—35V)**
  - **−48V (−39... −64V)**
- **Low RFI and noise**
- **Transient protected**
- **Input sense with shutdown command at undervoltage**
- **Output adjustable: ±10%**
- **Remote control**
- **Soft start**
- **Very high efficiency: 79—85%**
- **No derating of output power −45°C to +85°C**

The PKA series DC/DC converters are modular miniaturized standard components designed for economic Industrial/Professional applications in central and decentralized power supply systems. Their completeness and particular mechanical features of dimensions and weight make the PKA series suitable also for high power density PC-card applications. The very high MTBF-figure makes the converters useful for parallel operations in great numbers, while maintaining a good system MTBF-figure. 300kHz PWM-switching technology, and sophisticated mechanical design including thickfilm technology, custom designed IC:s and extremely minimized magnetics, give the RIFA converters unique electrical and mechanical features.



Product Program

In:	+ 24V DC (19—35V)	P_{out}	Type
Out:	+5V/5A	25W	PKA 2212
	+12V/2,5A	30W	PKA 2314
	+5V ±12V/3.8A, ±0.25A	25W	PKA 2231
	+5V ±15V/3.2A, ±0.32A	25W	PKA 2232
In:	**−48V DC (−39...−64V)**	**P_{out}**	**Type**
Out:	+ 5V alt. −5V/5A	25W	PKA 4211
	+ 5V alt. −5V/8A	40W	PKA 4411
	+ 12V alt. −12V/2.5A	30W	PKA 4313
	±12V/±1.25A alt. —24V/1.25A	30W	PKA 4321
	+5V ±12V/3.8A, ±0.25A	25W	PKA 4231
	+5V ±15V/3.2A, ±0.32A	25W	PKA 4232
All types available in PC card or Chassis versions.			

Absolute Maximum Ratings

V_i	Input voltage	+ 40V DC alt. −65V DC
T_{op}	Operating ambient temperature	−45 to + 85°C
$T_{stg.}$	Storage temperature	−55 to + 125°C
T_C	Case temperature	+ 115°C
I_O	Output current	Internally limited
W_{tr}	Transient input energy, $T_{amb.}$ = 25°C	1.3Ws

RIFA Inc.

Greenwich Office Park 3, Greenwich, CT 06830 / (203) 625-7300 / TWX 710-579-2970

RIFA

PKA

power products

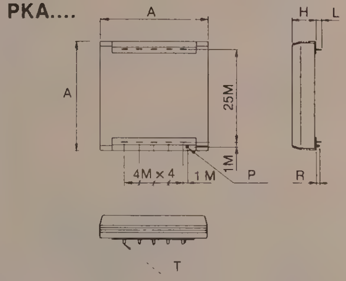
Environmental Tests according to IEC 68

Test method		Reference	Test conditions	
F_c	Vibration (Sinusoidal)	IEC 68-2-6 F_c	Frequency Displacement amplitude Acceleration amplitude Number of cycles	10—500 Hz 0.75 mm (0.03 in.) 100 m/s^2 (327.9 ft/s^2) ≈ 10.2 g 10 in each axis
E_a	Mechanical shock (Half-sinusoidal)	IEC 68-2-27 E_a	Peak acceleration Shock duration	2000 m/s^2 (6557.4 ft/s^2) ≈ 204 g 3 ms
E_b	Bump (Half-sinusoidal)	IEC 68-2-29 E_b	Peak acceleration Bump duration Number of bumps	400 m/s^2 (1311.5 ft/s^2) ≈ 40.8 g 6 ms 1.000 in 6 directions

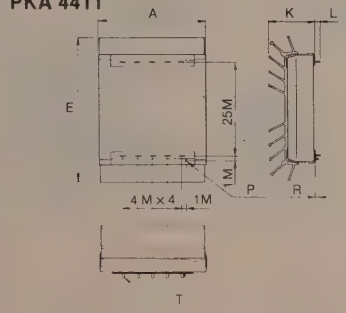
Mechanical Data (Dimensions given as max. values unless otherwise stated.)

PC-card versions

PKA....

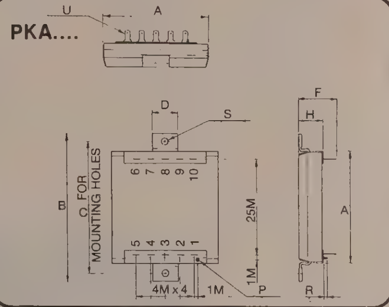


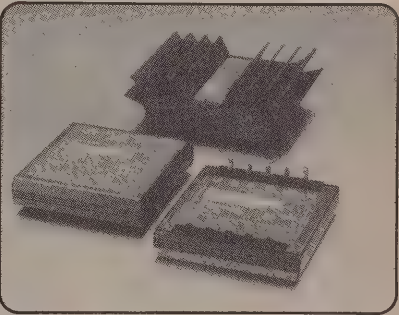
PKA 4411



Chassis version

PKA....





	Millimeters	Inches		Millimeters	Inches
A	76	2.99	**K**	34	1.39
B	100	3.94	**L**	3.4	0.14
C	88±0.3	3.46±0.02	**M**	2.54	0.1
D	19	0.75	**P**	Ø1.8	Ø0.07
E	101.6	4.00	**R**	2.6	0.1
F	27.3	1.07	**S**	Ø4.6±0.2	Ø0.18±0.01
G	19.8	0.78	**T**	1.3×0.5	0.05×0.02
H*	17.8	0.70	**U**	2.8×0.5	0.11×0.02

* For PKA 4411C replace H with G.

Ordering Information:

PKA.... P PC-Card version
PKA.... C Chassis version

Package:

Blue anodized self-cooled aluminium chassis with snap-on cover. Chassis version includes blue anodized snap-on adapter and flat contacts according to DIN 46244.

Weight:

PC-Card version 100 grams (3.53 ozs.), PKA 4411 (40W) 160 grams (5.64 ozs.) Chassis version 155 grams (5.47 ozs.).

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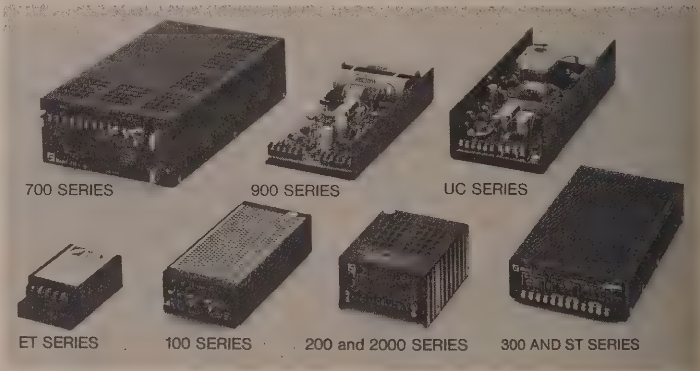
- MTBF'S TO 126,000 HOURS
- 90/110/240 VAC INPUTS AVAILABLE
- ST SERIES MEETS MIL-STD-810C
- 17 YEARS EXPERIENCE IN SWITCHING POWER SUPPLIES
- OVER 200,000 SWITCHERS DELIVERED

SINGLE OUTPUTS

Volts DC	Amps	Model	Price
1.5–6V	5	105	$135.00
5.0	1	ET-13	87.00
	5	105	135.00
	10	210	299.00
	25	925	199.00
	25	325	320.00
	25	325ST	480.00
	35	UC-35	275.00
	100	710	595.00
	120	712	650.00
6.0	5	105	135.00
	20	325C	320.00
	20	325STC	480.00
	100	710C	650.00
6–12	3	108	135.00
6–28	1.5	106	135.00
12	3	108	135.00
	10	940	199.00
12–15	2.5	107	135.00
	4	250	315.00
	10	350	320.00
	10	350ST	480.00
	40	750	595.00
15	8	950	199.00
16–23	1.5	106	135.00
24	5	951	199.00
24–28	1.5	106	135.00
	2	251	315.00
	5	351	320.00
	5	351ST	480.00
	20	751	595.00
30	5	351	320.00
	20	751	595.00
250	.030	ET-19	95.00

MULTI OUTPUTS

Output 1	Output 2	Output 3	Output 4	Model	Price
5V @ .6A	+12V @ .1A	−12V @ .1A	—	ET-31	$108.00
5V @ .5A	+15V @ .1A	−15V @ .1A	—	ET-32	108.00
5V @ 5A	+12V @ .4A	−12V @ .4A	—	213C	395.00
5V @ 5A	+15V @ .4A	−15V @ .4A	—	213	395.00
5V @ 10A	12V @ 2A	—	—	314	375.00
5V @ 10A	12V @ 2A	—	—	314ST	562.50
5V @ 8A	12V @ 3A	—	—	315	375.00
5V @ 8A	12V @ 3A	—	—	315ST	562.50
5V @ 12A	12V @ 1A	—	—	316	375.00
5V @ 12A	12V @ 1A	—	—	316ST	562.50
5V @ 10A	+12V @ 1A	−12V @ 1A	—	312	395.00
5V @ 10A	+12V @ 1A	−12V @ 1A	—	312ST	592.50
5V @ 10A	+15V @ 1A	−15V @ 1A	—	313	395.00
5V @ 10A	+15V @ 1A	−15V @ 1A	—	313ST	592.50
5V @ 15A	+12V @ 1.0A	−12V @ 1.0A	−5V @ .5A	910	225.00
5V @ 15A	+15V @ .8A	−15V @ .8A	−5V @ .5A	910	225.00
5V @ 20A	+12V @ 3A	−12V @ 1A	−5V @ .5A	UC-10	325.00
5V @ 20A	+15V @ 2.5A	−15V @ 1A	−5V @ .5A	UC-10	325.00
5V @ 15A	+(12–15)V @ 2A	−(12–15)V @ 1A	+12V @ 4.0A	UC-22	325.00
5V @ 15A	+(12–15)V @ 2A	−(12–15)V @ 1A	+24V @ 2.0A	UC-24	325.00
5V @ 50A	+(12–15)V @ 10A	−(12–15)V @ 10A	−5V @ 1A	713	750.00



DC to DC CONVERTERS

Input	Output 1	Output 2	Output 3	Output 4	Output 5	Model	Price
40–70VDC	5V @ 20A	+12V @ 4.0A	−12V @ 4.0A	−5V @ 0.5A	—	1110	$395.00
40–70VDC	5V @ 20A	+15V @ 3.0A	−15V @ 3.0A	−5V @ 0.5A	—	1110	395.00
40–70VDC	5V @ 20A	+12V @ 4.0A	+12V @ 3.0A	−12V @ 2.0A	−5V @ 0.5A	1112	395.00
40–70VDC	5V @ 20A	+12V @ 4.0A	+15V @ 2.5A	−15V @ 1.5A	−5V @ 0.5A	1112	395.00
40–70VDC	5V @ 20A	+24V @ 2.0A	+12V @ 3.0A	−12V @ 2.0A	−5V @ 0.5A	1124	395.00
40–70VDC	5V @ 20A	+24V @ 2.0A	+15V @ 2.5A	−15V @ 1.5A	−5V @ 0.5A	1124	395.00

CONSULT FACTORY FOR MIL-SPEC UL/VDE/FCC APPROVALS

DUAL OUTPUTS ALSO AVAILABLE

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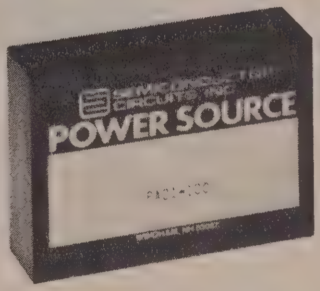
AC OPERATED POWER SUPPLIES & SWITCHERS DC/DC CONVERTERS

AC/DC Linear Power Supplies (Encapsulated)

5V Thru 180V Single Outputs
±5 Thru ±15V Dual Outputs
5V/±12V and 5V/±15V Triple Outputs

- 1, 2 and 3 Output Models
- Extremely Low Noise Operation
- −25° to + 71° C Operation

OUTPUT		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL[3] NO.
VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
5V[2]	200	105-125V SEE NOTE 1	0.25	0.4	2 x 2 x 0.88	SQ11-020
	500		0.25	0.4	2.3 x 2.3 x 1.25	SQ11-050
	500		0.05	0.05	2.5 x 3.5 x 0.88	P11-050
	500		0.05	0.05	2.5 x 3.5 x 0.88	PA11-050
	1000		0.05	0.1	2.5 x 3.5 x 1.25	P11-100
	1000		0.05	0.1	2.5 x 3.5 x 1.25	PA11-100
	1000		0.05	0.1	2.5 x 3.5 x 1.56	CM11-100
12V	100		0.25	0.4	2 x 2 x 0.88	SQ12-010
	500		0.05	0.1	2.5 x 3.5 x 1.25	P12-050
	500		0.05	0.1	2.5 x 3.5 x 1.56	CM12-050
180V	30		1.0	1.0	2.5 x 3.5 x 1.25	ED16-003



MAIN OUTPUT		OUTPUT 2		OUTPUT 3		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL[3] NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
5V	500	−5V	500	–	–	105-125V STANDARD SEE NOTE 1	0.05	0.05	2.5 x 3.5 x 1.25	P21-100 PA21-100
12V	50	−12V	50	–	–		0.25	0.25	2 x 2 x 0.88	SQ22-010
	100		100	–	–		0.25	0.25	2.3 x 2.5 x 1.25	SQ22-020
	120		120	–	–		0.1	0.05	2.5 x 3.5 x 0.88	P22-020
	120		120	–	–		0.1	0.05	2.5 x 3.5 x 0.88	PA22-020
	200		200	–	–		0.05	0.1	2.5 x 3.5 x 1.56	CM22-040
	240		240	–	–		0.1	0.05	2.5 x 3.5 x 1.25	P22-040
	240		240	–	–		0.1	0.05	2.5 x 3.5 x 1.25	PA22-040
	300		300	–	–		0.01	0.05	2.5 x 3.5 x 1.56	P22-060
	300		300	–	–		0.01	0.05	2.5 x 3.5 x 1.56	PA22-060
	300		300	–	–		0.05	0.1	2.5 x 3.5 x 2	CM22-060
15V	30	−15V	30	–	–		0.25	0.25	2 x 2 x 0.88	SQ23-006
	50		50	–	–		0.25	0.25	2 x 2 x 0.88	SQ23-010
	100		100	–	–		0.25	0.25	2.3 x 2.5 x 1.25	SQ23-020
	100		100	–	–		0.01	0.05	2.5 x 3.5 x 0.88	P23-020
	100		100	–	–		0.01	0.05	2.5 x 3.5 x 0.88	PA23-020
	200		200	–	–		0.01	0.05	2.5 x 3.5 x 1.25	P23-040
	200		200	–	–		0.01	0.05	2.5 x 3.5 x 1.25	PA23-040
	200		200	–	–		0.05	0.1	2.5 x 3.5 x 1.56	CM23-040
	300		300	–	–		0.01	0.05	2.5 x 3.5 x 1.56	P23-060
	300		300	–	–		0.01	0.05	2.5 x 3.5 x 1.56	PA23-060
	300		300	–	–		0.05	0.1	2.5 x 3.5 x 2	CM23-060
5V	300	12V	150	−12V	150		0.01	0.2	2.5 x 3.5 x 1.25	MP34-060
	500		100		100		0.01	0.2	2.5 x 3.5 x 1.25	MP34-070
	300	15V	150	−15V	150		0.01	0.2	2.5 x 3.5 x 1.25	MP35-060
	500		100		100		0.01	0.2	2.5 x 3.5 x 1.25	MP35-070

Notes:
1 Alternative input voltages available
2 Over volt protection optional
3 "A" prefix = alternate pins out available
"C" prefix = chassis mount, add 0.43 to height for terminal strip

SEMICONDUCTOR CIRCUITS, INC., 49 RANGE ROAD, WINDHAM, NEW HAMPSHIRE 03087 (603) 893-2330 TWX (710) 366-0505

AC/DC Off-Line Switching Power Supplies (Encapsulated)

5V and 12V Single Outputs
±5V/12V and 5V/±15V Triple Outputs

MAIN OUTPUT		OUTPUT 2		OUTPUT 3		PACKAGE W x L x H	MODEL[1] NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA		
5V	5000	–	–	–	–	3.5 x 5.5 x 1.25	USE-11-500
	5000	–	–	–	–		CSE11-500
12V	2000	–	–	–	–		USE12-200
	2000	–	–	–	–		CSE12-200
5V	1000	–5	1000	12V	600		USE34-260
	1000		1000		600		CSE34-260
	2000		100		600		USE34-270
	2000		100		600		CSE34-270
5V	2000	15V	300	–15V	300		USE35-260
	2000		300		300		CSE35-260

Notes: 1 "C" indicates chassis mount, add 0.43 to height for terminal strip
Regulation: Main output, 0.2% line, 0.2% load 12V or 15V outputs, 0.1% line, 0.15% load
–5V output, 0.1% line, 0.5% load

- AC or DC input:
  70-140/140-280 Vac
  200-400 Vdc
- Opto-Isolated Remote Power Shutdown
- Over Voltage Protection on +5V Output

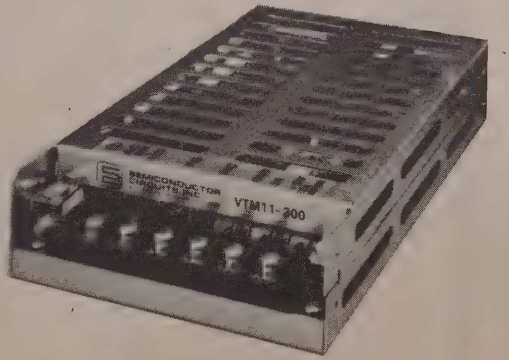
POWER SOURCE
POWER SOURCE

AC/DC Off-Line Switching Power Supplies (Enclosed)

5V Thru 24V Single Outputs, ±12V and ±15V Dual Outputs
5V/±12V and 5V/±15V Triple Outputs

OUTPUT		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL NO.
VOLTAGE Vdc	CURRENT Adc		LINE %	LOAD %		
5V	3	90-132	0.8	0.9	3.2 x 4.6 x 1.0	VTM11- 300
	5		0.8	0.9	3.3 x 5.3 x 1.2	VTA11- 500
	10		0.8	0.9	3.7 x 6.2 x 1.3	VTB11-1000
	15		0.8	0.9	3.9 x 7.7 x 1.5	VTC11-1500
	20		0.8	0.9	3.8 x 8.1 x 1.9	VTD11-2000
12V	1.2		0.8	0.8	3.2 x 4.6 x 1.0	VTM12-1200
	2.1		0.8	0.8	3.3 x 5.3 x 1.2	VTA12- 210
	4.2		0.8	0.9	3.7 x 6.2 x 1.3	VTB12- 420
	6.3		0.8	0.8	3.9 x 7.7 x 1.5	VTC12- 630
	9		0.8	0.8	3.8 x 8.1 x 1.8	VTD12- 900
15V	1		0.8	0.9	3.2 x 4.6 x 1.0	VTM13- 300
	1.7		0.8	0.9	3.3 x 5.3 x 1.2	VTA13- 170
	3.4		0.8	0.9	3.7 x 6.2 x 1.3	VTB13- 340
	5		0.8	0.9	3.9 x 7.7 x 1.5	VTC13- 500
	7		0.8	0.9	3.8 x 8.1 x 1.9	VTD13- 700
24V	.62		0.8	0.8	3.2 x 4.6 x 1.0	VTM17- 062
	2.5		0.8	0.9	3.3 x 5.3 x 1.2	VTA17- 110
	2.1		0.8	0.9	3.7 x 6.2 x 1.3	VTB17- 210
	7.5		0.8	0.9	3.9 x 7.7 x 1.5	VTC17- 320
	12		0.8	0.9	3.8 x 8.1 x 1.9	VTD17- 500

- All Have Soft Start
- All Have O.V.P. for +5V Output
- All Have Metal Cases and are Chassis Mount



MAIN OUTPUT		OUTPUT 2		OUTPUT 3		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
12V	.75	–12V	.50	—	—	90-132	0.8	0.9	3.2 x 4.6 x 1.0	VTM22- 125
15V	.50	–15V	.50	—	—	90-132	0.8	0.9	3.2 x 4.6 x 1.0	VTM23- 100
5V	1.8	15V	.12	–15V	.12	90-132	Note 2		3.2 x 4.6 x 1.0	MTP35- 204
	1.8	12V	.15	–12V	.15	90-132			3.2 x 4.6 x 1.0	MTP34- 210
	15.0	12V	4.0	–12V	4.0	Note 1	0.4	0.4	5 x 10.5 x 2.5	VS34- 2300
	15.0	15V	3.0	–15V	3.0	Note 1	0.4	0.4	5 x 10.5 x 2.5	VS35- 2100
	5.0	12V	1.0	–12V	1.0	90-132	0.8	0.9	3.9 x 7.7 x 1.5	VTC34- 700
	5.0	–15V	1.0	–15V	1.0	90-132	0.8	0.9	3.9 x 7.7 x 1.5	VTC35- 700

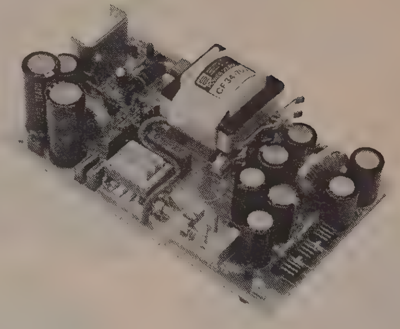
Notes:
1 70-140/140-280 Vac (200-400 Vdc)
2 Main output: line 0.2%, cross/load 0.8%
Auxiliaries: line 0.05%, cross/load 0.05%

SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD., WINDHAM, N H 03087
(603) 893-2330 TWX (710) 366-0505

AC/DC Off-Line Switching Power Supplies (Open Frame)

5V/±12V and 5V/±15V Triple Outputs
5V/±12V and 5V/±15V and −5V Quad Outputs

- **User Selectable Input Ranges Accommodate Domestic and European Format**
- **50 and 65 Watt Sizes**
- **3 and 4 Output Models Available**



MAIN OUTPUT		OUTPUT 2		OUTPUT 3		OUTPUT 4		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL NO.
VOLTAGE Vdc	CURRENT Adc	VOLTAGE Vdc	CURRENT Adc	VOLTAGE Vdc	CURRENT Adc	VOLTAGE Vdc	CURRENT Adc		LINE %	LOAD %		
5V	5	12V	1.0	−12V	1.0	—	—	DUAL INPUT VOLTAGE STANDARD 115(230)	0.8 MAX	0.9 MAX	3.55 x 9.06 x 1.25	SEP34-700S2
	3.5		2.5		0.3				Note 1		3.9 x 6.3 x 2.0	CF34-630
	5		1.5		0.5						3.9 x 6.3 x 2.0	CF34-700
	4		3.5		0.5						3.9 x 6.3 x 2.0	CF34-800
5V	5	15V	1.0	−15V	1.0	—	—		0.8 MAX	0.9 MAX	3.55 x 9.06 x 1.25	SEP35-700S2
	4		1.5		0.5				Note 1		3.9 x 6.3 x 2.0	CF35-600
	4		1.5		1.5						3.9 x 6.3 x 2.0	CF35-700
5V	3.5	12V	2.5	−12V	0.3	−5V	0.1				3.9 x 6.3 x 2.0	CF44-640
	5.0		1.5		0.4		0.1					CF44-700
	4.0		3.5		0.4		0.1					CF44-800
5V	4.0	15V	1.5	−15V	0.4	−5V	0.1				3.9 x 6.3 x 2.0	CF45-600
	4.0		1.5		1.4		0.1					CF45-700

Note 1: Load curves available on request

AC/DC Switch-Mode Power Supplies (Encapsulated)

5V Thru 24V Single Outputs
±12V and ±15V Dual Outputs

- **Full Operation −25 to +71° C**
- **Line Transient Immunity >60dB**
- **Near Constant Efficiency to 70%: 105-125 Vac IN**

OUTPUT		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL[3] NO.
VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
5V[2]	1500	105 - 125 50 - 440Hz STANDARD SEE NOTE 1	0.15	0.15	2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56	ES11-150 EA11-150 EC11-150
	3000				2.5 x 3.5 x 1.56 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2.0	ES11-300 EA11-300 EC11-300
	4000				2.5 x 3.5 x 2.0 2.5 x 3.5 x 2.0 2.5 x 3.5 x 2.0	ES11-400 EA11-400 EC11-400
12V	800				2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56	ES12-080 EA12-080 EC12-080
	1500				2.5 x 3.5 x 2.0 2.5 x 3.5 x 2.0 2.5 x 3.5 x 2.0	ES12-150 EA12-150 EC12-150
24V	400				2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56	ES17-040 EA17-040 EC17-040

OUTPUT 1		OUTPUT 2		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL[3] NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
12V	500	−12V	500	105 - 125 50 - 440 Hz STANDARD SEE Note 1	0.15	0.15	2.5 x 3.5 x 2.0	ES22-100 EA22-100 EC22-100
15V	500	−15V	500				2.5 x 3.5 x 2.0	ES23-100 EA23-100 EC23-100

Notes:
1 Alternative input voltages available
2 Over volt protection option
3 "A" prefix = alternate pins out available
"C" prefix = chassis mounting,
add 0.43 to height for terminal strip

SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD., WINDHAM, N.H. 03087
(603) 893-2330 TWX (710) 366-0505

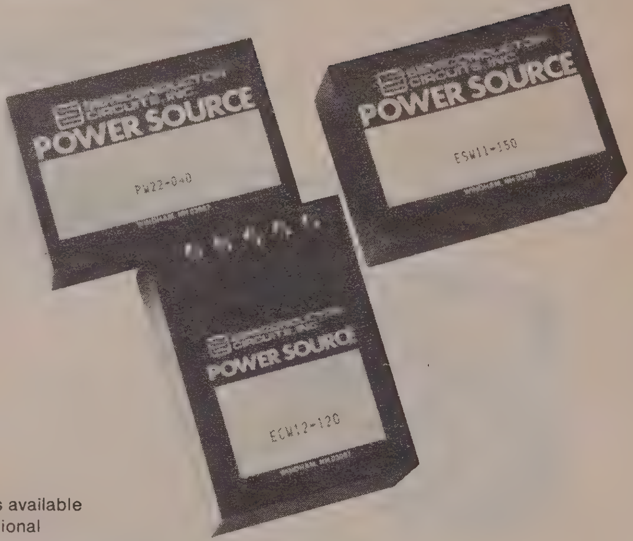
AC/DC UL544 Standard for Safety-Medical & Dental Equipment

5V and 12V Single Outputs ±12V and ±15V Dual Outputs

- Patient Contact Rated
- 2500 Vac Breakdown
- Faraday - Shielded Transformers

OUTPUT		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL[3] NO.
VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
5V[2]	1000	105 - 125V 50 - 440Hz STANDARD SEE Note 1	0.05	0.1	2.5 x 3.5 x 1.25	PW11-100
					2.5 x 3.5 x 1.25	PAW11-100
					2.5 x 3.5 x 1.56	CMW11-100
	1500		0.15	0.15	2.5 x 3.5 x 1.25	ESW11-150
					2.5 x 3.5 x 1.25	EAW11-150
					2.5 x 3.5 x 1.25	ECW11-150
	3000		0.15	0.15	2.5 x 3.5 x 1.25	ESW11-300
					2.5 x 3.5 x 1.56	EAW11-300
					2.5 x 3.5 x 2.0	ECW11-300
12V	800		0.15	0.15	2.5 x 3.5 x 1.25	ESW12-080
					2.5 x 3.5 x 1.56	ECW12-080

OUTPUT 1		OUTPUT 2		INPUT VOLTAGE Vac	REGULATION		PACKAGE W x L x H	MODEL[3] NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
12V	120	−12V	120	105-125V 50-440Hz STANDARD SEE Note 1	0.01	0.05	2.5 x 3.5 x 0.88	PW22-020
	200		200				2.5 x 3.5 x 1.56	CMW22-040
	240		240				2.5 x 3.5 x 1.25	PW22-040
	240		240				2.5 x 3.5 x 1.25	PAW22-040
15V	100	−15V	100		0.01	0.05	2.5 x 3.5 x 0.88	PW23-020
	100		100				2.5 x 3.5 x 0.88	PAW23-020
	200		200				2.5 x 3.5 x 1.25	PW23-040
	200		200				2.5 x 3.5 x 1.25	PAW23-040
	200		200				2.5 x 3.5 x 1.56	CMW23-040



Notes:
1 Alternative input voltages available
2 Over voltage position optional
3 "A" in prefix indicates alternate pin-out
"C" in prefix indicates chassis mounting

DC/DC Regulated Converters (Encapsulated)

5V and 12V Single Outputs

- FC - extremely low noise
- RD, RA - low reflected ripple
- LA, LD - minimum case height

OUTPUT		INPUT VOLTAGE Vdc	REGULATION		PACKAGE W x L x H	MODEL[1] NO.
VOLTAGE Vdc	CURRENT mA		LINE %	LOAD %		
5V	600	4.5 - 5.5	0.02	0.1	2 x 2 x 0.4	FC11-060- 5
		10.8 x 15.0				FC11-060-12
		21.6 - 30.0				FC11-060-24
		42.0 x 56.0				FC11-060-48
5V	1000	4.5 x 5.5	0.05	0.1	2 x 2 x 0.88	RD11-100- 5
		4.5 x 5.5				RA11-100- 5
		10.8 x 13.2				RD11-100-12
		10.8 x 13.2				RA11-100-12
		21.6 - 26.4				RD11-100-24
		21.6 x 26.4				RA11-100-24
		42.0 x 56.0				RD11-100-48
		42.0 x 56.0				RA11-100-48
12V	300	4.5 x 5.5	0.05	0.05	2 x 2 x 0.375	LD12-030- 5
		10.8 - 13.2				LD12-030-12
		21.6 x 26.4				LD12-030-24
12V	500	4.5 x 5.5	0.05	0.05	2 x 2 x 0.88	RD12-050- 5
		10.8 x 13.2				RD12-050-12
		21.6 - 26.4				RD12-050-24
		42.0 x 56.0				RD12-050-48

Notes:
1 "A" in prefix indicates alternate pin-out

SEMICONDUCTOR CIRCUITS, INC
POWER SOURCE
FC11-060-5
WINDHAM, NH 03087

SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD., WINDHAM, N.H. 03087
(603) 893-2330 TWX (710) 366-0505

DC/DC Regulated Converters (Encapsulated) 5V, ±12V and ±15V Dual and Triple Outputs

MAIN OUTPUT		OUTPUT 2		OUTPUT 3		INPUT	REGULATION		PACKAGE	MODEL[1]
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	LINE %	LOAD %	W x L x H	NO.
12V	35	−12V	35	—	—	4.5 - 5.5 10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.02	0.02	1.5 x 2.0 x 0.4	FC22-007- 5 FC22-007-12 FC22-007-24 FC22-007-48
12V	125	−12V	125	—	—	4.5 - 5.5 10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.02	0.02	2.0 x 2.0 x 0.4	FC22-025- 5 FC22-025-12 FC22-025-24 FC22-025-48
12V	150	−12V	150	—	—	4.5 - 5.5 4.5 - 5.5 10.8 - 13.2 10.8 - 13.2 21.6 - 26.4 21.6 - 26.4	0.05	0.05	2.0 x 2.0 x 0.375	LD22-030- 5 LA22-030- 5 LD22-030-12 LA22-030-12 LD22-030-24 LA22-030-24
12V	250	−12V	250	—	—	4.5 - 5.5 4.5 - 5.5 10.8 - 13.2 10.8 - 13.2 21.6 - 26.4 21.6 - 26.4 42.0 - 56.0 42.0 - 56.0	0.05	0.05	2.0 x 2.0 x 0.88	RD22-050- 5 RA22-050- 5 RD22-050-12 RA22-050-12 RD22-050-24 RA22-050-24 RD22-050-48 RA22-050-48
12V	425	−12V	425	—	—	10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.02	0.02	2.5 x 3.5 x 0.88	MC22-085-12 MC22-085-24 MC22-085-48
15V	30	−15V	30	—	—	4.5 - 5.5 10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.02	0.02	1.5 x 2.0 x 0.4	FC23-006- 5 FC23-006-12 FC23-006-24 FC23-006-48
15V	100	−15V	100	—	—	4.5 - 5.5 10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.02	0.02	2.0 x 2.0 x 0.4	FC23-020- 5 FC23-020-12 FC23-020-24 FC23-020-48
15V	150	−15V	150	—	—	4.5 - 5.5 4.5 - 5.5 10.8 - 13.2 10.8 - 13.2 21.6 - 26.4 21.6 - 26.4	0.05	0.05	2.0 x 2.0 x 0.375	LD23-030- 5 LA23-030- 5 LD23-030-12 LA23-030-12 LD23-030-24 LA23-030-24
15V	250	−15V	250	—	—	4.5 - 5.5 4.5 - 5.5 10.8 - 13.2 10.8 - 13.2 21.6 - 26.4 21.6 - 26.4 42.0 - 56.0 42.0 - 56.0	0.05	0.05	2.0 x 2.0 x 0.88	RD23-050- 5 RA23-050- 5 RD23-050-12 RA23-050-12 RD23-050-24 RA23-050-24 RD23-050-48 RA23-050-48
15V	330	−15V	330	—	—	10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.02	0.02	2.5 x 3.5 x 0.88	MC23-066-12 MC23-066-24 MC23-066-48
5V	500	+12V	300	−12V	300	−44 to −56	±1	±0.5	2.58 x 4.57 x 0.83	SP34-110-48
5V	1000	15V	300	−15V	300	10.8 - 15.0 21.6 - 30.0 42.0 - 56.0 10.8 - 15.0 21.6 - 30.0 42.0 - 56.0	0.15(5V) .15(15V)	0.05(5V) .15(15V)	2.5 x 3.5 x 2.0	MC34-160-12 MC34-160-24 MC34-160-48 MC35-160-12 MC35-160-24 MC35-160-48
5V	1000	+12V	400	−12V	200	21.6 - 30.0	.15(5V) .15(12V)	0.5(15V) .15(12V)	2.5 x 3.5 x 2.0	MC34-170-24

- **RD, RA - low reflected ripple**
- **LA, LD - minimum case height**
- **FC - extremely low noise**
- **MC - higher power levels**
- **SP-34 - for telecommunications**

SEMICONDUCTOR CIRCUITS, INC.
POWER SOURCE
RD23-050-5
WINDHAM, NH 03087
SEMICONDUCTOR CIRCUITS, INC.
POWER SOURCE
FC23-006-5
WINDHAM, NH 03087

Note 1
"A" in prefix indicates alternate pin-out

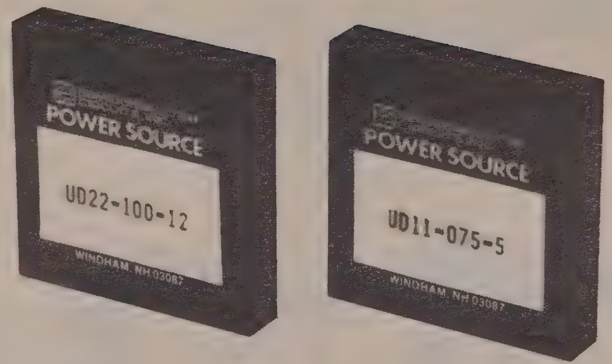
SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD., WINDHAM, N.H. 03087
(603) 893-2330 TWX (710) 366-0505

DC/DC Unregulated Isolated Converters (Encapsulated)

5V and 12V Single Outputs
5V, ±12V and ±15V Dual Outputs

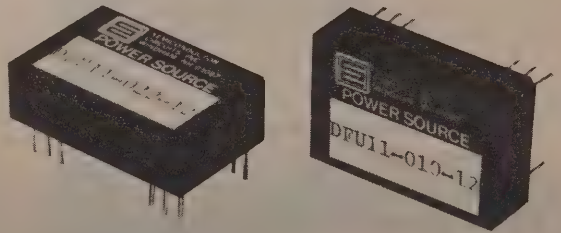
- Full Operation From −25° C to +71°C
- Maximum Power Density up to 5.5 w/cu. in. up to 200,000 hrs., MTBF
- Efficiency to 85%

OUTPUT		INPUT	REGULATION		PACKAGE W x L x H	MODEL NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	LINE %	LOAD %		
5V	180	4.5 - 5.5	1%/%Vin (TYP)	LOAD CURVES AVAIL ON REQUEST	1.1 x 1.1 x 0.5	DTS11-018- 5
		10.2 - 13.8				DTS11-018-12
		20.4 - 27.6				DTS11-018-24
	450	4.5 - 5.5				DTS11-045- 5
	750	4.5 - 5.5			2.0 x 2.0 x0.4	UD11-075- 5
12V	75	4.5 - 5.5			1.1 x 1.1 x 0.5	DTS12-007- 5
	75	10.2 - 13.8				DTS12-007-12
	200	4.5 - 5.5				DTS12-020- 5
	300	10.2 - 13.8				DTS12-030-12
	600	4.5 - 5.5			2.0 x 2.0 x 0.4	UD12-060- 5
	800	4.5 - 5.5			2.0 x 2.0 x 0.88	UD12-080- 5



OUTPUT 1		OUTPUT 2		INPUT	REGULATION		PACKAGE W x L x H	MODEL NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	LINE %	LOAD %		
12V	300	−5V	100	4.5 - 5.5	1%/% Vin (TYP)	LOAD CURVES AVAIL ON REQUEST	2.0 x 2.0 x 0.4	UD24-040- 5
	38	−12V	38	4.5 - 5.5			1.1 x 1.1 x 0.5	DTD22-008- 5
				10.2 - 13.8				DTD22-008-12
	100		100	4.5 - 5.5			1.1 x 1.1 x 0.5	DTD22-020- 5
	165		165	10.2 - 13.8			1.1 x 1.1 x 0.5	DTD22-033-12
				20.4 - 27.6				DTD22-033-24
	300		300	4.5 - 5.5			2.0 x 2.0 x 0.4	UD22-060- 5
	400		400	4.5 - 5.5			2.0 x 2.0 x 0.88	UD22-080- 5
	500		500	10.8 - 13.2			2.0 x 2.0 x 0.4	UD22-100-12
	650		650	10.8 - 13.2			2.0 x 2.0 x 0.88	UD22-130-12
15V	30	−15V	30	4.5 - 5.5			1.1 x 1.1 x 0.5	DTD23-006- 5
				10.2 - 13.8				DTD23-006-12
				20.4 - 27.6				DTD23-006-24
	80		80	4.5 - 5.5			1.1 x 1.1 x 0.5	DTD23-016- 5
	135		135	10.2 - 13.8			1.1 x 1.1 x 0.5	DTD23-027-12
				20.4 - 27.6				DTD23-027-24
	300		300	4.5 - 5.5			2.0 x 2.0 x 0.4	UD23-060- 5
	400		400	4.5 - 5.5			2.0 x 2.0 x 0.88	UD23-080- 5
	500		500	10.8 - 13.2			2.0 x 2.0 x 0.4	UD23-100-12
	650		650	10.8 - 13.2			2.0 x 2.0 x 0.88	UD23-130-12

DC/DC 24 Pin-Dip Compatible Single & Dual Output Converters Unregulated with Input Filter (Encapsulated)

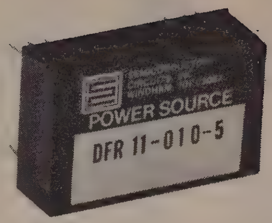


OUTPUT 1		OUTPUT 2		INPUT	REGULATION		PACKAGE W x L x H	MODEL* NO.
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	LINE %	LOAD %		
5V	220	—	—	4.5 - 5.5	1%/%Vin	Note 1	0.8 x 1.25 x 0.38	DFU11-022-05
				10.8 - 13.2				DFU11-022-12
12V	50	−12V	50	4.5 - 5.5				DFU22-010-05
				10.8 - 13.2				DFU22-010-12
15V	45	−15V	45	4.5 5.5				DFU23-009-05
				10.8 - 13.2				DFU23-009-12

Note 1 Load Curves available on request
* Where input/output filters are not required, replace prefix DFU with μD

SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD. WINDHAM, N.H 03087
(603) 893-2330 TWX (710) 366-0505

DC/DC 24 Pin-Dip Compatible Single & Dual Output Converters Regulated with Input Filter (Encapsulated)



OUTPUT 1		OUTPUT 2		INPUT	REGULATION		PACKAGE	MODEL*
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	LINE %	LOAD %	W x L x H	NO.
5V	100	—	—	4.5 - 5.5 10.8 - 13.2	<1	0.1	0.8 x 1.25 x 0.38	DFR11-010-05 DFR11-010-12
12V	40	−12V	40	4.5 - 5.5 10.8 - 13.2				DFR22-008-05 DFR22-008-12
15V	40	−15V	40	4.5 - 5.5 10.8 - 13.2				DFR23-008-05 DFR23-008-12

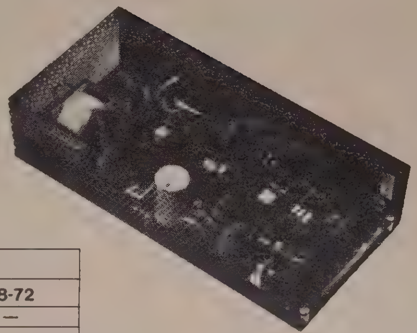
* Where input/output filters are not required, replace prefix DFR with μR

DC/DC Single and Multiple Output Converters (Enclosed)

5V, 12V and 15V Single and Multiple Outputs

- All Outputs Independently Regulated
- Over Voltage Protection Standard
- Wide Input Voltage Range

OUTPUT VOLTAGE Vdc	OUTPUT CURRENT mA	REGULATION		PACKAGE W x L x H	MODEL NO. - INPUT VOLTAGE RANGE		
		LINE %	LOAD %		9.2-16	19.2-31.2	38.4-62.4
5V	3,000	0.8	0.9	3.2 x 4.6 x 1.0	VTM11-300-12	VTM11-300-24	VTM11-300-48
12V	1,200	0.8	0.9	3.2 x 4.6 x 1.0	VTM12-120-12	VTM12-120-24	VTM12-120-48
15V	1,000	0.8	0.9	3.2 x 4.6 x 1.0	VTM13-100-12	VTM13-100-24	VTM13-100-48
24V	620	0.8	0.9	3.2 x 4.6 x 1.0	VTM17-062-12	VTM17-062-24	VTM17-062-48



OUTPUT 1		OUTPUT 2		OUTPUT 3		REGULATION		PACKAGE	MODEL NO. - INPUT VOLTAGE RANGE			
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	LINE %	LOAD %	W x L x H	9.2-16	19.2-31.2	38.4-62.4	18-72
12V	1 750	−12V	−500	—	—	0.8	0.9	3.2 x 4.6 x 1.0	VTM22-125-12	VTM22-125-24	VTM22-125-48	—
15V	500	−15V	−500	—	—				VTM23-100-12	VTM23-100-24	VTM23-100-48	—
5V	15,000 15,000	12V 15V	4,000 3,000	12V 15V	4,000 3,000	0.4	0.4	5 x 10.5 x 2.5	—	—	—	DS34-2300-36 DS35-2100-36
5V	1,800 1,800	12V 15V	150 120	−12V −15V	−150 −120	Note 1		3.2 x 4.6 x 1.0	MTP34-210-12 MTP35-204-12	MTP34-210-24 MTP35-204-24	MTP34-210-48 MTP35-204-48	—

Note 1 Main output: line 0.2%, cross/load 0.8%
Auxiliaries: line 0.05%,cross/load 0.05%

DC/DC Converter for Telecommunications

- High Efficiency >75%
- High Reliability >200,000 hrs.
- Short Circuit Protected

OUTPUT 1		OUTPUT 2		OUTPUT 3		INPUT	REGULATION		PACKAGE	MODEL
VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	CURRENT mA	VOLTAGE Vdc	LINE %	LOAD %	W x L x H	NO.
5V	500	12V	100	−12V	100	−44 to −56	±5	NOTE 1	2.05 x 3.35 x .50	TC34-070-48

Note 1 Load Curves available on request

SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD WINDHAM, N H 03087
603) 893 2330 TWX (710) 366-0505

DC/DC Wide Input Range Converters (Encapsulated)

5V, 12V and 15V Single Outputs

OUTPUT VOLTAGE Vdc	OUTPUT CURRENT mA	INPUT VOLTAGE Vdc	REGULATION LINE % / LOAD %	PACKAGE W x L x H	MODEL* NO.
+5	2000	+(9.5 - 18) +(9.5 - 18) +(18 - 32) +(18 - 32)	0.3/0.3%	2.0 x 2 x 0.88 2.5 x 3.5 x 1.25 2.3 x 2.5 x 1.25 2.5 x 3.5 x 1.25	SW11-200-12 CW11-200-12 SW11-200-24 CW11-200-24
+5V	3000	+(9.5 - 18) +(9.5 - 18) +(18 - 32) +(18 - 32)	0.3/0.3%	2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56 2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56	SW11-300-12 CW11-300-12 SW11-300-24 CW11-300-24
+5V	4000	+(9.5 - 18) +(9.5 - 18) +(18 - 32) +(18 - 32)	0.5/0.5%	2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56 2.5 x 3.5 x 1.25 2.5 x 3.5 x 1.56	SW11-400-12 CW11-400-12 SW11-400-24 CW11-400-24
+5V	6500	+(9.5 - 18) +(18 - 32)	0.5/0.5%	2.5 x 3.5 x 2	CW11-650-12 CW11-650-24
+5V	8000	+(9.5 - 18) +(18 - 32)	0.5/0.5%	2.5 x 3.5 x 2	CW11-800-12 CW11-800-24
+12V	2000	+(18 - 32) +(18 - 32)	0.3/0.3%	2.3 x 2.5 x 1.25 2.5 x 3.5 x 1.56	SW12-200-24 CW12-200-24
+12V	3500	+(18 - 32) +(18 - 32)	0.5/0.5%	2.5 x 3.5 x 2	SW12-350-24 CW12-350-24
+15V	2000	+(18 - 32) +(18 - 32)	0.3/0.3%	2.3 x 2.5 x 1.25 2.5 x 3.5 x 1.56	SW13-200-24 CW13-200-24

* "CW" designates chassis mount, add 0.43 to height for terminal strip

- **Input Protection, Shutdown**
- **Full Operation −25° to +71° C**
- **Over Voltage Protection, Standard**

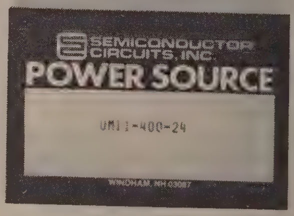
POWER SOURCE
SW12 200 24
WINDHAM NH 03087
POWER SOURCE
SW11-200-12
WINDHAM NH 03087

DC/DC Wide Input Range Isolated Converters (Encapsulated)

5V, 12V and 15V Single and Multiple Outputs

OUTPUT VOLTAGE Vdc	OUTPUT CURRENT mA	INPUT VOLTAGE Vdc	REGULATION LINE %	REGULATION LOAD %	PACKAGE W x L x H	MODEL* NO.
5V	3000	9 - 18 9 - 18 18 - 36 18 - 36 35 - 70 35 - 70	0.1	0.1	2.5 x 3.5 x 1.56 2.5 x 3.5 x 2 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2	UM11-300-12 UMC11-300-12 UM11-300-24 UMC11-300-24 UM11-300-48 UMC11-300-48
5V	4000	18 - 36 18 - 36 35 - 70 35 - 70	0.1	0.1	2.5 x 3.5 x 2	UM11-400-24 UMC11-400-24 UM11-400-48 UMC11-400-48
5V	5000	Note 1	0.2	0.2	3.5 x 5.5 x 1.25	U11-500-XX CU11-500-XX
12V	1000	9 - 18 9 - 18 18 - 36 18 - 36 35 - 70 35 - 70	0.1	0.1	2.5 x 3.5 x 1.56 2.5 x 3.5 x 2 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2	UM12-100-12 UMC12-100-12 UM12-100-24 UMC12-100-24 UM12-100-48 UMC12-100-48
12V	2000	35 - 70	0.1	0.1	2.5 x 3.5 x 2	UM12-200-48 UMC12-200-48
12V	2000	Note 1	0.2	0.2	3.5 x 5.5 x 1.25	UM12-200-XX CU12-200-XX
15V	1000	9 - 18 9 - 18 18 - 36 18 - 36 35 - 70 35 - 70	0.1	0.1	2.5 x 3.5 x 1.56 2.5 x 3.5 x 2 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2 2.5 x 3.5 x 1.56 2.5 x 3.5 x 2	UM13-100-12 UMC13-100-12 UM13-100-24 UMC13-100-24 UM13-100-48 UMC13-100-48
15V	2000	35 - 70	0.1	0.1	2.5 x 3.5 x 2	UM13-200-48 UMC13-200-48

- **Output Power to 42 Watts**
- **Ideal for Battery Applications**
- **Wide Input Range - 2:1**



MAIN OUTPUT VOLTAGE Vdc	MAIN OUTPUT CURRENT mA	OUTPUT 2 VOLTAGE Vdc	OUTPUT 2 CURRENT mA	OUTPUT 3 VOLTAGE Vdc	OUTPUT 3 CURRENT mA	OUTPUT 4 VOLTAGE Vdc	OUTPUT 4 CURRENT mA	INPUT VOLTAGE Vdc	PACKAGE W x L x H	MODEL* NO.
5V	1000	−5V	1000	12V	600	—	—	Note 1	3.5 x 5.5 x 1.25	U34-260-XX CU34-260-XX
	2000	−5V	100	12V	600	—	—			U34-270-XX CU34-270-XX
	2000	15V	300	−15V	300	—	—			U35-260-XX CU35-260-XX
	1000	−5V	1000	12V	300	−12V	300			U44-260-XX CU44-260-XX
	2000	−5V	100	12V	300	−12V	300			U44-270-XX CU44-270-XX

* "C" in prefix designates chassis mount, add 0.43 to height for terminal strips

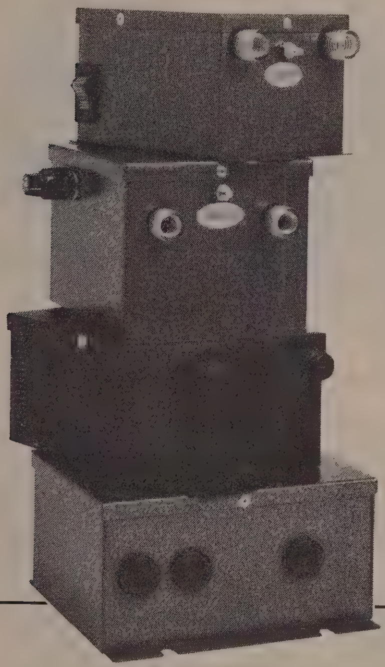
Note 1:
For 9-36Vdc input range, replace XX with suffix 18
For 18-72Vdc input range, replace XX with suffix 36
For 28-90Vdc input range, replace XX with suffix 48

SEMICONDUCTOR CIRCUITS, INC.
49 RANGE RD., WINDHAM, N.H. 03087
(603) 893-2330 TWX (710) 366-0505

THE MOST RELIABLE POWER SUPPLIES FOR HIGH VOLTAGE DC POWER

- Delivery from stock
- Standard or custom design
- Regulated, short circuit and arc protected
- All units available — 120/220, 50/60 Hz
- Special input voltages available

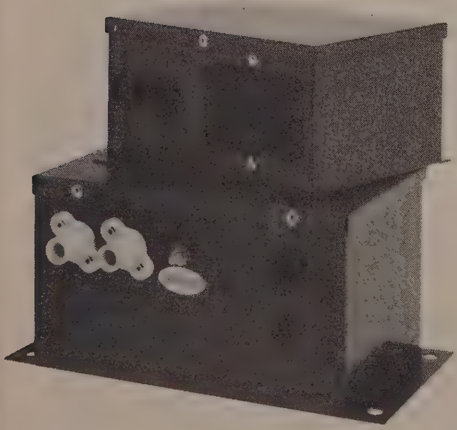
S&H manufactures a wide range of High Voltage Power Supplies, both in stock and custom designs. Our Application Engineers can work with your special requirements and match them to either a cataloged unit or they will be pleased to quote to your exact specifications.



SINGLE OUTPUT VOLTAGE

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	POWER OUTPUT
DC-1205	120V/60 Hz	5000 VDC	20 VA
DC-1206	120V/60 Hz	6000 VDC	20 VA
DC-1207	120V/60 Hz	7000 VDC	20 VA
DC-1208	120V/60 Hz	8000 VDC	20 VA
DC-1209	120V/60 Hz	9000 VDC	20 VA
DC-12010	120V/60 Hz	10,000 VDC	20 VA
DC-12012	120V/60 Hz	12,000 VDC	20 VA
DC-12014	120V/60 Hz	14,000 VDC	20 VA
DC-12016	120V/60 Hz	16,000 VDC	20 VA
DC-12018	120V/60 Hz	18,000 VDC	20 VA

Units are also available for 230 and/or 50 Hz. The output of above models are isolated. Either output terminal may be grounded for positive or negative applications.



DUAL OUTPUT VOLTAGE

MODEL NUMBER	PRIMARY INPUT	POLARITY	OUTPUT VOLTAGE
DC-1205/9	120V/60 Hz	Positive	9000/5000
DCN-1205/9	120V/60 Hz	Negative	9000/5000
DC-1205/10	120V/60 Hz	Positive	9500/5000
DCN-1205/10	120V/60 Hz	Negative	9500/5000
DC-1205/11	120V/60 Hz	Positive	10,500/5000
DCN-1205/11	120V/60 Hz	Negative	10,500/5000

Above units also available for 230V and/or 50 Hz.

All S&H power sources utilized epoxy molded ferroresonant transformers and are therefore line and load regulated.

Ideal for use in precipitators, microfiche copiers, plain paper copiers and many other electrostatic charge and discharge applications.

SEE OUR OTHER PAGE IN SECTION 4100 PAGE 3•1928

S&H INDUSTRIES, INC.

119 GLEN COVE DRIVE • GLEN HEAD, NEW YORK 11545 • (516) 671-5600

OEM Switching Power Supplies

Features
- Dual Range AC input
- UL recognized, CSA certified
- Compliance to FCC 20780/Class A and VDE 0871/A for conducted noise
- VDE 0806/IEC 380 safety standards (7M and 5K only)
- Two year warranty
- 24-hour burn-in
- 65% to 80% efficiency
- Output status LED indicator
- Overvoltage protection
- Overload protection
- Enable/inhibit function
- Reverse polarity protection
- Convection cooled

Specifications

The following is a brief summary of specifications. Comprehensive specifications for each model are included in the full product line catalog.
- Input 90-132/180-264 VAC, 47-63 Hz
- Input carry-over 16ms minimum
- Ripple and noise from 50mVp-p typical
- 0 to 40°C full rated load. Derate linearly to 50% load at 70°C
- Efficiency ranges from 65% to 80% dependent on model number
- Line regulation from 0.15%
- Load regulation from 0.15%
- Transient response from 500μs for a 50% to 100% load change with a maximum deviation of 4% of V_{out}.
- Turn-on time 100ms maximum
- Power fail option

Single output ratings

Voltage	Current	Model
5V	7.0A	5A5A
	12.0A	5B5A
	20.0A	5C5A
	35.0A	5E5A
	50.0A	5F5A
	65.0A	5G5A
	100.0A	5K5A
12V	3.3A	5A12A
	5.6A	5B12A
	8.3A	5C12A
	14.5A	5E12A
	21.0A	5F12A
	27.0A	5G12A
	41.0A	5K12A
15V	2.6A	5A15A
	4.5A	5B15A
	6.8A	5C15A
	11.8A	5E15A
	17.0A	5F15A
	22.0A	5G15A
	34.0A	5K15A
24V	1.6A	5A24A
	2.9A	5B24A
	4.5A	5C24A
	7.9A	5E24A
	11.0A	5F24A
	15.0A	5G24A
	22.0A	5K24A

Dimensions and weights:

Case	5A	5B	5C	5E	5F	5G	5K	5AX	7M45	5BX	7M65	5CX	7M100	7M150	5EX	7M200	5FX	5GX
Height	4 75	4 87	4 87	4 87	4 87	4 87	7 50	4 75	3 9	4 87	4 25	4 87	5 00	5.50	4.87	5.50	6.00	7.50
Width	5 00	6 50	8 50	10 50	13 50	15 00	15 00	6 10	6 3	8 00	8 25	11 00	9 5	10.50	15.00	11.50	15.00	15.00
Depth	2 10	1 75	2 00	2 25	2 25	2 37	3 00	2 10	2 00	1 75	2 00	2 00	2 25	2 75	2 25	2 75	2 25	2 50
MTG SDS	1	4	4	4	4	4	4	1	1	4	1	4	2	2	4	2	4	4
Weight	0 80	1 65	2 81	3 86	4 57	6 05	8 5	1 00	1 00	1 88	1 30	3 55	2 00	2 50	5 22	4 25	6 12	8 55

Multiple Output Ratings

1st Output		2nd Output		3rd Output		4th Output		5th Output		Max. Power	Model
Voltage	Current	Voltage	Current	Voltage	Current	Voltage	Current	Voltage	Current		
+5V	4.0A	+12V	0.5A	−12V	0.5A	−5V	0.5A	+15V	1.0A	40W	5AXMPA
+5V	5.0A	+12V	2.0A	−12V	0.5A	—	—	—	—	45W	7M45
+5V	7.0A	+12V	1.5A	−12V	0.5A	−5V	0.25A	—	—	60W	5BXMPA
+5V	8.0A**	+12V	3.0A**	−12V	0.6A	−5V*	0.1A*	—	—	70W	7M70
+5V	7.0A	+15V	1.0A	−15V	1.0A	—	—	—	—	65W	5BX515TA
+5V	10.0A	+12V	2.0A	−12V	1.0A	−5V	1.0A	—	—	90W	5CXMPA
+5V	10.0A	+15V	2.0A	−15V	1.0A	—	—	—	—	90W	5CX515TA
+5V	10.0A	+12V	1A/2APk	+12V	3A/5APk	−12V	2.0A	−5V*	0.6A*	100W	7M100
+5V	15.0A	+12V	3A/5.8APk	−12V	2.0A	−5V	0.7A	+24V	2A/3.75APk	150W	7M150
+5V	20.0A	+12V	3.0A	−12V	2.0A	−5V	1.0A	—	—	165W	5EXMPA
+5V	20.0A	+12V	4A/7.5APk	−12V	4.0A	−5V	0.7A	+24V	3.2A/6APk	200W	7M200
+5V	30.0A	+12V	5.0A	−12V	3.0A	−5V	2.0A	+24V	3.2A	250W	5FXMPA
+5V	45.0A	+12V	7.0A	−12V	5.0A	−5V	2.0A	+24V	3.2A	325W	5GXMPA

*Optional **9A Max Current between +5V and 12V outputs.

For applications information,
dial direct toll free
(800) 423-5569
In California, call collect (818) 998-6811
Specifications subject to change without notice.

Sierracin/Power Systems
20500 Plummer Street, Chatsworth, California 91311
Telephone (818) 998-9873

OEM Linear Power Supplies

Features
- Dual range AC input
- Overvoltage protection
- Foldback current limiting
- Remote sense—most models
- Two year warranty
- UL recognized

Specifications
The following is a brief summary of specifications. Comprehensive specifications for each model are included in the full product line catalog.
- Input 105-125/210-250 VAC, 47-440 Hz.
- Line regulation 0.15% typical.
- Load regulation 0.15% typical
- Ripple 3mVp-p typical, 10mVp-p maximum.
- 0 to 40°C full rated load. Derate linearly to 50% load at 70°C ambient temperature.
- Dimensions on back page.

OEM III Power Supplies

Single output ratings

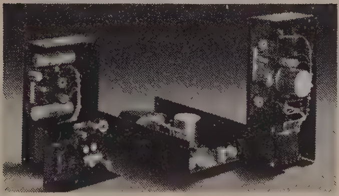
Voltage	Current	Model
5 Volts	3.0A	3B5
	6.0A	3C5
	9.0A	3CC5
	12.0A	3D5
	18.0A	3DD5
12 Volts	1.7A	3B12
	3.4A	3C12
	5.1A	3CC12
	7.0A	3D12
	10.0A	3DD12
15 Volts	1.5A	3B15
	3.0A	3C15
	4.5A	3CC15
	6.0A	3D15
	9.0A	3DD15
24 Volts	1.2A	3B24
	2.4A	3C24
	3.6A	3CC24
	4.8A	3D24
	7.0A	3DD24

Multiple output ratings

1st Output		2nd Output		3rd Output		Model
Voltage	Current	Voltage	Current	Voltage	Current	
+12V	1.0A	−12V	1.0A	—	—	2BB12D
12V	1.6A	12V	1.6A	—	—	3K12D
12V	3.2A	12V	3.2A	—	—	3L12D
+15V	0.8A	−15V	0.8A	—	—	2BB15D
15V	1.5A	15V	1.5A	—	—	3K15D
15V	3.0A	15V	3.0A	—	—	3L15D
5V	3.0A	12V	0.5A	12V	0.5A	2CC512T
5V	3.0A	+12V	1.0A	−12V	1.0A	3KX512T
5V	7.0A	12V	1.0A	12V	1.0A	2D512T
5V	8.0A	+12V	1.7A	−12V	1.7A	2P512T
5V	15.0A	+12V	3.4A	−12V	3.4A	2Q512T
5V	3.0A	15V	0.5A	15V	0.5A	2CC515TA
5V	7.0A	15V	1.0A	15V	1.0A	2D515TA
5V	8.0A	+15V	1.5A	−15V	1.5A	2P515T
5V	15.0A	+15V	3.0A	−15V	3.0A	2Q515T

Shading indicates output includes OVP

Floppy Disk Supplies

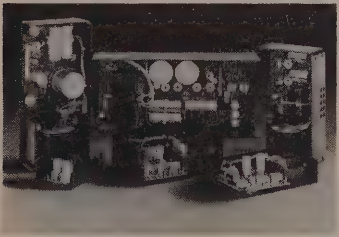


Output ratings

1st Output		2nd Output		3rd Output		4th Output*		Model
Voltage	Current	Voltage	Current	Voltage	Current	Voltage	Current	
+5V	0.5A Avg 0.7A PK	+12V	0.9A Avg 1.8A PK	—	—	—	—	2BXFD
5V	1.4A	+12V	1.8A Avg 3.2A PK	—	—	—	—	2BBXFD
+5V	2.2A	− 5V	0.2A	+24V	1.2A Avg 3.0A PK	+8V	2.0A	2DFD
5V	3.0A	5V	0.6A	24V	4.0A	—	—	2PFD
+5V	6.0A	−12V	1.0A	24V	4.0A	—	—	2QXFD

Shading indicates output includes OVP *Unregulated Output

Microprocessor Supplies



Output ratings

1st Output		2nd Output		3rd Output		4th Output		Model
Voltage	Current	Voltage	Current	Voltage	Current	Voltage	Current	
5V	2.0A	9-15V or 5V	0.5A 0.35A	—	—	—	—	2BBMPD
5V	2.0A	9-15V	0.25A	9-15V or 5V	0.25A 0.25A	—	—	2BBMP
5V	3.0A	12V	0.6A	9-12V or 5V	0.6A 0.38A	—	—	2CCMP
5V	7.0A	12V	1.0A	9V or 5V	1.2A 0.75A	—	—	2DMP
5V	8.0A	+12V	1.7A	−12V	1.0A	5V	0.6A	2PMP
5V	15.0A	+12V	3.4A	−12V	1.7A	5V	1.0A	2QMP

Shading indicates output includes OVP

For applications information,
dial direct toll free
(800) 423-5569
In California, call collect (818) 998-6811
Specifications subject to change without notice.

Sierracin/Power Systems
20500 Plummer Street, Chatsworth, California 91311
Telephone (818) 998-9873

Micro-Reg Low Power Supplies

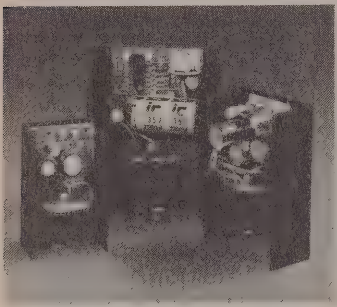
Features

- Smallest open frame construction available
- Overvoltage protection
- Monolithic voltage regulation
- Single, dual and triple outputs
- Economical replacement for encapsulated supplies
- Two year warranty
- UL recognized
- Overcurrent protection

Specifications

The following is a brief summary of specifications. Comprehensive specifications for each model are included in the full product line catalog.

- Input 105-125 VAC, 47-440 Hz.
- Line regulation for 1C single output models 0.15% for a low-high line change. All others 0.5%.
- Load regulation for 1C single output models 0.15% for a 0 to 100% load change. All others 0.5%.
- Ripple 3mVp-p typical, 10mVp-p maximum on 1C single output models. 10mVp-p typical, 50mVp-p maximum on all others.
- 0° to 40°C full rated load. Derate linearly to 50% load at 70°C ambient temperature.



Single output ratings

Voltage	Current	Model
5V	0.5A	1A5
5V	1.1A	1B5
5V	2.2A	1C5
12V	0.25A	1A12
12V	0.6A	1B12
12V	1.2A	1C12
15V	0.2A	1A15
15V	0.5A	1B15
15V	1.0A	1C15
24V	0.5A	1C24

Shading indicates output includes OVP

Multiple output ratings

1st Output		2nd Output		3rd Output		Model
Voltage	Current	Voltage	Current	Voltage	Current	
+12V	0.13A	−12V	0.13A	—	—	1A12D
+12V	0.30A	−12V	0.30A	—	—	1B12D
+12V	0.60A	−12V	0.60A	—	—	1C12D
+15V	0.10A	−15V	0.10A	—	—	1A15D
+15V	0.25A	−15V	0.25A	—	—	1B15D
+15V	0.50A	−15V	0.50A	—	—	1C15D
+ 5V	0.25A	+12V	0.06A	−12V	0.06A	1A512T
+ 5V	0.50A	+12V	0.13A	−12V	0.13A	1B512T
+ 5V	1.00A	+12V	0.25A	−12V	0.25A	1C512T
+ 5V	0.25A	+15V	0.05A	−15V	0.05A	1A515T
+ 5V	0.50A	+15V	0.13A	−15V	0.13A	1B515T
+ 5V	1.00A	+15V	0.25A	−15V	0.25A	1C515T
+ 5V	1.00A	+12V	0.25A	− 5V	0.40A	1CMP

Shading indicates output includes OVP

S-100 Bus Power Supplies

Features:

- Standard units provide 128W and 288W output power
- Dual range AC input
- Unregulated supplies for "on-board" regulators

Specifications

- Input 115/230 VAC ±10%, 47-440 Hz.
- Outputs below 20A are fused.

Output ratings

Model	Output 1 +8V @	Output 2 +16V @	Output 3 −16V @
2D-S100	8A	2.0A	2.0A
2F-S100	20A	4.0A	4.0A

Custom Power Supplies

Sierracin is presently supplying open frame custom power supplies in high volume to a large number of customers for application in floppy disk drives, CRT terminals, electronic games, computers, etc. Contact Sierracin for a quotation on custom power supplies for your specific requirements.

Outline Dimensions and Weights

The table describes overall outline dimension of the power supply envelope. Detailed dimension and mounting patterns are included in the full product line catalog.

	1A	1B	1C	2BB	2BX	2CC	2D	2P	2Q	2QX	3B	3C	3CC	3D	3DD	3K	3KX	3L	2DS	2FS
Height	1.80	2.20	3.20	4.00	4.00	4.87	4.87	4.87	6.25	6.25	4.00	4.87	4.87	4.87	4.87	4.00	4.00	4.87	4.87	4.87
Width	2.80	3.50	4.00	6.50	5.50	7.00	9.00	11.00	13.50	10.50	4.87	5.62	7.00	9.00	14.00	7.88	10.25	9.38	9.00	11.25
Depth Overall	1.48	1.88	2.07	1.93	1.93	3.20	3.20	3.13	4.00	3.25	2.07	2.95	3.20	3.20	3.20	2.95	2.95	3.20	3.20	4.12
Chassis	1.10	1.35	1.65	1.62	1.62	2.75	2.75	2.75	3.37	2.87	1.62	2.50	2.75	2.75	2.75	2.50	2.50	2.75	2.75	3.75
Mtg Sides	3	3	3	3	2	4	4	4	3	3	3	3	4	4	4	4	4	4	4	2
Weight	0.50	0.90	1.55	2.15	1.95	4.25	7.20	7.85	11.3	9.4	1.9	4.0	4.25	7.75	10.2	4.1	4.25	7.35	7.55	12.2

NOTE All dimensions are in inches and are ± 0.030 inches.

For applications information,
dial direct toll free
(800) 423-5569
In California, call collect (213) 998-6811
Specifications subject to change without notice.

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20500 Plummer Street, Chatsworth, California 91311
Telephone (818) 998-9873

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USE ONE OF THE NEW

EEMEDIATE ACTION CARDS

INSIDE THE BACK COVER OF
VOLUMES 1A, 1B & 2

SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
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SPECS?
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LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

150 Watt Switcher

Features

- Single, triple and quad outputs
- Three board levels—PC board only, open frame and enclosed
- Construction Flexibility
- Remote Sensing
- Soft Start
- UL/CSA Recognized
- Overcurrent Protection
- Overvoltage Protection

Electrical Characteristics

Input Voltage: 120/240 VAC RMS
Input Voltage Range: 90-137 VAC
180-257 VAC
Input Frequency: 50-400 Hz.
Soft Start: 500 mSec. maximum to full output.
Maximum Input Current: 4. Amp @ 120 VAC
2.5 Amp @ 240 VAC
(External fuse)
Regulation: 0.25 - 0.5%; unit dependent
Hold-Up Time: 10 mSec @ 100 VAC input (full load)
Output Power: 150 Watts

Environmental Characteristics

Storage Temperature: −30 to +105 degrees C.
Operating Temperature: 0 to 40 degrees C.: full output.
40 to 85 degrees C.: derate linearly to 0 watts.

Electrical Specifications
(Single Output Series)

Initial Set Accuracy: ±1%
Adjustability: ±5%
Line Regulation: 0.25%
Load Regulation: 0.25%
Ripple (p-p): 50 mV. max.
Transient Response: 500 μSec - 25% to 100% load.
Maximum Overshoot: 2% - 50% to 100% load.
Overload Protection: 110% of load rating.

Catalog Number**	Output Volts/Amps	Maximum Amp Rating
86-05-325	+5.0/25	28
86-12-312	+12.0/12.5	15
86-13-310	+13.8/10	11
86-15-310	+15.0/10	12.5
86-24-262	+24.0/6.25	8

**For Open Frame add (−1) to catalog number.
For Board Level add (−2) to catalog number.

Electrical Specifications Triple and Quad Output Series

	Triple Output Series			Quad Output Series			
	Primary	Aux. A	Aux. B	Primary	Aux. A	Aux. B	Aux. C
Voltage:	5.0	12 to 15	−5 to −15	5.0	5 to 18	5 to 18	12-24
Initial Set Accuracy:	1%	5%	5%	1%	5%	5%	5%
Adjustable:	±5%	No	No	±5%	No	No	No
Line Reg. (Maximum):	.25%	.5%	.5%	.25%	1%	1%	1%
Load Reg. (Maximum):	.25%	1%	1%	.25%	1%	1%	1%
Max. Rated Current:	20A	4A	4A	20A	1.5A	1.5A	1.5A
Max. Current Limit:	115%	2*	2*	115%	2*	2*	2*
Ripple (p-p) mV.:	50	50	50	50	20	20	20
Transient Response (uS):	500	500	500	500	50	50	50
Efficiency:		65%			65%		
Overshoot:	2%	2%	2%	2%	2%	2%	2%

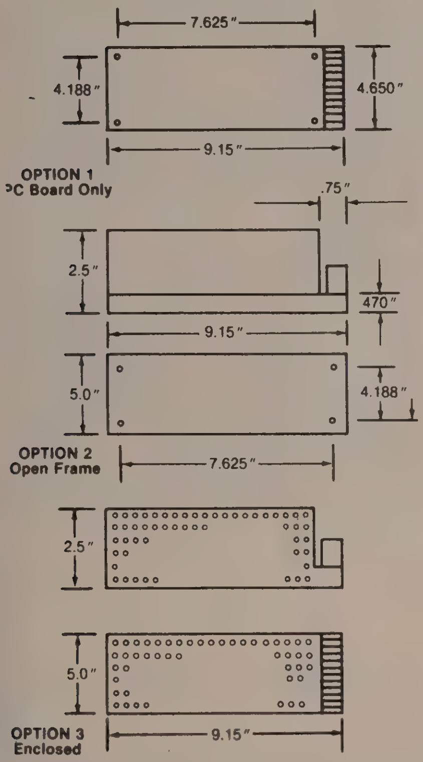
*Two times current output.

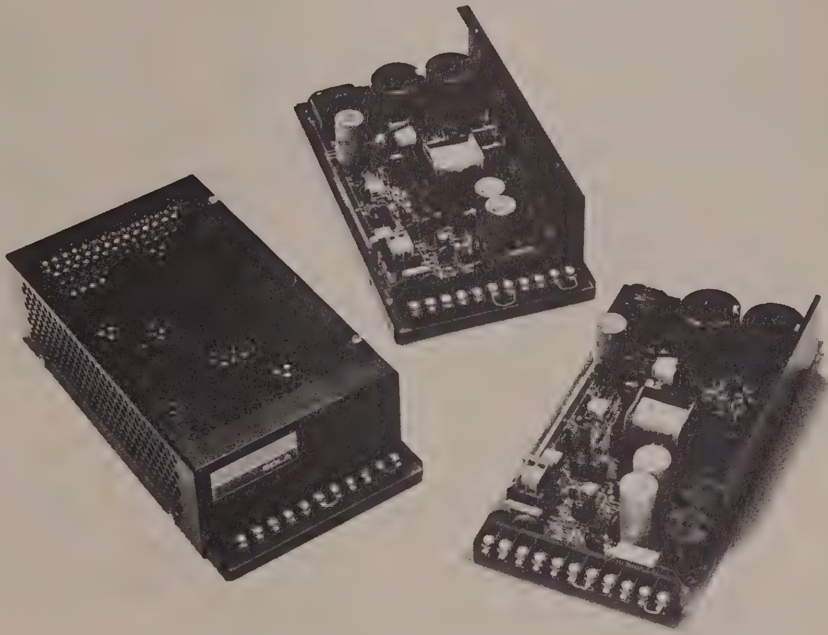
SOLA

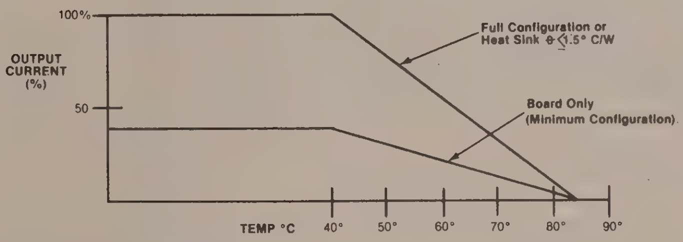
1717 BUSSE ROAD, ELK GROVE VILLAGE, IL 60007
Phone: 312/439-2800 Telex 28-0538

Dimensions

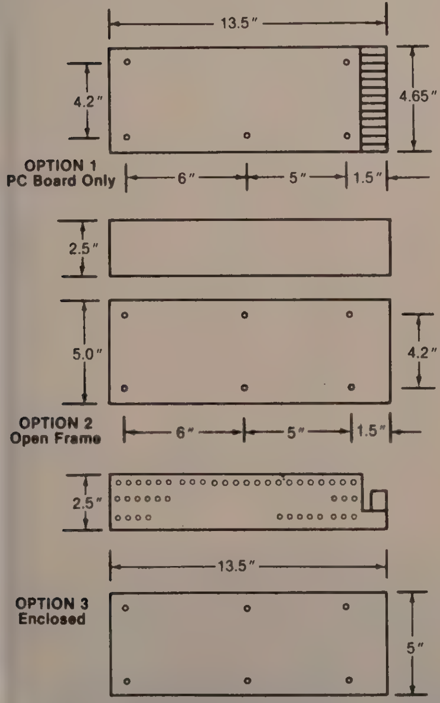
SINGLE OUTPUT


7.625″
4.188″
4.650″
9.15″
OPTION 1
PC Board Only
.75″
2.5″
470″
9.15″
5.0″
4.188″
OPTION 2
Open Frame
7.625″
2.5″
5.0″
OPTION 3
Enclosed
9.15″




100%
OUTPUT CURRENT (%)
50
Full Configuration or Heat Sink θ ≤1.5° C/W
Board Only (Minimum Configuration)
TEMP °C
40°
50°
60°
70°
80°
90°

TRIPLE AND QUAD OUTPUT


13.5″
4.2″
4.65″
OPTION 1
PC Board Only
6″
5″
1.5″
2.5″
5.0″
4.2″
OPTION 2
Open Frame
6″
5″
1.5″
2.5″
13.5″
OPTION 3
Enclosed
5″

Standard Voltages— Triple Output Series (Volt/Amps)

Catalog Number**	Primary (adj)	Aux A	Aux B	Aux C
86-83-3320	5/20	12/2	– 12/2	
86-85-3320	5/20	15/2	– 15/2	
86-84-3320	5/20	12/2	– 5/3	
86-86-3320	5/20	15/2	– 5/3	
86-83-3310	5/10	12/4	– 12/4	
86-85-3310	5/10	15/4	– 15/4	

Standard Voltages— Quad Output Series (Volts/Amps)

Catalog Number**	Primary (adj)	Aux A	Aux B	Aux C
86-87-4320	5/20	12/1	– 12/1	24/1
86-87-4310	5/10	12/1	– 12/1	24/3
86-84-4320	5/20	12/1.5	– 12/1.5	– 5/1.5
86-88-4320	5/20	15/1	– 15/1	24/1
86-86-4320	5/20	15/1.5	– 15/1.5	– 5/1.5

**For Open Frame add (– 1) to catalog number. For Board Level add (– 2) to catalog number.

SPELLMAN High Voltage Electronics Corporation

HIGH VOLTAGE POWER SUPPLIES

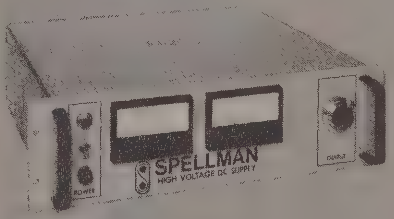
- Voltages as high as 400 KV
- Models from low to high power (0 to 100 KW)
- Rack and modular configurations
- Standard, custom and OEM designs
- Highly regulated and economy versions
- Designs for laboratory, production or military applications
- Protection against shorts, overload, and arcing
- Low ripple

TYPICAL APPLICATIONS:

- **HV devices** . . . CRT's, lasers, photomultipliers, X-ray tubes, capacitor chargers
- **HV instrumentation** . . . ionization chambers, electron beam accelerators, SEM's
- **Production processing** . . . X-ray lithography, ion implantation, electrostatics
- Medical x-ray imaging
- Nuclear magnetic resonance

SPELLMAN'S EXPERIENCE IN HV DESIGN MAKES THE DIFFERENCE

For over 42 years SPELLMAN has been a leader in high voltage technology as a **specialist** in supplying high voltage power sources for a wide variety of applications. The **RHP** models use SPELLMAN's proprietary new series resonant technology. This highly efficient design allows switching rates of over 20 KHz. At the same time it avoids spikes and RFI problems previously associated with switching and pulse width modulated supplies. The **RHR/UHR/RHSR** models utilize a solid state RF high voltage circuit that feeds to an RF oscillator circuit operating at 35-40 KHz.



STANDARD HV RACK POWER SUPPLIES

SUMMARY OF SPECIFICATIONS

INPUT: 105-125 VAC, 50-60 Hz (optional 100V or 220 VAC, 50-60 Hz); RHP: 208 VAC ±10%, 3φ, 50-60 Hz; (Others available on request).

OUTPUT: continuously adjustable current limited to 100% of rated load.

PROTECTION: overload, short circuit and arc.

FEATURES: contact factory for complete details on available options for each model and to receive a full line catalog.

SPECIFICATION	UHR	RHP	RHR	RHSR	CRT30/40 (anode)	CRT30/40 (focus)
MAXIMUM OUTPUT:						
Voltage (KV)	400	200	400	60	40	6.5**
Wattage (W)	150	3-30 KW	400	60	120	.3
MINIMUM OUTPUT VOLTAGE: (KV)	40	3	5	5	5	0
REGULATION:						
0 to full load (%)	±0.1	0.02	0.01 +1V	0.001	0.01 +1V	1
±10% line change (%)	±0.1	0.01	0.01 +1V	±.001	±.01 +1V	±0.01
RIPPLE: (RMS) (%)	0.1	0.1 (x)	0.02 +2V*	0.001	0.02 +2V	0.1 (.05 no load)
STABILITY:						
per hour (%)	0.2	0.02	0.02 +2V	0.005	0.02 +2V	
per 8 hours (%)	—	0.05	0.05 +5V	0.01	0.05 +5V	
TEMPERATURE:						
Coefficient/°C (%)	0.2	0.01	0.02 +2V	0.005	0.02% +2V	
Operating (°C)	0-50	0-50	−20 to +55	0-50	0-50	

* 0.1% at or over 100 KV
(x) lower ripple available
** Other voltages available — consult factory (1-30 KV @ .3-10 watts)

A MODEL FOR EVERY APPLICATION

		MOST APPLICABLE MODEL (a)				
	CUSTOM	UHR	RHP	RHR	RHSR	CRT.
General high quality lab	●		●	●	●	
CRT:						
General				●		
High resolution					●	
Production testing	●	●		●		●
Scanning electron microscope	●			●	●	
Mass spectrometer	●				●	
Ionization chamber				●		
Electron beam guns	●	●		●		
High power (welding, cutting)	●		●			
Capacitor charging	●	●	●	●		
Ion Implantation:	●		●	●		
Predeposition	●		●			
X-ray:						
Lab and Industrial	●		●	●		
Medical Imaging	●		●(b)			
Lithography	●		●(b)			
Photomultiplier		●		●	●	
Laser: High power (pulsed & CW)	●	●	●(b)	●		
Image Intensifier	●	●		●		
TWT and Klystron	●		●(b)			
Magnet and NMR	●					
Electrostatics:						
Production (flocking, spraying)	●	●				
Production:						
CRT test						●
Plasma etching			●			
Corona test				●		
Hi Pot Insulation Testing		●		●		

FOOTNOTES

(a) Depending upon the specific application, other models may be more suitable; see the individual specifications or consult the factory.
(b) Consult factory for (RHPX) special product designs

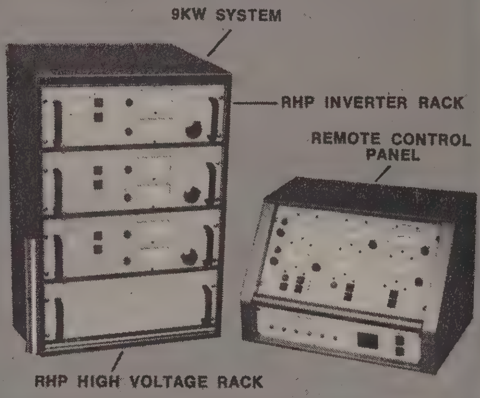
SPELLMAN HIGH VOLTAGE ELECTRONICS CORPORATION • 7 Fairchild Avenue, Plainview, New York 11803 • 516/349-8686 • TWX 510-221-2155

SPELLMAN High Voltage Electronics Corporation

Standard HV RACK power supplies

continued from previous page

Refer to the charts below to select appropriate models. If specifications do not meet exact requirements consult factory. Custom designs available upon request.



RACK MOUNTED POWER SUPPLY MODELS

RHP Series High wattage without large size (due to a uniquely efficient design technique), digital metering and IEEE bus available; can be paralled for up to 9 KW (15-100 KW also available).

RHR Series A general purpose unit for a variety of uses with a reasonable compromise between power, regulation, stability, ripple, size and price.

RHSR Series For demanding applications featuring exceptional regulation and stability with very low ripple; remote voltage and resistance programming and monitoring is standard.

UHR Series Most economical unit with satisfactory performance for many uses such as production test.

CRT 30/40 Designed specifically for testing CRT's; provides variable anode and focus voltages; remote voltage and resistance control with monitoring of both voltage and current.

RHR SERIES

POLARITY		FIXED (a)			REVERSIBLE	
Max. Output Voltage (KV)	Max. Output Current (mA)	(c) Rack Height In (mm)	(b) Model Number	Net Weight Lbs (kg)	(b) Model Number	Net Weight Lbs (kg)
5	2	5¼ (133)	RHR5*10	25 (12)	——	——
	6	5¼ (133)	RHR5*30	30 (14)	RHR5PN30	25 (12)
	10	5¼ (133)	RHR5*50	30 (14)	RHR5PN50	30 (14)
	20	5¼ (133)	RHR5*100	55 (25)	RHR5PN100	60 (27)
10	1	5¼ (133)	RHR10*10	25 (12)	——	——
	3	5¼ (133)	RHR10*30	30 (14)	RHR10PN30	25 (12)
	6	5¼ (133)	RHR10*60	30 (14)	RHR10PN60	30 (14)
	10	5¼ (133)	RHR10*100	30 (14)	RHR10PN100	30 (14)
	20	10½ (267)	RHR10*200	55 (25)	RHR10PN200	60 (27)
15	0.67	5¼ (133)	RHR15*10	25 (12)	——	——
	2	5¼ (133)	RHR15*30	25 (12)	RHR15PN30	25 (12)
	4	5¼ (133)	RHR15*60	30 (14)	RHR15PN60	30 (14)
	8	5¼ (133)	RHR15*120	30 (14)	RHR15PN120	30 (14)
	15	10½ (267)	RHR15*225	55 (25)	RHR15PN225	60 (27)
20	0.5	5¼ (133)	RHR20*10	25 (12)	——	——
	1.5	5¼ (133)	RHR20*30	25 (12)	RHR20PN30	25 (12)
	3	5¼ (133)	RHR20*60	30 (14)	RHR20PN60	30 (14)
	6	5¼ (133)	RHR20*120	30 (14)	RHR20PN120	30 (14)
	12	10½ (267)	RHR20*240	55 (25)	RHR20PN240	60 (27)
30	0.33	5¼ (133)	RHR30*10	25 (12)	——	——
	1	5¼ (133)	RHR30*30	25 (12)	RHR30PN30	25 (12)
	2	5¼ (133)	RHR30*60	30 (14)	RHR30PN60	30 (14)
	4	5¼ (133)	RHR30*120	30 (14)	RHR30PN120	30 (14)
	5	5¼ (133)	RHR30*150	50 (23)	RHR30PN150	55 (25)
	8	10½ (267)	RHR30*240	55 (25)	RHR30PN240	60 (27)
40	0.75	5¼ (133)	RHR40*30	40 (18)	RHR40PN30	40 (18)
	1.5	5¼ (133)	RHR40*60	40 (18)	RHR40PN60	40 (18)
	3	5¼ (133)	RHR40*120	40 (18)	RHR40PN120	40 (18)
	6	10½ (267)	RHR40*240	60 (27)	RHR40PN240	60 (27)
50	0.5	5¼ (133)	RHR50*25	40 (18)	RHR50PN25	52 (24)
	1	5¼ (133)	RHR50*50	40 (18)	RHR50PN50	52 (24)
	3	5¼ (133)	RHR50*150	55 (25)	RHR50PN150	70 (32)
	5	10½ (267)	RHR50*250	60 (27)	RHR50PN250	75 (34)
60	0.5	5¼ (133)	RHR60*30	40 (18)	RHR60PN30	52 (24)
	1	5¼ (133)	RHR60*60	40 (18)	RHR60PN60	52 (24)
	2	5¼ (133)	RHR60*120	40 (18)	RHR60PN120	52 (24)
	4	10½ (267)	RHR60*240	60 (27)	RHR60PN240	75 (34)
80	1	8¾ (222)	RHR80*80	52 (24)	RHR80PN80	52 (24)
	3	10½ (267)	RHR80*240	72 (33)	RHR80PN240	75 (34)
100	1	8¾ (222)	RHR100*100	52 (24)	RHR100PN100	52 (24)
	1.5	8¾ (222)	RHR100*150	69 (31)	RHR100PN150	70 (32)
	2	10½ (267)	RHR100*200	72 (33)	RHR100PN200	75 (34)
150 (e)	1	34 (864)	RHR150*150	125 (57)	Consult Factory	Consult Factory
	2	40 (1016)	RHR150*300	145 (66)		
200 (e)	0.5	34 (864)	RHR200*100	150 (68)	Consult Factory	Consult Factory
	1	34 (864)	RHR200*200	170 (77)		
300 (e)	0.5	48 (1220)	RHR300*150	175 (80)	Consult Factory	Consult Factory
	1	60 (1554)	RHR300*300	200 (91)		
400 (e)	0.5	48 (1220)	RHR400*200	225 (102)	Consult Factory	Consult Factory
	1	60 (1554)	RHR400*400	225 (102)		

RHSR SERIES (REVERSIBLE POLARITY)*

Output Voltage (KV)	Max. Output Current (mA)	Rack (c) Height In (mm)	Model (b) Number	Net Weight Lbs (kg)
0-5	10	5¼ (133)	RHSR5PN50	30 (14)
0-10	5	5¼ (133)	RHSR10PN60	30 (14)
0-15	4	5¼ (133)	RHSR15PN60	30 (14)
0-20	3	5¼ (133)	RHSR20PN60	30 (14)
0-25	2.4	5¼ (133)	RHSR25PN60	30 (14)
0-30	2	5¼ (133)	RHSR30PN60	30 (14)
0-40	1.5	8¾ (222)	RHSR40PN60	52 (24)
0-50	1	8¾ (222)	RHSR50PN50	52 (24)
0-60	1	8¾ (222)	RHSR60PN60	52 (24)

* Fixed polarity also available — consult factory.

RHP 3 KW SERIES (FIXED POLARITY(a))

0-3	1000	14 (356)	RHP3*3	144 (65)
0-6	500	14 (356)	RHP6*3	144 (65)
0-10	300	14 (356)	RHP10*3	144 (65)
0-15	200	14 (356)	RHP15*3	144 (65)
0-20	150	14 (356)	RHP20*3	144 (65)
0-30	100	14 (356)	RHP30*3	144 (65)
0-40	75	14 (356)	RHP40*3	144 (65)
0-50	60	14 (356)	RHP50*3	144 (65)
0-60	50	14 (356)	RHP60*3	144 (65)
0-80	40	15¾ (445)	RHP80*3	150 (68)
0-100	30	15¾ (445)	RHP100*3	150 (68)
0-120(b)	25	22 (559)	RHP120*3	140 (63)
0-150(b)	20	22 (559)	RHP150*3	140 (63)
0-170(b)	17	27 (686)	RHP170*3	155 (70)
0-180(b)	16	27 (686)	RHP180*3	155 (70)
0-200(b)	15	27 (686)	RHP200*3	155 (70)

Consult factory for reversible models & availability of 6 KW, 9 KW, & higher.

UHR SERIES (FIXED POLARITY(a))

0-40	0.75	5¼ (133)	UHR40*30	40 (18)
	1.5	5¼ (133)	UHR40*60	40 (18)
	3	5¼ (133)	UHR40*120	40 (18)
0-60	0.5	5¼ (133)	UHR60*30	40 (18)
	1	5¼ (133)	UHR60*60	40 (18)
	2	5¼ (133)	UHR60*120	40 (18)
0-100	1	8¾ (222)	UHR100*100	52 (24)
0-150	1	34 (864)	UHR150*150	125 (57)
0-200	0.75	34 (1016)	UHR200*150	150 (68)
0-300	0.5	48 (1220)	UHR300*150	175 (80)
0-400	0.25	48 (1220)	UHR400*100	225 (102)

CRT SERIES (d)

0-30	4	5¼ (133)	CRT30	25 (11)
0-40	3	5¼ (133)	CRT40	25 (11)

FOOTNOTES

(a) (*) Specify "P" (positive) or "N" (negative) in place of (*).

(b) High voltage output is an air insulated toroid terminated stack.

(c) 19 inches wide (rack) x 16½ inches deep, except 18½ inches deep for units 150 KV and larger.

(d) Also includes FOCUS voltage output 0-6.5 KV, 50 μA

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SPELLMAN High Voltage Electronics Corporation

STANDARD HV MODULAR POWER SUPPLIES

SUMMARY OF SPECIFICATIONS

OUTPUT: Variable from near zero to rated voltage using an input control voltage

SPECIFICATION	MODEL						
	WRM	RM	UM	LRD	RV	LCM	RIM30
INPUT: (nominal VDC ±10%)	+28	+28	+28	2-12	+28	±12 to ±31	+24 VDC or 115/230 VAC
MAXIMUM OUTPUT: (KV) (WATT)	30 30	30 9	24 1.5	3 3	20 10	30 10	30 1.0
REGULATION: 0-full load (%) ±10% line (%)	0.05 ±0.01	1%/W 0.01	15%/W ~ line	5% (b)	0.05 0.005	0.05 0.05	1.0 .5
RIPPLE: (%)	0.01 PTP/W	0.1 RMS/W	0.1 RMS	1 (c) PTP	0.05 (c) PTP	2V	0.3 PTP
OPERATING TEMP: (°C)	0-60	0-60	0-60	0-60	0-60	0-60	0-60
AUXILIARY OUTPUTS:	—	—	—	—	+600V to +800V (a) (d)	+1400 VDC focus & grid (opt) (d)	(G1) 100-400 (G2) 0-2000 (G3) 0-12KV (G4) 3KV
PROGRAMMABLE: (Voltage & Resistance)	•	•			•		•
ADJUSTABLE: (Control by input and pot.)	•	•	•	•	•	•	•
PROTECTION: All Models Have: short circuit, reverse input polarity, arc-over and overload protection.							

(a) Proportional to anode (main) voltage with +600V ±5% with anode at 12 KV and +800V ±5% with anode at 16 KV; 1 mA secondary output current, 3% regulation 0-1 mA, 1% peak ripple at 1 mA. (b) one half to full load (c) at full load (d) unregulated or tracks anode

OUTPUT VOLTAGE (+KV)	MAXIMUM OUTPUT CURRENT (mA)	AUXILIARY OUTPUT	MODEL NUMBER	CASE SIZE*
RV Series for Mil Spec				
0-16	0.5	+600V to 800V, 1 mA	RV16P8/F	E
0-20	0.5			E
RIM 30 Series for Image Intensifiers				
30	1 μA	(G1) 100-210V (G2) 0-2000V (G3) 0-12,000V (G4) 3 KV	RIM30X	7⅞″ L x 5¾″ D x 2½″ W

LCM Series for CRT's					
OUTPUT VOLTAGE (+KV)	MAXIMUM OUTPUT CURRENT mA	MODEL NUMBER	CASE SIZE*	AUXILIARY OUTPUT	
				FOCUS	G1
2-3.5	5-2.8	LCM3.5	B	±1000V	±1400
3.5-5	2.8-2	LCM5	B	±1000V	±1400
5-7.5	2-1.3	LCM7.5	B	±1000V	±1400
7.5-10	1.3-1	LCM10	B	±1000V	±1400
10-14	1-0.7	LCM14	B	±1000V	±1400
14-18	0.7-0.55	LCM18	B	±1000V	±1400
18-22	0.55-0.45	LCM22	B	±1000V	±1400
22-30	0.45-0.33	LCM30	I	±1000V	±1400

Note·
* (a) Specify "P" (positive) or "N" for (negative) in place of (*)

OUTPUT VOLTAGE (KV)	MAXIMUM OUTPUT CURRENT (mA)	MODEL NUMBER (a)	CASE SIZE*
UM Series			
0-1	1000 μA	UMI*1000D	C
0-1.5	1000 μA	UM1.5*1500D	C
0-3	500 μA	UM3*1500D	C
0-6	250 μA	UM6*1500D	C
0-9	150 μA	UM9*1500D	C
0-12	100 μA	UM12*1500D	C
0-15	75 μA	UM15*1500D	D
0-18	60 μA	UM18*1500D	D
0-24	50 μA	UM24*1500D	F
0-30	50 μA	UM30*1500D	H
LRD Series (Reversible)			
80-500V	6 mA	LRD.5PN3000D	A
200-1500V	2 mA	LRD1.5PN1500D	A
400-3000V	1 mA	LRD3PN3000D	A

*Consult factory for case size letter representation.

A MODEL FOR EVERY APPLICATION

	(a) WRM	(a) RM	UM	LRD	RV	LCM	RIM30
CRT:							
General	•		•	•		•	
MIL, Airborne					•		
Low Cost						•	
Photomultipliers	•	•	•	•			
Image Intensifiers	•						•
Electron Beam			•				
Scintillation Counters			•				
Geiger tubes				•			
Control grid bias		•	•			•	•
Ion sources	•						
Scanning electron microscopes	•		•				
Electrostatics			•				
Lasers	•	•					

(a) Consult factory for FWRM and FRM models which provide for narrow range output.

MODULAR SUPPLY MODELS

Output Voltage (KV)	Maximum Output Current (mA)	Model Number (a)	Case Size*	Model Number (a)	Case Size (see chart)
WRM Series				**RM Series**	
0-1.5	1.0	WRM1.5*1500D	F	RM1.5*1500D	D
0-1.5	2.0	WRM1.5*3000D	F	RM1.5*3000D	D
0-1.5	4.0	WRM1.5*6000D	F	RM1.5*6000D	D
0-1.5	6.0	WRM1.5*10KD	F	RM1.5*10KD	D
0-1.5	10.0	WRM1.5*15KD	H	——	—
0-3	0.5	WRM3*1500D	F	RM3*1500D	D
0-3	1.0	WRM3*3000D	F	RM3*3000D	D
0-3	2.0	WRM3*6000D	F	RM3*6000D	D
0-3	3.0	WRM3*10KD	F	RM3*10KD	D
0-3	10.0	WRM3*30KD	H	——	—
0-6	0.25	WRM6*1500D	F	RM6*1500D	D
0-6	0.5	WRM6*3000D	F	RM6*3000D	D
0-6	1.0	WRM6*6000D	F	RM6*6000D	D
0-6	1.5	WRM6*10KD	F	RM6*10KD	D
0-6	5.0	WRM6*30KD	H	——	—
0-9	0.15	WRM9*1500D	F	RM9*1500D	D
0-9	0.3	WRM9*3000D	F	RM9*3000D	D
0-9	0.6	WRM9*6000D	F	RM9*6000D	D
0-9	1.0	WRM9*10KD	F	RM9*10KD	D
0-9	3.3	WRM9*30KD	H	——	—
0-12	0.15	WRM12*1500D	F	RM12*1500D	D
0-12	0.3	WRM12*3000D	F	RM12*3000D	D
0-12	0.6	WRM12*6000D	F	RM12*6000D	D
0-12	0.8	WRM12*10KD	F	RM12*10KD	D
0-12	2.5	WRM12*30KD	H	——	—
0-15	0.1	WRM15*1500D	F	RM15*1500D	F
0-15	0.2	WRM15*3000D	F	RM15*3000D	F
0-15	0.4	WRM15*6000D	F	RM15*6000D	F
0-15	0.6	WRM15*10KD	F	RM15*10KD	F
0-15	2.0	WRM15*30KD	H	——	—
0-18	0.08	WRM18*1500D	E	RM18*1500D	E
0-18	0.16	WRM18*3000D	E	RM18*3000D	E
0-18	0.3	WRM18*6000D	E	RM18*6000D	E
0-18	0.5	WRM18*10KD	E	RM18*10KD	E
0-18	1.6	WRM18*30KD	E	——	—
0-20	0.07	WRM20*1500D	H	RM20*1500D	F
0-20	0.15	WRM20*3000D	H	RM20*3000D	F
0-20	0.3	WRM20*6000D	H	RM20*6000D	F
0-20	0.5	WRM20*10KD	H	RM20*10KD	F
0-20	1.5	WRM20*30KD	H	——	—
0-24	0.06	WRM24*1500D	H	RM24*1500D	F
0-24	0.12	WRM24*3000D	H	RM24*3000D	F
0-24	0.24	WRM24*6000D	H	RM24*6000D	F
0-24	0.4	WRM24*10KD	H	RM24*10KD	F
0-24	1.25	WRM24*30KD	H	——	—
0-30	0.15	WRM30*1500D	H	RM30*1500D	F
0-30	0.1	WRM30*3000D	H	RM30*3000D	F
0-30	0.2	WRM30*6000D	H	RM30*6000D	F
0-30	0.3	WRM30*10KD	H	RM30*10KD	F
0-30	1.0	WRM30*30KD	H	——	—

(a) specify "p" (positive) or "n" (negative)

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STANDARD ENERGY

Division of WBH Scientific, Inc.
GREENVILLE, NEW YORK 12083 • (518) 966-4197 • TLX: 754180

HIGH VOLTAGE LC-20 SERIES LOW COST CRT SWITCHING SUPPLIES

STANDARD ENERGY
HIGH VOLTAGE POWER SUPPLY
Model LC 20
SER. NO.
INPUT
OUTPUT
TEMP. RANGE

The LC-20 Series are high-voltage switching power supplies which provide 20 KVdc for use with CRT Displays. Since they incorporate a high frequency step-up switching regulator their efficiency approaches 90%. This means lower input current and virtually no heat dissipation from the power supply. It runs cool to the touch.

Typical specifications include: Anode Voltage: 20 KVdc, Anode Current: 500*u*a, GI Voltage: –150v @ 10ma, Focus Voltage: +750v @ 1ma, Input Voltage: ±15 Vdc, Input Current: 600ma @ Full Output, Sync Frequency: 15.75 Khz typical.

In addition, all LC-20's may be synchronized to your sweep signal - this alleviates the problem of random noise on the display. They are powered through a PC edge connector for rapid installation. All LC-20's are encapsulated with a high quality RTV in a black anodized aluminum can. Mounting is easy with two 6-32 studs located in the back of the unit.

The high voltage output is equipped with an anode cap and 12" of corona resistant high voltage cable, UL approved. The output voltage of the LC-20 may be adjusted over at ±20% range via a front trimpot. Line and Load regulation is kept below 0.1% for crystal clear display resolution.

The LC-20's are truly state of the art for the 80's. They are guaranteed against defects in workmanship and materials for five years. Prices: 1-100: $135.00 Ea, 101-500: $115.00 Ea, 501-1000: $100.00 Ea.

High Efficiency, Switching Supply, Wide Line Range, Sync Operation, GI & Focus Outputs.

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Standard Energy's SC Series are a line of compact high voltage DC to DC converters (size: 2.5″ x 1.5″ x 0.8″) which offer 5 watts of output power in only 2.8 cubic inches. Voltages available range from 100 to 3kvdc. The output is directly proportional to the input, starting as low as 2 volts and will not be destroyed by inputs as high as 18 vdc. Each SC supply has an internal bleeder on the output for safety. The output ripple of each supply is kept below 0.1% at full power.

The SC Series are very easy to use. The two output high voltage leads are floating and are fully isolated from the two input leads. This permits either plus or minus polarity output.

Output proportional to Input, 5 Watts, Five Models: SC1: 100v @ 50ma, SC5: 500v @ 10ma, SC15: 1500v @ 3.3ma, SC30: 3000v @ 1.6ma.

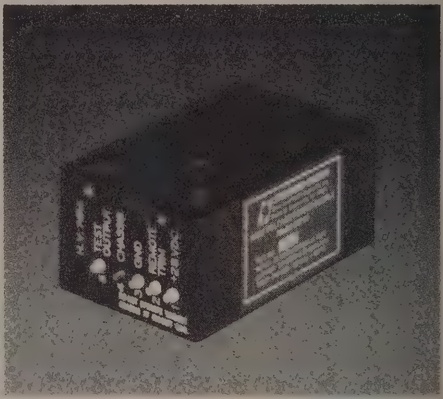
The SW Series precision switching high voltage power supplies are highly efficient DC to DC converters for applications requiring a regulated source of high voltage such as a 20kv CRT display. Since these models use state of art switching circuitry, as opposed to older linear design, the input current into the supply is greatly reduced. This has a profound effect on the reliability of the unit, and since the power dissipation is low, operation at ambient temperatures to 100°C are possible.

The output voltage is adjustable over a 5 to 1 range via an external control voltage or resistance to ground. The output may also be adjusted via a 10 turn potentiometer located in the unit. This varies the output over a 3 to 1 range.

All SW power supplies are fully encapsulated in RTV and shielded in a black anodized aluminum case. As the high voltage transformer is encapsulated in a low loss high temperature epoxy, this serves to raise the MTBF considerably.

All SW Series supplies are guaranteed against defects in workmanship and materials for 5 years and each unit is fully burned in and tested prior to shipment for 24 hrs. at 100°C at full load.

High Efficiency Switching Power Supply, Model SW20: 20kv, SW30: 30kv, Airborne CRT Supplies, Input Current: 500ma @ 10w, Military Specifications.



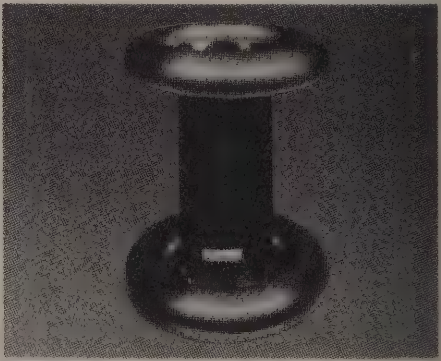
The Standard Energy SD-100 precision high voltage divider is an easy way of measuring voltages up to 100kv with complete safety.

The SD-100 is ruggedly constructed of a fire retardant material (not lucite) as a safety feature and will not crack if dropped. It contains multiple rare earth oxide resistors which provide extremely low temperature coefficients and high stability. This unit does not contain any oil which could leak out and damage other equipment.

Two anti corona torroids are used as the input and ground, and if needed, two or more SD-100 dividers may be stacked to measure voltages over 100kv. The output impedances of 1 Megohm and 100 kohm provide a 1000: 1 and 10,000: 1 division ratio respectively.

With a weight of less than 7 lbs. the SD-100 is very portable and easy to use.

100kv Resistive Divider, 0.1% Accuracy, Low TC: 15ppm/°C, High Stability.



The model SF Series power supplies provide up to 15 watts of high voltage power in a package of just 6.4 cubic inches. The SF Series units are extremely versatile since they allow the user to float the high voltage output up to 5kvdc above the input line. These power supplies are ideal for photomultiplier, CRT and other electro-optical applications.

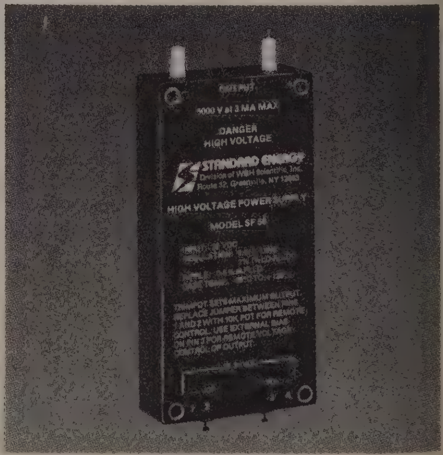
The outputs available range from 100vdc to 10kvdc, all at 15 watts.

The output is adjustable over the specified voltage range by 3 methods. A 10 turn screwdriver adjust pot on the top surface of the unit sets the maximum output voltage. Remote control of this voltage is also possible with an external trim resistor between pins 2 and ground, or by an external voltage between pin 3 and ground.

A 2% load regulation is provided for half to full load variations. Output ripple is 1% max at full output power.

Each unit is fully encapsulated in RTV and packaged in an anodized aluminum case which provides electrostatic shielding. Calculated MTBF is 70,000 hours at 71°C.

Floating High Voltage Output, 15 Watts, 6 Models: SF3: 300v @ 50ma, SF6: 600v @ 25ma, SF12: 1250v @ 12ma, SF25: 2500v @ 6ma, SF50: 5000v @ 3ma, SF100: 10,000v @ 1.5ma.



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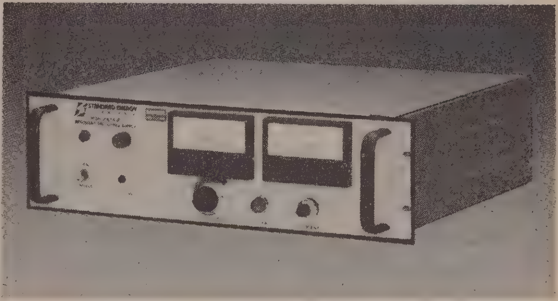
The HVS series of power supplies are a new design of low cost off the line resonant switchers capable of delivering 250 watts for applications requiring a regulated source of high voltage. The HVS line is compact, reliable and unique. All switching is done at an inaudible rate (f › 25KH$_z$) so there are no unpleasant buzzing or whistling noises as in other resonant designs. This is a user safety feature. The HVS series operate with a fixed frequency mode.

Both the voltage and current can be adjusted by front panel 10 turn potentiometers, and in addition can also be remotely programmed by either an external resistance or voltage. As an extra feature all HVS supplies contain adjustable OVP and OCP circuitry. The HVS series will easily withstand the continuous vacuum arcing that occurs in ion beam work.

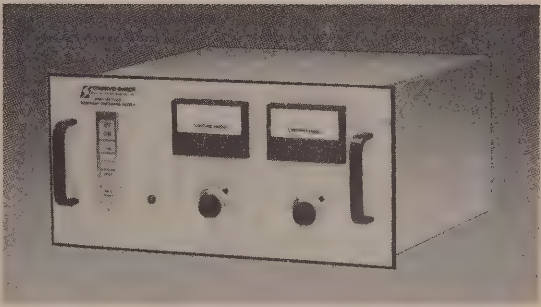
Resonant Switching Supply, Models HVS-5: 5Kv @ 50ma, HVS-10: 10Kv @ 25ma, HVS-25: 25Kv @ 10ma, HVS-50: 50Kv @ 5ma, 250 Watts, Low Cost.



Standard Energy's VHP series of very high power resonant switching supplies offer complete flexibility rarely found in any high voltage power source. To enable the user the option of selecting various output voltages, currents, and polarities, the entire supply is composed of two sections: the power drive section and the output section. The main advantage of the VHP series supplies is that the output section may be easily interchanged with one another to provide a negative output, or even a higher voltage output.

The VHP series provides regulation to 0.01%, transient response as fast as 1 ms, and output ripple down to 0.05%. Both output voltage and current are adjustable via front panel potentiometers with automatic crossover feature standard. Output monitors which may be used to drive a chart recorder or feed information to an A to D converter are standard. The power supply may also be programmed via an external voltage. Both overvoltage and overcurrent shutdown levels may be remotely controlled.

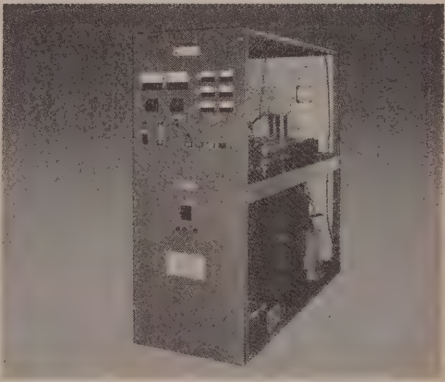
Very High Power Switching Supply, Outputs to 200KVdc @ 3000 Watts, Efficiency to 90%, Low Stored Energy.



Standard Energy SCR power supplies offer high power, high efficiency, and smallest size per watt....at low cost. They are rugged, dependable, and versatile. This design is capable of high regulation, and moderately low ripple.

Each SCR power supply can be remotely programmed over the entire voltage or current range by an external signal. Both the voltage and current are displayed on 3½" panel meters. In addition, all control circuitry is transient protected against output arcing. The SCR series can be used in all vacuum arcing equipment.

SCR Regulated Supply, Power up to 100kw, Low Cost/Watt, High Efficiency.



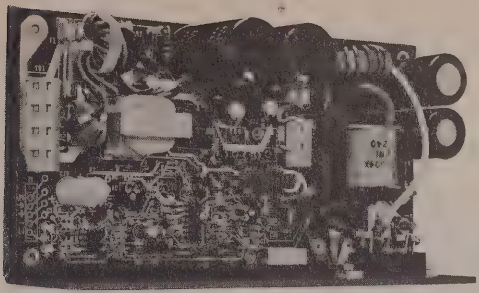
Standard Energy series tube power supplies offer high quality, dependability, and reasonable price for all R&D laboratory work. They are of proven design and versatile enough to suit any application.

In this design, a series pass tube regulates the output voltage and is capable of extremely fast transient response (100*us*) and low output ripple with low stored energy. In the event of an overcurrent condition, the series tube stops current flow within 100*us* thereby protecting any delicate output load.

Each ST power supply can be remotely controlled via a voltage program signal. Both voltage and current monitors are provided which give a signal proportional to the output being examined. In all ST supplies 3½" voltage and current meters are standard. Also a supply status indicator is provided on the front panel which indicates the output condition at all times.

Series Tube Supply, Power up to 10kw, Fast Response, Low Ripple.

SWITCHING REGULATORS



The SWS line of regulated Switching Power Supplies offer an advanced approach to Power Supply Technology. These supplies feature low component count, high efficiency, modular design, soft-start, low weight, and fast transient response.

The control circuitry offers the latest specialized I.C. technology. Integrated circuits enhance reliability with low component count.

FEATURES:

- **Hi-Reliability — Fewer Components**
- **Hi Efficiency — to 82%**
- **Hi-Power — 150 to 1,000 Watts**
- **Hi-Frequency Switching — 25 KHz**
- **Latest I.C. Design**
- **Microprocessor Compatible**
- **Burn-In Tested**
- **Slow Turn-On Capability**
- **OVP — Built-In**
- **Logic Inhibit — Remote Shutdown**
- **Remote Sense on Main Output**

Design characteristics include:

- Dropout immunity for up to 50 ms
- Soft-start circuitry limits in-rush current
- 82% efficiency is obtained by on-line switching circuitry, at greater than 25 KHz
- Input line filters in a shielded modular approach effectively control EMI
- Out-ripple is filtered through a LC filter incorporating low ESR capacitors while maintaining fast transient recovery time.

Model Number	Volts	Amps	Size (Inches)	Wt. (Lbs.)	Price
SWS 152-2	2	30	9.12 x 4.00 x 2.50	2.4	$240.00
SWS 152-5	5	30	9.12 x 4.00 x 2.50	2.4	240.00
SWS 152-12	12	12.5	9.12 x 4.00 x 2.50	2.4	240.00
SWS 152-15	15	10	9.12 x 4.00 x 2.50	2.4	240.00
SWS 152-24	24	6.5	9.12 x 4.00 x 2.50	2.4	240.00
SWS 152-28	28	5.5	9.12 x 4.00 x 2.50	2.4	240.00
SWS 152T-5/12/12	5/12/12	20/4/4	11.50 x 4.88 x 2.50	3.1	270.00
SWS 152T-5/15/15	5/15/15	20/4/4	11.50 x 4.88 x 2.50	3.1	270.00
SWS 152T-5/5/12	5/5/12	20/4/4	11.50 x 4.88 x 2.50	3.1	270.00
SWS 152Q-5/5/12/12	5/5/12/12	20/1/4/4	11.50 x 4.88 x 2.50	3.1	290.00
SWS 152Q-5/5/15/15	5/5/15/15	20/1/4/4	11.50 x 4.88 x 2.50	3.1	290.00
SWS 152Q-10	5/12/12/24*	20/4/4/4	11.50 x 4.88 x 2.50	3.1	290.00
SWS 152Q-12	5/12/12/24*	20/4/4/4	11.50 x 4.88 x 2.50		290.00
SWS 252-5	5	50	13.00 x 4.88 x 2.50	3.3	273.00
SWS 252-12	12	21	13.00 x 4.88 x 2.50	3.3	273.00
SWS 252-15	15	17	13.00 x 4.88 x 2.50	3.3	273.00
SWS 252-24	24	11	13.00 x 4.88 x 2.50	3.3	273.00
SWS 252-28	28	9	13.00 x 4.88 x 2.50	3.3	273.00
SWS 252-48	48	5.5	13.00 x 4.88 x 2.50	3.3	273.00
SWS 252T-5/12/12	5/12/12	30/5/5	14.00 x 4.88 x 2.50	3.5	310.00
SWS 252T-5/15/15	5/15/15	30/5/5	14.00 x 4.88 x 2.50	3.5	310.00
SWS 252Q-5/5/12/12	5/5/12/12	30/1/5/5	14.00 x 4.88 x 2.50	3.5	341.00
SWS 252Q-5/5/15/15	5/5/15/15	30/1/5/5	14.00 x 4.88 x 2.50	3.5	341.00
SWS 252Q-10	5/12/12/24*	30/5/5/4	14.00 x 4.88 x 2.50	3.5	341.00
SWS 252Q-11	5/12/12/24*	16/4/3/6	14.00 x 4.88 x 2.50	3.5	341.00
SWS 252Q-12	5/15/15/24*	30/5/5/4	14.00 x 4.88 x 2.50		341.00

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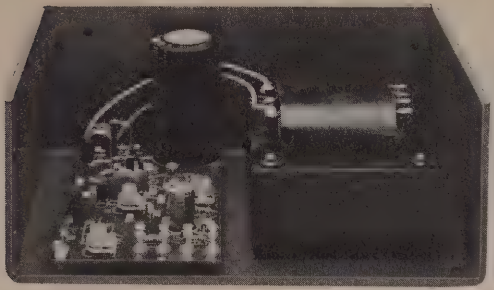
Worldwide Series / DC Power Supplies



Features:

- Accept AC inputs of 100, 120, 220, 230 & 240 volts.
- Designed to meet most important worldwide safety requirements of VDE, UL, CSA, IEC and ECMA.

SINGLE OUTPUT SUPPLIES

5 Volt Models

Voltage	Amps	Model Number	Pkg. Size	Price
5*	3/OVP	SPW 5-3/OVP	4.87 x 4.00 x 1.62	$ 32.95
5*	6/OVP	SPW 5-6/OVP	5.62 x 4.87 x 2.50	54.95
5*	9/OVP	SPW 5-9/OVP	7.00 x 4.87 x 2.75	74.95
5*	12/OVP	SPW 5-12/OVP	9.00 x 4.87 x 2.75	84.95
5*	18/OVP	SPW 5-18/OVP	14.00 x 4.87 x 2.75	119.95

*Overvoltage protection provided — set at 6.2V ± .4V.

12 Volt Models

Voltage	Amps	Model Number	Pkg. Size	Price
12	1.7	SPW 12-1.7	4.87 x 4.00 x 1.62	$ 32.95
12	3.4	SPW 12-3.4	5.62 x 4.87 x 2.50	49.95
12	5.1	SPW 12-5.1	7.00 x 4.87 x 2.75	69.95
12	6.8	SPW 12-6.8	9.00 x 4.87 x 2.75	79.95
12	10.2	SPW 12-10.2	14.00 x 4.87 x 2.75	109.95

15 Volt Models

Voltage	Amps	Model Number	Pkg. Size	Price
15	1.5	SPW 15-1.5	4.87 x 4.00 x 1.62	$ 32.95
15	3.0	SPW 15-3	5.62 x 4.87 x 2.50	49.95
15	4.5	SPW 15-4.5	7.00 x 4.87 x 2.75	69.95
15	6.0	SPW 15-6	9.00 x 4.87 x 2.75	79.95
15	9.0	SPW 15-9	14.00 x 4.87 x 2.75	109.95

24 Volt Models

Voltage	Amps	Model Number	Pkg. Size	Price
24	1.2	SPW 24-1.2	4.87 x 4.00 x 1.62	$ 32.95
24	2.4	SPW 24-2.4	5.62 x 4.87 x 2.50	49.95
24	3.6	SPW 24-3.6	7.00 x 4.87 x 2.75	69.95
24	4.8	SPW 24-4.8	9.00 x 4.87 x 2.75	79.95
24	7.2	SPW 24-7.2	14.00 x 4.87 x 2.75	109.95

28 Volt Models

Voltage	Amps	Model Number	Pkg. Size	Price
28	1.0	SPW 28-1	4.87 x 4.00 x 1.62	$ 32.95
28	2.0	SPW 28-2	5.62 x 4.87 x 2.50	49.95
28	3.0	SPW 28-3	7.00 x 4.87 x 2.75	69.95
28	4.0	SPW 28-4	9.00 x 4.87 x 2.75	79.95
28	6.0	SPW 28-6	14.00 x 4.87 x 2.75	109.95

DUAL OUTPUT SUPPLIES

±12 Volt/±15 Volt Models

Output #1		Output #2		Model Number	Pkg. Size	Price
Volts	Amps	Volts	Amps			
12 OR 15	1.0 .8	−12 OR −15 OR −5	1.0 .8 .4	SPW 15D-.8	6.50 x 4.00 x 1.62	$ 42.95
12 OR 15	1.7 1.5	−12 OR −15 OR −5	1.7 1.5 .7	SPW 15D-1.5	7.00 x 4.87 x 2.50	54.95
12 OR 15	3.4 3.0	−12 OR −15	3.4 3.0	SPW 15D-3	9.38 x 4.87 x 2.75	87.95
12 to 15	5.0	−12 to −15	5.0	SPW 15D-5	14.00 x 4.87 x 2.75	129.95
5*	2.0	12	4.0	SPW 323D	7.00 x 4.87 x 2.75	79.95

TRIPLE OUTPUT SUPPLIES

Output #1		Output #2		Output #3		Model Number	Pkg. Size	Price
Volts	Amps	Volts	Amps	Volts	Amps			
5*	2.0	9 to 15	.4	−9 to −15 OR −5	.4 .4	SPW 16WT	6.50 x 4.00 x 1.62	$ 54.95
5*	3.0	12 OR 15	1.0 .8	−12 OR −15 OR −5	1.0 .8 .4	SPW 40WT	10.25 x 4.00 x 2.50	75.95
5*	6.0	12 OR 15	1.7 1.5	−12 OR −15 OR −5	1.7 1.5 .7	SPW 75WT	11.00 x 4.87 x 2.75	99.95
5*	8.0	12 OR 15	1.7 1.5	−12 OR −15 OR −5	1.7 1.5 .7	SPW 131T	11.00 x 4.87 x 2.75	119.95
5*	12.0	12 OR 15	1.7 1.5	−12 OR −15 OR −5	1.7 1.5 .7	SPW 105WT	14.25 x 4.87 x 2.75	134.95

*Overvoltage protection provided — set at 6.2V ± .4V.

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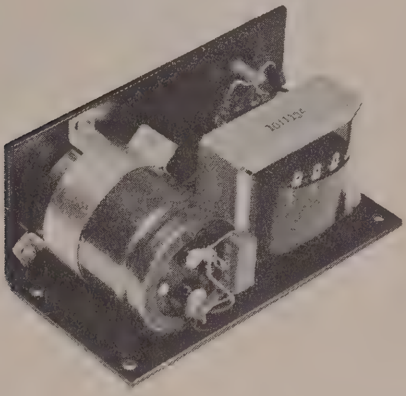
"Black Line" Unregulated DC Supplies

Reliable low cost supplies for powering solenoids, motors, relays, magnets, lamps, signal systems, and any circuitry (including transistorized) accepting unregulated DC.



The "Black Line" is the new low-cost alternative for many applications where regulation is not needed. . . "raw power" at significant savings by eliminating the "frills". . .yet maintaining top performance through the use of high quality components.

FEATURES

- Conservatively Rated
- U.L. Recognized
- Top-Quality Transformer
- Open-Frame Construction
- Floating Output
- Computer-Grade Capacitors
- Input Taps Provide for ±10% Output Voltage Adjustment to Compensate for Line and/or Load Variations!

GENERAL SPECIFICATIONS:

Universal Input Voltage: 115/230 Vac, 50/60 Hz with ±10% Primary Taps

Maximum Ripple: 3% rms

Temperature Range: 0-50°C (derate 2%/C° to 70°C)

Overcurrent Protection: Fuse

Model Number	Typ. Vdc Out (at 115 Vac In)			Amps Full Load	Price
	No Load	Half Load	Full Load		
15B7H	11.0	9.0	7.5	1.8	31.00
15B12H	16.0	13.0	11.0	1.2	31.00
15B16H	21.2	18.8	17.0	0.9	31.00
15B20H	24.7	21.8	19.8	0.75	31.00
15B24H	31.0	27.5	25.0	0.6	31.00
15B48H	59	52	48	0.3	33.00
15B120H	135	121	113	0.12	36.00
15B250H	286	265	247	0.05	36.00
30B7H	10.0	8.5	7.5	3.0	39.00
30B12H	17.0	14.0	12.0	2.4	39.00
30B16H	20.0	18.0	16.0	1.8	39.00
30B20H	25.8	22.3	19.8	1.5	39.00
30B24H	34.5	29.5	26.5	1.2	39.00
30B48H	62	55	48	0.6	41.00
30B120H	149	131	120	0.25	44.00
30B250H	298	267	248	0.1	44.00
60B7H	10	8.5	7.5	6.0	59.00
60B12H	17	14	12	4.8	59.00
60B16H	20	18	16	3.6	59.00
60B20H	25.8	22.3	19.8	3.0	59.00
60B24H	34.5	29.5	26.5	2.4	59.00
60B48H	62	55	48	1.2	61.00

Model Number	Typ. Vdc Out (at 115 Vac In)			Amps Full Load	Price
	No Load	Half Load	Full Load		
100B7H	11.0	9.5	8.5	10	69.00
100B12H	15.5	13.5	12.5	7.0	69.00
100B16H	21.0	19.0	17.0	6.0	69.00
100B20H	24.0	21.7	19.4	5.0	69.00
100B24H	31.5	27.5	25.5	3.5	69.00
100B48H	56	51	48	1.8	72.00
200B7H	11.0	10.0	9.0	20	93.00
200B12H	15.5	13.5	12.5	15	93.00
200B16H	22.0	18.5	16.5	12.5	93.00
200B20H	26.8	22.4	20.0	10	93.00
200B24H	31.7	29.0	27.5	7.5	93.00
200B48H	54	50	47	4	96.00
500B24H	29.2	26.8	24.6	20	155.00
500B48H	56.6	52.8	48.4	10	158.00
750B24H†	32	29.8	26.7	30	254.00
750B48H	64	60	53	15	257.00
30BT-9/18/18H	9 +18 −18			1.0 0.5 0.5	55.00

†Secondary tap available for 28Vdc output

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Programmable Power Supply Loads

OPERATION & CAPABILITIES

The Programmable Solid State Load (PS^{2}L) has the capability of dissipating up to 1000 Watts within a voltage range of approximately 2 VDC to 60 VDC and a maximum current of 110 Amps when derated per the power dissipation curve. If higher current level testing is desired, units can be hooked in parallel. It is equipped with two modes of operation: (1) constant current and (2) constant resistance, which can be used independent of each other or with one mode acting as a limit for the other.

Working in the constant current mode the PS^{2}L can be used to test DC power regulators, to act as a constant current discharge of batteries and capacitor banks, and if connected as shown, to make an adjustable constant current supply from a DC power source.

The constant resistance mode of the PS^{2}L can also be used to test DC power regulators and with a 0.03 ohm to 1K ohm adjustment range can virtually eliminate the need to stock different value power rheostats. The 2% reference meters on the front panel will, in most cases, eliminate the need of external meters being used.

Steady state testing of a power supply or a battery is only one of the capabilities of the PS^{2}L. Testing transient response of a power regulator to a dynamic load change is another. The PS^{2}L is capable of being programmed externally for either constant current or constant resistance with any number of waveforms. If a series regulator is under test and it is desired to see how the DC output voltage will react under actual dynamic loading conditions, the PS^{2}L can simulate the actual conditions merely by programming it with the desired waveform.

Features

- Designed to fulfill a wide range of DC test applications requiring constant current, constant resistance or both.
- In its constant resistance mode, the PS^{2}L offers a 0.03 ohm to 1K ohm adjustment range.
- In its constant current mode, the PS^{2}L can be used to test DC regulators and power supplies.
- Acts as a constant current discharge of batteries and capacitor banks.
- Can be used to convert a DC power source into a constant current supply.
- Virtually eliminates the need for different power rheostats otherwise normally required in testing.
- Available in 1000 watt model size.

PERFORMANCE CHARACTERISTICS

	PS^{2}L-1000
Operating Ambient	0°C.-55°C.
Input Voltage Requirements	115/230VAC ±10%
Input Frequency Range	47-63 Hz
Maximum Input Current	1 Amp
Input Fuse Rating	2 Amp Type MDL
Maximum Loading Power @ 25°C.	1000 Watts
Maximum Loading Voltage	60 VDC
Maximum Loading Current	110 ADC
Minimum Loading Voltage	2 VDC
Overvoltage Crowbar Point	70 VDC-78 VDC

	PS^{2}L-1000
Typical Constant Resistance Range	0.03 Ω -1000
Typical Program Input Impedance	50K
Programming Input Volt Requirement	1v/10 Amp load
Typical Current Monitor Output	±50MV/Amp load
Typical Square Wave Response Time	120 *u*sec for Δ 100 Amp step
Typical Regulation (constant current, constant resistance)	1%

Model	A	B	C	(Inches) D	E	F	G	Load Capacity	Weight (lbs.)	Price
PS^{2}L-1000	17.00	5.25	14.00	19.00/24.00	2.25	1.38	.63	1000 Watts	52	1395.00

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Summit Electronics, Inc.

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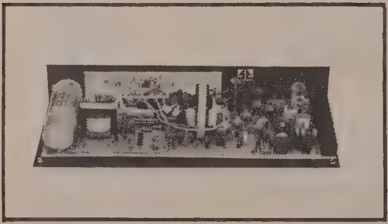
750 S. SHERMAN • RICHARDSON, TEXAS 75081
• (214) 231-1456

50-400 Watt OPEN FRAME Switching Power Supplies

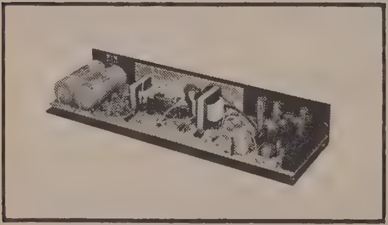
Boschert, & National Power Replaceables

SUMMIT MODEL SX53

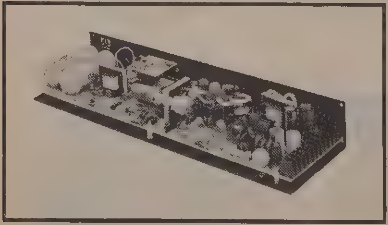
SUMMIT MODEL SS100



SUMMIT MODEL SX130



SUMMIT MODEL SX200



SUMMIT MODEL SS400

MODEL & WATTAGE	MAIN OUTPUT	AUX #1	AUX #2	AUX #3	AUX #4	PRICE 1-9
SX53-XXXX (65W)	5V @ 6A	12V @ 2.5A 15V @ 2.5A	12V @ 1A 15V @ 1A	-5V @ .7A	24V @ 2A	$\$155^{00}$
SS100-XXXX	5V @ 10A	12V @ 2A 15V @ 2A	12V @ 2A 15V @ 2A	-5V @ 1.5A	24V @ 4A	$\$189^{00}$
SS130-XXXX	5V @ 15A	12V @ 4A 15V @ 4A	12V @ 4A 15V @ 4A	-5V 4A	24V @ 4A	$\$245^{00}$
SS180-XXXX	5V @ 25A	12V @ 4A 15V @ 4A	12V @ 4A 15V @ 4A	-5V 4A	24V @ 4A	$\$320^{00}$
SX200-XXXX	5V @ 30A	12V @ 6A 15V @ 6A	12V @ 6A 15V @ 6A	-5V @ 4A	24V @ 4A	$\$350^{00}$
SS400-XXXX	5V @ 45A	12V @ 10A 15V @ 10A	12V @ 10A 15V @ 10A	-5V @ 4A	24V @ 4A	$\$520^{00}$
SX450-XXXX	5V @ 60A	12V @ 4A 15V @ 4A	12V @ 4A 15V @ 4A	-5V @ 1A	24V @ 8A	$\$550^{00}$

Any Combination of Voltage & Currents Is Available As Long As The Maximum Wattage Rating Is Not Exceeded For Continuous Operation.

FEATURES

- Up to five outputs, three regulated and two semi-regulated
- Choice of voltage and current on all outputs up to maximum wattage total
- Voltage adjustable on all regulated outputs
- Brownout protection
- OVP Standard on primary output
- Overload protection
- Short circuit protection
- Reverse polarity protection
- Soft start
- Adjustable current limiting on regulated outputs
- Built to UL, CSA, and VDE safety standards.
- Built to VDE and FCC EMI standards.
- Convenient 2-surface mounting
- Convection cooled
- Advanced EMI filtering
- Isolated returns

SPECIFICATIONS

Input	90-132VAC/180-264VAC, 47-440Hz
Output	See Table
Line Regulation	0.2%, all outputs
Load Regulation	0.2%, main output ±0.5% aux outputs
Ripple & Noise	50mV P-P max, all outputs
Efficiency	75% Typical
Operating Temperature	0-50° C at full rated load. Derate to 50% of rated output at 70° C.
Temperature Coefficient	0.02% per °C
Overload Protection	All outputs are individually current limited and short circuit protected. Recovery is automatic when load is reduced.
Overvoltage Protection	OVP on main output is set between 6-6.5V. This protection is reset by recycling input power.
Holdover Storage	16mSEC minimum, 20mSEC typical
Remote Sense	Remote sense on main output compensates for up to 0.5V in the load cable.
Overshoot	No voltage spikes on turn-on, turn-off or power fail.
Transient Response	Recovery to within 1% of nominal output voltage within 500uSEC for a 25% load step.
Power Fail (Optional)	A TTL signal (low) appears within 5mSEC at full load to warn of input voltage drop below minimum operating level.
Remote Inhibit (Optional)	Power supply can be remotely programmed off by application of TTL signal (high).

Summit Electronics, Inc.

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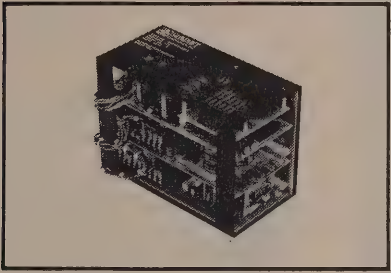
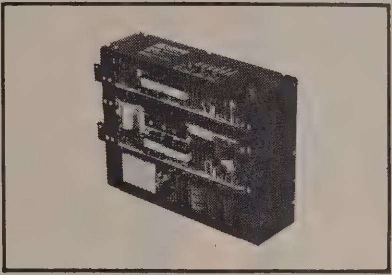
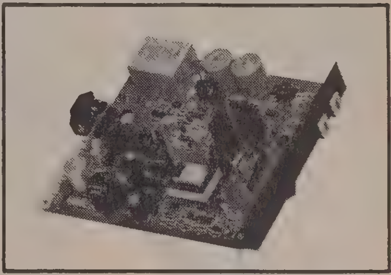
COMPUTER PERIPHERAL POWER SUPPLIES



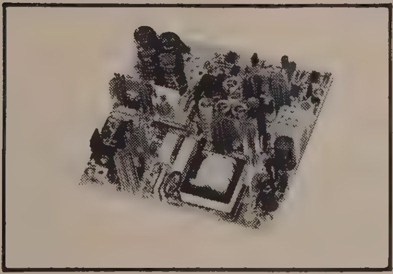
SUMMIT MODEL CS0067



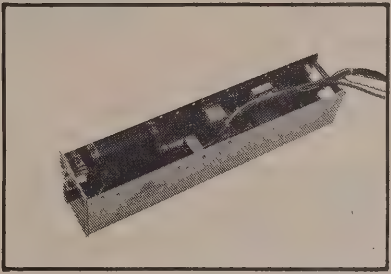
SUMMIT MODEL CS0068



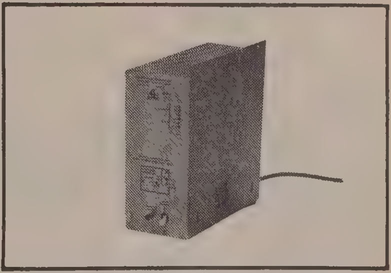
SUMMIT MODEL CS0104



SUMMIT MODEL CS0115 CRT

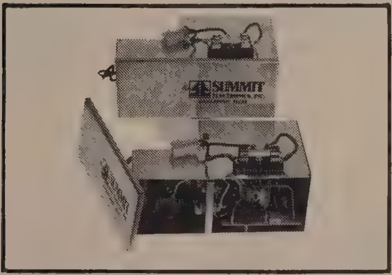


SUMMIT MODEL CS0084

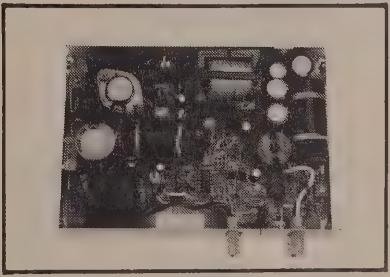


SUMMIT MODEL CS0044

DC-DC SWITCHING POWER SUPPLIES



SUMMIT MODEL CS0121



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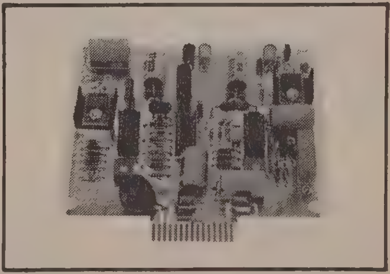
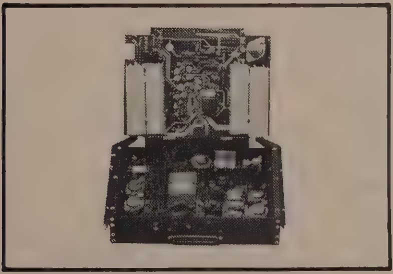
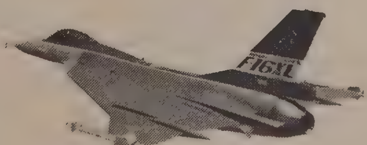


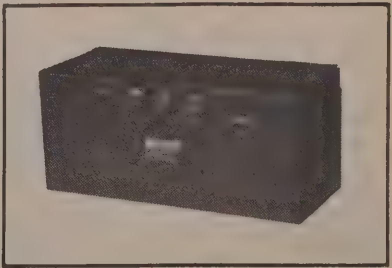
SUMMIT MODEL CS0025

MILITARY SWITCHING POWER SUPPLIES



SUMMIT MODEL CS0105





SUMMIT MODEL CS0097

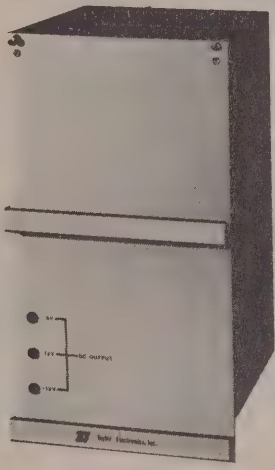
TAYLOR ELECTRONICS, INC.

HIGH PERFORMANCE SWITCHING POWER SUPPLIES

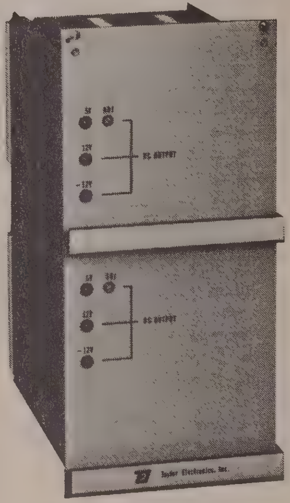
EUROMATE™ MODELS FOR VME BUS APPLICATIONS

EUROMATE™ MODELS FOR GENERAL BUS APPLICATIONS

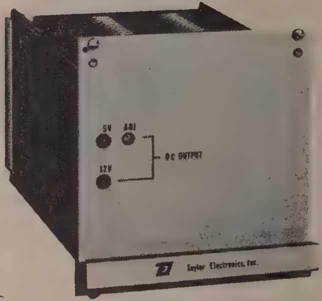
VME 911



VME 910



EM 200



EM 75

SELECTION GUIDE

The chart at right was designed to help you select the standard EuroMate model which will meet the needs of your application. If you require specifications which differ from those listed, contact our factory. We can meet special requirements by modifying existing models or by designing a custom unit for your application.

MODEL	SIZE	POWER	OUTPUT VOLTAGE			
			STANDARD		OPTIONAL	
			Number of Voltages	Voltages	Number of Voltages	Voltage Range
VME 911	6U/24E	400 W	Three	+5, +12, −12 VDC	One to four	−36 to +36 VDC
VME 910	6U/28E	250 W	Three	+5, +12, −12 VDC	One to five	−36 to +36 VDC
EM 200	6U/24E	200 W	Six	+5, +5, +12, +12, −12, −12 VDC	One to six	−36 to +36 VDC
EM 75	3U/24E	75 W	Three	+5, +12, -12 VDC	One to three	+5 to +36 VDC

SPECIFICATIONS

The following specifications are applicable to all standard EuroMate models.

ELECTRICAL

Input voltage range: 90 to 130; 180 to 260 VAC. Jumper selected.
Input frequency: 47 to 63 Hz.
Input filtering: Meets FCC 20780, VDE 0871/6.78 Curve B, and VDE 0875 conducted and radiation specifications.
Efficiency: 70 to 85%
Voltage regulation: 5V outputs, 0.2%. Other outputs, 3%.
Current limit: Foldback on all outputs.
Output noise: 5V ports, 75 mV max.
12V ports, 100 mV max.
Other ports 1% of output.
Output voltage overshoot: Less than 5% for 50% load step from I_{max}.
Reverse voltage: Diode protected on all outputs.
Holdup time: 20 msec min at 90 VAC input.
Isolation: Input to chassis-
3750 VAC RMS—VME911
1500 VAC RMS—VME910, EM200, EM75
Input to output-
3750 VAC RMS—VME911
1500 VAC RMS—VME910, EM200, EM75
Output to chassis-
500 VAC RMS all models
Total input lines capacitance to chassis: 6500 pF max.

ENVIRONMENTAL

Operating temperature: 0 to 70°C ambient.
Storage temperature: −55 to 85°C.
Humidity: 0 to 95%, non-condensing.

MECHANICAL

Output connectors: DIN 41612 or user specified.
Package outline: Conforms to DIN 41494 and IEC 48 D, section 12.

MODEL NUMBER	VME 911	VME 910	EM 200	EM 75
OUTPUT VOLTAGE				
Standard	5 VDC @ 50A 12 VDC @ 8 A −12 VDC @ 4 A	5 VDC @ 30 A 12 VDC @ 3 A −12 VDC @ 1 A	5 VDC @ 25 A 5 VDC @ 15 A 12 VDC @ 1.5 A 12 VDC @ 1.5 A −12 VDC @ 1.5 A −12 VDC @ 1.5 A	5 VDC @ 5 A 12 VDC @ 3 A -12 VDC @ 1.5 A
Optional	24 VDC @ 4 A	5 to 24 VDC at port #1 12 to 24 VDC at port #2 −12 to −24 VDC at port #3 15 to 36 VDC at port #4 −15 to −36 VDC at port #5	5 to 24 VDC at port #1 12 to 24 VDC at port #2 −12 to −24 VDC at port #3 5 to 24 VDC at port #4 12 to 36 VDC at port #5 −12 to −36 VDC at port #6	5 to 24 VDC at port #1 12 to 24 VDC at port # 2 24 to 36 VDC at port #3
OVP	5 VDC: 5.4 to 5.8 VDC	5 VDC: 5.4 to 5.6 VDC 12 VDC: 13.6 to 15 VDC 12 VDC: −13.6 to −15 VDC	5 VDC @ 25 A: 5.6 to 5.8 VDC 5 VDC @ 15 A: 5.6 to 5.8 VDC	5 VDC: 5.4 to 5.8 VDC
	400 W	250 W	200 W	75 W
Thermal shut-off	T_1 = 85°C	T_1 = 85°C	N/A	N/A
Input power fail monitor	Open collector. 6 msec reaction time.	Open collector. 6 msec reaction time.	Open collector. 6 msec reaction time.	N/A
Output voltage fail monitor	N/A	N/A	Open collector.	N/A
Minimum load requirement	No minimum load required	No minimum load required	5 VDC @ 3.5 A	5 VDC @ 1 A
Package Size^2	6U/24E	6U/28E	6U/24E	3U/24E

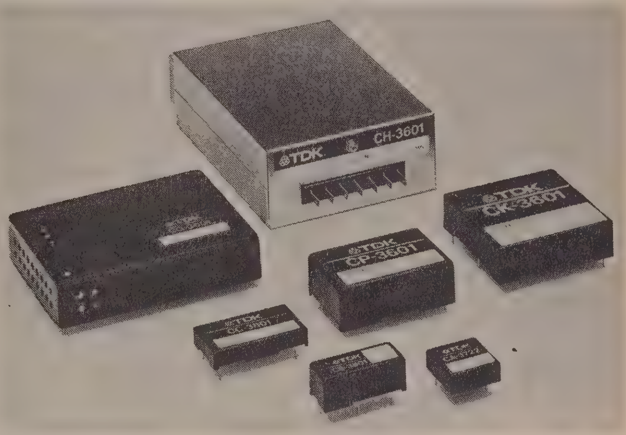
NOTES:
1. Specifications listed are for standard EuroMate models. If your require specifications which differ from those listed, contact our factory. We can meet your special requirements by modifying existing models—or by designing a custom unit for your application.
2. System dimensions: 1E = 0.20 inches (5.08 mm); 1U k= 1.75 inches (44.45 mm).

Taylor Electronics, Inc. 401 West Orion Street Tempe, Arizona 85283 Telephone (602) 838-4523

TDK

POWER CONVERTERS

DC TO DC CONVERTERS



TDK DC to DC converters simplify supplying power to various portions of complex electronic circuits. They provide a reliable source of "onboard" DC power dedicated to specific operations such as microprocessors and other VLSI integrated circuits.

FEATURES

1. TDK's expertise in ferrites and electronic circuitry combine to produce superior products.
2. Compact and lightweight.
3. High efficiency and precision.
4. High reliability.
5. For printed circuit boards (Except CH series).

APPLICATIONS

Computers and peripheral equipment, industrial robots, electronic measuring instruments, automotive electronic equipment and industrial controls.

Electrical specifications VS. Part No.

Type	Output power (W)	Input-output Isolation	Input (V)	Output (V)												
				+12	+15	−12	−15	−5	5	9	12	15	−17	±12	±15	6
CA Series	0.12	Non-Isolated	+3 to +7	3708	3709											
			−3 to −7			3722	3725									
CB Series	0.3	Non-Isolated	+4 to +7					3810								
			+3 to +7	3801	3802	3811	3812									
CC Series	0.25	Non-Isolated	5 ±5%	3801	3802	3852	3853	3851								
CP Series	1.5	Isolated (CP-36, CP-46) Non-Isolated (Others)	5 ±10%						3601	3604	3607	3610		4601	4604	
			12 ±10%						3602	3605	3608	3611		4602	4605	
			24 ±10%						3603	3606	3609	3612		4603	4606	
			+4.5 to +12.0							3801	3803	3805	3807	4801	4803	
			+10.8 to +28.8							3802	3804	3806	3808	4802	4804	
CK Series	3	Isolated	5 ±10%						3601		3607	3610				
			12 ±10%						3602		3608	3611				
			24 ±10%						3603		3609	3612				
CG Series	6	Isolated	5 ±10%						3601		3607	3610				3513
CH Series	10	Isolated	5 ±10%						3601		3607	3610				
CD-Series for driving fluorescent display	Up to 6W	Non-Isolated	5 ±10%	"PRODUCTS ARE MADE IN ACCORDANCE WITH FLUORESCENT DISPLAYS."												

Type	Dimension (mm)	Terminal (mm)
CA Series	19.2 x 14.0 x 7.2	φ0.6 ±0.1 x 3
CB Series	30.5 x 13.3 x 12.2	φ0.6 ±0.1 x 4
CC Series	35.5 x 20.0 x 6.55	φ0.5 ±0.1 x 4
CP Series	38.1 x 30.5 x 16.5	φ1.0 ±0.1 x 5
CK Series	47.0 x 47.0 x 14.5	φ1.0 ±0.1 x 5
CG Series	78.0 x 60.0 x 19.0	φ1.0 ±0.1 x 5
CH Series	98 x 70 x 32	AMP #110 x 7
CD Series	32 x 24 x 8.5 & 10 43 x 31 x 15 & 18 51 x 34 x 20	φ0.6 x 4

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1•B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

TECHNIPOWER® A Penril COMPANY

"MIL-QUAL" MODULAR POWER SUPPLIES

These Advanced Design, High Reliability, Modular Power Sources offer the systems engineer economical, proven alternatives to expensive custom built or lab types. Now, you can choose the exact source required — from an extensive selection, to meet the most demanding Mil-Spec and industrial needs. Our knowledgeable design and development group can also assist you with any product modifications or special variations to suit individual demands.

VC-80 Series
AC-DC Converters. Partially encapsulated, 2.8 to 125 VDC — to 450 Watts output. 110,000 hours MTBF @ 80°C base.

HF-80/HFC-80 Series
AC-DC, DC-DC stabilized. Partially encapsulated, 2.8 to 250 VDC, to 375 Watts. 70,000 hours MTBF @ 80°C base.

HIGH EFFICIENCY, HIGH DENSITY MODULAR SWITCHERS

Fully encapsulated, partially encapsulated or open frame, these switching power supplies are designed for high thermal application. With as low as 0.1% overall source/load effects, 0.1% PARD and 500 microsec recovery.

YC-95 Series
Ruggedized DC-DC Converters. Hermetically sealed, 2.8 to 125 VDC, to 450 Watts. 110,000 hours MTBF @ 95°C base.

CD-95/CDC-95 Series
Stabilized DC-DC Converters. Encapsulated. 2.8 to 250 VDC, to 275 Watts. 60,000 hours MTBF @ 95°C base.

CL/CLC Series
AC-DC, DC-DC, open frame stabilized converters. 3 to 32 VDC, to 256 Watts. 50,000 hours MTBF.

SCR-80 Series
Stabilized AC-DC phase control. High current. Partially encapsulated. 5 to 160 VDC, to 2000 Watts.

RA-80 Series
Special circuit AC-DC. Programmable from zero. Partially encapsulated. 0 to 160 VDC, to 1000 Watts.

PM-95 Series
Stabilized AC-DC modules. Fully encapsulated. 3 to 325 VDC, to 800 Watts. 80,000 hours MTBF, @ 95°C base.

"MIL-QUAL" LINEAR SUPPLIES

Ultra high reliability for military and industrial harsh environments. These fully encapsulated AC-DC supplies are designed for use in extreme MIL environments. Source/load effects are as low as 0.05% with 1mV rms PARD and 50 Microsec. recovery.

DPM-95, TDPM-95 Series
Stabilized, AC-DC, dual output, tracking and non-tracking. 12 to 15 VDC, to 150 Watts. 50,000 hours MTBF, @ 95°C base.

F-115, FD-115 Series
Stabilized, AC-DC modules, 3 to 325 VDC, to 500 Watts. 50,000 MTBF, @ 115°C base.

PL-80 Series
Lower cost, high density, stabilized AC-DC modules. 3 to 152 VDC, to 75 Watts, 120,000 hours MTBF, @ 80°C base.

LINEAR SUPPLIES

For industrial, military and commercial use. The partially encapsulated AC-DC stabilizers are designed for moderate environments. They have 0.05% load effect, 1mV rms PARD and generally have 50 microsecond recovery.

P-80 Series
All purpose, fully encapsulated, series stabilized AC-DC modules. 3 to 325 VDC, to 800 Watts. 100,000 hours MTBF, @ 80°C base.

MC-65 Series
Series stabilized, DC-DC modules. Up to 30% more current. 3 to 152 VDC, to 750 Watts, 1,000,000 hours MTBF, 65°C base.

DP-80, TDP-80 Series
Tracking and non-tracking, AC-DC, dual output. 6 to 150 VDC, to 10 Watts. 50,000 hours MTBF, @ 80°C base.

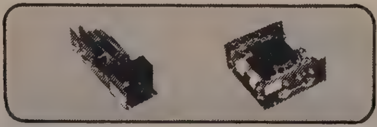
NP-80 Series
Non-stabilized, low cost. 3 to 1000 VDC, to 975 Watts. 250,000 hours MTBF, @ 80°C base.

SINE-WAVE INVERTERS

For military and industrial applications. Open frame and partially encapsulated with 70% efficiency, 5% rms max. source ripple and less than 100 rms recovery.

IN Series
24/28 DVC, 115/220 VAC, 5-/60 or 400 HZ. 50-100VA.

NAC/NACD Series
Stabilized DC-AC, 24/28 VDC, 115 VAC rms, 60/400 Hz output, to 500 VA.



LP/LPC Series
UL approved, open frame, AC-DC stabilized. 5-28 VDC, 224 Watts.

HIGH RELIABILITY, OPEN FRAME AC-DC POWER SOURCES

Practical, low cost, high performance, open frame AC/DC stabilized units. Wide variety of models. Multiple output variations available.

LPDT/LPDTC Series
Dual output tracking ±12 to ±15 VDC, to 30 Watts. For op-amp and other commercial use.

NLP/NLPC Series
Single output, 5 to 28 VDC, to 28 Watts. For logic, op-amp and signal use.

NLPD Series
Dual output, ±12 to ±15 VDC, to 22 Watts. For logic op-amp and other uses.

Multiple Outputs
Triple and quad output sources with enclosures available on order.

CUSTOM CAPABILITIES FOR MODULE RACK MOUNTS are also available from Technipower.

VARIAC BY TECHNIPOWER
See EEM Page 1A•2301 for availability of Variac® Autotransformers and Voltage Regulators produced by Technipower.

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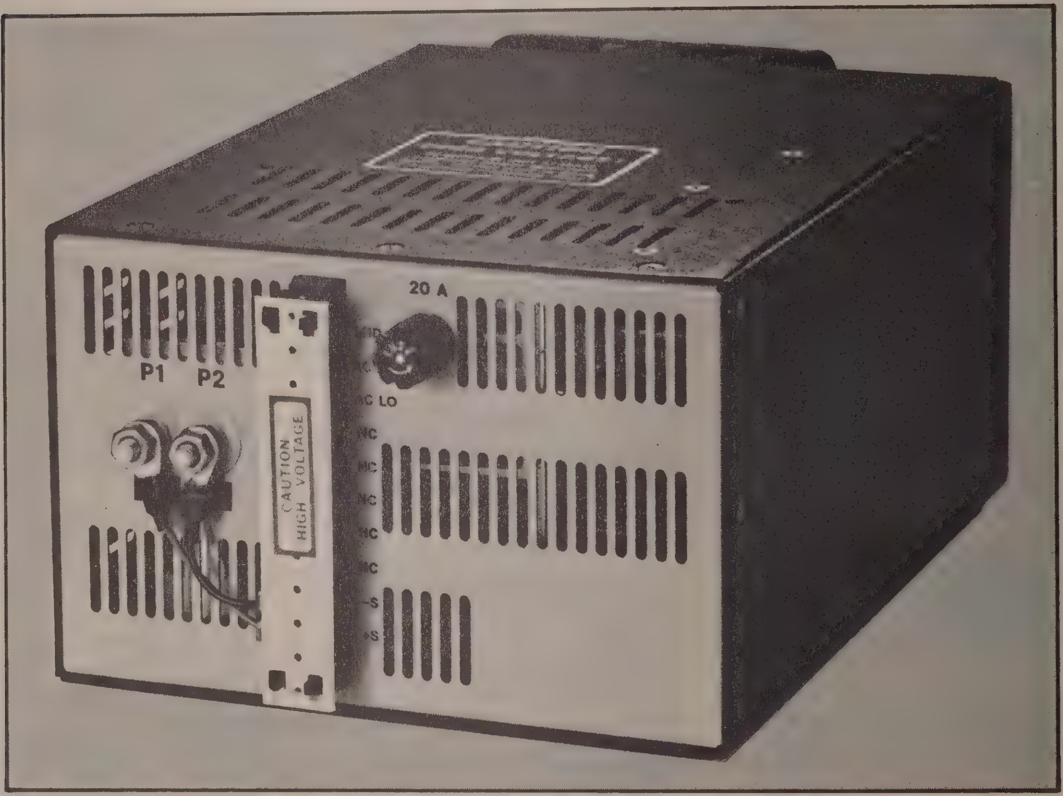
Custom & Standard "Off-Line" Switching Power Supplies

CONVENTIONAL & UNINTERRUPTABLE
COMMERCIAL • MILITARIZED • MILITARY
FULL LINE DC-DC CONVERTERS



MODEL TDI-224 +28v @ 60A

- **High power 1.5KW units with 100v, 56v, 28v or 12v outputs.**
- **Medium power multi output • Low power open frame.**
- **Maximum modularity for design flexibility & fast turn-around.**

Custom designs in 10 weeks.

TECHNOLOGY
DYNAMICS
INC.

91 Carver Avenue • Westwood, New Jersey 07675
(201) 664-7636

Serving the Data Processing, Communication, Telecommunication, Vehicular and Aerospace Markets.

PRODUCT SUMMARY
SWITCHING POWER SUPPLIES

Model #	Total Power	Input Voltage	Outputs	Dimensions
TDI-153	50 W	115/230VAC ±10%	+5VDC @ 10A +12VDC @ 1A −12VDC @ 1A	7.63 x 4.31 x 1.50 (Enclosed)
TDI-173	60 W	115/230VAC ±15%	+12VDC @ 5A −12VDC @ 1.5A	8.00 x 4.71 x 1.25 (PC Card)
TDI-168	60 W	110/220VAC ±20%	+5VDC @ 2.5A +12VDC @ 2.0A	7.75 x 4.25 x 2.20 (Open Frame)
TDI-149	100 W	110/220VAC ±10%	+5VDC @ 8A +24VDC @ 1A −12VDC @ 1A −12VDC @ 1A	7.75 x 4.25 x 2.20 (Open Frame)
TDI-170	150 W	110/220VAC ±15%	+5VDC @ 8.5A +12VDC @ 4.0A −12VDC @ 1.5A −7.2VDC @ 6.0A	13.5 x 6.0 x 3.5 (Enclosed)
TDI-190 (Military)	150 W	115VAC/Nominal	+12VDC @ 1.5A −12VDC @ 1.5A +5VDC @ 14A −5VDC @ 0.75A	8.75 x 7.0 x 4.5
TDI-201	300 W	110 or 220V Versions	+50VDC @ 5A +40VDC @ 1A	11.5 x 6.25 x 2.75
TDI-194	400 W	115/230VAC ±10%	+5VDC @ 65A ±15VDC @ 1.5A	13.5 x 6.75x 3.0
TDI-131	500 W	115/230VAC ±10%	6 Outputs	12.5 x 8.5 x 5.25 (Enclosed)
TDI-184	800 W	115/230VAC ±10% or battery	13.5VDC @ 55A	11.5 x 8.0 x 5.0 (Enclosed)
TDI-146	1000 W	220VAC ±10%	30VDC @ 33A	12.0 x 8.0 x 5.0 (Open Frame)
TDI-207	1500 W	110/220VAC ±15%	100VDC @ 15A	11.5 x 8.0 x 5.0 (Enclosed)
TDI-224	1550 W	110/220VAC ±15%	28VDC @ 60A	11.5 x 8.0 x 5.0 (Enclosed)

Outputs indicated above are representative of those in current production. Other outputs are available at user's request with slight circuit modifications. NRE charges may apply depending upon complexity of modification.

DC-DC CONVERTERS

Model #	Total Power	Input Voltage	Outputs	Dimensions
TDI-177	50 W	77-120VDC	+15VDC @ 2.0A −15VDC @ 1.0A	5.5 x 3.5 x 2.75 (Open Frame)
TDI-204	50 W	22-45VDC	+15VDC @ 1.0A −15VDC @ 1.0A	5.5 x 3.5 x 2.75 (Open Frame)
TDI-214	50 W	50-90VDC	+15VDC @ 1.0A −15VDC @ 1.0A	5.5 x 3.5 x 2.75 (Open Frame)
TDI-178	60 W	21-28VDC	+12VDC @ 5.0A −12VDC @ 1.5A	8.0 x 4.7 x 1.25 (PC Card)
TDI-179	60 W	42-56VDC	+12VDC @ 5.0A −12VDC @ 1.5A	8.0 x 4.7 x 1.25 (PC Card) 8.0 x 4.7 x 1.25 (PC Card)
TDI-180	60 W	104-140VDC	+12VDC @ 5.0A −12VDC @ 5.0A	8.0 x 4.7 x 1.2 (PC Card) 8.0 x 4.7 x 1.2 (PC Card)
TDI-189 (Military)	150 W	28VDC nominal	+12VDC @ 1.5A −12VDC @ 1.5A + 5VDC @ 14A − 5VDC @ .075A	8.75 x 6.0 x 3.0 (Enclosed)
TDI-155	250 W	20-32VDC	Up to 3 (see catalog)	6.5 x 6.5 x 3.0 (enclosed)
TDI-144	300 W	105–160VDC	15VDC @ 20A	6.56 x 5.25 x 4.81 (Enclosed)
TDI-158	300 W	55-80VDC	15VDC @ 20A	6.56 x 5.25 x 4.81 (Enclosed)

Models shown above may be modified to accommodate use needs by changing either input voltage ranges or output voltages. NRE charges may apply depending on complexity of requested order.

High Reliability Power Systems

TECHNOLOGY DYNAMICS inc.

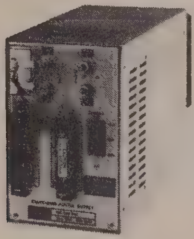
91 E. CARVER AVENUE, WESTWOOD, NJ 07675 • (201) 664-7636

CUSTOM AND STANDARD SWITCHING POWER SUPPLIES

HIGH POWER
Commercial or Military

800W Single Output Uninterruptable Power Supply

TDI-184



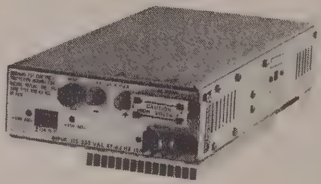
Input: 115/230VAC 50/60Hz and +12VDC battery
Output: 13.5VDC @ 55A
Regulation: ±1.0% line and load combined for a 20-100% load change

Features:
1) Battery charging circuit
2) Very low switching noise
3) OV and OL protection
4) Input RFI filter

Dimensions: 11.5″ x 8.0″ x 5.0″
Outputs Available: 24V, 48V, 56V

400W Slim Line MULTIPLE OUTPUT

TDI-194



Input: 115/230VAC 50/60 Hz
Output: +5VDC @ 65A
±15VDC @ 1.5A
Line Regulation: ±0.5%
Load Regulation: ±1.0% for 10-100% load change

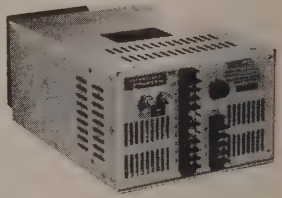
Features:
1) Designed to meet U.L. 544
2) Overvoltage protection
3) Overload protection
4) Remote sensing of +5V output
5) Input RFI filter

Dimensions: 13.5″ x 6.75″ x 3.0

Other output voltages may be provided upon request.

1500W High Density Single Output

TDI-207



Input: 110/220VAC 47-63Hz
Output: 100VDC @ 15A
Regulation: Within ±1.0% line and load combined
Ripple and Noise: 200mVpp max

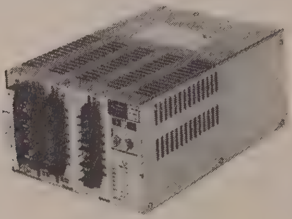
- Overvoltage and overload protection
- Remote sense
- High efficiency
- High reliability

Dimensions: 11.5″ x 8.0″ x 5.0″

Output voltages other than those shown may be provided.

500W Multiple Output

TDI-131



Input: 115/230VAC ±10% 50/60Hz
Outputs: + 6VDC @ 30A
− 6VDC @ 10A
+12VDC @ 5A
−12VDC @ 3A
±24VDC @ 3A

Load Regulation:
±0.5% for +6VDC output
±1.0% for all other outputs

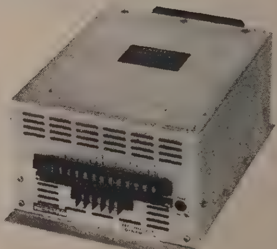
Line Regulation:
±0.5% for all outputs

Dimensions: 5¼″ x 8$\frac{7}{16}$″ x 12½″

Note: Other output voltages are available upon request.

500W Multiple Outlet

TDI-206



Input: 115/230VAC ±10% 50/60Hz
Outputs: + 5VDC @ 20A
+15VDC @ 2A
−15VDC @ 1A
+12VDC @ 3A
−12VDC @ 4A
+26VDC @ 4A unregulated

Load Regulation:
±0.5% on all outputs except +26V

Line Regulation:
±0.25% for all outputs except +26V

Dimensions: 5½″ x 8½″ x 12½″

Features:
1) Overload protection on all regulated outputs
2) O.V. protection on 5V output
3) Efficiency = 65% minimum
4) Operates to 60°C with no derating

High Reliability Power Systems

TECHNOLOGY DYNAMICS inc.

91 E. CARVER AVENUE, WESTWOOD, NJ 07675 • (201) 664-7636

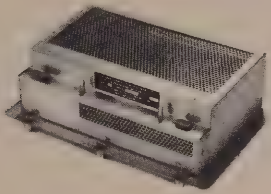
CUSTOM AND STANDARD SWITCHING POWER SUPPLIES

- Full Military for airborne, shipboard, and ground support applications
- Militarized designs for economy and high reliability

Military to Mil-E-5400

150W
Full-Mil, Multiple Output

TDI-183



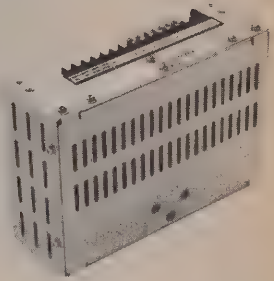
Input: 108-118VAC 50-425Hz

Outputs: + 15VDC @ 6.0A ±2%
− 15VDC @ 1.7A ±2%
± 10VDC @ 0.2A ±5%
+ 24VDC @ 1.1A ±3%
−5.3VDC @ 0.15A ±5%
+5.3VDC @ 2.2A ±5%

Dimensions: 12.15" x 7.875" x 3.38"
Wt.: 8.6 lbs.
Built in accordance with Mil-E-5400

150W
Full-Mil DC/DC Converter

TDI-189



Input: 28VDC nominal per Mil-Std-704C
Outputs: + 5VDC @ 14A
− 5VDC @ 0 .75A
±12VDC @ 1.5A

Line Regulation:
±0.5%, all outputs

Load Regulation:
±1.0% for +5V, ± 5.0% all others

Ripple and Noise: 100mVpp, all outputs

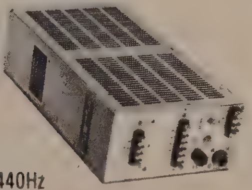
Dimensions: 3.0" x 6.0" x 8.75"
Wt.: 4 lbs.

Built in accordance with Mil-E-5400

Militarized Units

800W
Multiple Output, Enclosed

TDI-211



Input: 104-132VAC 47-440Hz

Outputs: + 5VDC @ 140A
±15VDC @ 4.0A

Regulation: ±1% line and load combined

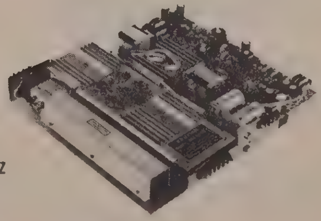
Ripple and Noise: ±1% peak-to-peak

Features:
- Militarized for high reliability
- Remote sensing of 5V output
- O.V. protection on all outputs
- Overload protection on all outputs

Dimensions: 14" x 7.5" x 4.0"

800W
Multiple Output, Open-Frame

TDI-210



Input: 104-132VAC 47-440Hz

Outputs: + 5VDC @ 140A
±15VDC @ 4.0A

Regulation: ±1% line and load combined

Ripple and Noise: ± 1% peak to peak

Dimensions: 15.0" x 13.5" x 2.0"

Features:
1) OV and OL protection on all outputs
2) Remote sensing of 5V output
3) Militarized for high reliability-operating temp to 70°C with no derating

High Reliability Power Systems

TECHNOLOGY DYNAMICS inc.

91 E. CARVER AVENUE, WESTWOOD, NJ 07675 • (201) 664-7636

CUSTOM AND STANDARD SWITCHING POWER SUPPLIES

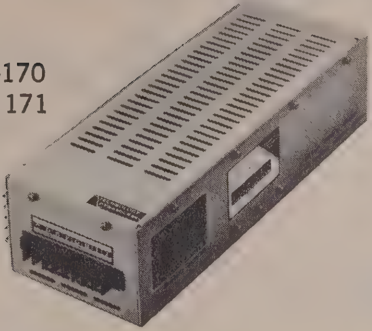
MEDIUM and LOW POWER

- Commercial or Military
- Designed to UL, CSA, VDE, FCC

150W
Multiple Output Switching Power Supply

TDI-170 and 171

TDI-170 and 171



Input: 85-132VAC 47-63Hz

Outputs:

TDI-170	TDI-171
+5V @ 8.5A	+5V @ 0.5A
+12V @ 4.0A	+15V @ 1.0A
−12V @ 1.5A	−15V @ 0.5A
−7.2V @ 6.0A	−27.5A @ 4.0A

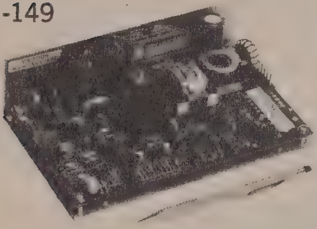
Ripple and Noise: Within 1% peak to peak

Dimensions: 13.5″ x 6.0″ x 3.5″

- Operating temperature 0°C-70°C
- OV and OL protection
- Optional conformal coating
- Militarized for high reliability
- Other output voltages available

100W
Open Frame

TDI-149



Input: 110/220VAC ±10% 50/60Hz

Outputs See table below

Load Regulation:
Main Output ±0.5%, 20%-full load
Auxiliary Outputs ±6.0% with main @ ½ load

Line Regulation: ±0.25% all outputs

Ripple and Noise: 50mVpp max.

Operating Temperature: 0°C-65°C

Derate: To 60% @ 75°C

Dimensions: 7½″ x 4⅝″ x 2$\frac{1}{16}$″

Weight: 1.5 lbs.

60W
Plug In PC Card

TDI-173

Input: 115/230VAC ±15% 47-63Hz
Control via slide switch

Outputs: +12VDC @ 5A
−12VDC @ 1.5A
(Total output power 60w max.)

Regulation: ±1% both outputs

Ripple and Noise: ±1% of output voltage

Efficiency: 70% typical

Hold Up Time: 16msec.

Notes:
1) On/off control via front switch
2) Plug into standard 22 pin finger connector
3) Output voltage adjustable ±3%
4) Soft start and inrush current control
5) Designed to work with no derating −30°C to +70°C

60W
Extended Range

TDI-168

Input: 70-138 VRMS or 140-276 VRMS
47-64Hz jumper selectable

Outputs: +5VDC @ 2.5A
+12VDC @ 2.0A

Load Regulation:
±1.0% from 20% to full load for output #1
±6.0% for output #2

Line Regulation:
±1.0% both outputs over full input range

Ripple & Noise: 50mVpp max on both outputs

Hold-Up Time:
40msec upon removal of nominal AC voltage (115v/230v)

Dimensions: 7.75″ x 4.25″ x 2.20″

Weight: 2.0 lbs.

OUTPUTS OPEN FRAME

Model #	Output #1 (Main)	Output #2	Output #3	Output #4
TDI-149	+5VDC @ 8A	+24VDC @ 1A	+12VDC @ 1A	−12VDC @ 1A
TDI-165	+5VDC @ 8A	+24VDC @ 2A*	+12VDC @ 0.5A*	−12VDC @ 0.5A*
TDI-186	+9VDC @ 2A	+5VDC @ 1A*	+12VDC @ 0.5A	−12VDC @ 0.5A
TDI-162	+5VDC @ 3A	+24VDC @ 4A Avg.†	+45VDC @ 7mA	−12VDC @ 20mA

* Output is linearly post regulated — load regulation = ±0.2%

High Reliability Power Systems

TECHNOLOGY DYNAMICS inc.

91 E. CARVER AVENUE, WESTWOOD, NJ 07675 • (201) 664-7636

CUSTOM AND STANDARD DC-DC CONVERTERS

and

SWITCHING REGULATORS

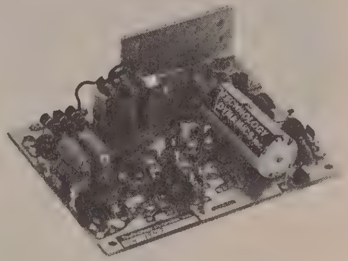
- 10-12 Week Delivery for Prototype
- Single or Multiple Outputs

30W and 50W

Single Output DC-DC Switching Regulators

Line Regulation: 0.005%/Volt max.
Load Regulation: 0.1%/Amp max.
Ripple: 60mVpp max.
Switching Frequency: > 30KHz
Operating Temperature: 0°C to 50°C
Derating: To 50% PWR @ 70°C
Recovery Time: Less than 400 micro sec.

- **High Efficiency — 70%**
- **High Reliability — 150,000 Hr. MTBF**
- **Compact Size — 4″ x 5″ x 1.3″**
- **Build your own multiple output supply**



STANDARD FEATURES
- **OVERLOAD PROTECTION**
- **OVERVOLTAGE PROTECTION**
- **INPUT RFI FILTER**

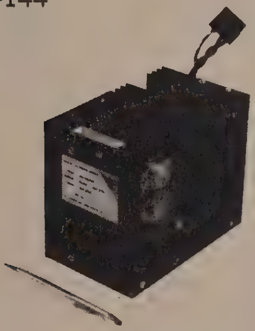
SR30P-*	30 Watts	Input: +9VDC to +30VDC	Output: +5VDC to +15VDC
SR50P-*	50 Watts	Input: +9VDC to +30VDC	Output: +5VDC to +15VDC

* Please Consult Factory for Model Numbers

Input voltage must exceed output voltage by 3V min.

300W
High Power Converters and Battery Chargers

TDI-144



Input: 105-160VDC (or 55-80VDC)
(AC input option available)

Output: 15VDC @ 20A

Line Regulation: ±1% max.

Load Regulation: ±1% from 15%-full load

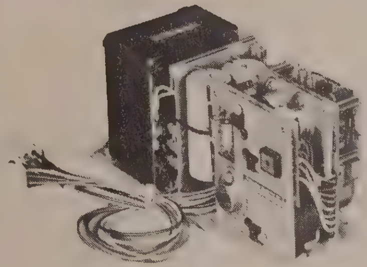
Ripple and Noise: Less than 1% pp

Dimensions: 4 13/16″ x 5¼″ x 6 9/16″

Note: Other output voltages available upon request.

100W
Multiple Output Dual Input UPS

TDI-123



Input: 21-32VDC and/or 115/230VAC

Outputs:
+ 8.4VDC @ 3.5A
+18.0VDC @ 2.0A
−18.0VDC @ 1.25A
− 6.0VDC @ 0.5A
+70.0VDC @ 10mA

Regulation: ±0.25% line and load

Ripple and Noise: Less than 50mVpp for all outputs

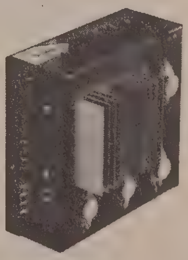
Operating Temp.: −10°C to +65°C

Dimensions: 3.3″ x 4.5″ x 8.5″

Note: With AC input, a DC output of +24V is delivered and may be used for battery charging.

250W
Medium Power Multi-Output DC-DC Converters

TDI-155



Input: 20-30VDC

Outputs: Single, Dual or Triple as required. Most voltage-current combinations available.
Maximum Power Output = 250 Watts

Line Regulation: ±0.2% over full input range

Load Regulation: 2.0% from ½ to full load

Ripple and Noise: 1.0% RMS

Weight: 3.5 lbs.

High Reliability Power Systems

TECHNOLOGY DYNAMICS inc.

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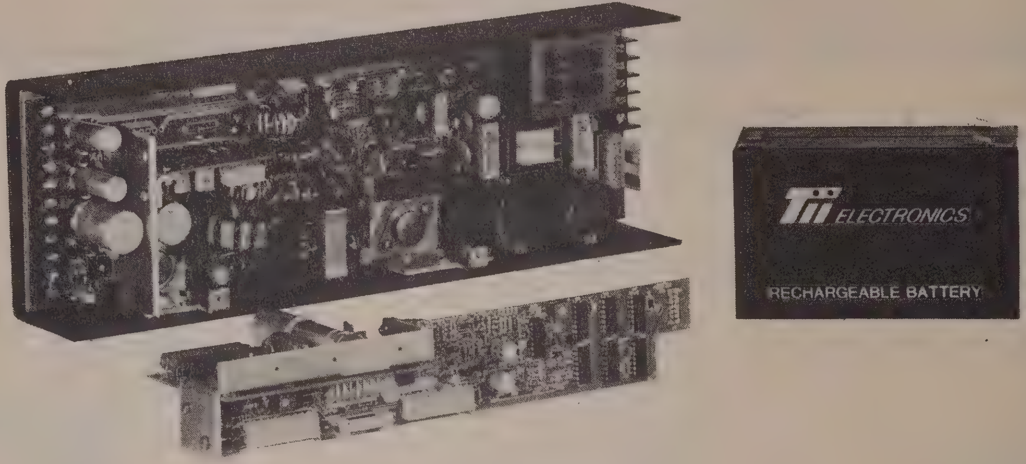
EHVQ™ SWITCHING POWER SUPPLIES WITH OPTIONAL BATTERY BACKUP



EHVQ™ 220, BATTERY BACK UP BOARD AND BATTERY PACK

POWER SUPPLIES DESIGNED AS INTELLIGENTLY AS YOUR COMPUTER

EHVQ POWER SUPPLY

- 115/230 VAC INPUT
- DESIGNED TO MEET FCC VDE UL CSA
- INDUSTRY STANDARD CASES
- FULL POWER AT 50°C
- OVERVOLTAGE PROTECTION ON MAIN OUTPUT
- REMOTE ON/OFF
- 1 YEAR WARRANTY
- AVAILABLE WITH OPTIONAL BATTERY BACKUP
- ALL OUTPUTS ISOLATED AND FULLY FLOATING
- OPTIONAL COVER
- BUILT IN LINE FILTER
- SOFT START

BATTERY BACKUP OPTION

- FIELD UPGRADEABLE (PLUG IN PC BOARD)
- TTL STATUS SIGNALS
- JUMPER SELECTIBLE SHUTDOWN MODES
- ON-BOARD, FLOAT-TYPE BATTERY CHARGER

Our EHVQ™ line of high-quality, compact switches offer new flexibility in the design of fault-tolerant systems. The optional battery backup now allows you to implement reliable DC power without the size/cost penalty associated with traditional battery backup systems. Battery backup is field upgradeable. It plugs into your system's EHVQ™ power supply as easily as adding more memory. The EHVQ™ line is designed to retain it's form factor when the battery backup is added.

The battery backup board contains the battery charger, soft transition logic, and all communications logic. TTL compatible status signals indicate AC low, battery low and battery charged conditions. During an AC power failure, automatic shutdown logic allows system shutdown to occur after a timeout, after the battery gets to a low state or controlled by the system, via the "Shutdown Inhibit" input. The unit automatically restarts after AC power is restored. A "Return from Power Fail" status signal can be used by the system to vector to the appropriate restart procedure.

Transition from AC power to battery power is done with novel "Soft Transition" logic (patent pending). This allows power sharing between the battery and AC line even under the most severe brownout conditions.

Call or write TII Electronics for more information. Our application engineers are ready to answer any questions you may have about optional battery backup. EHVQ Designer's Kits are available from stock. They contain everything you need to test the EHVQ with optional battery backup.

HELPING YOU BEFORE YOUR CHIPS ARE DOWN.™

TII® ELECTRONICS, INC.
226 Terminal Road, E. Setauket, New York 11733 516-751-6285

EHVQ™ SWITCHING POWER SUPPLIES WITH OPTIONAL BATTERY BACKUP

ELECTRICAL SPECIFICATIONS

INPUT: 85-140 /170-280 VAC
50-60 HZ
LINE REGULATION: .2% Fully Regulated Outputs
2% Semi Regulated Outputs
LOAD REGULATION: .2% Fully Regulated Outputs
±5% Semi Regulated Outputs

CROSS REGULATION: ±5% Semi Regulated Outputs
Main Output Change 50%
to 100% of Rated load
CENTERING: ±3% Semi Regulated Outputs
RIPPLE & NOISE: 50 mV PP Max Main Output
and Fully Regulated Outputs
1% Nominal Semi Regulated
Outputs

170 WATT MODELS 2.6″ x 5″ x 13.4″

EHVQ-170	MAIN	AUX 1*	AUX 2	AUX 3
2	5V, 15A	12V, 4A SR	12V, 4A SR	
3	5V, 15A	12V, 6A SR	12V, 1A FR	
4	5V, 15A	12V, 4A SR	12V, 4A SR	5V, 1A FR
5	5V, 15A	12V, 6A SR	12V, 1A FR	5V, 1A FR
6	5V, 15A	12V, 6A SR	12V, 1A FR	12V, 1A FR
7	5V, 15A	12V, 4A SR	15V, 1A FR	15V, 1A FR
8	5V, 15A	24V, 4A SR	12V, 1A FR	12V, 1A FR

220 WATT MODELS 2.6″ x 5″ x 15.0″

EHVQ-220	MAIN	AUX 1*	AUX 2	AUX 3
1	5V, 44A			
2	5V, 25A	12V, 6A SR	12V, 4A SR	
3	5V, 25A	12V, 6A SR	12V, 4A FR	
4	5V, 25A	12V, 6A SR	12V, 4A FR	12V, 1A FR
5	5V, 25A	12V, 4A SR	15V, 4A FR	15V, 1A FR
6	5V, 25A	12V, 6A SR	12V, 4A SR	5V, 1A FR
7	5V, 25A	12V, 6A SR	12V, 4A FR	5V, 1A FR
8	5V, 25A	24V, 4A SR	12V, 4A SR	12V, 1A FR
9	5V, 25A	24V, 4A SR	12V, 4A FR	12V, 1A FR
10	5V, 25A	12V, 6A SR	12V, 4A SR	12V, 1A FR
11	5V, 25A	12V, 4A FR	12V, 4A FR	
12	5V, 25A	15V, 4A FR	15V, 4A FR	

330 WATT MODELS 2.6″ x 6.5″ x 15.0″

EHVQ-330	MAIN	AUX 1*	AUX 2	AUX 3
1	5V, 45A	24V, 4A SR		
2	5V, 45A	12V, 4A SR		
3	5V, 45A	12V, 12A SR	12V, 6A SR	
4	5V, 45A	12V, 12A SR	12V, 6A FR	
5	5V, 45A	12V, 12A SR	12V, 6A FR	12V, 2A FR
6	5V, 45A	12V, 6A SR	15V, 6A FR	15V, 2A FR
7	5V, 45A	12V, 12A SR	12V, 6A SR	5V, 2A FR
8	5V, 45A	12V, 12A SR	12V, 6A FR	5V, 2A FR
9	5V, 45A	24V, 6A SR	12V, 6A SR	12V, 2A FR
10	5V, 45A	24V, 6A SR	12V, 6A SR	12V, 2A FR
11	5V, 45A	12V, 12A SR	12V, 6A SR	12V, 2A FR
12	5V, 45A	12V, 6A FR	12V, 6A FR	24V, 4A SR

SR - Semi-Regulated Output FR - Fully Regulated Output

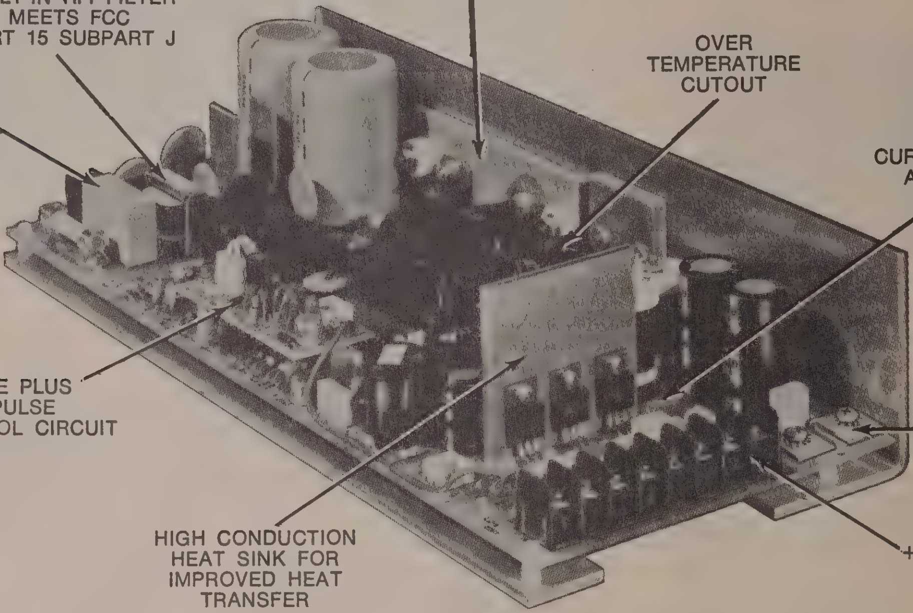
All models total power current limited. Currents shown represent maximum continuous current available per output, AUX 1* capable of supplying additional 4A surge current.

HELPING YOU BEFORE YOUR CHIPS ARE DOWN.™

TII® ELECTRONICS, INC.
226 Terminal Road, E. Setauket, New York 11733 516-751-6285

TODD PRODUCTS CORP.

50 Emjay Boulevard, Brentwood, NY 11717 • Tel: (516) 231-3366 • TWX 510-227-4905


IEC 380 4mm/8mm CREEPAGE AND CLEARANCE DISTANCES
BUILT-IN RFI FILTER MEETS FCC PART 15 SUBPART J
VDE 0806 APPROVED COMPONENTS
OVER TEMPERATURE CUTOUT
AUTOMATIC RESETTING CURRENT LIMIT ON ALL OUTPUTS
VERI-DRIVE PLUS 60 kHz PULSE WIDTH CONTROL CIRCUIT
HEAVY DUTY LOW IMPEDANCE OUTPUT BUSS
HIGH CONDUCTION HEAT SINK FOR IMPROVED HEAT TRANSFER
+5 VOLT REMOTE SENSE

VERI-DRIVE PLUS

A field proven design which has accumulated hundreds of millions of trouble free field operating hours.

VERI-DRIVE PLUS is the enhanced version of Todd's proprietary VERI-DRIVE, the time tested switching power supply technology that has made Todd Products Corp. the fastest growing power supply company in the country. Using the powerful combination or VERI-DRIVE PLUS, state of the art components, and higher switching frequencies, the Todd Engineering team has produced a line of cost effective, high performance, reliable switchers second to none.

VERI-DRIVE PLUS improves switcher reliability:

- Prevents Inverter Transistor cross-conduction
- Eliminates Inverter Transistor Matching
- Reduces Transistor losses by faster switching time
- Reduces spiking due to core saturation effects

AND . . . if a failure does occur, VERI-DRIVE PLUS automatically prevents secondary component failure thus simplifying repair and analysis.

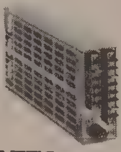
SINGLE OUTPUT SWITCHERS

Designed to Meet FCC/VDE RFI Specs

CONVECTION COOLED

FEATURES

☐ UL recognized
☐ Convection cooled
☐ Full ratings to 50°C
☐ Remote Sense
☐ Dual AC Input



100 WATTS

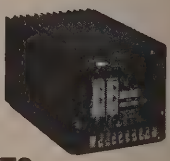
Size: 1.93 x 4.63 x 9.5

MODEL	VOLTAGE	CURRENT
SW2-20	2V	20A
SW5-20	5V	20A
SW12-10	12V	10A
SW15-8	15V	8A
SW24-5	24V	5A
SW28-4.5	28V	4.5A
SW48-2.5	48V	2.5A

150 WATTS

Size: 3.11 x 4.85 x 8.5

MODEL	VOLTAGE	CURRENT
SW2-30	2V	30A
SW5-30	5V	30A
SW12-15	12V	15A
SW15-12	15V	12A
SW24-7.5	24V	7.5A
SW28-6.5	28V	6.5A
SW48-4	48V	4.0A



300 WATTS

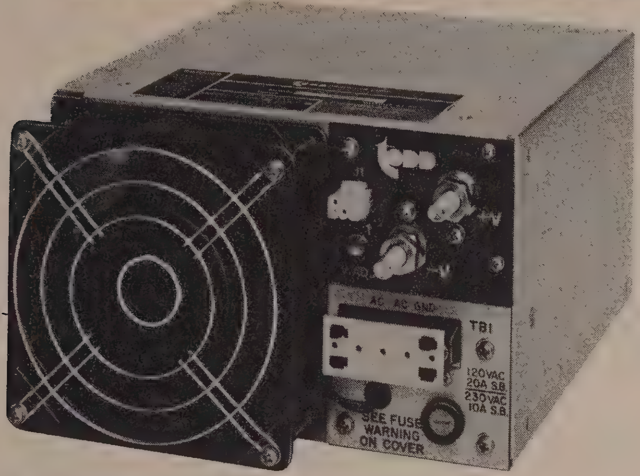
Size: 4.85 x 5.13 x 9.12

MODEL	VOLTAGE	CURRENT
SW2-60	2V	60A
SW5-60	5V	60A
SW12-30	12V	30A
SW15-24	15V	24A
SW24-15	24V	15A
SW28-13	28V	13A
SW48-7.5	48V	7.5A

CUSTOMIZED VERSIONS OF ALL MODELS AVAILABLE CONSULT FACTORY

TODD PRODUCTS CORP.

50 Emjay Boulevard, Brentwood, NY 11717 • Tel: (516) 231-3366 • TWX 510-227-4905



NEW SINGLE OUTPUT SWITCHERS

HIGH POWER 625 WATT SWITCHER... UNDER** 60c PER WATT

FEATURES

- ☐ Small size — 5 x 8 x 10 inches
- ☐ Industry standard mounting
- ☐ Meets FCC RFI (Part 15 Subpart J)
- ☐ U/L recognized
- ☐ IEC 380 version available
- ☐ 50 KHz VERI-DRIVE PLUS design
- ☐ Optional AC power fail
- ☐ Optional remote margining

625 WATTS
Size: 5 x 8 x 10 inches

MODEL	VOLTAGE	CURRENT
SOX-2-125*	2V	125A
SOX-3-125*	3V	125A
SOX-5-125*	5V	125A
SOX-12-52*	12V	52A
SOX-24-36*	24V	36A
SOX-28-23*	28V	23A
SOX-48-13*	48V	13A

* Specify suffix A1 for 115 VAC operation or A2 for 230 VAC.

SPECIFICATIONS: ALL SINGLE OUTPUT SWITCHERS

Input: 115/230 VAC ±15%, 47 to 63 Hz. Single phase. All models strappable except models indicated.

Output Adjustment: ±10%.

Regulation: 1% line or load.

Ripple and Noise: Less than 10 mv RMS, 50 mv P-P.

Stability: 0.1% over 8 hr.

Temperature Coefficient: Less than 0.02%/°C.

Transient Response: 500 μsec following a 50% load change. Sox, 250 μsec.

Overshoot: No turn on or turn off overshoot.

Brown Out Protection: To 85/170 VAC.

Carryover Time: 25 msec. Sox, 16 msec.

Overload Protection: Automatic resetting current limiting.

Overvoltage Protection: Latching or automatic OVP depending on model.

Remote Sensing: Standard on all models.

Reverse Voltage Protection:

Power Factor: 0.75 typical.

Temperature Range: 0°C to 50°C. Derates to 71°C.

Soft Start: Minimizes input current surge on turn-on.

Efficiency: 75% typical.

Safety: U/L recognized (most models).

Options:
A. Latching OVP (1500 and 300 watt models only)
B. AC power fail signal
C. Remote margining (Sox Series only)

** OEM Quantities

SW AND SX SERIES

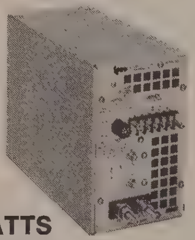
FAN COOLED

FEATURES

- ☐ Built in RFI Filter
- ☐ Power factor correction
- ☐ Fan cooled
- ☐ 50° ratings
- ☐ Fully protected

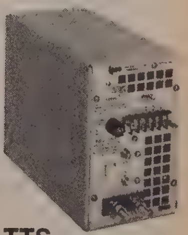
500 WATTS
Size: 4.95 x 5.5 x 10.7 in.

MODEL	VOLTAGE	CURRENT
SX2-100	2V	100A
SX5-100	5V	100A
SX12-50	12V	50A
SX15-40	15V	40A
SX24-25	24V	25A
SX28-22	28V	22A
SX48-13	48V	13A



750 WATTS
Size: 4.94 x 7.88 x 10.69 in.

MODEL	VOLTAGE	CURRENT
SW2-150S	2V	150A
SW5-150S	5V	150A
SW12-75S	12V	75A
SW15-60S	15V	60A
SW24-38S	24V	38A
SW28-33S	28V	33A
SW48-20S	48V	20A



1000 WATTS
Size: 4.94 x 7.88 x 10.69 in.

MODEL	VOLTAGE	CURRENT
SW2-200	2V	200A
SW5-200	5V	200A

For 625, 750 and 1000 Watt units add suffix "A1" for 115 VAC input or "A2" for 230 VAC.

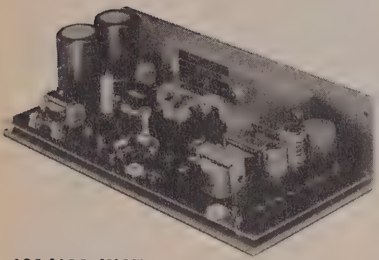
CUSTOMIZED VERSIONS OF ALL MODELS AVAILABLE CONSULT FACTORY

PRODUCTS CORP.

50 Emjay Boulevard, Brentwood, NY 11717 • Tel: (516) 231-3366 • TWX 510-227-4905

LOW COST O. E. M. MULTIPLE OUTPUT SWITCHERS

Designed to Meet FCC RFI (Part 15 Subpart J)



100/130 WATT

FEATURES

- ☐ UL recognized
- ☐ No 60 Hz magnetics
- ☐ Current limited on all outputs
- ☐ Dual AC input
- ☐ 75% typical efficiency
- ☐ Minimum component count
- ☐ Low output cross coupling
- ☐ Soft start

100 WATT 4 OUTPUT 2.5 x 5 x 9½″ PACKAGE

FEATURES

- ☐ High peak current disc drive output
- ☐ Tightly regulated ±12V output
- ☐ +5 remote sense
- ☐ Built in RFI filter

MODEL	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4
MOS-100-0512	+5A @ 15A	+12 @ 3.0A	−12 @ 2.0A	−5 @ 1A
MOS-100-2412	+5A @ 15A	+12 @ 1.5A	−12 @ 1.0A	+24 @ 4A pk
MOS-100-1212	+5A @ 15A	+12 @ 1.5A	−12 @ 1.0A	+12 @ 5A* pk

NOTE Peak currents are specified for disc drive applications. Maximum average current 2A. Shaded outputs are semi-regulated.

130 WATT 4 OUTPUT IEC 380/VDE 0806 2.5 x 5 x 9½″

FEATURES

- ☐ Meets International safety standards
- ☐ High peak current disc drive output
- ☐ Built in RFI filter
- ☐ +5V remote sense

MODEL	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4
MOV-100-1212	+5 @ 15A	+12 @ 1.5A	−12 @ 1.5A	+12 @ 5A pk
MOV-100-2412	+5 @ 15A	+12 @ 1.5A	−12 @ 1.5A	+24 @ 4A pk

NOTE Peak currents are specified for disc drive applications. Maximum average current 50% of pk. Shaded ouputs are semi-regulated.

150 WATT 4 OR 5 OUTPUT 2.5 x 5 x 10½″ PACKAGE

FEATURES

- ☐ High peak current disc drive output
- ☐ Remote sense on +5
- ☐ Tightly regulated ±12
- ☐ −5V bias supply

MODEL	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	OUTPUT #5
MOS-150-0512	+5 @ 20A	+12 @ 4.0A	−12 @ 3.0A	−5 @ 1A	
MOS-150-2412	+5 @ 20A	+12 @ 1.5A	−12 @ 1.0A	−5 @ 1A	+24 @ 6A pk
MOS-150-1212	+5 @ 20A	+12 @ 1.5A	−12 @ 1.0A	−5 @ 1A	+12 @ 6A pk

NOTE Peak currents are specified for disc drive applications. Maximum average current 3A. Shaded outputs are semi-regulated.

200 WATT 4 OR 5 OUTPUT 2.5 x 5 x 13″ PACKAGE

FEATURES

- ☐ Adjustable regulated high current ±12V output
- ☐ +5V remote sense
- ☐ High peak current disc drive output

MODEL	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	OUTPUT #5
MOX-200-0512	+5 @ 25A	+12 @ 4.0A	−12 @ 4.0A	−5 @ 1A	
MOX-200-0515	+5 @ 25A	+15 @ 4.0A	−15 @ 4.0A	−5 @ 1A	
MOX-200-2412	+5 @ 25A	+12 @ 4.0A	−12 @ 4.0A	−5 @ 1A	+24 @ 8A pk
MOX-200-1212	+5 @ 25A	+12 @ 4.0A	−12 @ 4.0A	−5 @ 1A	+12 @ 8A pk

NOTE Peak currents are specified for disc drive applications. Maximum average current 4A. Shaded outputs are semi-regulated.

SPECIFICATIONS

AC Input: 90-132 VAC/180-264 VAC selectable, 47-63 Hz.

Line and Load Regulaion: (20% to 100% load).
Semi-regulated Outputs: ±3%
All Other Outputs: ±1% or 2% depending on model.

Cross Regulation: (50% Load Change on Output #1).
All Shaded Outputs: ±3%.
All Other Outputs: ±1%.

Centering (Output #1 set to +5.00V, all outputs at 60% load): ±5%.

Min. Load Required: 20%.

Ripple and Noise: 0.2% RMS, 1% p-p or 100 mV, whichever greater.

Temperature Coefficient: 0.02%/°C.

Overshoot: No turn on or off overshoot.

Overload Protection: Current limit protection on all outputs.

Overvoltage Protection: Standard.

Brownout Protection: Holds full rated regulation to 85/170 VAC.

Hold Up Time: 16 ms.

Temperature Range: 0 to 50°C full ratings, derated 50% to 71°C.

Soft Start: Reduces turn-on current surge.

Safety: U/L recognized (most models).

CUSTOMIZED VERSIONS OF ALL MODELS AVAILABLE CONSULT FACTORY

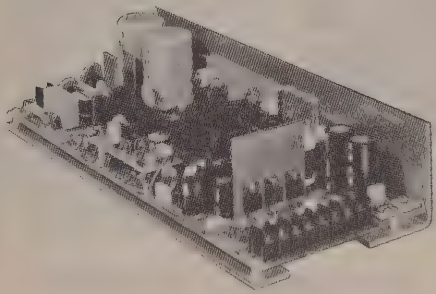
TODD PRODUCTS CORP.

50 Emjay Boulevard, Brentwood, NY 11717 • Tel: (516) 231-3366 • TWX 510-227-4905

O. E. M. OPEN FRAME SWITCHERS

NEW 300 WATT 3 OR 4 OUTPUTS

MEETS INTERNATIONAL SAFETY STANDARDS IN RECORD 2.1 WATTS/CU IN POWER DENSITY



The MOR Series 60 kHz switcher is designed for application requiring IEC 380/VDE 0806 safety as well as U/L 478. The units also meet the RFI requirements of FCC Part 15 Subpart J. Size: 2.5 x 5 x 11½".

FEATURES

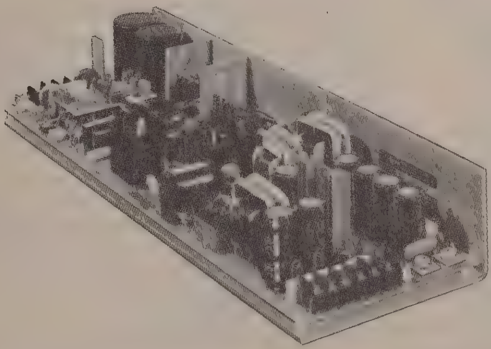
- ☐ IEC 380/VDE 0806 safety standards
- ☐ High current 45A, +5V output
- ☐ Remote Sense
- ☐ All regulated outputs
- ☐ Built in RFI filter

MODEL	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4
MOR-411-0512	+5 @ 45A	+12 @ 1.5A	−12 @ 1.5A	5.2 @ 1.5A
MOR-411-1212	+5 @ 45A	+12 @ 1.5A	+12 @ 1.5A	12 @ 1.5A
MOR-411-2412	+5 @ 45A	+12 @ 1.5A	−12 @ 1.5A	24 @ 1.5A
MOR-311-0512	+5 @ 45A	+12 @ 2A		12 @ 2A

- All outputs are regulated.
- Units require 60 cfm of moving air to achieve full ratings.

NEW 400 WATT 4 or 5 OUTPUTS

THE SMALLEST 400W OPEN FRAME SWITCHER IN THE INDUSTRY



This new Todd Multi-output high power open frame switcher represents a breakthrough in open frame switcher technology. Switching at 50 kHz and using Todd's VERI-DRIVE PLUS it is the only power supply delivering 50 amps at +5 VDC, and with a power density of greater than 2.1 watts per cubic inch (2.5 inches by 5 inches by 15 inches).

FEATURES

- ☐ High Current (50 Amp), Low Noise Output
- ☐ Remote Sense on +5 VDC Output
- ☐ Regulated Auxiliary outputs for ECL, or CRT display
- ☐ Built-in Thermal Protection
- ☐ High Surge Current Disk or Printer Output
- ☐ All Outputs Current Limited
- ☐ Built-in RFI Filter
- ☐ Heavy Duty High Current Output Studs
- ☐ Overvoltage and Open Sense Lead Protection

MODEL	OUTPUT #1	OUTPUT #2	OUTPUT #3	OUTPUT #4	OUTPUT #5
MOX-400-0512	+5 @ 50A	+12 @ 10A	−12 @ 10A	−5 @ 5A	
MOX-400-2412	+5 @ 50A	+12 @ 10A	−12 @ 10A	−5 @ 5A	+24 @ 8A pk
MOX-400-1212	+5 @ 50A	+12 @ 10A	−12 @ 10A	−5 @ 5A	+12 @ 8A pk
MRX-400-1212	+5 @ 50A	+12 @ 10A	−12 @ 10A	+12 @ 1.5A	
MRX-400-2412	+5 @ 50A	+12 @ 10A	−12 @ 10A	+24 @ 1.5A	
MRX-400-0512	+5 @ 50A	+12 @ 10A	−12 @ 10A	−5.2 @ 3A	

Shaded outputs are semi-regulated.

NOTE Peak currents specified are momentary, for motor starting. Reduce to 5A for maximum average current. Units require 60 cfm moving air to achieve full ratings. Combined current on outputs #2 and #3 cannot exceed 15A.

CUSTOMIZED VERSIONS OF ALL MODELS AVAILABLE CONSULT FACTORY

STATE-OF-THE-ART

DC POWER SUPPLIES

outboard, regulated multiple output power supplies for ...
microprocessor based computers, terminals, modems, printers and telecommunications equipment.

- **REDUCES HEAT**
- **REDUCES SIZE**
- **REDUCES COST**
- **ELIMINATES EMI**
- **EASY ACCESS SERVICE**
- **UL LISTING**

EXTERNAL WALL PLUG-IN MODEL

SPECIFICATIONS:

- INPUT: 103VAC to 129 VAC @ 60 Hz.
- OUTPUT:
  - + 5 VDC @ 750 M.A., 2.0% load regulation
  - +12 VDC @ 150 M.A., 0.1% load regulation
  - −12 VDC @ 150 M.A., 0.1% load regulation
- UL 1310 LISTED: Wall plug-in models.
- Meets CSA requirements (desk-top models).
- Line regulation: .2%.
- Operating temperature: 0°-40°C.
- Short circuit protected.

OPTIONS:

- 220 VAC, 50 Hz input.
- Permanent mounting tab.
- Shielded and/or drain output cable.

OTHER HIGH QUALITY TEC UL/CSA LISTED PRODUCTS:

- **AC-AC TRANSFORMERS:** Direct wall plug-in, P.C. board mount.
- **AC-DC POWER SUPPLIES:** Outboard, direct plug-in, inboard, P.C.B., chassis mount.
- **BATTERY CHARGERS:** Lead acid, nickel cadmium, fast rate, trickle, direct wall plug-in, inboard.
- **REGULATED POWER SUPPLIES:** (linear, switcher) Close regulation for micro-processor based equipment, direct wall plug-in, P.C.B., inboard mounted.
- **P.C. BOARD ASSEMBLY:** High-volume, wave soldered, point to point, manual or automatic stuffing.

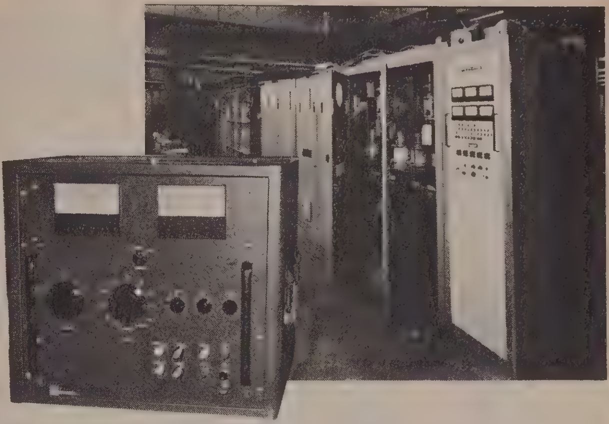
With the most experienced Engineering, Manufacturing and Marketing Team in our industry, Transformation Electronics Corp. can handle any low voltage power product or assembly requirement you have. TEC can engineer and obtain UL LISTING for power supplies in the U.S., build it here, or tool and manufacture in their Taiwan or Haiti manufacturing facilities.

TEC

TRANSFORMATION ELECTRONICS CORP.
170 Wilbur Place, Bohemia, New York 11716 (516) 563-1117
TWX: 510-222-0972

Precision Regulated High Voltage DC Power Supplies

Precisely regulated performance over wide adjustment range, low ripple, fast response and high stability enable the series "BRE" power supplies to be used in exacting work for X-Ray Spectroscopy, computerized tomography, electron microscopes, TWT's, ion bombardment experiments, particle separators.



☐ **FROM 1 KV THROUGH 500 KVDC**
These precisely regulated power supplies are available in voltage ratings from 1 KV through 500 KVDC at continuous duty output power up to 10 MW. Our regulation circuitry techniques realize performance specifications which are virtually independent of input line variations or no load-full load changes.

☐ **LOW RIPPLE...HIGH STABILITY**
Ripple in most cases is 0.01% rms and the output polarity is available as both fixed and reversible. Two voltage adjustment schemes are offered, namely digital dialable control for the most exacting applications and continuous coarse and vernier controls.

☐ **WIDE ADJUSTMENT RANGE**
In the digital dialable scheme, we allow for adjustment in increments of 10 KV, 1 KV, 100 volts, 10 volts, 1 volt and 0-1 volt vernier. Accuracy is within 1% of the dial readings. Regulation accuracy of ±0.25%; ±0.1%; ±0.05% and ±0.01% for line or load changes is available on most series "BRE" power supplies.

☐ **SCR PRIMARY REGULATION**
The use of SCR's for primary regulation, replacing motorised Auto-transformers, results in improved performance and significant volume and weight savings. Lower cost power supplies also result in volume applications. SCR primary regulators are applicable up to 1.5 MW primary power.

☐ **TWT/CFA POWER SUPPLY SYSTEMS**
Available with Cathode, Heater, Collector, Anode and Helix outputs. Each UVC Black Box system features:

- **CW or PULSED (grid, mod anode, cathode, etc.) OPERATION**
- **TURN ON/OFF SEQUENCE CONTROL TO INSURE SAFE AND PROPER PERFORMANCE**
- **FAST-ACTING CROWBAR PROTECTION**
- **REMOTE CONTROL FACILITY,** including IEEE 488 interface available as option

You can forget about power problems when you marry your TWT's to UVC Black Boxes.

BROCHURES: BRE 70-10 REGULATED
HIGH VOLTAGE DC POWER SUPPLIES

Adjustable High Voltage DC Power Supplies

VOLTAGE RANGES TO 2,000,000 VOLTS DC

☐ **CONSERVATIVELY RATED—HIGH RELIABILITY**
Every UVC power supply includes conservatively rated high voltage components designed and manufactured under the strict control of the specialized UVC technical staff to insure continuous duty, long term, trouble free operation.

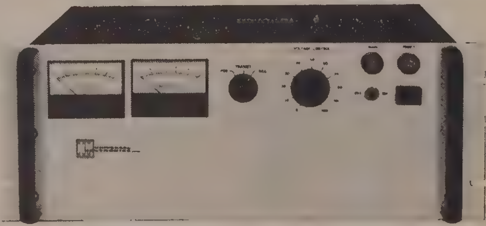
Each power supply offers a standard ripple specification of 5% maximum or better. Optional filters and attenuators are available for every UVC supply to reduce ripple to as low as .01% rms.

☐ **REVERSIBLE POLARITY**
Each power supply offers the flexibility of reversible output polarity performance.

☐ **FULLY SELF-PROTECTING**
Overvoltage and overcurrent protection features are available as both adjustable range and fixed value circuits. All access areas and doors are interlocked for personnel protection and all energy storage components and circuits are discharge protected for personnel protection.

☐ **"APPLICATIONS ORIENTED" CONTROLS OPTIONAL**
Rack mounted, floor and bench operable as well as portable design are among the packages available for UVC standard high voltage power supplies.

☐ **12-MONTHS WARRANTY**
A one year factory backed and field supported warranty policy accompanies each shipment.



Series "BA" adjustable power supplies and series "BP" power packs are available at voltage ratings from 1 KVDC through 2000 KVDC at output power ratings from 1 watt to 250 kilowatts continuous. The adjustable series includes applications oriented control features and package design. The power pack series has many applications in OEM systems and for general laboratory use.

BROCHURES: BA 70-10 ADJUSTABLE HIGH VOLTAGE DC POWER SUPPLIES
BA 70-11 EXTRA HIGH VOLTAGE DC POWER SUPPLIES
BA 70-13 MULTI-RANGE, HIGH VOLTAGE POWER SUPPLIES
BPE 70-5 HIGH VOLTAGE DC POWER PACKS ENCAPSULATED
BPO 70-5 HIGH VOLTAGE DC POWER PACKS OIL IMMERSED

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delay lines · panel hardware · displays · lamps/
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multimeters · panel meters · oscilloscopes · gra
phic recorde nnections · microwave
components ctors/
drives · ba
supplies, ac · relays ·
solenoids · potentiometers/trimmers
controls/rh s ·
switches · transducers/en
coders · transformers · wire & cable · enclosures
capacitors · circuit boards · coils, chokes, induc
tors · connectors, electronic · sockets,/terminals

EEM PRODUCT SELECTION GUIDES

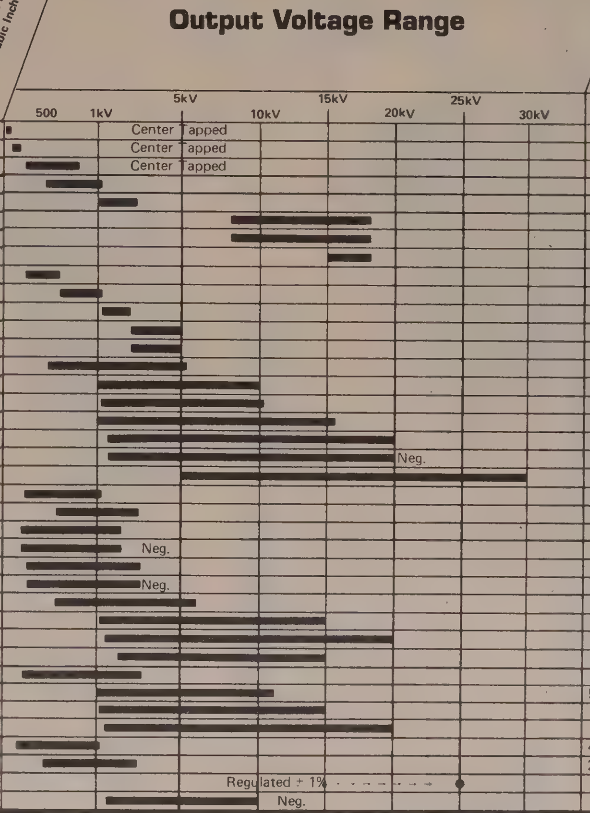
There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

VENUS
SCIENTIFIC, INC.

Miniature High Voltage Power Supplies

Standard Products "Quick" Selection Chart / Standard Products Performance Characteristics

MODEL NO.	Output Proportional to Input	Floating Bias Supply	Multiple Output	Low Power Battery Operated	PMT	CRT	Focus	Dynamic Focus	Switching Penetration	X-Ray Microscope	High Alt. Version	Volume in Cubic Inches	Output Voltage Range	-55° to +71°C Full Rating (-55° to +85°C Reduced Rating)	0° to 55°C
														Max. current rating	
C-½T	√	√	√									3	Center Tapped	*	32mA
C-2T	√	√	√									3	Center Tapped	*	8mA
C-8T	√	√	√				√					3	Center Tapped	*	2mA
C-15	√	√			√		√					3		*	1mA
C-30	√	√			√		√					3		*	500uA
CS-18						√			√			180		*	200uA
CS-18/DF			√			√	√	√	√			382		*	500uA
DF-18			√			√	√	√				314		*	500uA
F-6		√					√					7		16mA	*
F-12		√			√		√					7		8mA	*
F-25		√			√		√					7		4mA	*
F-50		√				√	√					7		2mA	*
F-50A		√				√	√				√	7		2mA	*
G-6						√	√				√	15		500uA	*
G-10						√					√	15		500uA	*
G-12						√					√	15		500uA	*
H-16F			√			√	√				√	31		500uA	*
H-20						√				√	√	31		500uA	*
H 20N						√				√	√	31	Neg.	500uA	*
H-30						√				√	√	44		300uA	*
K-15(Z)	√	√			√		√				(√)	2		1mA	*
K-30(Z)	√	√			√		√				(√)	2		500uA	*
LR-2					√							33		*	10mA
LR-2N					√							33	Neg.	*	10mA
LR-3					√							33		*	6.6mA
LR-3N					√							33	Neg.	*	6.6mA
LR 6						√	√					33		– –	3.3mA
LR-15			√			√	√					33		– –	1.3mA
LR-20			√			√	√					33		– –	1mA
LU-15	√		√			√	√					27		*	300uA
MG-3					√		√					7		1mA	*
MG 12						√						7		500uA	*
MR-15			√			√	√					33		– –	1.3mA
MR-20			√			√	√					33		– –	1mA
Q-15(Z)	√	√		√	√		√				(√)	3		400uA	*
Q-30(Z)	√	√		√	√		√				(√)	3		200uA	*
SM-25			√			√	√	√				97	Regulated ± 1%	*	1.2mA
ST-10N	√			√								7	Neg.	10uA	*



Above current ratings proportional to output voltage when units are operated at less than rated output voltage. *NOTE: Contact Factory

Most of Venus' power supplies can be obtained "off-the-shelf" from a large stock of inventory. This allows the unique advantage of selecting a power supply proven through previous years of field testing in numerous applications. The benefits of selecting from inventory include immediate delivery, no non-recurring engineering and demonstrated quality at a reasonable price. A custom design service is also available where unique and exacting requirements are not compatible with existing standard products. Venus can supply custom designed units in both prototype and production quantities for both Military and Commercial applications. Please contact the Venus Engineering Sales Department for further details in formulating a cost effective design to suit your specific requirements.

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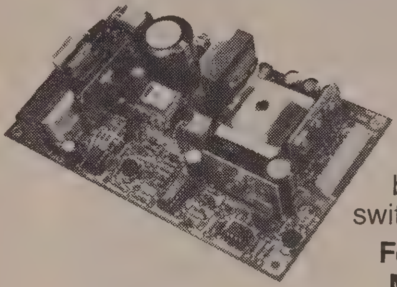
SCIENTIFIC, INC.

399 Smith Street Farmingdale, N.Y. 11735 (516) 293-4100 TWX: 510-224-6492

VOLTEX Power Supplies

compact, competitive and powerful.

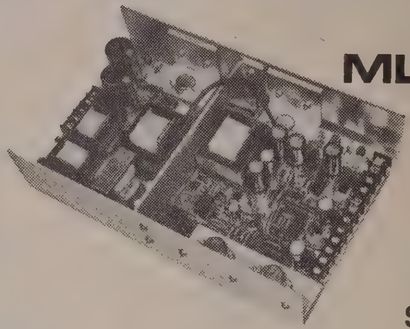


SERIES

VLX-50

45 watt
multi output
board mountable
switch mode supply.

For Terminal and Microprocessor applications.



SERIES

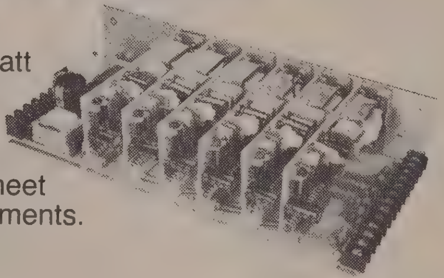
MLX-200

200 watt
multi output
open frame
switch mode
supply.

For Medium Size Systems.

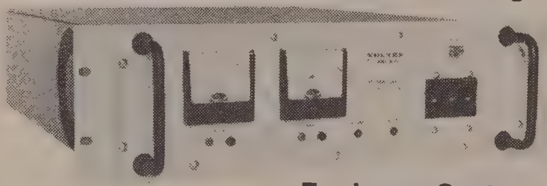
MMX-500

50 and 100 watt
plug-in modules
assembled on
multi-output
main chassis to meet
most system requirements.

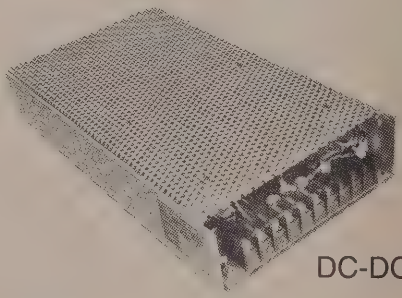


SERIES **RHX**

Rack Mounted 1 and 2 KW Switching.



For Large Systems.



SERIES

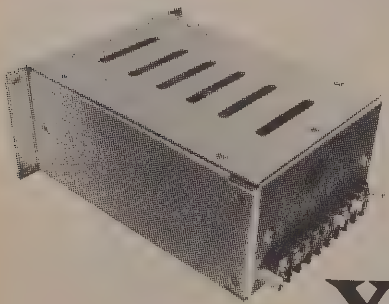
DMX

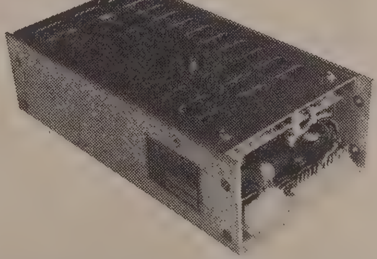
DC-DC converters

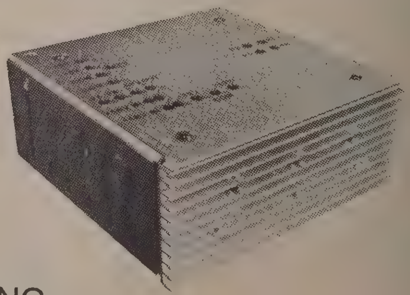
150 watt
multi output
DC-DC converters

Custom Designed Power Supplies for OEM applications

Switching Supplies **Linear Systems** **Ferroresonant Units** **SCR Regulators** **DC-AC Inverters**

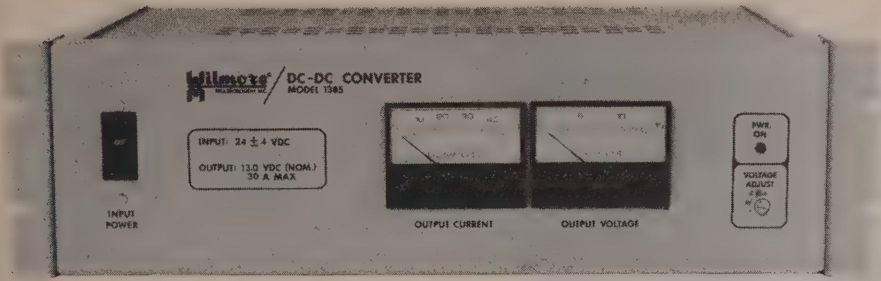






VOLTEX CO., INC.
3460 Great Neck Road, North Amityville, New York 11701
(516) 842-2772

DC-to-DC Power Converters



Wilmore®
ELECTRONICS CO., INC.

SERIES 1385

SERIES 1385 RACK-MOUNTED DC-to-DC POWER CONVERTERS

- **80% - 90% EFFICIENCIES**
- **INPUT/OUTPUT ISOLATION**
- **LOW OUTPUT RIPPLE**
- **-30°C TO 65°C OPERATING RANGE, CONVECTION COOLED**

The Series 1385 converters provide an isolated, regulated, adjustable dc output from station batteries or other widely fluctuating dc sources to reliably power telecommunications equipment, supervisory control systems, and other sensitive electronic loads. Although capable of providing up to 420 watts of continuous output power, these converters typically require only 5 watts of no-load input power and exhibit correspondingly high light-load efficiencies, making them uniquely suited for applications in which periods of "standby" or light-load service are encountered.

Front-Panel Controls and Indicators

A combination circuit breaker and ON/OFF switch is provided for the input power. A light-emitting diode indicates "DC Output Present." A voltmeter and ammeter display the DC output, and a screwdriver-slotted potentiometer shaft with locking nut is provided to adjust the output voltage level.

Size and Weight

All converters measure 5¼" high by 17" wide by 12" deep and are designed for 19" rack mounting. All units weigh less than 18 pounds.

Standard Options

Series 1385 converters are available with several standard options, including paralleling diodes for redundant applications, under- and over-voltage alarm contact closure, and remote sensing of output voltage. In addition, many other nonstandard input/output voltage combinations are available. Contact our sales department for details.

Model Number	Input Voltage Range (Vdc)	Settable Output Voltage Range (Vdc)	Output Current (Adc)
1385-24-13-15	20-29	12-14	0-15
1385-24-13-30			0-30
1385-24-24-7.5		22-26	0- 7.5
1385-24-24-15			0-15
1385-24-48-4		44-52	0-4
1385-24-48-8			0-8
1385-48-13-15	40-58	12-14	0-15
1385-48-13-30			0-30
1385-48-24-7.5		22-26	0- 7.5
1385-48-24-15			0-15
1385-48-48-4		44-52	0-4
1385-48-48-8			0-8
1385-48-125-1.5		115-135	0- 1.5
1385-48-125-3			0-3
1385-125-13-15	105-140	12-14	0-15
1385-125-13-30			0-30
1385-125-24-7.5		22-26	0- 7.5
1385-125-24-15			0-15
1385-125-48-4		44-52	0-4
1385-125-48-8			0-8
1385-125-125-1.5		115-135	0- 1.5
1385-125-125-3			0-3
1385-250-13-15	210-280	12-14	0-15
1385-250-24-7.5		22-26	0- 7.5
1385-250-48-4		44-52	0-4
1385-250-125-1.5		115-135	0- 1.5

OTHER RACK-MOUNTED DC-to-DC CONVERTERS

In addition to the Series 1385, Wilmore manufactures many other standard and custom, single- and multiple-output rack-mounted DC-to-DC converters, some of which are briefly described below. Each series is isolated, regulated, and highly efficient, and each is designed and manufactured in accordance with Wilmore's traditional emphasis on conservative electrical ratings and long product life.

The **Series 1240** converters are single-output units with standard output voltages of 24, 28, 30, 48 and 125 Vdc and standard input voltages of 48, 125 and 250 Vdc. These rugged converters are available at both 300-watt and 600-watt power levels. They are extensively used to power equipment within public utilities. Request bulletin 4011 for more information.

The **Series 1265** converters provide an adjustable 13 Vdc output at 30 amperes maximum load current, with standard input voltages of 24 Vdc and 48 Vdc. These converters weigh less than 15 pounds and feature an extremely wide ambient operating temperature range of -30°C to 71°C with convection cooling and no derating of output power. The Series 1265 is widely used in the communications industry to power sensitive radio transceivers and auxiliary base station equipment. Request bulletin 5061 for more information.

The **Series 1295** converters are similar to the Series 1265 except that the rated output power is 150 watts and additional output voltages of 24, 28, 36, 48 and 125 Vdc are available. Request bulletin 6061 for more information.

The **Series 1366** converters are modular, rack-mounted dual- or triple-output dc-to-dc converters. The independent outputs have a maximum output power of approximately 100 watts each and can be assembled in essentially any combination of the following standard outputs: 5 Vdc at 20 amperes, 12 Vdc at 6 amperes, and 15 Vdc at 6 amperes. Standard input voltages are 48 Vdc and 125 Vdc. Request bulletin 3051 for more information.

See Our Pages In Section 4050
DC-to-AC INVERTERS
UNINTERRUPTIBLE
POWER SYSTEMS

WILMORE ELECTRONICS CO., INC.

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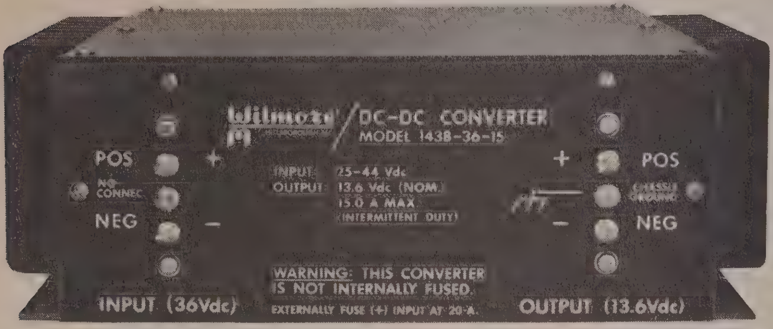
Railroad and Mobile-Radio DC-to-DC Converters



SERIES 1438

Wilmore®
ELECTRONICS CO., INC.

RELIABLE 13 VDC OR 26 VDC FROM VIRTUALLY ANY VEHICLE

- HIGHLY EFFICIENT OPERATION
- -30°C TO 60°C OPERATING RANGE
- ELECTRICALLY/MECHANICALLY RUGGED FOR MOBILE APPLICATIONS

These dc-to-dc converters are designed to power standard mobile communications equipment from vehicular electrical systems with output voltages other than 13-Vdc negative ground. Typical applications include 24, 36, 48, and 72-V lift trucks, positive-ground trucks, 24-V heavy duty construction vehicles, and 36-V and 72-V diesel and electric rail vehicles.

Series 1416 24-volt to 13-volt Converters
With output current ratings of 15, 25 and 35 amperes, the three models within this series provide a regulated 13.5 Vdc from 24-volt vehicular battery systems. Designed to meet military shock and vibration specifications, the Series 1416 converters are lightweight, highly efficient, and extremely rugged.

Series 1360 Mobile-Radio Converters
These rugged unregulated converters include Models 1360 and 1380 (13-Vdc polarity converters), Models 1365 and 1395 (24-Vdc to 13-Vdc converters) and Models 1424 and 1442 (12-Vdc to 24-Vdc converters). They are small, lightweight, and quiet, with typical efficiencies exceeding 85%.

Series 1340 Regulated/Isolated Converters
The Series 1340 can be used with 12, 24, 36, and 48-Vdc vehicular battery systems to provide voltage regulation and electrical isolation for 13-Vdc and 24-Vdc mobile communications equipment.

Model 1411 Wide Input Range Converter
Designed to power mobile-radio equipment on lift trucks, the Model 1411 has an input voltage range of 20 to 56 Vdc. This extremely wide input range, along with other features including electrical isolation and output voltage regulation, allows the user to specify one model for an entire fleet of lift trucks despite the presence of more than one vehicular battery voltage.

Series 1438 Railroad/LRV Converters
Communications equipment on diesel and electric rail vehicles is subject to an extremely harsh electrical and mechanical environment. The Series 1438 converters are designed to handle the constant mechanical stresses and will operate through input transients of up to 3000 Vdc in amplitude and 90 watt-seconds of energy content. Electrically isolated and well regulated, these converters are available with input voltages of 36 and 72 Vdc, with maximum output load currents of 5, 10 and 15 amperes.

MOBILE-RADIO DC-TO-DC CONVERTERS

Model Number	Input Voltage Range (Vdc)	Nominal Output Voltage[1] (Vdc)	Output Current[2] (Adc)	Isolated/ Polarity-Reversing	Dimensions (h" x w" x d")	Efficiency[3] (Typical)
1416-15	21-32	13.5	0-15	No	3.9 x 9.1 x 10.5	80%
1416-25			0-25			
1416-35			0-35			
1380	10-16	13.0	0-10	Polarity-Reversing	2.5 x 7.3 x 9.8	80%
1360			0-15			
1395	20-32		0-10	No		
1365			0-15			
1442	10-16	26.0	0-10			
1424			0-15			
1340-13-13-6	11-15	13.0	0-6	Isolated	3.9 x 5.5 x 7.1	72%
1340-13-26-3		26.0	0-3			
1340-26-13-6	22-30	13.0	0-6			
1340-26-26-3		26.0	0-3			
1340-36-13-6	30-42	13.0	0-6			
1340-48-13-6	40-56					
1411	20-56	13.0	0-4	Isolated	3.9 x 5.5 x 7.1	74%

RAILROAD/LRV DC-TO-DC CONVERTERS

Model Number	Input Voltage Range (Vdc)	Nominal Output Voltage (Vdc)	Output Current[2] (Adc)	Dimensions (h" x w" x d")	Weight (Pounds)	Input-Transient Withstand Capability	
						Voltage	Energy
1438-36-5	25-44	13.6	0-5	3.7 x 9.0 x 11.8	5.0	3000 Vdc	90 Joules
1438-72-5	58-86						
1438-36-10	25-44		0-10	3.7 x 11.4 x 11.8	5.5		
1438-72-10	58-86						
1438-36-15	25-44		0-15		7.0		
1438-72-15	58-86						

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1. Models 1380, 1360, 1395, 1365, 1442, and 1424 provide output voltages directly proportional to input voltage. All other models provide regulated output voltages.
2. All maximum current ratings assume an intermittent demand on a 20% duty cycle except for Models 1340, 1411, and 1438. Models 1340 and 1411 are continuous current ratings, and Model 1438 ratings assume a 25% duty cycle per AAR specifications.
3. These are typical minimum efficiencies from one-half to full load.

See Our Pages In Section 4050
DC-to-AC INVERTERS
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Power Supplies for Pulsed Lasers

Wilmore MODEL 1254
CAPACITOR CHARGING CONVERTER
FULL CHARGE
QUENCH DELAY ADJUST
INPUT POWER
HV ADJUST

Wilmore®
ELECTRONICS CO., INC.

SERIES 1254

ENERGY DELIVERY RATES UP TO 1200 JOULES/SECOND

- **AC- AND DC-INPUT MODELS**
- **± 0.25% OUTPUT VOLTAGE REPEATABILITY**
- **MIL-SPEC UNITS AND CUSTOM PACKAGING AVAILABLE**

Series 1254 capacitor-charging converters utilize a unique constant-power charging technique that allows them to charge any size capacitor at any pulse repetition rate within their energy-delivery-rate capacity. In addition to this series, Wilmore manufactures smaller, lighter and higher efficiency units on a custom-designed basis for industrial, military, and aerospace applications.

Model Number	Input Voltage	Energy Delivery Rate (Joules/sec*)	Maximum Output Voltage (Vdc)	Efficiency (Typical)	Dimensions (h"xw"xd")	Approximate Weight (Pounds)
1254-28-150	20 Vdc-32 Vdc (28 Vdc nominal)	150	User Specified - up to + 2500 Vdc (some units are available with negative output voltages) *Note: Energy delivery rates are maximum rates specified at the maximum output voltage. At one-half maximum voltage, the energy delivery rate will be reduced to approximately 70-75% of its maximum.	75%	5¼ x 19 x 17	12
1254-28-300		300			5¼ x 19 x 17	14
1254-28-450		450			5¼ x 19 x 21	20
1254-28-600		600			5¼ x 19 x 21	23
1254-115-300	115 Vac 50/60 Hz Single Phase (400 Hz optional)	300		85%	5¼ x 19 x 17	12
1254-115-600		600			5¼ x 19 x 21	20
1254-120/208-600	120/208 Vac 50/60 Hz Three Phase Wye (400 Hz optional)	600			5¼ x 19 x 17	20
1254-120/208-1200		1200			5¼ x 19 x 21	35

Custom-designed/OEM Power Supplies

FULLY INTEGRATED ELECTRICAL, MECHANICAL, AND THERMAL DESIGNS

- **INDUSTRIAL, MILITARY, AND AEROSPACE**
- **FAST TURNAROUND ON PROTOTYPES**
- **QUANTITY PRODUCTION CAPABILITY**
- **AC-to-AC, AC-to-DC, DC-to-AC, DC-to-DC DESIGNS**

Because user's needs tend to be highly individualized, a substantial portion of Wilmore's production involves custom-designed power conversion equipment rather than standard products. Our engineering charges for custom units are modest, and our urnaround times are exceedingly short. OEM's and system designers can cut costs without compromising quality with a custom power converter that is integrated in numerous ways to the overall electrical, mechanical, and thermal planning of a product.

Wilmore's involvements in designing and manufacturing custom power supplies in production quantities include a myriad of products, each with its own set of special electrical, mechanical, and thermal concerns. The following example categories are cited to illustrate the considerable range of Wilmore's custom engineering and production capabilities.

Sub-Modular and Encapsulated Supplies for PC-Board Mounting.
Wilmore is currently manufacturing ac-input and dc-input power supplies with single and multiple outputs that are designed to be mounted directly to printed circuit boards by plug-in sockets or direct soldering. These power supplies feature compact size and very wide operating temperature ranges with no output-power derating.

PC-Card Multiple-Output Switching Power Supplies
Designed to provide multiple dc outputs in a compact mounting configuration, these units operate from dc or ac power sources to power microprocessor-based equipment in utility-station environments. They can deliver up to 40 watts of power in a single pc-card, edge-connector configuration.

High-Efficiency DC-to-DC Converters
Wilmore specializes in the custom design of truly state-of-the-art dc-to-dc converters for military, aerospace, or particularly demanding industrial applications. We manufacture single- and multiple-output units in the power range from milliwatts to a kilowatt, with emphasis on reliability, efficiency, and cost-effectiveness.

Open-Frame and Enclosed Switching Power Supplies
Many power supply manufacturers have recently jumped on the "switcher" bandwagon, but Wilmore has been designing and manufacturing switching power supplies for more than 15 years. Virtually every power supply that we have designed and manufactured is a transistor-switching power supply. If you have some challenging requirements regarding efficiency, size, weight, reliability, or other performance criteria, our engineers would like to hear from you.

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Xentek

Power Supplies

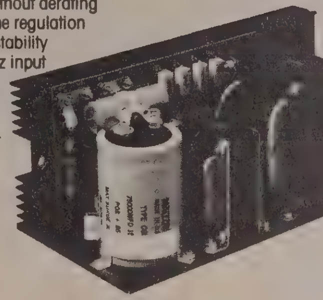
The heart of your system

Standard features for all Xentek supplies on this page: computer grade components ■ cermet adjustment pots ■ varnish impregnated transformers with 180°C magnet wire ■ 15-turn voltage adjustment pots ■ metal sealed or ceramic ICs with 168 hour burn-in ■ foldback current limiting ■ short circuit and reverse voltage protection ■ black anodized all aluminum chassis ■ 100% inspection

XE Series — Premium grade single output

- Nine models from 15-375W
- 0-55°C operation without derating
- ± 0.1% load and line regulation
- ± 0.1% ripple and stability
- 115/230V 50/60 Hz input
- large aluminum heat sinks on XE30 and larger
- shielded transformer and remote sensing standard

Options: built-in, adjustable OVP; high performance (0.01% regulation, ripple and stability); multiple or wide range inputs.



Output Current (amps at nominal voltage)

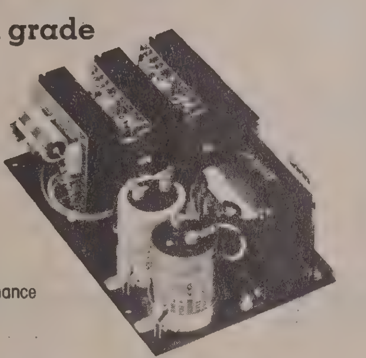
DASH NO.	-3	-5	-7	-9	-12	-15	-18	-24	-28				Price
MODEL/VDC	2-4	5-6	7-8	9-10	11-13	14-16	17-19	20-25	26-33	L × W × H (in.)			(1-9)
XE 15	3	3	2.4	2	1.7	1.5	1.2	1.0	.6	4.50	4.00	2.75	$ 35
XE 20	4	4	3	2.9	2.4	2.1	1.8	1.2	.9	4.50	4.00	3.06	42
XE 30	6	6	4.8	4.6	4	3.3	2.6	2	1.7	5.75	4.38	3.50	64
XE 60	12	12	9.6	9.2	8	6.6	5.2	4	3.4	6.25	5.25	4.88	94
XE 90	18	18	12.9	12	10.2	8.4	7.4	5	4.2	8.50	5.50	4.88	116
XE 120	25	25	17.3	14	12.1	10.3	8.7	6.5	5.6	12.00	5.62	4.88	146
XE 180	36	36	25.5	21	18.1	14.7	12.5	9.3	8	9.62	8.50	4.88	187
XE 240	50	50	34.6	28	24.2	20.6	17.4	13	11.2	11.94	9.25	4.88	229
XE 375	75	75	52	42	36	31	26	19.5	16.8	14.75	12.00	4.88	359

OVP option $8 (1-9) on most outputs under 90W.

XM Series — Premium grade multiple output

- Dual, triple and quadruple outputs to 180W
- 16 standard models listed here, plus:
- Thousands of tailored combinations — send for complete catalog
- 0-55°C operation without derating (0-40°C on XM20, XM25)
- ± 0.1% regulation, ripple, stability
- 115/230V inputs, shielded transformer, remote sensing all standard

Options: built-in adjustable OVP; high performance output; multiple or wide range inputs; dual tracking on XM15 or XM20.



Standard Models

Model	Output #1	Output #2	Output #3	L × W × H (in.)			Price (1-9)
XM-15-12/15	±12/15V, 0.8/0.75A each			4.50	4.00	2.75	$ 50
XM15-510	+5V, 1.5A	−9-12V, 1.0-0.8A		4.50	4.00	2.75	50
XM20-12/15	±12/15V, 1.0/0.9A each			4.50	4.00	3.06	56
XM20-510	+5V, 2A	−9-12V, 1.3-1.0A					56
XM25-510/512	5V, 4A	12/15V, 1.0/0.8A		6.50	4.38	2.38	67
3XM75S	5V, 4A	±12V, 4A each		10.50	6.25	3.62	169
3XM120-12/15	5V, 12A*	±12/15V, 4/3.3A each		12.00	7.00	4.88	219
3XM140-12/15	5V, 20A*	±12/15V, 2.4/2.1A each		14.62	5.75	5.00	259
3XM180-12/15	5V, 25A*	±12/15V, 4/3.3A each		15.00	7.00	5.38	264
4XM180S	5V, 25A*	±12V, 2.4A each, #4: 5V, 3A		12.00	8.50	4.88	272

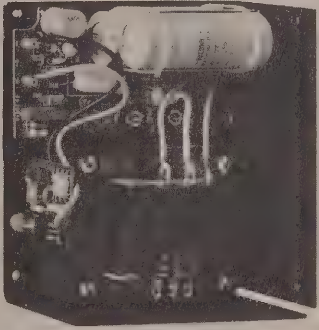
*Includes OVP standard

Note: Select 12V (-12) or 15V (-15) operation on models marked -12/15.

XP Series — Ideal choice for OEM, systems. Single outputs to 90W.

- Any output voltage from 2-32Vdc (2-250V on XP20, XP30)
- ± 0.1% load and line regulation
- ± 0.1% ripple and stability
- 0-40°C operation, derate 2%/°C to 71°C
- 115V 50/60Hz input

Options: Adjustable OVP; XPX, XS versions with 115/230V input; remote sensing; multiple and wide range inputs; shielded transformer



Output Current (amps at nominal voltage)

Dash No.	-3	-5	-9	-12	-24	-28	L × W × H (in.)			Price
Model/VDC	2-4	5-6	7-10	11-16	17-24	25-32				(1-9)
XP15	3	3	2	1.8	1.0	.6	4.87	4.00	1.97	$33.50
XP20	4	4	2.9	2.4	1.2	.9	4.87	4.00	2.28	40
XP30	6	6	4	3	2.3	1.2	5.62	4.88	2.95	53
XP45	9	9	6.1	4.8	3.6	1.8	7.00	4.88	3.38	71
XP60	12	12	8.2	6.5	5	2.6	9.00	4.88	3.38	84
XP90	18	18	12	10	6.7	6.0	14.00	4.88	3.38	114
XS40	5	5	3.8	3.5	2	1.6	5.62	4.88	3.00	56

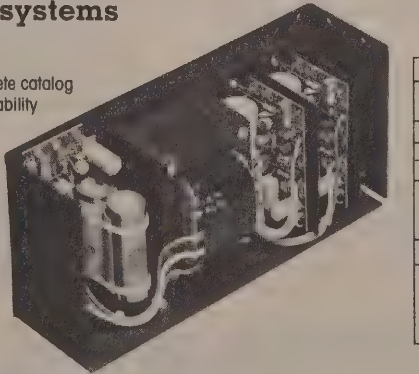
High voltage versions

VDC	48	75-100	120-180	200-250	Price (1-9)
XP20HV	.6A	.3A	.15A	.1A	$49
XP30HV	1.2A	.6A	.3A	.2A	85

2X, 3X, XPD, XPT Series — Multiple outputs for OEM, systems

- Dual and triple outputs to 120W
- Thousands for tailored combinations — send for complete catalog
- ± 0.1% regulation, ripple and stability
- 115V 50/60 Hz input
- 0-40°C without derating
- Packages to replace existing supplies

Options: adjustable OVPs, 115/230V inputs; remote sensing; multiple and wide range inputs, shielded transformer



Standard Models

Model	Output #1	Output #2	Output #3	L × W × H (in.)			Price (1-9)
XPD30-12	±12-15V, 1.8-1.5A each			7.87	4.00	2.70	$ 64
XPD30-512	5V, 3A	12-15V, 1.8-1.5A		7.87	4.00	2.70	64
2X45S	5V, 6A	12-15V, 1.8-1.5A		8.00	4.88	3.25	85
XPD60-12	±12-15V, 3A each			9.38	4.88	3.25	93
XPD60-512	5V, 6A	12-15V, 3A		9.38	4.88	3.25	93
XPD120S	±12-15V, 6.5-6.0A each			15.00	4.88	4.06	164
3X30S	5V, 3A	±12-15V, 0.8-0.75A each		9.50	4.25	2.62	82
3X45S	5V, 3A	±12-15V, 1.8-1.5A each		9.00	4.12	3.25	99
3X50S	5V, 6A	±12-15V, 0.8-0.75A each		9.25	4.88	3.25	95
3X55S	5V, 6A	12-15V, 1.8-1.5A	12-15V, 0.8-0.75A	10.00	4.88	3.25	99
XPT60S	5V, 6A	±12-15V, 1.8-1.5A each		11.00	4.88	3.38	108
XPT75S	5V, 9A	±12-15V, 1.8-1.5A each		11.00	4.88	3.70	119
XPT90S	5V, 12A	±12-15V, 1.8-1.5A each		14.25	4.88	3.38	129
XPT120S	5V, 12A	±12-15V, 3A each		15.00	4.88	4.06	165

Xentek, Inc. — 279 South Pacific Street, San Marcos, CA 92069 • **(619)744-3346 TWX: 910-332-1155**

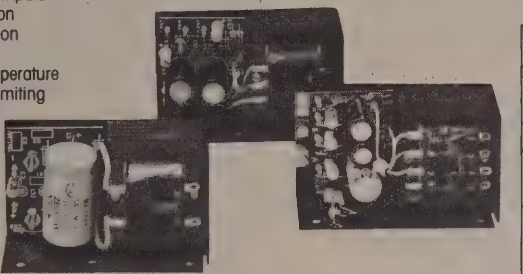
Power Supplies Isolation Transformers

Xentek

XI Series — Fixed output, IC regulated

- Single, dual, triple outputs to 30W
- Fixed voltage outputs within 5% of nominal
- 105-125V, 50/60Hz inputs
- ± 0.5% load regulation
- ±0.25% line regulation
- 0.1% ripple
- 0-40°C operating temperature
- Thermal and current limiting

Options: Output voltage adjustment (XI7 and XDI14, std on XTI30); OVP; shielded transformer



XI7 Single Output

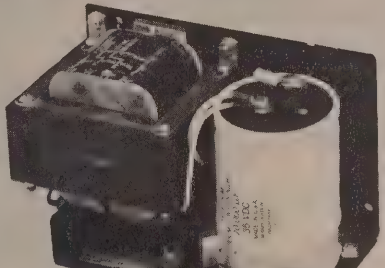
VDC	5	6	8	12	15	18	24	L × W × H (in.)			Price (1-9)
A	1.2	1.1	1.0	.8	.7	.5	.3	4 00	2.38	1 69	$22.50

Model	Output #1	Output #2	Output #3	L × W × H (in.)			Price (1-9)
XDI8-5	± 5V, 0.5A each			4 00	2 38	1 69	$32
XDI8-12 15	+ 12 15V 0 4 0 35A each			4 00	2 38	1 69	32
XDI9-5	+5V, 1.2A	−5V, 0 1A		4 00	2 38	1 69	37
XDI9-12 15	+ 12 15V, 0 8 0 7A	12 15V 0 1A		4 00	2 38	1 69	37
XDI9-5 12	+ 5V, 1 2A	12V, 0 1A		4 00	2 38	1 69	37
XDI14-12/15	+ 12/15V, 0 8/0.7A each			4 87	4 00	1 97	37
XDI14-512	+ 5V, 1.2A	− 12V, 0 8A		4 87	4 00	1 97	37
XDI20-5	+ 5V, 2A	− 5V, 1 0A		4 87	4 00	1 97	52
XDI20-12/15	+ 12/15V, 1.2/1.0A	− 12/15A, 0 6/0 5A		4 87	4 00	1 97	52
XTI5-12/15	+ 5V, 0 5A	± 12/15V, 0 125/0 1A each		3 50	2 20	1 60	37
XTI8-12/15	+ 5V, 0 75A	± 12/15V, 0 2/0 15A each		4 00	2 38	1 69	40
XTI15-12/15	+ 5V 1 2A	± 12/15V, 0 25/0 2A each		4 87	4 00	1 97	45
XTI20-12/15	+ 5V, 2A	± 12/15V, 0.4/0 35A each		4 87	4 00	1 97	52
XTI30-12/15	+ 5V, 3A	+ 12/15V, 0 4/0 35A each		7 00	4 50	3 00	69

XU Series — Unregulated dc to 500W

- Three input taps for ±10% voltage adjustment
- 3%rms max ripple at full load
- 0-50°C operating temperature
- Ideal for on-board regulator applications

Optional models: S-100 bus and ferroresonant versions available



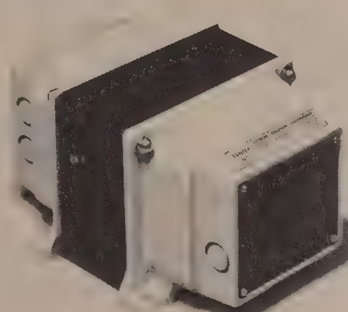
Output Current (amps at nominal voltage)

Dash No (VDC) Model	-7	-12	-16	-20	-24	-48	-120	-250	L × W × H (in.)			Price (1-9)
15XU	1 8	1 8	9	75	6	3	12	05	4 62	2.62	2 09	$ 23
30XU	3	2 4	1 8	1 5	1 2	6	25	1	5 88	3.19	2 62	28 50
60XU	6	4 8	3 6	3	2 4	1 2	5	2	6 25	3.69	3.00	38
100XU	10	7	7	5	3.5	1.8			7 12	4.00	3.25	50
200XU	20	15	12.5	10	7.5	4			8 10	5.00	3 88	72
500XU					20	10			9 00	5.62	4.62	129

EIT Series — Extreme Isolation Transformers

- Greatly attenuates unwanted power line noise
- Less than 0.1 femtofarad effective interwinding capacitance (-3 models)
- 115/230V strapping on input and output, 50/60 Hz. (1 KVA & up)
- ± 3% load regulation

Options: multiple input voltages; line cord and duplex receptacle; three phase operation



Selection Guide

Model No.	Rating (KVA)	Input Voltage (V AC)	Output Voltage (V AC)	Output Current AMPS	Effective Interwinding Capacitance (Pico Farads)	Common Mode Rejection	Price (1-9)
EIT5203	.25	115	115	2.17A	.005	130db	$149
EIT5204	.50	115	115	4.34A	.005	130db	189
EIT205	.75	115	115	6.52A	.005	130db	219
EIT1.0-20	1	115/230	115/230	9/4.5A	.001	140db	249
EIT1.0-30	1	115/230	115/230	9/4.5A	.0001	160db	299
EIT2.5-20	2.5	115/230	115/230	20/10A	.001	140db	349
EIT2.5-30	2.5	115/230	115/230	20/10A	.0001	160db	449
EIT5.0-20	5	115/230	115/230	39/19.5A	.001	140db	499
EIT5.0-30	5	115/230	1.15/230	39/19.5A	.0001	160db	599

Dimensions & Weights

Dimensions (Inches/mm) Model No.	Size H	W	L	Mounting WM	WM	Weight (Lbs.)
EIT5203	5.6	4.4	5.44	3.5	2.75	12
EIT5204	5.6	4.4	6.19	3.5	3.50	17
EIT5205	5.6	4.4	7.44	3.5	4.75	23
EIT1.0	6.5/165	8.5/216	9.75/248	7.25/184	3.50/89	38
EIT2.5	6.5/165	8.5/216	11.5/292	7.25/184	5.25/133	57
EIT5.0	6.5/165	8.5/216	14.5/368	7.25/184	8.25/210	92

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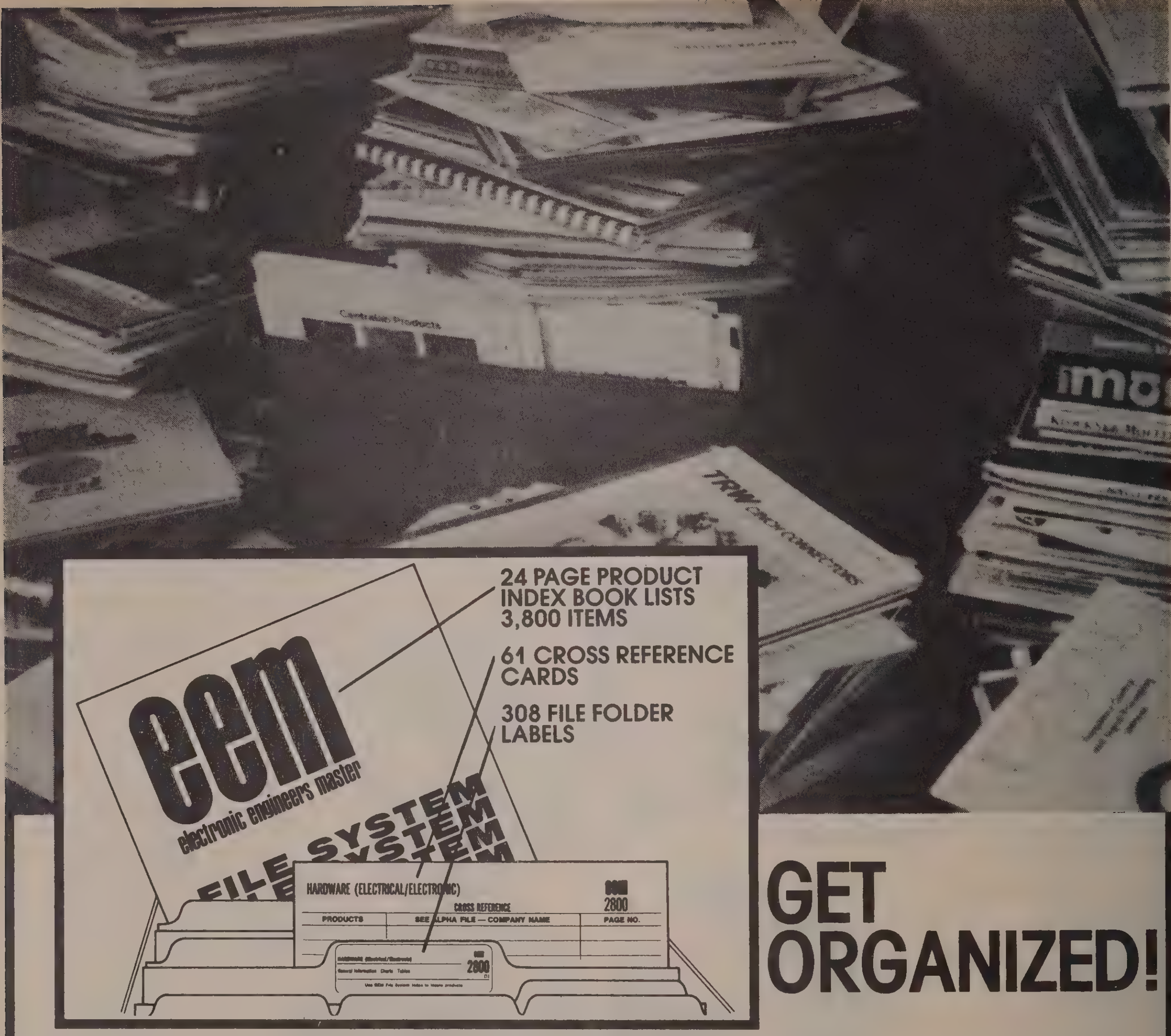
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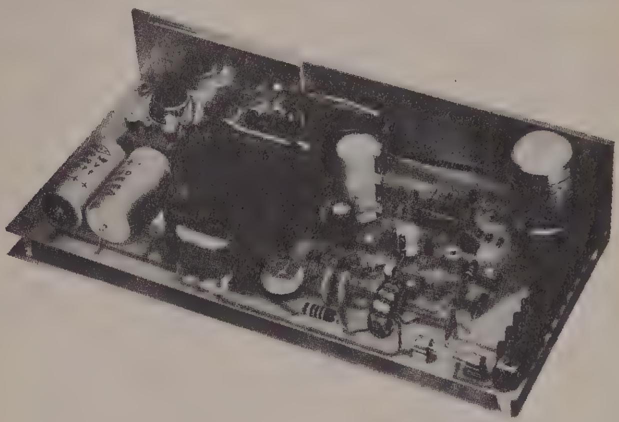
FEATURES

- Dual Range AC Input
- 65-80% Efficiency
- Overload Protection
- Convection Cooled
- 20 kHz Switching Frequency
- LG msec Holdup Time
- Brown-out Rated
- All Outputs Fully Regulated
- Designed to Meet UL, CSA and VDE Requirements



SPECIFICATIONS

- Input: 90-132/180-264 VAC 47-63 Hz
- Holdup Time: 16 msec min.
- Ripple and Noise: 2% pk-pk max.
  40 mV RMS max.
- Temperature Range: 0 to 70°C
- Regulation: 1%
- Current Limiting: 110-125% of Rated Current
- EMI Filtering

SINGLE OUTPUT

Model	SO 100	SO 175	SO 300
DC Volts/Watts	100W	175W	300W
5	20A	35A	60A
12	8.3A	14.5A	25A
15	6.8A	11.8A	20A
24	4.5A	7.9A	12.5A

MULTIPLE OUTPUT

Model	Case	1st Output	2nd Output	3rd Output	4th Output
MO 100	B	5V @ 10A	+12V @ 2A	—12V @ 1A	−5V @ 1A
MO 175	C	5V @ 20A	+12V @ 3A	−12V @ 2A	−5V @ 1A

DIMENSIONS

Case	H	L	W
A	2.5	8.5	5
B	2.5	10.5	5
C	3.0	15.0	5

All dimensions in inches.

OPTIONS

- Output Status LED Indicators
- Over Voltage Protection
- Enable/Inhibit Function
- Covers
- User Tailored Output Voltage
- Remote Sensing

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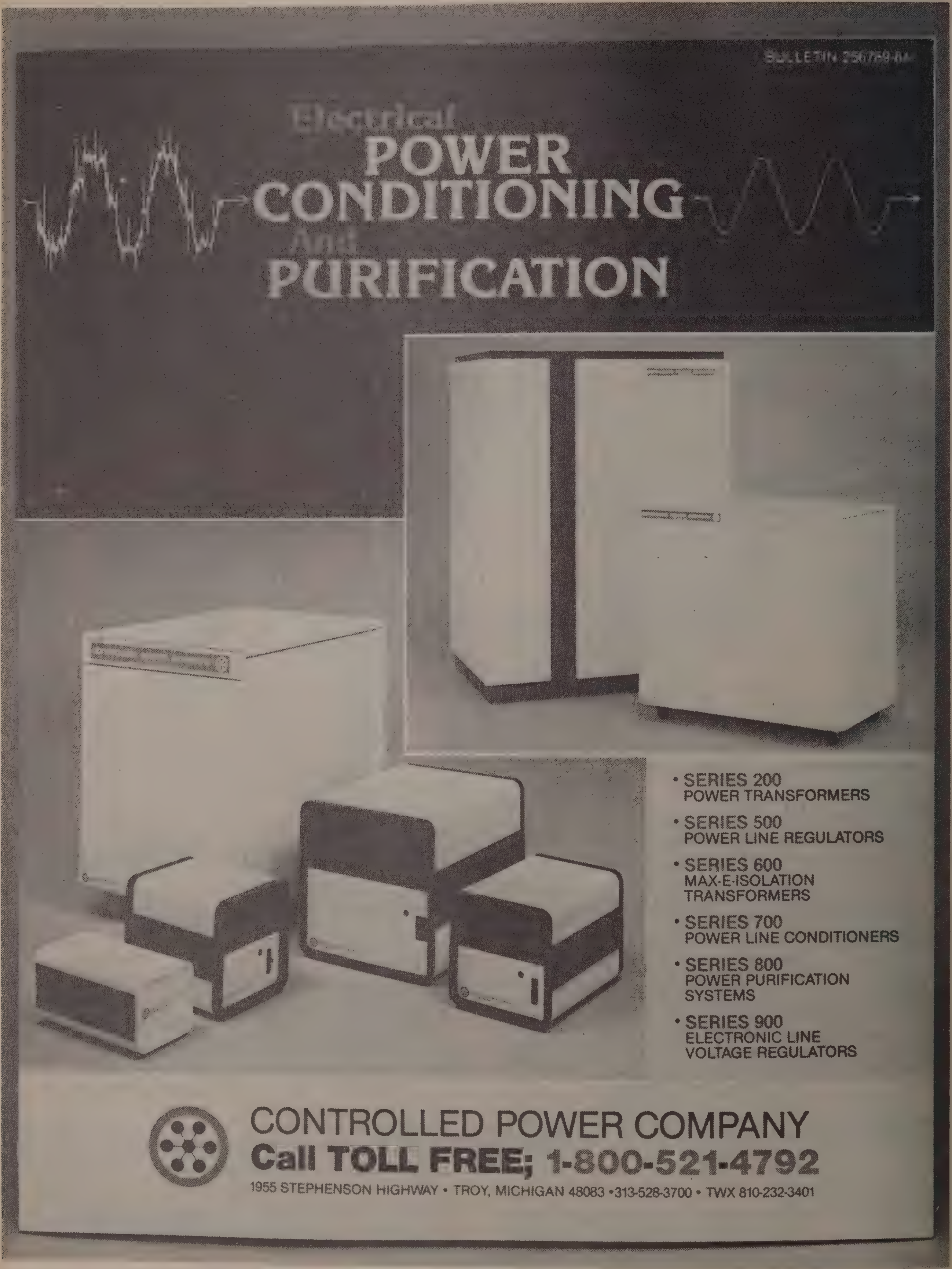

BULLETIN [illegible]

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LINE REGULATORS/CONDITIONERS

Manufacturer	EEM Page No.	Model/ Series	Power Rating	Output Frequency (Hz)	Phase			Under/ Over Voltage Protec- tion	Surge Protec- tion
					Single	Two	Three		
Atlas Energy Systems	3•1826	Value	0 to 160 KVA	50, 60, 400	●			●	●
Basic Measuring	3•1830		120, 240	50, 60	●			●	●
Behlman Engineering	3•1834	10/500	0 - 130 VAC	45 Hz - 10 KHz	●	●	●	●	●
	3•1838	UPS	100 VA - 20 KVA		●		●	●	●
California Instruments	3•1841	LC	115, 220, 230, 240V					●	
Clary Corp.	3•1842	UPS	115/230	60	●		●	●	
Controlled Power	3•1849	500	120/240	60	●		●	●	
	3•1852	800	120/240	60	●		●	●	
	3•1853	900	25 KVA to 150 KVA	60	●		●	●	
Displex	3•1860	LC	105-125 VAC	50, 60	●			●	●
Elgar	3•1855	6000/ 3000/ 5000	115/220/240	47 - 63				●	
	3•1856	RLC	120		●			●	
John Franek/ Helionetics	3•1870	61296	120 VAC	60	●				
		61304	120/208	60			●	●	
	3•1876*	61322	120/208	60			●	●	
Hipotronics	3•1883	Peschel		50, 60	●		●	●	
Hitran	3•1885	SFR	120/240/480	60	●		●	●	●
Powermark	3•1904	77000	117/220/230/240	47 - 63	●		●	●	●
RTE Deltec	3•1907		150 VA - 60 KVA	50, 60	●		●	●	
SGL Waber	3•1909							●	
Shape Magnetronics	3•1910	CLT	70 - 250 KVA	60	●			●	●
	3•1911	ILT	15 - 250 KVA	60	●		●	●	●
Sola	3•1912- 3•1915	UPS	120/220/240	50, 60	●			●	●
Superior Electric	3•1917	Stabiline	120/240	60	●			●	●
Triad-Utrad	3•1918		120/240	50, 60	●		●	●	

* Mil. Spec.

UPS SYSTEMS

Manufacturer	EEM Page No.	Model/ Series	Output Range (VA)	Output Frequency (Hz)	Phase		
					Single	Two	Three
Abacus Controls	3•1818		1 - 10 KVA	50, 60, 400	●		●
Advance Conversion Devices	3•1824	UPS	36 - 1500	60	●		●
Atlas Energy Systems	3•1826		10 - 750 KVA	50, 60, 400			
ATR Electronics	3•1827	UPS	0 - 1000				
Behlman Engineering	3•1838	UPS	0.1 - 20 KVA	50, 60	●		●
Clary Corp.	3•1842	UPS	750 VA - 30 KVA	60	●		●
Computer Power	3•1847	UPS	500 VA - 75 KVA	50, 60	●		●
Elgar	3•1856	UPS	0.5 - 45 KVA	50, 60	●		●
John Franek/Helionetics	3•1869	UPS	1.2 - 4 KVA	60	●		
Hitran	3•1884	UPS	1 - 45 KVA	50, 60	●		●
Nova Electric	3•1895	Taurus	125 VA - 37.5 KVA	50, 60	●		●
Pacific Power Source	3•1897	G/UG	2 - 90 KVA	50, 60, 400	●		●
RTE Deltec	3•1907	UPS	500 VA - 50 KVA	50, 60	●		●
Sola	3•1912		400 - 700	50, 60	●		
Wilmore Electronics	3•1921	1406/09	50 - 1000	50, 60	●		
Xylog	3•1922	MPS/SSG	800 - 1500	60	●		

FREQUENCY CONVERTERS

Manufacturer	EEM Page No.	Model/ Series	Output Range (VA)	Output Frequency (Hz)	Single	Two	Three
Abacus Controls	3•1818		0.5 - 10 KVA	50, 60, 400	●		●
Advance Conversion Devices	3•1825		36 - 5000	400, 60 - 400	●		●
Atlas Energy Systems	3•1826		10 - 750 KVA	50, 60, 400	●		
Avionic Instruments	3•1828	4A1000-3000	1000, 2000, 3000	50, 60	●		
Avtel/Unitron	3•1832*		0.4 - 120 KVA	50, 60, 400	●		●
Behlman Engineering	3•1834		100 VA - 27 KVA	45 KHz - 10 KHz	●	●	●
California Instruments	3•1840			45 Hz - 20 KHz	●		●
CML Macarr	3•1843	ST	500 - 4000	50, 60, 400	●		
	3•1843	TT	750 - 12,000	50, 60, 400			●
	3•1843	NAS	500 - 1000	45 Hz - 10 KHz	●		
	3•1843	TAS	500 - 3000	45 Hz - 10 KHz			●
Elgar	3•1858		120 - 6000	45 - 5000	●		
John Franek/Helionetics	3•1862*		12 - 72 KVA	50, 60, 400 (47 - 500 Variable)			
Georator	3•1878		0.15 KVA - 25 KVA	50, 60, 400, plus specials	●		●
Industrial Test/Powertron	3•1886		80 VA - 12 KVA	45 Hz - 10 KHz	●	●	●
KGS Electronics	3•1891	SPC	150, 1000, 2250, 500	400	●		●
Nova Electric	3•1895	Nova	125 VA - 37.5 KVA	50, 60, 400	●		●
Pacific Power Source	3•1897*		250 VA - 300 KVA	50, 60, 400	●		●
Powermark	3•1905		200 VA - 10 KVA	50, 60, 400	●		

STATIC INVERTERS

Manufacturer	EEM Page No.	Model/ Series	Output Range (VA)	Output Frequency (Hz)	Single	Two	Three
Abacus Controls	3•1819		0.5 - 10 KVA	50, 60, 400	●		●
Abbott Transistor	3•1822		5 - 240	50, 60, 400, 800	●		
Advance Conversion Devices	3•1824*		36 VA - 50 KVA	60	●		●
ATR Electronics	3•1827		50 - 5000	50, 60	●		
Avionic Instruments	3•1828*		50 VA - 7.5 KVA	50, 60, 400	●		●
CML Macarr	3•1845	MRS	200 - 500	50, 60	●		
	3•1845	DRS	200 - 500	400	●		
KGS Electronics	3•1890	SPS	200 - 1000	50, 60	●		
	3•1891	SPC	50 - 750	400	●		
Powermark	3•1905	Z	200 VA - 2 KVA	50, 60	●		
	3•1905	X	2 KVA - 10 KVA	400	●		
Wilmore Electronics	3•1920		45 - 500	50, 60	●		

* Mil. Spec.

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- **Designed for Critical ATE Applications**
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- **High Efficiency Autotransformer Design**

Astrosystems new series of programmable AC supplies provide precision AC power programmable in amplitude and phase. Featuring built-in microprocessor control,these completely solid state power sources are capable of driving high power loads. A unique switching autotransformer design eliminates the need for high power drive amplifiers resulting in low power dissipation and reduced size and weight.

Programming is via an IEEE 488 GPIB bus in CIIL language. Designed for critical Air Force MATE program applications, these power sources feature high reliability and meet all applicable MIL specs.

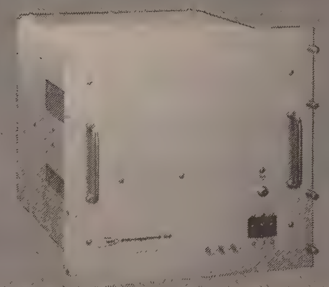
Features

- High power programmable AC outputs
- Programmable in phase and amplitude
- MATE compatible IEEE-488 bus
- Uses CIIL language programming
- All solid state low power dissipation design
- 1Ø , 2Ø or 3Ø outputs
- Automatic overload protection
- Uses internal or external frequency source
- Electrical isolation of input and output
- Modular design for ease in maintenance
- Built-in Test (BIT) capability
- Meet all applicable MIL specs

MATE Compatible
IEEE-488 BUS

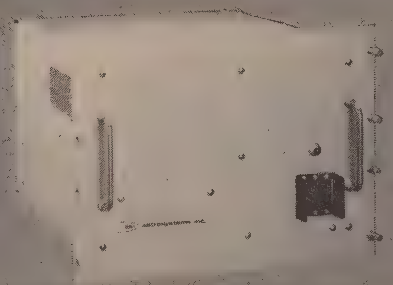
Each phase of the output is individually controlled in phase and amplitude via a GPIB bus. Programming is accomplished using the latest version of CIIL language. Overall control is exercised with a built-in Test Module Adapter (TMA) incorporating an 8088 processor. The processor also controls extensive Built-in Test (BIT) capabilities.

A5500-T Two Phase AC Power Supply



Output Power—Two independent AC power outputs; 4.5 amps each
Output Voltage—Programmable in 0.5 volt steps from 0 to 115 volts
Output Phase—Programmable in 1.5 degree steps from 0 to 360 degrees
Programming—MATE compatible IEEE 488 bus using CIIL language

A2100-T Three Phase Power Supply



Output Voltage—100-130 volts RMS per phase in 2 volt steps
Output Power—6.5 KVA maximum
Protection—Complete protection for short circuits. Voltage limiting to 110% of programmed value and current limiting to 110% of maximum power rating.
Programming—MATE compatible IEEE 488 bus using CIIL lanugage.

Custom/Standard Supplies

The power supplies described below are typical of those designed and produced by Astrosystems. Modular design and plug-in circuitry facilitate special designs. Our engineering department will customize these units to your exact requirements. Send us your specs or call the toll free number below.

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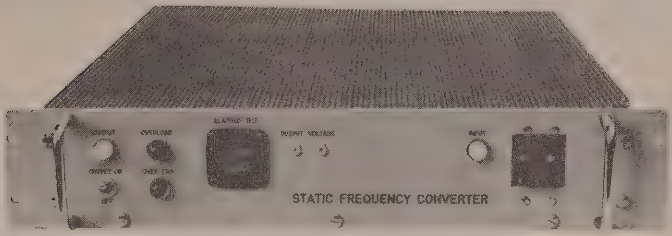

Model 152-1 (60Hz to 400Hz)

- **Digital Sinewave Generator**
- **77% Efficiency**
- **Low Cost**
- **Light Weight**
- **Proven Reliability**
- **Switching Power Transistors**
- **Useable as AC Power Supply**
  - **Motor Controller**
  - **Power Oscillator**
  - **Power Converter**
  - **Lab AC Source**

FREQUENCY CONVERTERS
50-60-400 Hz

Input Voltage: 115V AC, ±10%, single-phase for units 1000VA and below. 208V AC, ±10%, three-phase for units above 1000VA. 220V AC, ±10%, 50Hz is a no charge option. Other inputs available on a custom basis.

Input Frequency: 47 to 65Hz. 380 to 420Hz input is a no charge option.

Output Voltage: Adjustable 100 to 130 volts. Voltage adjust is internal for fixed frequency models, on the front panel for adjustable frequency models. (Other ranges available, consult factory.)

Voltage Regulation: Less than ±2% for combined no load to full load change and rated input voltage change.

Load Power Factor: 0.7 lead to 0.7 lag. Continuous zero lead to zero lag at full rated output without damage.

Output Waveshape: Sinewave less than 4% THD, 3% max any single frequency. (Less than 1% on custom basis.)

Protective Circuits: All models are equipped with automatic overload protection, including short circuit. Automatic reset upon overload removal. Circuit breaker on the input and fuse on the output. Automatic shutdown for input overvoltage, undervoltage.

Meters: Output voltmeter ammeter, and frequency meter offered as options.

Output Frequency: Rated output frequency for each model is shown on chart. For adjustable frequency models, adjustment is on the front panel. Internal frequency adjust is a no charge option.

Frequency Stability: Oscillator included in the unit base price. Fixed frequency oscillators are crystal controlled with a stability of ±0.05%. Adjustable oscillators are RC controlled and have a stability of ±0.25%.

Efficiency: Between 70 to 80 percent (typical 75%). At least 70% from 40% of full load to full load.

Peak Output Current: 150% of full rated current is available for three-cycles. Unit is set to current limit at 120% after three cycles.

SINGLE PHASE — 50/60 Hz

Model	Output Power (VA)	Output Frequency	Dimensions (Inches) H	W	D	Wt. (Lbs.)
152-3	500	50	3½	19	20	50
152-4	500	60	3½	19	20	50
152-5	500	45-65	3½	19	20	50
113-3	1000	50	8¾	19	20	70
113-4	1000	60	8¾	19	20	70
113-5	1000	45-65	8¾	19	20	70
223-3	2000	50	12¼	19	20	130
223-4	2000	60	12¼	19	20	130
223-5	2000	45-65	12¼	19	20	130
243-3	4000	50	21	19	20	240
243-4	4000	60	21	19	20	240
243-5	4000	45-65	21	19	20	240
263-3	6000	50	63	24	30	630
263-4	6000	60	63	24	30	630
263-5	6000	45-65	63	24	30	630
214-3	10000	50	63	24	30	775
214-4	10000	60	63	24	30	775
214-5	10000	45-65	63	24	30	775
224-3	20000	50	63	48	30	1500
224-4	20000	60	63	48	30	1500
224-5	20000	45-65	63	48	30	1500
234-3	30000	50	63	48	30	2250
234-4	30000	60	63	48	30	2250
234-5	30000	45-65	63	48	30	2250

THREE PHASE — 50/60 Hz

Model	Output Power (VA)	Output Frequency	Dimensions (Inches) H	W	D	Wt. (Lbs.)
117-3	1000	50	8¾	19	20	75
117-4	1000	60	8¾	19	20	75
117-5	1000	45-65	8¾	19	20	75
118-3	1600	50	12¼	19	20	110
118-4	1600	60	12¼	19	20	110
118-5	1600	45-65	12¼	19	20	110
238-3	3000	50	17½	19	20	170
238-4	3000	60	17½	19	20	170
238-5	3000	45-65	17½	19	20	170
268-3	6000	50	63	24	30	630
268-4	6000	60	63	24	30	630
268-5	6000	45-65	63	24	30	630
288-3	8000	50	63	24	30	680
288-4	8000	60	63	24	30	680
288-5	8000	45-65	63	24	30	680
219-3	10000	50	63	24	30	730
219-4	10000	60	63	24	30	730
219-5	10000	45-65	63	24	30	730
229-3	20000	50	63	48	30	1500
229-4	20000	60	63	48	30	1500
229-5	20000	45-65	63	48	30	1500
239-3	30000	50	63	48	30	2250
239-4	30000	60	63	48	30	2250
239-5	30000	45-65	63	48	30	2250

abacus controls inc.

89 READINGTON ROAD
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(201) 526-6010

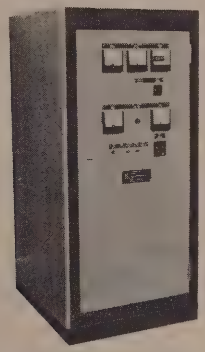
FREQUENCY CONVERTERS

SINGLE PHASE — 400 Hz

Model	Output Power (VA)	Output Frequency	Dimensions (Inches)			Wt. (Lbs.)
			H	W	D	
152-1	500	400	3½	19	20	35
152-2	500	350-450	3½	19	20	35
162-1	600	400	3½	19	20	40
162-2	600	350-450	3½	19	20	40
113-1	1000	400	8¾	19	20	70
113-2	1000	350-450	8¾	19	20	70
223-1	2000	400	12¼	19	20	130
223-2	2000	350-450	12¼	19	20	130
233-1	3000	400	21	19	20	180
233-2	3000	350-450	21	19	20	180
243-1	4000	400	21	19	20	210
243-2	4000	350-450	21	19	20	210
263-1	6000	400	63	24	30	550
263-2	6000	350-450	63	24	30	550
283-1	8000	400	63	24	30	680
283-2	8000	350-450	63	24	30	680
214-1	10000	400	63	24	30	775
214-2	10000	350-450	63	24	30	775
224-1	20000	400	63	48	30	1400
224-2	20000	350-450	63	48	30	1400

THREE PHASE — 400 Hz

Model	Output Power (VA)	Output Frequency	Dimensions (Inches)			Wt. (Lbs.)
			H	W	D	
117-1	1000	400	8¾	19	20	70
117-2	1000	350-450	8¾	19	20	70
118-1	1600	400	8¾	19	20	90
118-2	1600	350-450	8¾	19	20	90
218-1	1600	400	12¼	19	20	95
218-2	1600	350-450	12¼	19	20	95
228-1	2500	400	12¼	19	20	140
228-2	2500	350-450	12¼	19	20	140
238-1	3500	400	17½	19	20	180
238-2	3500	350-450	17½	19	20	180
268-1	6000	400	63	24	30	590
268-2	6000	350-450	63	24	30	590
278-1	7500	400	63	24	30	680
278-2	7500	350-450	63	24	30	680
219-1	10000	400	63	24	30	750
219-2	10000	350-450	63	24	30	750
229-1	20000	400	63	48	30	1400
229-2	20000	350-450	63	48	30	1400
239-1	30000	400	63	48	30	2100
239-2	30000	350-450	63	48	30	2100


Model 463-4-200 6KVA

STATIC INVERTERS
DC TO 50-60-400 Hz

- 85% Efficiency
- Low Cost
- Light Weight
- Proven Reliability

Input Voltage: 100 to 140V DC. Other input voltage ranges, 28V DC, 48V DC, 60V DC and 200V DC Sunverter.

Output Voltage: Set for 117V. Internal adjustment from 110V to 120V. 220V AC for 50Hz models.

Voltage Regulation: Less than 2% for single phase units, less than 5% for three phase units, for combined load and input voltage changes.

Output Waveshape: Sinewave less than 4% THD, 3% max any single frequency. (Less than 1% on custom basis.)

Protective Circuits: All models are equipped with automatic overload protection, including short circuit. Automatic reset upon overload removal. Circuit breaker on the input and fuse on the output. Automatic shutdown for input overvoltage, undervoltage.

STATIC INVERTERS

SINGLE PHASE

Model	Output Power (VA)	Output Frequency	Dimensions (Inches)			Wt. (Lbs.)
			H	W	D	
452-1	500	400	3½	19	20	40
452-3	500	50	3½	19	20	45
452-4	500	60	3½	19	20	45
413-1	1000	400	8¾	19	20	60
413-3	1000	50	8¾	19	20	65
413-4	1000	60	8¾	19	20	65
423-1	2000	400	12¼	19	20	90
423-3	2000	50	12¼	19	20	110
423-4	2000	60	12¼	19	20	110
433-1	3000	400	12¼	19	20	140
433-3	3000	50	12¼	19	20	160
433-4	3000	60	12¼	19	20	155
443-1	4000	400	22¾	19	20	170
443-3	4000	50	22¾	19	20	220
443-4	4000	60	22¾	19	20	210
463-1	6000	400	63	24	30	350
463-3	6000	50	63	24	30	400
463-4	6000	60	63	24	30	390
483-1	8000	400	63	24	30	400
483-3	8000	50	63	24	30	440
483-4	8000	60	63	24	30	430
414-1	10000	400	63	24	30	470
414-3	10000	50	63	24	30	540
414-4	10000	60	63	24	30	510
424-1	20000	400	63	48	30	969
424-3	20000	50	63	48	30	1080
424-4	20000	60	63	48	30	1020

THREE PHASE

Model	Output Power (VA)	Output Frequency	Dimensions (Inches)			Wt. (Lbs.)
			H	W	D	
417-1	1000	400	8¾	19	20	60
417-3	1000	50	8¾	19	20	70
417-4	1000	60	8¾	19	20	70
418-1	1600	400	12¼	19	20	90
418-3	1600	50	12¼	19	20	100
418-4	1600	60	12¼	19	20	100
428-1	2500	400	12¼	19	20	130
428-3	2500	50	12¼	19	20	150
428-4	2500	60	12¼	19	20	140
438-1	3500	400	17½	19	20	160
438-3	3500	50	17½	19	20	180
438-4	3500	60	17½	19	20	170
468-1	6000	400	63	24	30	350
468-3	6000	50	63	24	30	400
468-4	6000	60	63	24	30	390
488-1	8000	400	63	24	30	395
488-3	8000	50	63	24	30	475
488-4	8000	60	63	24	30	430
419-1	10000	400	63	24	30	470
419-3	10000	50	63	24	30	540
419-4	10000	60	63	24	30	520
429-1	20000	400	63	48	30	990
429-3	20000	50	63	48	30	1090
429-4	20000	60	63	48	30	1090
439-1	30000	400	63	48	30	1310
439-3	30000	50	63	48	30	1490
439-4	30000	60	63	48	30	1490

abacus controls inc.

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UNINTERRUPTIBLE POWER SUPPLIES

Single Phase and Three Phase
50, 60, and 400 HZ

- **Uninterruptible AC Power**
- **Quiet Operation — No Ferroresonant Devices**
- **Dual Mode Operation**
- **High Efficiency For Low Heat Generation**
- **Electro-Mechanical System Bypass**
- **"Bumpless Transfer" From Utility to Battery Operation**
- **Protection From Line Transients**
- **Electrically Isolated Integral Battery Charges**

Input Voltage: 115V AC ±10% single phase for single phase units. 208V AC ±10% three phase for three phase units. 220V AC for 50 Hz units. Other inputs available on a custom basis. Consult factory.

Input Frequency: 48 to 52Hz, 57 to 63Hz, or 380 to 420Hz depending on output.

Input and Output Terminations: Rear panel terminal blocks for 50Hz and 60-Hz models. MS3102A circular connectors on 400Hz models.

Output Voltage: Internally adjustable. Any standard power line voltage available. Three phase units are supplied in either wye or delta configurations.

Voltage Regulation: ±2% for single phase equipment and ±5% for three phase units.

Peak Output Current: 150% of full rated current is available for three cycles. Unit is set to current limit at 110% after three cycles.

Frequency Stability: Oscillator included in the unit base price. Fixed frequency oscillators are crystal controlled with a stability of +0.05%. Adjustable oscillators are RC controlled and have a stability of +0.25% (See option for phase-lock.)

Load Power Factor: 0.7 lead to 0.7 lag. Continuous zero lead to zero lag at full rated load without damage.

Output Waveshape: Sinewave, less than 4% THD, 3% max any single frequency. (Less than 1% on custom basis.)

Duty Cycle: Continuous duty at full rated output.

Efficiency: Between 75 to 80 percent (typical 80%). At least 75% from 40% of load to full load.

Battery Charger: Operates in a constant current mode until the battery achieves float voltage, then automatic transfer to a constant voltage mode. The output is well filtered to minimize battery heating.

Float Voltage: The float voltage set point is adjustable.

Ambient Temperature Range: Operating 0 to 40°C. Nonoperating −20 to +85°C.

Construction: Unit 3 KVA or less are standard 19" rack mount. Larger units are cabinet models.

Method of Operation: The load operates from the UPS System. Should a power failure occur, the inverter will continue to operate from the battery bank. There is no transfer time since the load normally is connected to the inverter. An electromagnetic by-pass line to the utility power is provided should the UPS have a problem.

Transfer Time: Standard electro mechanical by-pass transfer time is two cycles nominal.

SINGLE PHASE UPS

Model	Output Power (VA)	Output Frequency	Dimensions (Inches) H	W	D	Wt. (Lbs.)
513-1	1000	400	12¼	19	20	100
513-3	1000	50	12¼	19	20	130
513-4	1000	60	12¼	19	20	120
523-1	2000	400	17½	19	20	160
523-3	2000	50	17½	19	20	180
523-4	2000	60	17½	19	20	180
543-1	4000	400	24½	22	30	230
543-3	4000	50	24½	22	30	260
543-4	4000	60	24½	22	30	260
563-1	6000	400	63	22	30	590
563-3	6000	50	63	22	30	605
563-4	6000	60	63	22	30	605
583-4	8000	60	63	22	30	700
514-3	10000	50	63	22	30	900
514-4	10000	60	63	22	30	850

THREE PHASE UPS

Model	Output Power (VA)	Output Frequency	Dimensions (Inches) H	W	D	Wt. (Lbs.)
618-1	1600	400	21	19	20	100
618-3	1600	50	21	19	20	130
618-4	1600	60	21	19	20	125
638-1	3000	400	24½	19	20	160
638-3	3000	50	24½	19	20	185
638-4	3000	60	24½	19	20	180
668-1	6000	400	63	22	30	605
668-3	6000	50	63	22	30	605
668-4	6000	60	63	22	30	605
688-1	8000	400	63	22	30	650
688-3	8000	50	63	22	30	650
688-4	8000	60	63	22	30	650
619-1	10000	400	63	22	30	690
619-3	10000	50	63	22	30	760
619-4	10000	60	63	22	30	760

eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

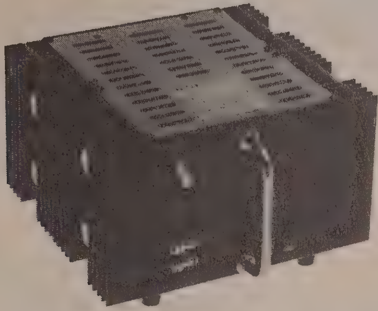
Y

YIG yttrium iron garnet

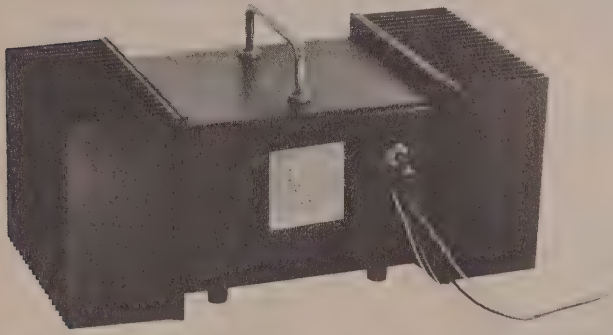
abbott
INDUSTRIAL POWER SUPPLIES

Sine Wave Inverters

MODELS
KN-PN
LN-TN



Standard Models: KN, PN, LN, TN
Cases K2, F2, J2



Salt Spray Models: KS, PS, LS, TS
Case G-2

Severe environment models are fully enclosed in an anodized aluminum case. Specifically designed to provide trouble-free operation in a salt spray environment such as marine navigation, offshore platforms as well as corrosive industrial applications. Flying leads are provided to simplify installation.

11 to 54 VDC Input
30 to 320 VA Output

- A wide range of standard models.
- 50 Hz or 60 Hz output.
- Surge current capabilities up to 3 times rated output power.
- Exceptional reliability. Typical MTBF: 90,586 hours for model LN8
- High efficiency provided by sine wave. Conserves power.
- Saves motors by reducing overheating.
- Low distortion. 2% typical.
- Salt spray package.
- Compact. Lightweight.
- Switchable 115 VAC 60 Hz/230 VAC 50 Hz.
- Wide temperature range: −20°C to +55°C ambient operation.
- 2-year warranty.

11 to 15 VDC Input

Output Power (VA)	Case	Weight (Lbs.)	Single Output 115 VAC 60 Hz	Single Output 220 VAC 50 Hz	Switchable Output 115V 60 Hz/220V 50 Hz
30	K2	16	KN3T-115-60	KN3T-220-50	KN3T-50/60
30	G2	27	KS3R-115-60	KS3R-220-50	NA
60	F2	18	KN6T-115-60	KN6T-220-50	KN6T-50/60
60	G2	27	KS6R-115-60	KS6R-220-50	NA
120	J2	30	KN12T-115-60	KN12T-220-50	KN12T-50/60

22 to 30 VDC Input

Output Power (VA)	Case	Weight (Lbs.)	Single Output 115 VAC 60 Hz	Single Output 220 VAC 50 Hz	Switchable Output 115V 60 Hz/220V 50 Hz
60	K2	16	PN6T-115-60	PN6T-220-50	PN6T-50/60
60	G2	27	PS6R-115-60	PS6R-220-50	NA
120	F2	18	PN12T-115-60	PN12T-220-50	PN12T-50/60
120	G2	27	PS12R-115-60	PS12R-220-50	NA
240	J2	30	PN24T-115-60	PN24T-220-50	PN24T-50/60

29 to 38 VDC Input

Output Power (VA)	Case	Weight (Lbs.)	Single Output 115 VAC 60 Hz	Single Output 220 VAC 50 Hz	Switchable Output 115V 60 Hz/220V 50 Hz
80	K2	16	LN8T-115-60	LN8T-220-50	LN8T-50/60
80	G2	27	LS8R-115-60	LS8R-220-50	NA
160	E2	18	LN16T-115-60	LN16T-220-50	LN16T-50/60
160	G2	27	LS16R-115-60	LS16R-220-50	NA
320	J2	30	LN32T-115-60	LN32T-220-50	LN32T-50/60

42 to 54 VDC Input

Output Power (VA)	Case	Weight (Lbs.)	Single Output 115 VAC 60 Hz	Single Output 220 VAC 50 Hz	Switchable Output 115V 60 Hz/220V 50 Hz
80	K2	16	TN8T-115-60	TN8T-220-50	TN8T-50/60
80	G2	27	TS8R-115-60	TS8R-220-50	NA
160	F2	18	TN16T-115-60	TN16T-220-50	TN16T-50/60
160	G2	27	TS16R-115-60	TS16R-220-50	NA
320	J2	30	TN32T-115-60	TN32T-220-50	TN32T-50/60

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abbott
INDUSTRIAL POWER SUPPLIES

Sine Wave Inverters

MODELS
KN-PN
LN-TN

SPECIFICATIONS

INPUT VOLTAGE RANGE:
KN, KS: 11 to 15 VDC
PN, PS: 22 to 30 VDC
LN, LS: 29 to 38 VDC
TN. TS: 42 to 54 VDC

OUTPUT VOLTAGE: 115 or 220 VAC ±2% at full load and nominal input voltage.

OUTPUT FREQUENCY: 50 Hz or 60 Hz.

LINE REGULATION: 3% for specified input voltage range with load constant.

LOAD REGULATION: 3% for load change of half load to full load with line constant; 6% for change of no load to full load.

WAVE FORM: Sine wave with 2% typical, 5% maximum distortion.

POWER FACTOR: Fully rated output VA, from unity to 0.7 power factor lagging or leading.

EFFICIENCY: At full load with nominal input voltage
40% minimum on KN, KS
50% minimum on PN, PS
58% minimum on LN, LS
60% minimum on TN, TS

OPERATING TEMPERATURE RANGE: (KN, PN, LN and TN): 4°F to +131°F (−20°C to +55°C) ambient air temperature. Humidity 0 to 90% (non condensing) at 25°C.

OPERATING TEMPERATURE RANGE: (KS, PS, LS and TS): 4°F to +131°F (−20°C to +55°C) ambient air temperature. G2 case is submersible (10 feet, 2 minutes).

INPUT TRANSIENT PROTECTION: 45 VDC for 0.1 second transient deviation and recovery (for change of 50%) of rated (load).

ALTITUDE: 10,000 feet above sea level (KN, PN, LN, TN) 50,000 feet above sea level (KS, PS, LS, TS).

PROTECTIVE FEATURES

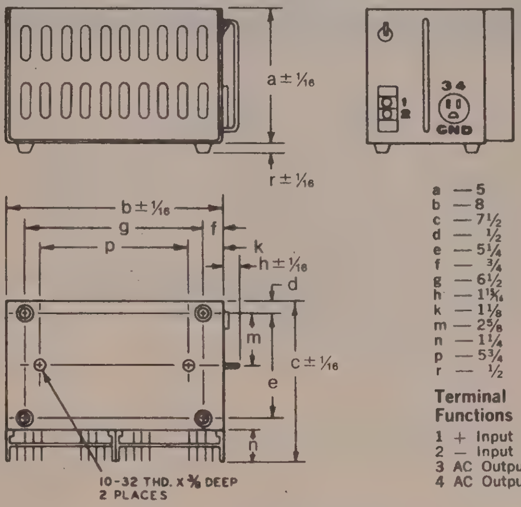
OVERLOAD PROTECTION: Magnetic type circuit breaker. Reverse polarity protection.

HIGH RELIABILITY

Model LN8T-115-60: MTBF 90,586 hours at 25°C ambient, ground benign environment per MIL-HDBK-217C. Model TN8T-115-60: MTBF 74,733 hours at 50° ambient.

2-YEAR WARRANTY/ALL MODELS.

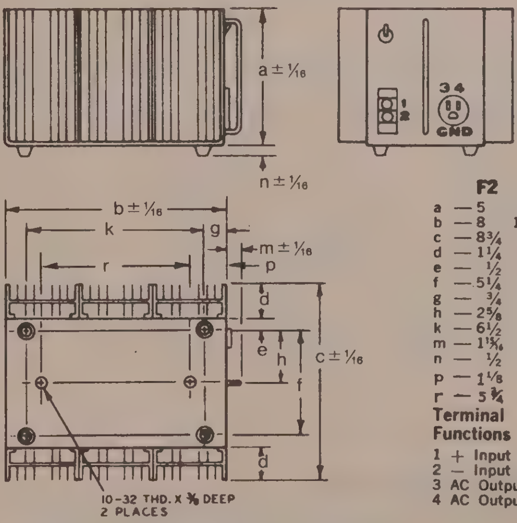
Case K2 Dimensions in inches.



a	— 5
b	— 8
c	— 7½
d	— ½
e	— 5¼
f	— ¾
g	— 6½
h	— 1 15/16
k	— 1⅛
m	— 2⅝
n	— 1¼
p	— 5¾
r	— ½

Terminal Functions
1 + Input
2 — Input
3 AC Output
4 AC Output

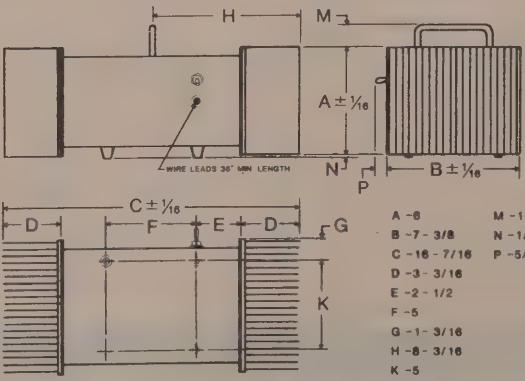
Cases F2, J2 Dimensions in inches.



	F2	J2
a	— 5	6½
b	— 8	12
c	— 8¾	9¾
d	— 1¼	2⅛
e	— ½	⅜
f	— 5¼	4¾
g	— ¾	1¼
h	— 2⅝	2⅜
k	— 6½	9½
m	— 1 15/16	1 15/16
n	— ½	½
p	— 1⅛	1¼
r	— 5¾	9½

Terminal Functions
1 + Input
2 — Input
3 AC Output
4 AC Output

Case G2 Dimensions in inches.



A	-6	M	-1- 1/4
B	-7- 3/8	N	-1/8
C	-16 - 7/16	P	-5/8
D	-3 - 3/16		
E	-2 - 1/2		
F	-5		
G	-1- 3/16		
H	-8 - 3/16		
K	-5		

WIRE FUNCTIONS	
RED	+ INPUT
BLACK	— INPUT
WHITE	AC OUTPUT
BROWN	AC OUTPUT

Note: Dimensional tolerances are all ±1/16".

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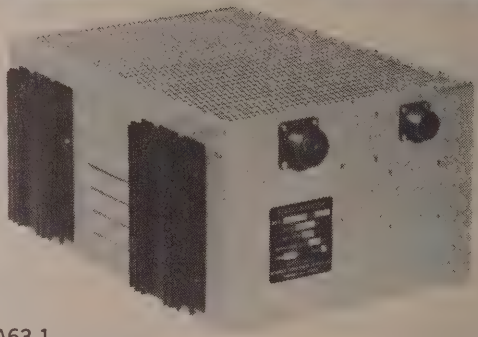
ACDCo Power WHERE you need it!

Inverters-Uninterruptible Power Systems -Battery Chargers-Frequency Changers-Power Supplies

ACDCo Power Equipment is designed to meet high reliability and performance standards providing maximum life with minimum maintenance to protect all system circuits that require dependable, high quality power.



A63-1
1 KVA INVERTER

HARDWARE

Inverters, Power — DC to AC Output: Fixed-base, portable, mobile and marine.

ACDCo INVERTERS are used in one of the **roughest** of Marine Environments on the **U.S. Coast Guard's - Rescue Life Boats** to power their Navigation and Communication equipment.

Uninterruptible AC Power Systems: 36 VA to 5 KVA.

Frequency Converters — AC to AC: 50/60 Hz, 60/50 Hz, 50/400 Hz and 60/400 Hz.

Power Supplies: Constant current and constant voltage current regulated and modular.

Battery Chargers — Special Purpose, custom made.

TYPICAL SPECIFICATIONS

Input: ±15% from nominal.

Output: Sine wave, 120 Volts RMS, 60 Hz.

Voltage Regulation: 2% over full input and load range.

Frequency Regulation: 1% over full input and load range.

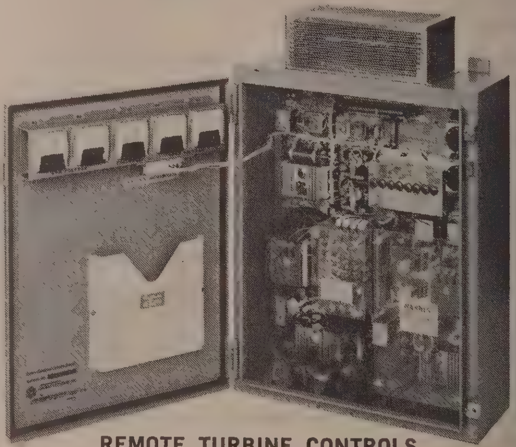
Power Factor: .9 Lead to .8 Lag.

Efficiency: Over 80% at nominal input.

Distortion: Less than 5%.

Overload: Within specifications for ONE MINUTE at 140% load.

Overload Protection: No damage from short to open circuit, reversal of input, or input voltage to 140% nominal.



REMOTE TURBINE CONTROLS FOR THE ALASKAN PIPELINE

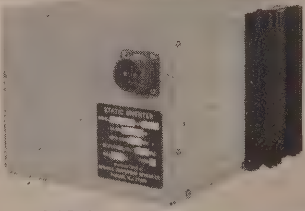
DESIGN FEATURES

Ruggedized construction, no moving parts, completely solid state, easy servicing — sides fold down, plug-in transistors and I/C's on Printed Circuit Boards, all P/C boards plug-in removable.

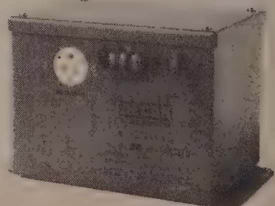
STATIC INVERTER MODELS

Rating	12VDC	24VDC	32VDC	48VDC	120VDC
36VA	A12-1	A13-1	A19-1	A14-1	A16-1
72VA	A22-1	A23-1	A29-1	A24-1	A26-1
125VA	A32-1	A33-1	A39-1	A34-1	A36-1
250VA	A42-1	A43-1	A49-1	A44-1	A46-1
500VA	A52-1	A53-1	A59-1	A54-1	A56-1
1000VA		A63-1	A69-1	A64-1	A66-1
1750VA		A63-2		A64-2	A66-2
2500VA		A73-1		A74-1	A76-1
3750VA				A74-2	A76-2
5000VA				A84-1	A86-1

Three Phase Models Available up to 15KVA



A43-1
250VA INVERTER



A12-1
36VA INVERTER

ADVANCE CONVERSION DEVICES COMPANY

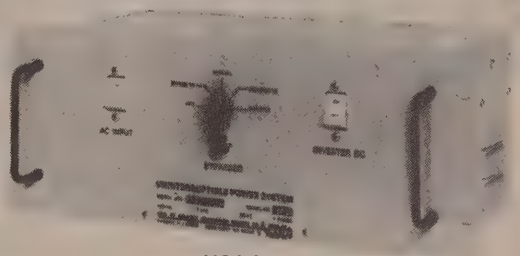
274 SOUTH SALEM STREET, RANDOLPH, NJ 07869 Phone (201) 989-0095

ACDCo

ACDCo Power WHEN you need it!

Protect Against Costly Power Interruptions

ACDCo Uninterruptible Power Systems protect critical circuits for computer peripherals, process controls, telephone switch boards, high risk medical or experimental procedures and all systems requiring dependable emergency power when normal AC is lost.



U34-1

Typical UPS Model U34-1 is used to power a critical liquid hydrogen temperature control system at a major government research nuclear reactor.

UNINTERRUPTIBLE POWER SYSTEMS

Your margin of safety to insure continuous high quality power even in the event of any utility line or generator power fluctuation or failure. ACDCo's UPS systems are designed to provide full output capacity even under "brownout" conditions where voltage reductions as severe as 15% are encountered. The reserve (battery back-up) for power outages is not diminished by extended operation in brownout conditions.

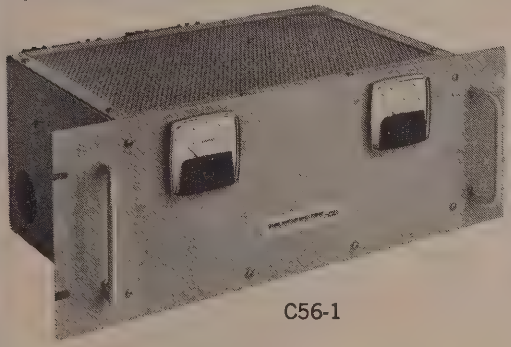
The use of power transistors rather than SCR's in the inverter greatly reduces the susceptibility to transients which can be present on power lines due to faults, switchovers, lightning and other factors. These transients usually cause the problems that the UPS was intended to protect. If the inverter can malfunction as a result of the transient, then the expected protection is absent when it is most needed.

DESIGN FEATURES

- **Ruggedized construction**
- **Easy servicing**
- **Plug-in Transistors and I/C's**
- **Removable P/C Boards**
- **Optimized design to provide maximum value for the procurement dollar**

VA Rating	36VA	72VA	125VA	250VA	500VA	1KVA	1.75KVA	2.5KVA	3.75KVA	5KVA
Model No.	U14-1 U13-1	U24-1 U23-1	U34-1	U44-1	U54-1	U64-1	U64-2	U74-1 U76-1	U74-2 U76-2	U84-1 U86-1

Three phase models also available from 100VA to 1500VA.
Typical specifications relate to those of static inverters.



C56-1

AC TO AC FREQUENCY CONVERTERS

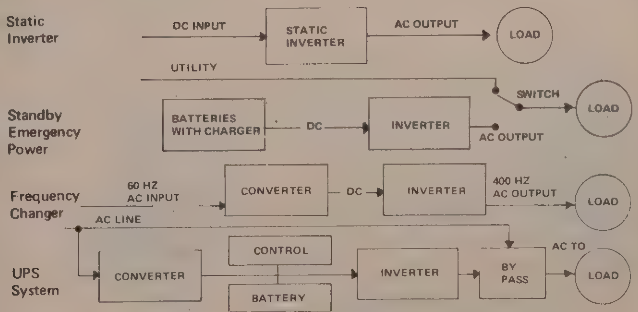
Available in eight power sizes from 36VA to 5000VA plus three phase up to 15 KVA. Power frequencies changed from: 50 to 60 Hz, 60 to 50 Hz, 50 to 400 Hz, and 60 to 400 Hz.

Options available for laboratory applications include metering, front panel controls, etc.

SPECIAL POWER SYSTEMS BULLETIN

Ask for our power systems outline discussion in which ACDCo answers many outstanding questions of systems configuration.

ACDCo POWER SYSTEMS FUNCTIONAL DIAGRAMS


Static Inverter
DC INPUT
STATIC INVERTER
AC OUTPUT
LOAD
UTILITY
SWITCH
LOAD
Standby Emergency Power
BATTERIES WITH CHARGER
DC
INVERTER
AC OUTPUT
Frequency Changer
60 HZ AC INPUT
CONVERTER
DC
INVERTER
400 HZ AC OUTPUT
LOAD
AC LINE
UPS System
CONVERTER
CONTROL
BATTERY
INVERTER
BY PASS
AC TO
LOAD

WIND DRIVEN SYSTEMS

ACDCo designs and manufactures the electronic control, regulation, and power subsystems for "modern" power conversion from this "ancient" energy source.

A SUBSIDIARY OF TRANSISTOR DEVICES, INC.

ADVANCE CONVERSION DEVICES COMPANY

274 SOUTH SALEM STREET, RANDOLPH, NJ 07869 Phone (201) 989-0095

ATLAS

ENERGY SYSTEMS

Home Office
9457 Rush Street
El Monte **CA** 91733
213 575-0755

Regional Centers

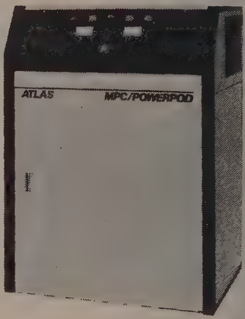
Boston MA
617 492-2525

Chicago IL
312 372-2237

Orange County CA
714 953-9645

Santa Clara CA
408 988-5386

ROTARY UPS POWER CONDITIONERS FREQUENCY CHANGERS



Accoustically enclosed unit for computer room use.
To 75 KVA.

ATLAS USES AN ALL-COPPER POWER PATH EXCLUSIVELY—FOR TWICE THE RELIABILITY OF SEMICONDUCTOR-BASED SYSTEMS.

As nationwide specialists in rotary power conditioning, Atlas consistently sets market standards in technology. We provide reliability and power quality no other segment of the industry can match.

THE ABSOLUTE SERIES: Our premium system. It gives an absolutely continuous flow of clean power even during a total blackout. Can be purchased with or without batteries and DC drive. Buy only what you can afford today, upgrade later in the field. Has the perfect frequency control of synchronous drive, line isolation of rotaries, ruggedness of an all-copper power path, and reliability and subtlety of solid state controls. Each feature is used in its most durable mode: the solid state electronics are in the controls, where they're protected from heavy currents; copper, which handles potentially catastrophic power flows easily, makes up the power path. Options are available to fill all needs. Systems up to 75 KVA can be supplied in acoustical cabinets for computer room use. Sizes range from 10 to 200 KVA.

THE RELIANCE SERIES: Has the same construction, performance and options as the Absolute Series, but cannot be upgraded to handle long duration power failures. Extreme durability of both systems results from our thorough reliability engineering. Sizes range from 10 to 750 KVA.

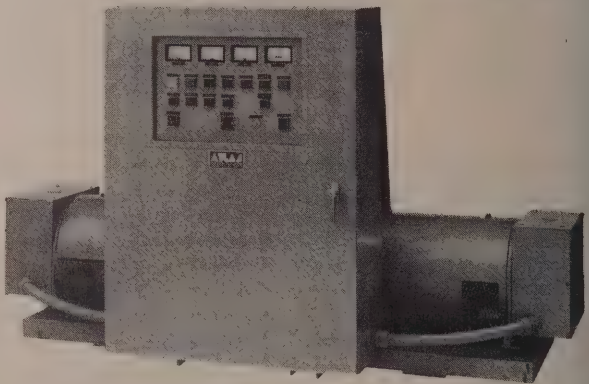
THE VALUE SERIES: Priced for economy budgets, this "no frills" induction-driven machine gives high reliability and the same input-to-output isolation and voltage regulation of our other systems. It lacks, however, their very tight frequency control and options. It has Atlas' rugged all copper power path and 5 to 8 year bearings. Sizes range from 10 to 750 KVA.

THE FREQUENCY CHANGING SERIES: Various models convert 50 to 60 Hz or the reverse. Also available: 60 or 50 to 400 Hz. Designed with the same durable construction and electronic controls as our best machines, this one can be converted to computer power conditioning after frequency changing requirements have passed. Sizes range from 10 to 750 KVA.

WARRANTY: We guarantee all parts on our equipment for twelve months, and we replace them without charge for labor or parts. Extended warranties are also available (see the option list).

RENTALS: The Atlas rental fleet is the nation's largest. We can provide you interim power conditioning and frequency changing equipment at affordable prices. For demands to 160 KVA.

SERVICE: Atlas' reputation for responsive service is strong and we work to keep it that way. We accept service requests 24 hours a day, and maintain a full parts inventory to minimize your down-time. A preventive maintenance program is available as an option.



Open unit for power room use.
To 750 KVA.

ATLAS OPTIONS	PRODUCT SERIES			
	Absolute	Reliance	Value	Fequency Changing
Upgradability to emergency battery option.	Yes	No	No	No
Thermal Winding and bearing protection	Opt	Opt	No	Opt
Reduced current starting	Opt	Opt	Opt	Opt
Uninterrupted bypass	Opt	Opt	No	No
Bi-directional bypass	Opt	Opt	No	No
Automatic restart	Opt	Opt	No	Opt
Input transfer switch, manual	Opt	Opt	No	Opt
Input transfer switch, automatic	Opt	Opt	No	Opt
Solid state electronic Master Control	Incl.	Incl.	No	Incl.
Input-output quality-monitoring jacks	Opt	Opt	No	Opt
Remote Control	Opt	Opt	No	Opt
Remote control and status monitoring	Opt	Opt	No	Opt
Extended status monitoring	Opt	Opt	No	Opt
Remote extended status monitoring	Opt	Opt	No	Opt
Input-output protection module	Incl	Incl	No	Incl
Acoustical enclosure, computer room	Optional to 75 KVA	Optional to 75 KVA	No	No
Acoustical enclosure, industrial	Opt	Opt	Opt	Opt
Preventive Maintenance Program	Opt	Opt	Opt	Opt
Extended warranties: 18 mo. P & L	Opt	Opt	Opt	Opt
60 Mo. windings	Opt	Opt	Opt	Opt
Travel inclusion	Opt	Opt	Opt	Opt
System startup and optimization	Opt	Opt	Opt	Opt

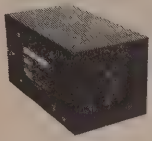
MANUFACTURERS OF QUALITY PRODUCTS SINCE 1931

ATR ELECTRONICS, INC.

SUBSIDIARY: DIGITAL CONTROLS, INC.

INVERTERS 50-60 Hz

12V, 24V, 48V, 110V
50 VA to 5000 VA
24, 110, 220 VAC

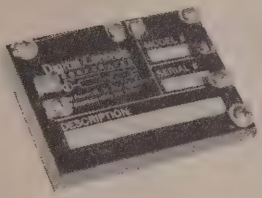


Automatic overloads and voltage protection power MOS! Sq. and sinewave high frequency synthesized or unsynthesized waveforms.

Will operate VCR, TV, Stereo, Computer & Portable Telescope equipment, in your remote location.

Order by the input voltage and power requirements.

8813 OPTO ISOLATED, MULTI FUNCTION, INDUSTRIAL PROGRAMMABLE TIMERS.



Power MOS Opto Isolated Output SSR'S.

TOUGH!

Call to discuss your application.

Replacement Vibrators for all your former applications. Now non-mechanical, solid state construction.

One year limited warranties on all products. We will repair or replace any unit delivered to our location.

CALL FOR DETAILS

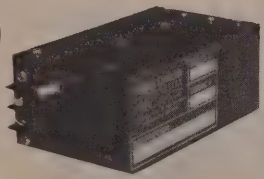
THE "NEW" ATR ELECTRONICS INC. INTEGRATED FAMILY OF PRODUCTS. THE SAME HIGH QUALITY AND DEPENDABILITY WITH STATE OF THE ART SOLID STATE CONSTRUCTION.

UPS SYSTEMS

Design for Personal Computers and Instruments to 1000 VA

FULL PROTECTION—INCLUDES BATTERIES. ALSO AVAILABLE FOR DC BACK-UP.

HBC 8000



HIGH EFFICIENCY • HIGH POWER BATTERY CHARGERS AND POWER SUPPLIES USE POWER MOS 200 KHz — 400 KHz SMPS TECH.

110/220 VAC • 20 to 80 Amp • From 12 — 110 VDC
AUTOMATIC! RUGGED!

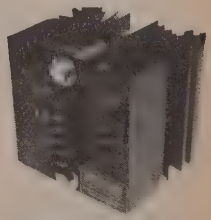
8851 SOLID STATE RELAY

SSR'S INDICATE BOTH INPUT SIGNAL AND OUTPUT CURRENT!

8, 20, 30, 40 Amp
Up to 240 VAC

Power MOS versions with Solid State Circuit Breakers.

8830 3 PHASE SOLID STATE CONTACTORS.



Have Indicating Signal Input and Current Sensed Indicator Outputs!

110/220 VAC

ATR ELECTRONICS, INC. • 280 E. LAFAYETTE RD. • ST. PAUL, MN 55107 • 612/222-3791

OUT OF STATE CALL 1-800-533-5542 All states (except Minnesota) phone: 1-800-533-5542.

POWER CONVERSION FROM

AVIONIC INSTRUMENTS INC.

"THE INVERTER PEOPLE"

DC to AC STATIC INVERTERS

Avionic Instruments Inc. (AI^2) specializes in the design and manufacture of DC to AC Static Inverters for applications which demand the highest levels of reliability and performance. Design ingenuity and the use of solid-state elements are the basic ingredients that qualify Avionic Instruments Inverters to these high standards. Our complete family of sinewave inverters was developed to provide you with a wide selection of VA ratings, from 50 VA to 7.5 KVA, single and three phase, to serve fully your specific system requirements.

The features of our sophisticated, new design DC to AC Inverters are unique in contrast to older, classically designed inverters. **AI^2's new advanced technology Lightweight Hi-Performance Static Inverter series** feature a **patented high frequency power processing technique** that has virtually eliminated the inherent limitations traditionally associated with classical power conversion designs.

LIGHTWEIGHT HI-PERFORMANCE

This breakthrough in design and performance allows us to provide ultra lightweight 400 cycle equipment, ultra lightweight 60 and 50 cycle inverters and frequency converters. Our 250-350 VA, 400 Hz, 60 Hz and 50 Hz designs weigh less than 5 pounds and provide a **115 VAC pure sinewave with less than .5% total harmonic distortion, better than 1% voltage and frequency regulation.** All of our single and multi-phase inverter and frequency converter designs reflect this superb advanced state-of-the-art performance which minimizes weight while achieving optimal performance, **spike free absolutely predictable voltage** to all powered electronic and electrical systems.

One feature not as obvious as the drastic reduction in size and weight relates to our 200 microsecond load response time, which is 10 times faster than static inverters employing conventional power conversion techniques. This feature enables our inverters to maintain superb voltage output stability even if the loads are dynamically unstable, and non-sinusoidal.

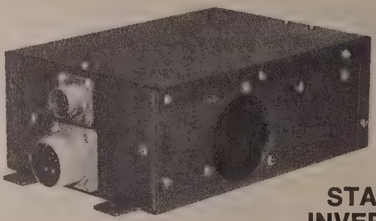
CUSTOM MAGNETICS

Avionic Instruments Inc. (AI^2) also specializes in the manufacture of custom-built transformers and inductors designed to customer specifications for non-standard requirements in a range from 10 VA to 10 KVA, single and three phase, high and low voltage and current, 25 Hz to 25 KHz.

APPLICATIONS VERSATILITY—400/60/50 Hz

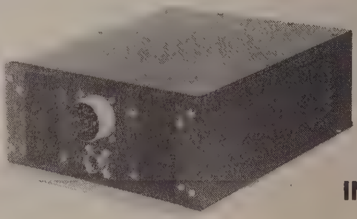
- Radio/Communications
- RPV/Drone Systems
- Robots
- Stability Augmentation
- Space Shuttle Systems
- Surveillance Equip
- SATCOM Terminals
- Shelters, Portable
- Shipboard Communication
- Autopilots
- AGE
- Appliances
- Business Equip.
- CRT Displays
- Computers
- Environmental Sys.
- Fire Control Sys.
- Flight Test Equip.
- Aircraft Systems
- Vans/Jeep Systems
- Security Systems
- TV Systems
- Trainers/Simulators
- Telemetry
- Transponders
- UPS
- Underwater Systems
- Weather Radar
- X-Ray Systems
- Guidance & Gyros
- Laser Systems
- Laboratory Equip.
- MEDEVAC/EMS
- Microwave Relay
- NAV Systems (DME/ILS)
- OMEGA/VLF
- Radars
- Night Vision Devices
- Electronic Shelters

New Lightweight Hi-Performance Static Inverters Frequency Converters Commercial/Military Applications



STATIC INVERTER

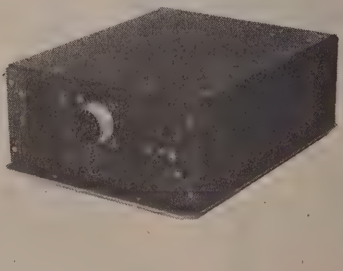
MODEL 2A350
350 VA, 60 Hz, 4.8 Pounds



STATIC INVERTER

MODEL 2A/1000
1000 VA/60 Hz/13.75 Pounds

FREQUENCY CONVERTER



MODEL 4A1000
1000 VA
50/60 Hz Output
400 Hz Input
15.5 Pounds

AVIONIC INSTRUMENTS INC.

943 East Hazelwood Ave., Rahway, New Jersey 07065 (USA) • Tel: (201) 388-3500
International Sales: REA International Limited, 937 East Hazelwood Ave., Rahway, N.J. 07065 • Tel: (201) 382-7100 • Telex: 884-413
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STATIC INVERTERS • FREQUENCY CONVERTERS

Airborne • Aerospace • Marine • Ground • Mobile
To Meet Any Specific Need

LIGHTWEIGHT HI-PERFORMANCE DC to AC SERIES 400/60/50 Hz (SINGLE PHASE)

AI^2 MODEL	OUTPUT POWER	OUTPUT FREQUENCY	OUTPUT VOLTAGE	INPUT VOLTAGE RANGE	INPUT CURRENT @ 28 VDC	EFFICIENCY (%)	DIMENSIONS INCHES (mm) W	H	D	WEIGHT LBS	(KG)
1A 50 2A 50 3A 50	50 VA	400 Hz 60 Hz 50 Hz	115/26 VAC 115 VAC 115 VAC	18-38 VDC	2.3 A	80	5.0 (127.0)	2.75 (69.9)	7.0 (177.8)	3.90	(1.77)
1A 125 2A 125 3A 125	125 VA	400 Hz 60 Hz 50 Hz	115/26 VAC 115 VAC 115 VAC	18-38 VDC	5.6 A	82	5.0 (127.0)	2.75 (69.9)	7.0 (177.8)	4.25	(1.93)
1B 250 2A 250 3A 250	250 VA	400 Hz 60 Hz 50 Hz	115/26 VAC 115 VAC 115 VAC	18-38 VDC	11.0 A	82	5.0 (127.0)	2.75 (69.9)	7.0 (177.8)	4.50	(2.04)
1B 350 2A 350 3A 350	350 VA	400 Hz 60 Hz 50 Hz	115/26 VAC 115 VAC 115 VAC	18-38 VDC	16.0 A	78	5.0 (127.0)	2.75 (69.9)	7.0 (177.8)	4.80	(2.18)
1B 500 2A 500 3A 500	500 VA	400 Hz 60 Hz 50 Hz	115/26 VAC 115 VAC 230 VAC	18-38 VDC	22.0 A	82	5.0 (127.0)	5.5 (139.7)	7.0 (177.8)	9.00	(4.09)
1B 800	800 VA	400 Hz	115/26 VAC	18-38 VDC	36.0 A	80	8.5 (215.9)	4.0 (101.6)	12.0 (304.8)	13.50	(6.14)
1B 1000 2A 1000 3A 1000	1000 VA	400 Hz 60 Hz 50 Hz	115/26 VAC 115 VAC 115 VAC	18-38 VDC	44.0 A	80	8.5 (215.9)	4.0 (101.6)	12.0 (304.8)	13.75	(6.25)
3A 2000	2000 VA	50 Hz	230 VAC	18-38 VDC	90.0 A	80	8.5 (215.9)	8.0 (203.2)	12.0 (304.8)	25.00	(11.36)

LIGHTWEIGHT HI-PERFORMANCE DC to AC SERIES 400/60/50 Hz (3 PHASE)

AI^2 MODEL	OUTPUT POWER	OUTPUT FREQUENCY	OUTPUT VOLTAGE 3PH WYE ▲	INPUT VOLTAGE RANGE	INPUT CURRENT @ 28 VDC	EFFICIENCY (%)	VOLUME CUBIC INCHES	WEIGHT LBS	(KG)
3PH-150	150 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	7 ADC	80	295 IN^3	12.80	(5.80)
3PH-375	375 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	17 ADC	80	295 IN^3	14.00	(6.40)
3PH-750	750 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	33 ADC	80	295 IN^3	14.80	(6.70)
3PH-1050	1050 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	48 ADC	80	295 IN^3	15.80	(7.70)
3PH-2400	2400 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	108 ADC	80	1251 IN^3	41.25	(18.75)
3PH-3000	3000 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	132 ADC	80	1251 IN^3	41.25	(18.95)
3PH-4800	4800 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	216 ADC	80	2502 IN^3	82.50	(37.90)
3PH-6000	6000 VA	400/60/50 Hz	115/200 VAC	18-38 VDC	270 ADC	80	2502 IN^3	82.50	(37.90)

OUTPUT FREQUENCY: 400/60/50 Hz ±0.5% for all conditions of line, load and temperature; **OUTPUT VOLTAGE:** 115/26 VAC ±2%, no load to full load, 200 microsecond response time; **OVERLOAD:** 110% rated output for 2 hours. 150% rated load current for 5 minutes; **WAVESHAPE:** sinewave, 0.5% THD typical, 1.0% THD maximum; **POWER FACTOR:** 0.7 Lead to 0.7 Lag, not damaged by any power factor; **ALTITUDE:** 55,000 feet, operating; **TEMPERATURE RANGE:** −55°C to +71°C operating; **ENVIRONMENTAL:** RTCA DO-160A; **EMI:** RTCA DO-160A, MIL STD 461 A(4); **QUALIFICATIONS (TYPICAL):** FAA TSO-C73, RTCA DO-160A; **PROTECTION:** Cannot be damaged by any short circuit, input under/over voltage, output overvoltage, output over/under frequency, thermal overheat, reverse polarity, fault light indicator. **Note:** ▲ 50 Hz 3PHA voltage is 200/397 VAC.

STATIC INVERTERS — LIGHTWEIGHT HI-PERFORMANCE, 400/60/50 Hz SINGLE, PARALLEL, and THREE PHASE SYSTEMS

MODEL	OUTPUT POWER	OUTPUT FREQUENCY	OUTPUT VOLTAGE	INPUT VOLTAGE RANGE	INPUT CURRENT	EFFICIENCY %	DIMENSIONS INCHES W	H	D	WEIGHT LBS	(KG)
3A1000-1D	1000 VA	50 Hz	230 VAC	18-38 VDC	45 ADC	80	13.9	9.3	16	36.0	(16.4)
2A2000-1A	2000 VA	60 Hz	115 VAC	18-38 VDC	90 ADC	80	13.9	9.3	16	36.0	(16.4)
3A2000-1A	2000 VA	50 Hz	230 VAC	18-38 VDC	90 ADC	80	13.9	9.3	16	36.0	(16.4)
1A2400-1A	2400 VA	400 Hz	115/200 VAC Wye	18-38 VDC	130 ADC	80	13.9	9.3	16	49.0	(22.3)
1A3000-1A	3000 VA	400 Hz	115/200 VAC Wye	18-38 VDC	138 ADC	80	13.9	9.3	16	49.0	(22.3)
2A3000-1A	3000 VA	60 Hz	115 VAC	18-38 VDC	135 ADC	80	13.9	9.3	16	49.0	(22.3)
2A3000-1B	3000 VA	60 Hz	115/200 VAC Wye	18-38 VDC	135 ADC	80	13.9	9.3	16	49.0	(22.3)

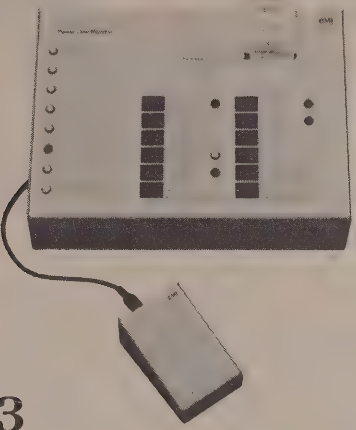
FREQUENCY CONVERTERS — LIGHTWEIGHT HI-PERFORMANCE, 400 Hz to 60 Hz or 50 Hz, PARALLEL, and THREE PHASE SYSTEMS

MODEL	OUTPUT POWER	OUTPUT FREQUENCY	OUTPUT VOLTAGE	INPUT VOLTAGE RANGE	EFFICIENCY %	DIMENSIONS INCHES W	H	D	WEIGHT LBS	(KG)
4A1000-1A	1000 VA	50 Hz	115 VAC	115/200 VAC + 20V	85	8.5	4.1	12	15.5	(7.04)
4A1000-1B	1000 VA	60 Hz	115 VAC	115/200 VAC + 20V	85	8.5	4.1	12	15.5	(7.04)
4A1000-1C	1000 VA	50 Hz	230 VAC	115/200 VAC + 20V	85	13.9	9.3	16	40.0	(18.18)
4A2000-1A	2000 VA	50 Hz	230 VAC	115/200 VAC + 20V	85	13.9	9.3	16	40.0	(18.18)
4A2000-1B	2000 VA	60 Hz	115 VAC	115/200 VAC + 20V	85	13.9	9.3	16	40.0	(18.18)
4A3000-1A	3000 VA	50 Hz	115 VAC	115/200 VAC + 20V	85	13.9	9.3	16	55.0	(25.00)
4A3000-1B	3000 VA	60 Hz	115 VAC	115/200 VAC + 20V	85	13.9	9.3	16	55.0	(25.00)
4A3000-1C	3000 VA	60 Hz	115/200 VAC Wye	115/200 VAC + 20V	85	13.9	9.3	16	55.0	(25.00)

AVIONIC INSTRUMENTS INC.

943 East Hazelwood Ave., Rahway, New Jersey 07065 (USA) • Tel: (201) 388-3500
International Sales: REA International Limited, 937 East Hazelwood Ave., Rahway, N.J. 07065 • Tel: (201) 382-7100 • Telex: 884-413
European Support Center: REA International Europe B.V., Schiphol-Oost, Hanger 7, The Netherlands • Tel: 020-473334 Telex: 13451

Power Line Monitoring from BMI



GS-3

- Easy installation—just plug it in.
- LED display of line voltage and set-ups
- Records magnitude, time and date of disturbances
- Simultaneous monitoring of single-phase AC, DC, and temperature

Description

The BMI Model GS-3 monitors single-phase 120/240 VAC ground outlets, as well as ambient temperature and DC voltage. It records disturbances which can affect proper operation of computers and other sensitive electronic equipment. Users can easily adjust measurement thresholds with a small screwdriver.

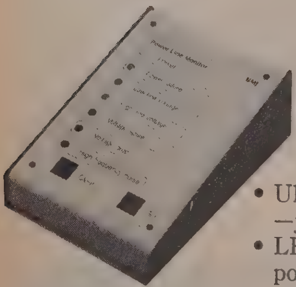
The monitor is equipped with alarm LED's, thermal printer, and an audible alarm. Temperature and DC probes are also included. Rechargeable Ni-Cad batteries keep the internal clock, calendar, and memories alive during storage or power failures.

Specifications

AC — Monitors 120 or 240 VAC nominal, 50 or 60 Hz
— Records power failure, low line voltage, high line voltage, voltage spike, voltage drop, high frequency noise, high and low line frequency.

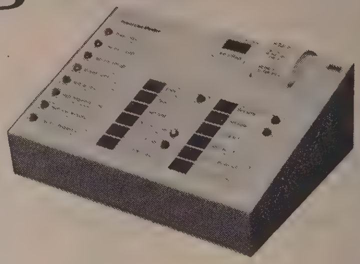
DC — Monitors DC voltage, up to ± 25 VDC
— Records low DC, high DC, DC spikes

Temperature — Monitors ambient temperature, 60°–123°F (15°–53°C)
— Records High and Low temperature events



GS-1

- Ultra-simple to use and install—just plug it in
- LED alarms alert user to possible bad power situations
- Monitors 120 VAC at 60 Hz. Other voltage/frequency combinations on special order
- Useful for selecting locations for further monitoring with GS-3 or GS-2X



GS-2X

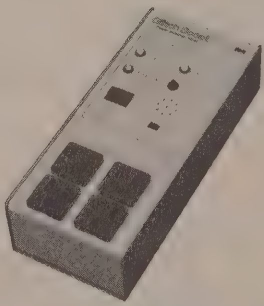
- Easy installation—just plug it in.
- LED display of line voltage, time, date
- Thermal printer records time of occurrence of each disturbance

Description

The BMI Model GS-2X monitors 120/240 VAC single phase, 50/60 Hz, grounded outlets. It records voltage variations which can affect proper operation of computers and other sensitive electronic equipment. The monitor is equipped with alarm LED's, thermal printer, and an audible alarm. Rechargeable Ni-Cad batteries keep the internal clock and calendar alive during storage or power failures.

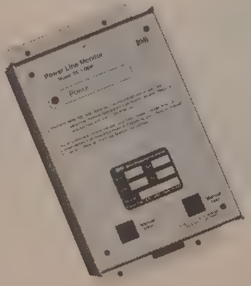
Specifications

— Monitors 120 or 240 VAC nominal, 50 or 60 Hz
— Records power failure, low line voltage, high line voltage, voltage spike, voltage drop, high frequency noise, high and low line frequency.



GS-10

- Eliminates spikes and high-frequency noise
- Combination MOV and Gas discharge tube for spikes
- 3-stage LC filter for high-frequency noise
- Annunciates common voltage disturbances with LED and audible alarm
- Provides conditioned AC power at four coefficient outlets



GS-1 OEM

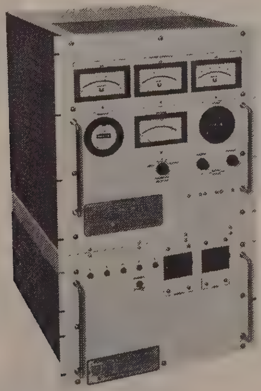
- Intended for installation within a computer or other system
- Interfaces directly computer-based system via TTL outputs

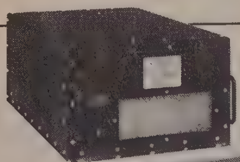
BMI Basic Measuring Instruments

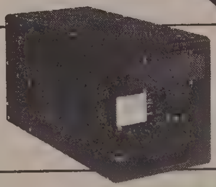
420 Lincoln Centre Drive
Foster City, California 94404
(415) 570-5355/TWX: 910-374-3059

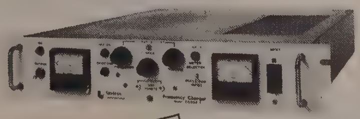
25 Years of Experience.

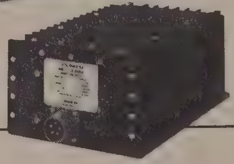
Beginning in 1960, Unitron, Incorporated has concentrated on the design and development of solid state static power conversion equipment. As a result, Unitron is able to produce equipment of high reliability and superior performance within practical economic limits. This single point concentration has resulted in Unitron's becoming the supplier of the largest variety of products to both the defense aerospace and industrial markets. With the world-wide desire to conserve natural resources Unitron has expanded its product line to include 400 Hz converters that operate from 50 Hz or 60 Hz sources. This expansion includes a series of new ultra-lightweight high efficiency units. We invite your inquiries.











NOW AVAILABLE!
New ultra-lightweight highly efficient units. Selectable output voltage and frequency. Parallelable for high power applications.

Unitron

Unitron Incorporated
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Dallas, TX 75238
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AVTEL

FREQUENCY CONVERTERS
400 to 8000 VA SINE WAVE
400 Hz to 60* Hz

Unitron

GENERAL SPECIFICATIONS

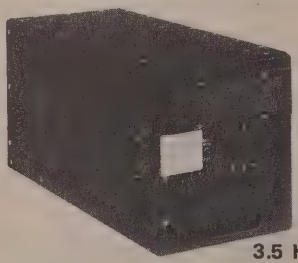
POWER RATING	INPUT PHASE	INPUT VOLTAGE	OUTPUT PHASE	OUTPUT VOLTAGE
400 VA	3ϕ	115/200 VRMS	1ϕ	115 VRMS
750 VA	3ϕ	115/200 VRMS	1ϕ	115 VRMS
*2000 VA	3ϕ	115/200 VRMS	1ϕ	115 VRMS
*3000 VA	3ϕ	115/200 VRMS	1ϕ	115 VRMS
3500 VA	3ϕ	115/200 VRMS	1ϕ	115 VRMS
8000 VA	3ϕ	115/200 VRMS	1ϕ	115 VRMS

*Also available in 50 Hz output

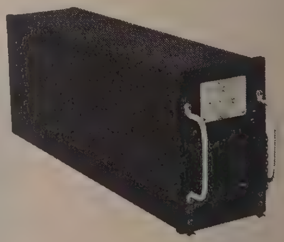
UNITRON IS THE LEADING MFG. OF 400 TO 60 Hz FREQUENCY CONVERTERS, WITH **EXPERIENCE EXCEEDING 18,000,000 HOURS OF FIELD OPERATION** IN AIRBORNE ■ SHIPBOARD ■ TRANSPORTABLE SHELTERS & GROUND POWER ENVIRONMENTS.

FEATURES:

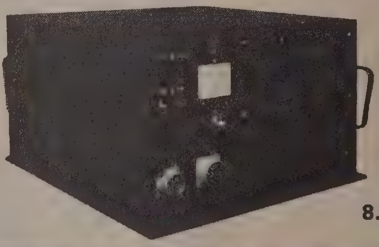
- ■ MIL SPECIFICATIONS (Standard power)
- ■ FEDERAL & NATIONAL STOCK LISTINGS
- ■ LIGHT WEIGHT
- ■ LOW DISTORTION
- ■ PRECISE FREQUENCY
- ■ FULLY PROTECTED
- ■ SINE WAVE OUTPUT
- ■ HIGH EFFICIENCY
- ■ LOW AUDIO NOISE
- ■ SELF-COOLED
- ■ LONG MAINTENANCE FREE OPERATION
- ■ 6000 + NOW IN AIRBORNE OPERATION
- ■ HIGH RELIABILITY
- ■ LOW COST



3.5 KVA



400 VA



8.0 KVA

APPLICATIONS: AIRBORNE ■ COMPUTERS ■ VIDEO SYS. ■ TELETYPE ■ CONVENIENCE ITEMS ■ MOVIE PROJECTOR ■ RECORDERS ■ TRASH COMPACTORS ■ TEST EQUIPMENT ■ DATA ACQUISITION ■ ETC. ■ SHIPBOARD ■ GROUND & AIR TRANSPORTABLE SHELTERS ■ FLYING LABORATORIES ■ MEDICAL EVACUATION ■ THERMAL BLANKETS ■ EKG'S ■ BREATHING APPARATUS ■ LIFE SUPPORT ■

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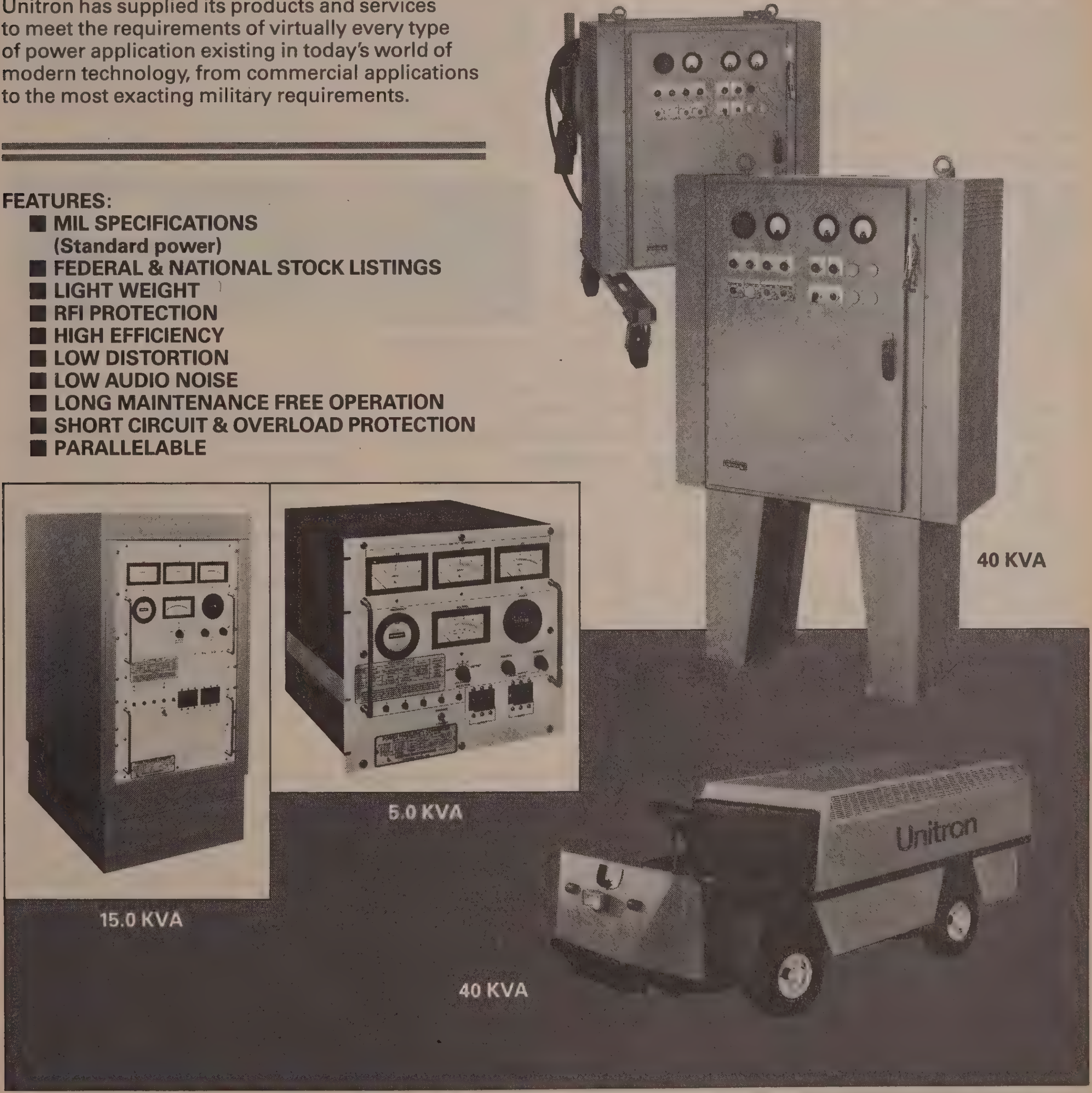
AVTEL

FREQUENCY CONVERTERS
500 VA to 160 KVA SINE WAVE
50/60 Hz to 400 Hz

Unitron

Unitron has supplied its products and services to meet the requirements of virtually every type of power application existing in today's world of modern technology, from commercial applications to the most exacting military requirements.

FEATURES:
- MIL SPECIFICATIONS (Standard power)
- FEDERAL & NATIONAL STOCK LISTINGS
- LIGHT WEIGHT
- RFI PROTECTION
- HIGH EFFICIENCY
- LOW DISTORTION
- LOW AUDIO NOISE
- LONG MAINTENANCE FREE OPERATION
- SHORT CIRCUIT & OVERLOAD PROTECTION
- PARALLELABLE



40 KVA

5.0 KVA

15.0 KVA

40 KVA

APPLICATIONS:
SHIPBOARD ■ SHELTERS ■ GROUND SUPPORT ■ SIMULATORS ■ AVIONICS TEST & REPAIR ■ LABORTORIES ■ HANGARS ■ Wherever precision power is required.

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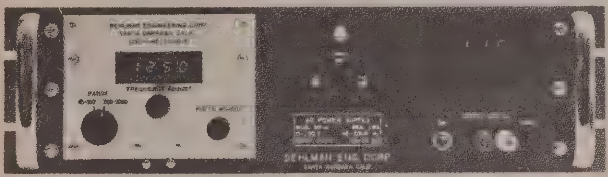
Behlman Engineering Corporation

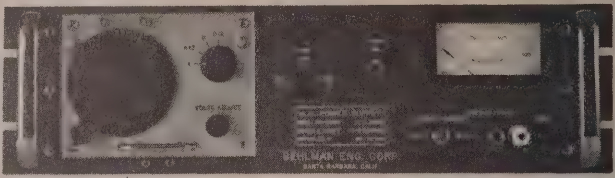
1142 MARK AVENUE • CARPINTERIA, CALIFORNIA 93013 • (805) 684-8311

A.C. POWER SOURCES

A.C. POWER SUPPLY PROBLEM SOLVERS. Behlman Engineering has a well deserved reputation for being the industry's A.C. power supply problem solver. The first problem many customers encounter is the comparison of power ratings. Be aware that there are six major and very important considerations when comparing A.C. power supply ratings. They are: 1) The output power or voltampere (VA) rating, 2) The output current rating, 3) The effect on the supply of loads having high inrush or high peak recurrent currents, 4) How the ratings are affected by low input line voltages, 5) How the ratings are affected by low power factor loads, 6) Is the supply fully isolated, both input and output, for reasons of safety and flexibility? For FREE fact sheets on power supply rating comparisons, contact Behlman Engineering. Consider (805) 684-8311 your problem solving HOT LINE.



Digital Readouts



Analog Readouts

BEHLMAN 10/500 SERIES

- **Single, two and three phase outputs**
- **Tight regulation vs. line and load changes**
- **Up to 150% of rated output with high power factor loads**
- **Up to 18000. VA per phase**
- **Low output distortion**
- **Instantaneous overload protection, automatic recovery**
- **Smaller, lighter, more reliable**
- **Fixed or variable output frequencies, 45 Hz–10 kHz**
- **Full rated output into loads of any power factor**
- **Complete transformer-coupled isolation, input and output**

DESCRIPTION

The Behlman 10/500 series of A.C. Power Supplies are efficient linear power amplifiers driven by plug-in oscillators. Fixed and variable frequency oscillators, with frequency accuracies to 0.001% and 0.1% respectively, are available in a wide variety of standard models.

For single-phase power output, a power amplifier is driven by a single-phase oscillator. Two separate power amplifiers driven by a two-phase oscillator, and three separate power amplifiers driven by a three-phase oscillator, are used to provide two and three phase power outputs. Units are available with the capability of providing a choice of single or multi-phase output by means of a front panel mode selector switch.

Both input and output are transformer coupled providing complete isolation. The output can be left floating or one side can be grounded. Complete overload, short circuit and fault protection is provided by a combination of an instantaneous, automatic-recovery electronic protector plus a fast acting main circuit breaker.

In comparison to other power supplies the Behlman 10/500 Series are capable of providing continuous FULL-RATED volt ampere output even under worst case conditions: zero power factor loads either leading or lagging, 10% low line, and output voltage at 77% of maximum. Continuous operation at 150% of rating is possible with unity factor loads, nominal input voltage, and maximum output voltage.

PROGRAMMABLE. The entire 10/500 Series are available with optional programmable plug-in oscillators. These units may be programmed for output voltage level and frequency. All of the generally accepted methods of programming can be used with these units. This includes resistance and voltage programming as well as digital programming and either binary or BCD format from computers, micro-processors, keyboards, punched tape or key punched cards. Please contact the factory for further information.

SPECIFICATIONS 10/500 SERIES

Input Voltage: 115/230 VAC±10% single phase on models up through 1500 VA output. Three phase inputs available.

120/208 or 230 VAC±10% three phase on models over 1500 VA output.

Input Frequency: 48-72 Hz. (400 Hz available.)

Efficiency: 50-65%, depending on operating conditions.

Various input voltage, frequency and power options are available, many at no extra charge.

Output Voltage: 0-130 for single phase and 0-130 line to neutral for 2 or 3 phase units. Other ranges or combinations of ranges available.

Load Regulation: ±0.5% no load to full load. Adjustable through zero for specific loads.

Line Regulation: ±0.1% for ±10% line change.

Power Factor: Full rated VA into any power factor load down to zero, lead or lag.

Distortion: 0.5% max. harmonic distortion at frequency extremes. Less at mid-band. (Unity power factor load.)

Overload and Fault Protection: Instantaneous, automatic recovery short circuit and overload protection. Fast acting main circuit breaker for fault protection.

Metering: Output voltmeter. Digital readout optional.

External Input: Via optional plug-in. 9.2 volts RMS. 15K ohms input impedance. (Replaces plug-in oscillator)

Operating Temperature: 0° to 55° Celsius (32° to 131°F.).

Front Panel Color: Dark grey, white engraved lettering.

Options: Many options are available such as input power, output voltage, frequency, etc. Please consult the factory.

Behlman Engineering Corporation
1142 MARK AVENUE • CARPINTERIA, CALIFORNIA 93013 • (805) 684-8311

10/500 SERIES AC POWER SOURCES

MAIN FRAME AMPLIFIERS

TO ORDER: Use model number corresponding to output power level and number of phases required. Add letter corresponding to desired frequency range. All units are in rack mounting enclosure. Cabinet enclosed versions of any of these units are available.

Order plug-in oscillators as listed below. For digital LED voltage readout in place of the analog voltmeter, add $105.00 to the prices listed below and designate with D at the end of the model number. (Example, 3-10-CD).

OUTPUT POWER		MAXIMUM AMPERES (Per Phase 0-130V)	MODEL NUMBER	OUTPUT FREQUENCY RANGE (Hz)				WEIGHT (lbs.) A MODELS	DIMENSIONS
MAXIMUM	RATED			150-2000	150-10,000	45-2000	45-10,000		
SINGLE PHASE				A	B	C	D		
150 VA	100 VA	1.2	10-	$ 1075	$ 1450	$ 1125	$ 1525	26	5¼″H × 15″D × 19″W
375 VA	250 VA	3.0	25-	1425	1925	1500	2025	38	5¼″H × 15″D × 19″W
525 VA	350 VA	4.2	35-	1650	2225	1750	2350	50	5¼″H × 15″D × 19″W
750 VA	500 VA	6.0	50-	1900	2575	2000	2700	60	5¼″H × 19″D × 19″W
1125 VA	750 VA	9.0	75-	2500	3375	2625	3550	65	5¼″H × 19″D × 19″W
1500 VA	1000 VA	12.0	100-	2850	3850	3000	4050	95	8¾″H × 19″D × 19″W
2250 VA	1500 VA	18.0	150-	3550	4800	3750	5050	120	14″H × 19″D × 19″W
3000 VA	2000 VA	24.0	200-	4475	6025	4700	6350	135	14″H × 19″D × 19″W
4500 VA	3000 VA	36.0	300-	5550	7500	5850	7900	180	21″H × 19″D × 19″W
7500 VA	5000 VA	60.0	500-	9250	12,500	9750	13,175	290	31½″H × 22″D × 19″W
9000 VA	6000 VA	72.0	600-	11,125	15,000	11,700	15,800	315	31½″H × 22″D × 19″W
[2]13,500 VA	9000 VA	108.0	900-	16,675	22,525	17,550	23,700	390	42″H × 22″D × 19″W
18,000 VA	12,000 VA	144.0	1200-	22,250	30,025	23,400	31,600	570	57¾″H × 22″D × 19″W
[2]27,000 VA	18,000 VA	216.0	1800-	33,350	45,025	35,100	47,400	780	42″H × 22″D × 19″W (2) Ea.
TWO PHASE—PLEASE CONSULT FACTORY									
THREE PHASE				A	B	C	D		
450 VA	300 VA	1.2	3-10-	$ 2625	$ 3550	$ 2775	$ 3750	42	5¼″H × 19″D × 19″W
1125 VA	750 VA	3.0	3-25-	3550	4800	3750	5050	72	7″H × 19″D × 19″W
1575 VA	1050 VA	4.2	3-35-	4000	5375	4200	5670	110	8¾″H × 22″D × 19″W
2250 VA	1500 VA	6.0	3-50-	4975	6725	5250	7075	145	14″H × 19″D × 19″W
3375 VA	2250 VA	9.0	3-75-	6950	9375	7325	9875	155	14″H × 19″D × 19″W
4500 VA	3000 VA	12.0	3-100-	8550	11,550	9000	12,150	200	21″H × 19″D × 19″W
6750 VA	4500 VA	18.0	3-150-	10,250	13,850	10,800	14,575	280	28″H × 19″D × 19″W
9000 VA	6000 VA	24.0	3-200-	11,400	15,400	12,000	16,200	325	29¾″H × 19″D × 19″W[1]
[2]13,500 VA	9000 VA	36.0	3-300-	17,100	23,075	18,000	24,300	390	42″H × 22″D × 19″W
18,000 VA	12,000 VA	48.0	3-400-	21,375	28,850	22,500	30,375	650	64¾″H × 22″D × 19″W
[2]27,000 VA	18,000 VA	72.0	3-600-	32,050	43,275	33,750	45,550	780	42″H × 22″D × 19″W (2) Ea.
[2]40,500 VA	27,000 VA	106.0	3-400-	48,100	64,925	50,625	68,350	1170	42″H × 22″D × 19″W (3) Ea.
54,000 VA	36,000 VA	144.0	3-1200-	64,125	85,575	67,500	91,125	1660	57¾″H × 22″D × 19″W (3) Ea.
[2]81,000 VA	54,000 VA	216.0	3-1800-	96,176	129,850	101,250	136,675	2340	42″H × 22″D × 19″W (6) Ea.

1—Size for "A" and "B" Models. The height is 35″ for "C" and "D" Models.
2—Available only as a complete cabinet enclosed unit. Price does not include cabinet which will vary depending upon type and cabinet manufacturer desired.

SERIES OSC PLUG-IN OSCILLATORS

The OSC series oscillators are designed to plug into the front panel of all Behlman Engineering Corporation AC Power Supplies. They are available in a wide variety of fixed and variable frequency outputs. Single, two and three phase models provide suitable drive signals for multi-phase supplies. These oscillators readily synchronize with external signals. In addition to the standard units shown below virtually any combination of fixed or variable frequencies to any practical degree of accuracy can be provided. Many special features, including provisions for external sync or drive, can be supplied.

FIXED FREQUENCY	MODEL	FREQUENCY ACCURACY					
		1%	0.5%	0.25%	0.1%	0.01%	0.001%
		E	F	G	H	J	K
SINGLE PHASE	OSC-1-XXX*—	$145	$175	$195	$225	$380	$515
TWO PHASE	OSC-2-XXX*—	200	230	250	280	435	570
THREE PHASE Y	OSC-3-XXX*—	235	265	285	315	450	585
*Insert desired frequency in place of XXX. Add code letter for desired frequency accuracy to model number.							
VARIABLE FREQUENCY	MODEL	1%	0.5%	0.25%	0.1%		
SINGLE PHASE	OSC-1-380/420—	$325	$370	$410	$485	"For digital LED frequency readout in place of the circular dial, add $150.00 to the variable frequency model prices and designate with OSCD in place of OSC in the model number."	
	OSC-1-350/450—	350	395	430			
	OSC-1-300/500—	375	410	450			
	OSC-1-44/66—	375	410	450			
	OSC-1-44/66—320/480—	440	475	515			
	OSC-1-45/2000—	460					
	OSC-1-150/2000—	450					
	OSC-1-45/10000—	510					
	OSC-1-150/10000—	490					
TWO PHASE	-2-	ADD 25% TO SINGLE PHASE PRICE (APPROX.)					
THREE PHASE Y	-3-	ADD 35% TO SINGLE PHASE PRICE (APPROX.)					
EXTERNAL INPUT PLUG-IN	EIP-1	$75 For one phase external input					
	EIP-2	85 For two phase external input					
	EIP-3	95 For three phase external input					
EXTERNAL SYNC	-SN	55 May be added to all fixed or variable frequency oscillators					

Behlman Engineering Corporation

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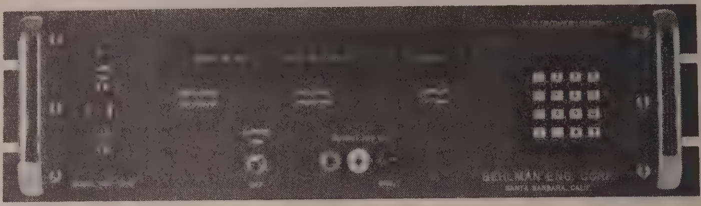
KB SERIES AC POWER SOURCES

PROGRAMMABLE AND INTELLIGENT



- Manual or computer controlled
- Reduces ATE system complexity
- Built-in measurement system
- Single command incrementing or decrementing of output voltage and frequency
- Microcomputer based crystal referenced, synthesized sinewave
- Cuts development time
- Reduces support equipment
- Variety of host interface options—IEEE 488, RS 232, and others
- Virtually no EMI/RFI emissions generated
- Standard programming languages—CIIL, AIE, Ada, and others
- Increases test reliability
- Versatile and efficient
- Self-test capability and diagnostic reports
- Front panel, alphanumeric display and keyboard
- Complete input/output electrical isolation

DESCRIPTION

The combination of a high quality AC power source, a precision measurement system, and a system performance monitor makes the Behlman KB Series a total AC power test tool. No other single AC test instrument available can equal this capability. Whether required for repetitive production testing, general laboratory support, or Automatic Test Equipment (ATE) applications, the KB Series AC power sources provide a single, cost effective, performance oriented solution to AC power testing.

Designed for high-reliability in both stand-alone and computer-controlled applications, the KB Series is programmable and reduces the necessity of costly support equipment and test hardware. Each KB Series model features a microcomputer control and measurement system that provides independent verification of operating output voltages, frequencies, currents, and phase relationships—not programmed values. On command the measurements are reported on a front panel, forty character, alpha numeric, fluorescent display and/or a variety of optional host interfaces such as IEEE 488, RS 232, and others. Watchdog functions are carried out by self-diagnostic circuits that make reports via the display and/or host interface.

Programming of the KB Series is accomplished by the front panel keyboard or a host computer and allows for incrementing and decrementing of the output values with user definable resolution. Military progamming requirements, such as the United States Air Force's Modular Automatic Test Equipment (MATE), are met by the KB Series. This allows for full use of the Control Interface Intermediate Language (CIIL) without supplementary hardware or software.

KB Series power configurations range from 100 VA to 54 KVA with less than 1% total harmonic distortion in single and multi-phase models. Frequency configurations range from 45 to 10,000 Hz with .001% accuracy. As with all Behlman products, the KB Series generates extremely low EMI and RFI emissions.

Among the specialized requirements Behlman Engineering can meet are unique designs which incorporate Field Effect Transistors (FET). These models are designated KB"F" Series and are for applications requiring the extended performance and high reliability of power FET Amplifier designs. Consult the factory for further information on the Behlman KBF Series.

FREE SOURCE OF A.C. POWER CONSULTATION. Behlman Engineering has the resources and versatility which enable us to solve the most difficult A.C. power problem. Because we listen and learn from our customers, our A.C. power products are the leading edge of A.C. power supply technology. Get the straight facts without the high-powered sales pitch from Behlman's consultants by calling (805) 684-8311.

Behlman Engineering Corporation
1142 MARK AVENUE • CARPINTERIA, CALIFORNIA 93013 • (805) 684-8311

KB SERIES AC POWER SOURCES:

TO ORDER: Use model number corresponding to output power level and number of phases required. Add letter corresponding to desired frequency range. For example KBT 3-10-D. All units are in rack mounting enclosure except as noted below. Cabinet enclosed versions for any of these units are available. (KBT designates standard KB Series models. The "T" stands for transistor.)

Rated Output Power	Maximum Amperes^2 (Per Phase) (0-130 V.)	Model Number	Output Frequency Range (Hz) 150-2000	150-10,000	45-2000	45-10,000	Weight (lbs.) E Models	Dimensions
SINGLE PHASE			**A**	**B**	**C**	**D**		
100 VA	1.2	KBT-10	$ 3075	$ 3475	$ 3125	$ 3550	26	5¼"H × 19"D × 19"W
250 VA	3.0	KBT-25	3450	3975	3525	4075	38	5¼"H × 19"D × 19"W
350 VA	4.2	KBT-35	3675	4275	3775	4400	50	5¼"H × 19"D × 19"W
500 VA	6.0	KBT-50	3950	4650	4050	4775	60	5¼"H × 19"D × 19"W
750 VA	9.0	KBT-75	4575	5475	4700	5675	65	7"H × 12"D × 19"W
1000 VA	12.0	KBT-100	4950	5975	5100	6200	95	8¾"H × 22"D × 19"W
1500 VA	18.0	KBT-150	5675	6975	5875	7250	120	14"H × 19"D × 19"W
2000 VA	24.0	KBT-200	6650	8275	6875	8600	135	14"H × 19"D × 19"W
3000 VA	36.0	KBT-300	7775	9825	8075	10250	180	21"H × 19"D × 19"W
5000 VA	60.0	KBT-500	11650	15075	12175	15772	280	31½"H × 22"D × 19"W
6000 VA	72.0	KBT-600	13625	17700	14225	18525	290	31½"H × 22"D × 19"W
*9000 VA	108.0	KBT-900	19450	25600	20375	26825	390	42"H × 22"D × 19"W
12000 VA	144.0	KBT-1200	25950	34150	27175	35775	570	57¾"H × 22"D × 19"W
*18000 VA	216.0	KBT-1800	38900	51200	40750	53650	780	42"H × 22"D × 19"W (2) Ea.
TWO PHASE—PLEASE CONSULT FACTORY								
THREE PHASE-Y			**A**	**B**	**C**	**D**		
300 VA	1.2	KBT3-10	$ 5075	$ 6050	$ 5225	$ 6275	42	5¼"H × 22"D × 19"W
500 VA	2.0	KBT3-17	5650	6800	5850	7025	65	7"H × 22"D × 19"W
750 VA	3.0	KBT3-25	6050	7400	6275	7675	72	7"H × 22"D × 19"W
1050 VA	4.2	KBT3-35	6550	8025	6750	8350	110	8¾"H × 22"D × 19"W
1500 VA	6.0	KBT3-50	7600	9475	7875	9850	145	14"H × 19"D × 19"W
2250 VA	9.0	KBT3-75	9725	12325	10125	12850	155	14"H × 19"D × 19"W
3000 VA	12.0	KBT3-100	11425	14650	11925	15300	200	21"H × 19"D × 19"W
4500 VA	18.0	KBT3-150	13275	17125	13850	17925	280	28"H × 19"D × 19"W
6000 VA	24.0	KBT3-200	14500	18800	15150	19650	325	29¾"H × 19"D × 19"W^3
*9000 VA	36.0	KBT3-300	20625	27050	21600	28375	390	42"H × 22"D × 19"W
12000 VA	60.0	KBT3-400	25235	33250	26425	34900	625	64¾"H × 22"D × 19"W
*18000 VA	72.0	KBT3-600	36700	48775	38525	51200	780	42"H × 22"D × 19"W (2) Ea.
*27000 VA	108.0	KBT3-900	55050	73175	57800	76800	1170	42"H × 22"D × 19"W (3) Ea.
36000 VA	144.0	KBT3-1200	73400	97550	77050	102400	1680	57¾"H × 22"D × 19"W (3) Ea.
*54000 VA	216.0	KBT3-1800	110100	146325	115575	153600	2340	42"H × 22"D × 19"W (6) Ea.

Notes: Height for "C" and "D" models is 35". *Available only as a complete cabinet—price not included.

SPECIFICATIONS*

INPUT

Voltage: 115/230 VAC ±10% single phase on models up through 1500 VA output. Three phase inputs available.
120/208 or 230 VAC ±10% three phase on models over 1500 VA output and up through 18000 output.
460 VAC ±10% three phase on models over 18000 VA output.

Frequency: 48-72Hz (400Hz available).
Various input voltage, frequency and power options are available, many at no extra charge.

Efficiency: 50-65% depending on operating conditions.

OUTPUT

Voltage: Single phase: 0-270 with auto range change at 135 volts. Two or three phase: 0-135 line to neutral. (0-270 with auto range change at 135 volts is optional.)

Frequency: 45-10,000Hz; See Selection Guide for frequency range of specific models.

Frequency Accuracy: ±0.001%

Load Regulation: ±0.2%, no load to full load.

Line Regulation: ±0.1% for ±10% line change.

Distortion: Less than 1% total harmonic distortion.

Rated Power Output: Obtainable from 100-135 volts and 200-270 volts, down to 10% low line.

Maximum Rated Power: Up to 150% of nominal rating available depending on operating conditions.

Power Factor: 100% VA rating available into any power factor load (utility to zero, leading or lagging).

Overload Protection: Electronic overload and short circuit protection with automatic, instantaneous recovery when overload is removed.

Over Voltage Protection (OVP): Continuously tracking within 5% of operating value.

Fault Protection: Fast-acting, main circuit breaker.

Output Sensing: Individual remote sensing for each phase.

OPTIONAL HOST INTERFACES

IEEE-488 (GPIB), 1978
RS-232C
Parallel Binary
Parallel BCD
0-10 VDC
A front panel LOCAL/REMOTE key lock is included with the host interface.

GENERAL

Operating Temperature: 0° to 55° Celsius (32° to 131° F.)

Front Panel: Dark grey, with white engraved lettering

*All specifications are based on unity power factor loads and may be changed without notice.

Behlman Engineering Corporation

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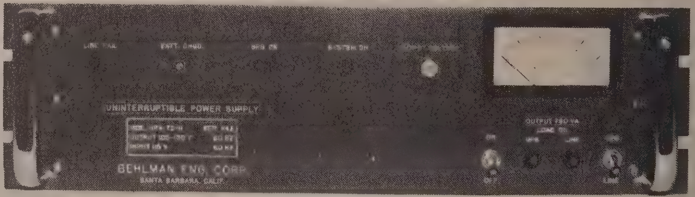
UNINTERRUPTIBLE POWER SYSTEMS

6KVA, SINGLE PHASE, UPS

VERY LOW EMI/RFI UPS

- High input/output isolation
- High noise reduction
- Low EMI/RFI
- Low output distortion
- Load power factor independence
- Outstanding MTBF
- Tight output regulation
- Small size and weight



750VA, SINGLE PHASE, UPS

DESCRIPTION

BEHLMAN Uninterruptible Power Systems provide a source of high quality AC power to critical electrical loads regardless of the input AC power line condition. UPS configurations range from 100 VA to 7.5 KVA in single-phase models and 3 KVA to 20 KVA in three-phase models.

A BEHLMAN UPS protects the load from all types of power line disturbances and from complete loss of line power. When normal AC line power is available, the UPS isolates the load from line anomalies such as voltage variations, frequency variations, and transient noise. If a complete failure of the line occurs or line anomalies exceed tolerable limits, the load is automatically switched to a battery supply allowing the UPS to maintain an uninterrupted output of high quality AC power.

These UPS systems are unique in that they are linear transistorized power amplifiers which inherently do not generate EMI or RFI either conducted or radiated and have lower distortion (under ±1.0%), and tighter line and load regulation (under ±1.0%).

All Behlman UPS models include a battery charger, solid state bypass switch, appropriate indicating lights and power line failue alarm provisions. The output frequency of the UPS is phase locked to the input power line frequency under conditions of normal operation. In the event the A.C. power line fails, the UPS continues to furnish the load with A.C. power by operating from the battery bank. The output frequency of the UPS is then determined by the highly stable internal oscillator.

Battery banks can be furnished for relay rack mounting or to the customer's specific requirements. Battery interconnect cables are provided with all standard UPS configurations.

PROBLEM SOLVER HOT LINE (805) 684-8311. Do you have a special A.C. power problem? Behlman Engineering's consultants can solve it. A variety of options provide solutions to many special requirements. We listen and learn with a desire to provide straight forward answers and solutions.

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UPS MODEL INFORMATION

1. To develop a complete model number, use the model number of this table (example UPS-10-) followed by the dash number for the Input/Output combination desired. Example: UPS-10-11 is a 100 VA unit with single phase, 115 VAC, 60 Hz input and output.
2. All models listed are rack mount type.
3. Battery packs listed are only suggestions for 15 minutes back-up using Gel-Cel batteries except where noted. Contact the factory for complete battery selection guide or for selection assistance.

MODEL[1]	TOTAL POWER OUTPUT	CURRENT OUTPUT PER PHASE (AMPERES)	WEIGHT (lbs)	DIMENSIONS[2] (In) (Not Including External Batteries)	RECOMMENDED BATTERY PACK[3] (Gel Cell)
SINGLE PHASE MODELS					
UPS-10-	100 VA, 1φ	1	28	5¼″H × 19″D × 19″W	Internal (60 min)
UPS-25-	250 VA, 1φ	2.5	41	5¼″H × 19″D × 19″W	Internal (20 min)
UPS-35-	350 VA, 1φ	3.5	54	5¼″H × 22″D × 19″W	Internal (15 min)
UPS-50-	500 VA, 1φ	5.0	65	5¼″H × 19″D × 19″W	BAT 6020-20
UPS-75-	750 VA, 1φ	7.5	70	5¼″H × 19″D × 19″W	BAT 6020-20
UPS-100-	1 KVA, 1φ	10	102	8¾″H × 22″D × 19″W	BAT 6040-05
UPS-150-	1.5 KVA, 1φ	15	129	14″H × 19″D × 19″W	BAT 6040-05
UPS-200-	2.0 KVA, 1φ	20	145	14″H × 19″D × 19″W	BAT 6040-05 (2) Ea.
UPS-300-	3.0 KVA, 1φ	30	194	22¾″H × 22″D × 19″W	BAT 6040-05 (2) Ea.
UPS-500-	5.0 KVA, 1φ	42	308	28″H × 22″D × 19″W	BAT 6040-05 (3) Ea.
UPS-750-	7.5 KVA, 1φ	63	318	33¼″H × 22″D × 19″W	BAT 6040-05 (4) Ea.
THREE PHASE MODELS					
UPS3-100-	3 KVA, 3φ	10	215	33¼″H × 22″D × 19″W	BAT 6040-05 (2) Ea.
UPS3-150-	5 KVA, 3φ	15	301	33¼″H × 22″D × 19″W	BAT 6040-05 (3) Ea.
UPS3-200-	7.5 KVA, 3φ	21	349	36¾″H × 22″D × 19″W	BAT 6040-05 (4) Ea.
UPS3-300-	10 KVA, 3φ	30	420	45½″H × 22″D × 19″W	BAT 6040-05 (5) Ea.
UPS3-500-	15 KVA, 3φ	42	650	68¼″H × 22″D × 19″W	BAT 6040-05 (8) Ea.
UPS3-600-	20 KVA, 3φ	60	810	45½″H × 22″D × 19″W (2) Ea.	BAT 6040-05 (11) Ea.

Lower power three phase units available; contact factory.

INPUT/OUTPUT COMBINATIONS AVAILABLE

Dash No.	INPUT			OUTPUT		
	Voltage	Phase	Frequency	Voltage	Phase	Frequency
11	115 VAC	1	60	115 VAC	1	60
12	230 VAC	1	60	230 VAC	1	60
13	220/230 VAC	1	50	220/230 VAC	1	50
15	100 VAC	1	50	100 VAC	1	50
31	120/208 VAC	3	60	120/208 VAC	3	60
32	230 VAC	3	60	230 VAC	3	60
33	460 VAC	3	60	460 VAC	3	60
34	220/380 VAC	3	50	220/380 VAC	3	50
35	380 VAC	3	50	380 VAC	3	50
36	120/208 VAC	3	60	120 VAC	1	60
37	120/208 VAC	3	60	230 VAC	1	60
38	230 VAC	3	60	115 VAC	1	60
39	230 VAC	3	60	230 VAC	1	60
40	460 VAC	3	60	115 VAC	1	60
41	460 VAC	3	60	230 VAC	1	60
42	220/380 VAC	3	50	220/380 VAC	1	50
43	380 VAC	3	50	220/230 VAC	1	50

GENERAL SPECIFICATIONS

INPUT

Voltage: See Selection Guide

Voltage Range: ±10%

Frequency: See Selection Guide

Frequency Range: ± 3 Hz

Power Factor (worst case): 0.8 lagging

OUTPUT

Voltage: See Selection Guide

Voltage Regulation: ±1% line and load

Voltage Adjustment: ±10% (i.e. 105-130 volts on 115 volt model)

Frequency: See Selection Guide

Frequency Accuracy (Freerunning): ±0.1% (0.01% and 0.001% available)

Frequency Stability (Freerunning); ±0.01% (short term), ±0.1% (long term)

Line Synchronization: Capture range ±3 Hz at a 1 Hz per second slew rate

Waveform: Sinewave

Distortion: 1% maximum total harmonic distortion

Load Power Factor Range: Unity to zero, leading or lagging

Overload Rating: 125% for 10 minutes, 150% for 30 seconds, 200% for 1 second

MISCELLANEOUS

Controls: System "On-Off" circuit breaker, Output Voltage Adjustment, Manual Bypass Switch "UPS-Line," Output to load "On-Off"

Indicators: Line Failure, Battery Charged, UPS OK, System On, Load On UPS, Load On Line

Contact Closure Outputs: Line Failure, UPS Output Off, Low Battery; Single Pole, Normally Open

Meter: Output Voltage

Static Transfer Switch: 4ms transfer to bypass line for inverter failure or overload, automatic re-transfer to inverter after removal of overload

Manual Bypass Switch: Front Panel Control for transfer of load to bypass line during UPS maintenance or checkout

Battery Chargers: Designed for rapid recharge. Rate and current depend on battery selection

Operating Temperature: 0°C to 40°C (32° to 104° F.)

Operating Humidity: 0 to 95% relative humidity; noncondensing

MTBF: 20,000 hours maximum 100,000 hours for AC output failure including static transfer switch

MTTR: 30 minutes

California INSTRUMENTS AC POWER SOURCES

STOCK DELIVERY— CALL TOLL FREE:

800/356-2244 (National) **Or 800/821-1634** (California)

AC POWER SOURCES

There are 90 standard models of manual or programmable AC Power Sources available from California Instruments that provide regulated voltage or current, and fixed or variable frequency. The unique building block design may be configured into multi-unit one, two, or three phase AC Power Systems.

AC Voltage Sources range in size from 100 VA to 36KVA, one, two, or three phase.

Line Regulation: ± 0.025% of full output for a ± 10% line change

Load Regulation: ± 1% over the unit's frequency range up to 5KHz

Amplitude Stability: ± 0.25% for 24 hours of constant line, load and temperature

AC Input Line:
Models 101T through 1501TC: 115V, 208V, 220V, 230V or 240-V-1Ø; 50 or 60Hz Models 1503TC through 3001TC: 208VL-L, 220VL-L, 230VL-L, 416VL-L, 440VL-L, 380V 4-wire-3Ø; 50, 60 Hz

AC CURRENT SOURCES

Average sensing AC Current Sources provide high accuracy regulated current for the laboratory and production testing. Thirty-seven models ranging from 60VA to 1800VA with maximum load current from 1.0 ampere to 200.0 amperes are available. The compliance voltages range from zero volts to 100.0 volts.

MODEL	MAXIMUM LOAD CURRENT (AMPERES)							
	1.0	2.0	5.0	10.0	20.0	50.0	100.0	200.0
10	80	40	15	8	4	1.5		
25		100	40	20	10	4	2	
50			75	40	20	8	4	2
75			100	50	25	10	5	

Maximum Compliance Voltage at Full Rated Load Current

NOTE: SHADED AREA limited to 2.0KHz maximum frequency.

To determine appropriate model number, use the table below following these steps:

1. Select maximum current required from blue row.
2. Select compliance voltage required from column below selected current.
3. Determine the model number by following the selected compliance voltage row to the left model column and add the selected current value as the dash number.

Example: Required current 5.0 Amps
Required Compliance Voltage 15 Volts
Model Number 10-5

POWER SOURCE SELECTION GUIDE

	Model	VA	Standard Output Voltage Range	Frequency Range	Price
Single Phase	101T	100	0-135V	45-10KHz	$ 1,395
	161T	160	0-120V	45-5KHz	1,565
	251T	250	0-30,75,135	45-20KHz	2,895
	251TCA	250	0-135,0-270	45-5KHz	1,795
	501TC	500	0-135,0-270	45-5KHz	2,325
	751TC	750	0-130,0-260	45-5KHz	2,995
	1001TC	1,000	0-130,0-260	45-5KHz	3,575
	1501TC	1,500	0-32.5,65,130,260	45-5KHz	4,495
	2501T	2,500	0-30,60,120,240	45-2KHz	6,025
	3001TC	3,000	0-32.5,65,130,260	45-2KHz	6,195
	3000TC/2-1	3,000	0-65,130,260	45-5KHz	9,090
	5000T/2-1	5,000	0-60,120,240	45-2KHz	12,150
	6000TC/2-1	6,000	0-65,130,260	45-2KHz	12,490
	10000T/4-1	10,000	0-120,0-240	45-2KHz	24,225
	12000TC/4-1	12,000	0-130,0-260	45-2KHz	24,905
Two Phase	200T/2-2	200	0-135 L-N	45-10KHz	$ 2,865
	320T/2-2	320	0-120 L-N	45-5KHz	3,205
	500T/2-2	500	0-30,75,135 L-N	45-20KHz	5,865
	500TCA/2-2	500	0-135,0-270 L-N	45-5KHz	3,665
	1000TC/2-2	1,000	0-135,0-270 L-N	45-5KHz	4,725
	1500TC/2-2	1,500	0-130,0-260 L-N	45-5KHz	6,065
	2000TC/2-2	2,000	0-130,0-260 L-N	45-5KHz	7,250
	3000TC/2-2	3,000	0-32.5,65,130,260 L-N	45-5KHz	9,090
	5000T/2-2	5,000	0-30,60,120,240 L-N	45-2KHz	12,150
	6000TC/2-2	6,000	0-32.5,65,130,260 L-N	45-2KHz	12,490
Three Phase Wye	153T	150	0-17.5,30,75,130 L-N	45-10KHz	$ 3,295
	300T/3-3	300	0-135 L-N	45-10KHz	4,310
	480T/3-1	480	0-120V L-N	45-5KHz	4,820
	503T	500	0-30,45,75,135 L-N	45-5KHz	4,095
	750T/3-3	750	0-30,75,135 L-N	45-20KHz	5,510
	750TCA/3-3	750	0-135,0-270	45-5KHz	8,810
	1500TC/3-3	1,500	0-135,0-270	45-5KHz	7,100
	1503TC	1,500	0-75,0-135 L-N	45-1KHz	5,545
	2250TC/3-3	2,250	0-130,0-260 L-N	45-5KHz	9,110
	2253TC	2,250	0-120V L-N	45-2KHz	7,295
	3000TC/3-3	3,000	0-130,0-260 L-N	45-5KHz	10,875
	4500TC/3-3	4,500	0-32.5,65,130,260 L-N	45-5KHz	13,635
	7500T/3-3	7,500	0-30,60,120,240 L-N	45-2KHz	18,225
	9000TC/3-3	9,000	0-32.5,65,130,260 L-N	45-2KHz	18,735
	15000T/6-3	15,000	0-60,120,240 L-N	45-2KHz	36,325
	18000TC/6-3	18,000	0-65,130,260 L-N	45-2KHz	37,345
	30000T/12-3	30,000	0-120,240 L-N	45-2KHz	72,500
	36000TC/12-3	36,000	0-130,260 L-N	45-2KHz	74,540
Three Phase Open Delta	200T/2-3D	200	0-135 L-L	45-10KHz	$ 2,865
	320T-2-3D	320	0-120 L-L	45-5KHz	3,205
	500T/2-3D	500	0-30,75,135 L-L	45-20KHz	5,865
	500TCA/2-3D	500	0-135,0-270 L-L	45-5KHz	3,665
	1000TC/2-3D	1,000	0-135,0-270 L-L	45-5KHz	4,725
	1500TC/2-3D	1,500	0-130,0-260 L-L	45-5KHz	6,065
	2000TC/2-3D	2,000	0-130,0-260 L-L	45-5KHz	7,250
	3000TC/2-3D	3,000	0-32.5,65,130,260 L-L	45-5KHz	9,090
	5000T/2-3D	5,000	0-30,60,120,240 L-L	45-2KHz	12,150
	6000TC/2-3D	6,000	0-32.5,65,130,260 L-L	45-2KHz	12,490

AC POWER SOURCE
MODEL 3001TC
PRECISION OSCILLATOR
California Instruments
AC POWER SOURCE
MODEL 161T PRECISION OSCILLATOR

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California INSTRUMENTS AC POWER SOURCES

STOCK DELIVERY— CALL TOLL FREE: 800/356-2244 (National) **Or 800/821-1634** (California)

OSCILLATORS

A family of over sixty different oscillators provide the true sine wave signal which drives the AC Power Source. They provide a fixed or variable output frequency and are either manually adjustable, or can be programmed with analog signals, or via the IEEE-488 (1978) BUS.

PROGRAMMABLE OSCILLATORS

The 835T rack mount and 847 Series Plug-in Oscillators provide the interface between an IEEE-488 Instrument Controller or Digital Computer and an AC Power Source. These units give the ability to program and control the frequency, amplitude, and with the 835T, the phase of the AC Power Source.

FIXED and VARIABLE OSCILLATORS

800 Series Oscillators are continuously variable frequency models, and the 815T Series provide only a single fixed frequency output. The 850T Series is digitally synthesized crystal controlled oscillator with either decade dialling or fixed frequency.

OSCILLATOR SELECTION GUIDE

Frequency Range	Frequency Accuracy	1∅	Price	2∅	Price	3∅	Price	3∅D	Price
Fixed									
50Hz	±0.1%	815T-50-1	$250	815T-50-2	$375	815T-50-3	$375	815T-50-3D	$375
60Hz	±0.1%	815T-60-1	250	815T-60-2	375	815T-60-3	375	815T-60-3D	375
400Hz	±0.1%	815T-400-1	250	815T-400-2	375	815T-400-3	375	815T-400-3D	375
Continuously Variable									
40-5KHz	±0.5%	800T-40/5K-1	$720	800T-40/5K-2	$975	800T-40/5K-3	$975	800T-40/5K-3D	$975
45-75Hz	±0.25%	800T-45/75-1	575	800T-45/75-2	750	800T-45/75-3	750	800T-45/75-3D	750
300-500Hz	±0.25%	800T-300/500-1	575	800T-300/500-2	750	800T-300/500-3	750	800T-300/500-3D	750
45-75Hz & 300-500Hz in two bands	±0.25%	800T-45/75—300/500-1	700	800T-45/75—300/500-2	875	800T-45/75—300/500-3	875	800T-45/75—300/500-3D	875
20-20KHz in three bands	±1%	800T-20/20K-1	765	800T-20/20K-2	1,020	800T-20/20K-3	1,020	800T-20/20K-3D	1,020
Crystal Controlled									
45-10KHz Four decades	±.005	850T-1	$495	850T-2	$710	850T-3	$710	850T-3D	$710
50/60/400Hz Switch selectable	±.005	853T-1	480	853T-2	695	853T-3	695	853T-3D	695
Any fixed frequency between 45 to 10KHz	±.005	855T-FREQ-1	450	855T-FREQ-2	665	855T-FREQ-3	665	855T-FREQ-3D	665
Programmable									
45-10KHz	±.005	835T-1	5,155	835T-2	5,565	835T-3	5,795	835T-3D	$5,565
45-10KHz	±.001	847T-1	1,595	847T-2	2,045	847T-3	2,045		
45-10KHz	±.001	848TCM-1	1,850	848TCM-2	2,300	848TCM-3	2,300		
45-10KHz		846CM	920	846CM	920	846CM	920		

AC LINE CORRECTORS

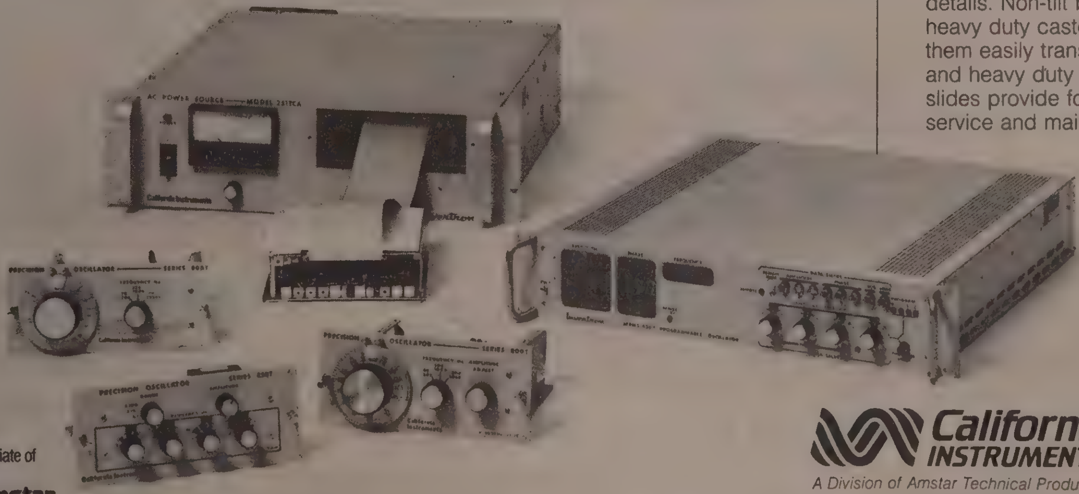
Precision AC Line Correctors provide pure sine wave power for critical applications. They deliver super regulated 0.025% line and load, low distortion, transient free AC power.

Model	Freq.	Output Volts	Output Power VA* Continuous	Input Volts	Price
LC1201B	57-63Hz	115V	1,200VA	115V	$ 2,550
LC1252B	47-53Hz	220,230,240V	1,200VA	220V	2,750
LC1262B	57-63Hz	220,230,240V	1,200VA	220V	2,750
1360	57-63Hz	115V	3,000VA	115V	5,295
1361	57-63Hz	115V	3,000VA	220V	5,495

*For Peak Output Power multiply X 5

DELUXE EQUIPMENT CABINETS

Modular all steel cabinets for housing three phase power systems feature rugged industrial construction and instrument quality finish and details. Non-tilt bases and heavy duty casters make them easily transportable and heavy duty rack slides provide for ease of service and maintenance.


AC POWER SOURCE — MODEL 251TCA
California Instruments
PRECISION OSCILLATOR — SERIES 800T

An affiliate of
Amstar
CORPORATION

California INSTRUMENTS
A Division of Amstar Technical Products Company, Inc.
5150 Convoy St., San Diego, CA 92111-1266 (619) 279-8620 Telex: 695047

Clary Uninterruptible Power Systems: 750 VA to 30 kVA

Broad Range of Products. Clary offers ten models of UPS ranging in capacity from 750 VA to 30kVA. They are typically found in commercial or industrial computer systems environments and are designed for applications such as data processing, data transmission, data collection and process or equipment control.

Built-in Reliability. Clary brings to the UPS market over forty years experience in design and manufacture of high technology products. Careful manufacturing, thorough inspection and extensive production testing under full load conditions ensures the high reliability and performance of Clary UPS.

The resulting pure, constant output sine wave of both our single and three phase units enhances the reliability of our customer's sensitive electronics equipment as well.

Quiet Convenient Operation. Clary UPS are designed with the user in mind. Many UPS on the market emit a constant, annoying hum which can be intolerable to personnel in the office, computer room, or laboratory. Clary has incorporated transistor technology and noise suppression techniques to produce one of the quietest systems on the market. As a result, a Clary UPS can be placed in a working environment without causing distraction or annoyance.

Clary has incorporated features that make the units simple and convenient to operate. For example, an operator can quickly monitor system status by observing the display panel. Visual and audible alarms are built-in to signal out of tolerance conditions.

Fast Delivery. When an installation has had power problems or is acquiring sensitive electronic equipment, the manager wants protection as soon as possible. However, deliveries in months are common in the industry. Clary is staffed to respond quickly to users' needs and can typically deliver in less than a month.

Reputation of Excellence. Backed by over 40 years industrial and military experience with high technology products, we recognize that no two companies have the same needs. Thus, the Clary UPS product line offers built-in flexibility to meet specific user requirements.

Clary's reputation for custom high quality design has contributed to its success in marketing Uninterruptible Power Systems across a broad range of industries. Installations are found in geophysical exploration trailers and ships, hotel reservation systems, bank automatic teller equipment, hospital systems, printing systems, communication networks, industrial process control systems and on-line data processing systems.

Call for free consultation. Whether you're a data processing manager, a representative of a company that packages computer-related systems, a plant manager or with an engineering firm involved in major facility design, call us for assistance in evaluating your power protection requirements. Contact us at corporate headquarters to request a free catalogue.

	Single phase							Three phase		
MODEL NO.	**UPS 1-750VA-1A**	**UPS 1-1.25K-1A**	**UPS 1-2.5K-1A**	**UPS 1-3.75K-1A**	**UPS 1-5K-1A**	**UPS 1-7.5K-1**	**UPS 1-10K-1**	**UPS 3-10K-1**	**UPS 3-15K-1**	**UPS 3-30K-1**
kVA RATING	**.75 kVA**	**1.25 kVA**	**2.5 kVA**	**3.75 kVA**	**5. kVA**	**7.5 kVA**	**10 kVA**	**10 kVA**	**15 kVA**	**30 kVA**
INPUT Voltage (VAC) @ 60Hz ± 3Hz	115 ± 15%	115 ± 15%	115 ± 15%	115 ± 15%	115 ± 15%	$115/230^{+10\%}_{-15\%}$ Split phase	$115/230^{+10\%}_{-15\%}$ Split phase	$208Y/120^{+10\%}_{-15\%}$	$208Y/120^{+10\%}_{-15\%}$	$208Y/120^{+10\%}_{-15\%}$
Current a	15A	23A	46A	78A	91A	85A	99A	53A	79A	158A
BATTERY b VOLTAGE	84 VDC	84 VDC	84 VDC	84 VDC	84 VDC	120 VDC	120 VDC	120 VDC	120 VDC	120 VDC
OUTPUT Voltage (VAC)	115 ± 2%	115 ± 2%	115 ± 2%	115 ± 2%	115 ± 2%	115/230±2% Split phase	115/230±2% Split phase	208Y/120±2%	208Y/120±2%	208Y/120±2%
Power kVA .8pf lag	0.75	1.25	2.5	3.75	5	7.5	10	10	15	30
Current at: 100% load	6.5A[c]	11A[c]	22A[c]	33A[c]	44A[c]	33A[d] 230 VAC	43A[d] 230 VAC	28A[d] per leg	42A[d] per leg	83A[d] per leg
Frequency e (Hz)	60 ± 0.25%	60 ± 0.25%	60 ± 0.25%	60 ± 0.25%	60 ± 0.25%	60 ± 0.25%	60 ± 0.25%	60 ± 0.5%	60 ± 0.5%	6 ± 0.5%
HARMONIC DISTORTION at 100% load	5% THD	5% THD	5% THD	5% THD	5% THD	5% THD	5% THD	5% THD 3% Single	5% THD 3% Single	5% THD 3% Single
Input/Output Phase	Single 2 wire + GND	Single 2 wire + GND	Single 2 wire + GND	Single 2 wire + GND	Single 2 wire + GND	Single 3 wire + GND	Single 3 wire + GND	Three 4 wire + GND	Three 4 wire + GND	Three 4 wire + GND
Rack Mountable Size - Inches (H x W x D)	12¼x19x21	12¼x19x21	21x19x21	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cabinet Size - Inches (H x W x D)	39½x25½x26	39½x25½x26	39½x25½x26	53½x25½x26	53½x25½x26	72x55x27	72x55x27	72x55x27	72x55x27	72x68x27
Weight-lbs. (less battery)	305[f]	305[f]	418[f]	700	760	1400	1500	1700	1800	2400

a At Full Load and Discharged Battery at Nominal Voltage.
b Back-Up Time to be specified by customer. Batteries on 0.75, 1.25 and 2.5 kVA units are self-contained.
c Overload 125% for 2 hours.
d Overload 125% for 15 minutes.
e Regulation applies to internal oscillator mode. Inverter normally phase-locked to commercial power.
f Deduct 183 lbs. for rack mountable unit.

CLARY®

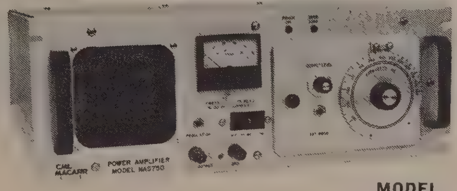
CLARY CORPORATION
320 West Clary Avenue
San Gabriel, CA 91776
(818) 287-6111
TWX 910-589-3369

CML MACARR®
POWER SUPPORT EQUIPMENT

SOLID STATE
WIDE BAND AC POWER SUPPLIES—45-10KHz
Single Phase and Three Phase

NAS series 500VA to 1KVA

Single Phase



MODEL
NAS 750-1

Model	Output Power VA	Input Power	Dimensions H x W x D	Shipping Weight
NAS-500	500	115/230 1ϕ 47-63 Hz	7 x 19 x 17	114 lbs.
NAS-750	750	115/230 1ϕ 47-63 Hz	7 x 19 x 19	125 lbs.
NAS-1000	1000	208/230 3ϕ 47-63 Hz	12¼ x 19 x 19	150 lbs.

TAS series 500VA to 3KVA

Three Phase

MODEL	OUTPUT POWER VA	INPUT POWER	DIMENSIONS H x W x D	SHIPPING WEIGHT
TAS-500	500	115/230 3ϕ 47-63 Hz	8¾ x 19 x 19	160 lbs.
TAS-1500	1500	208/230 3ϕ 47-63 Hz	14 x 19 x 19	205 lbs.
TAS-2000	2000	208/230 3ϕ 47-63 Hz	14 x 19 x 19	225 lbs.
TAS-3000	3000	208/230 3ϕ 47-63 Hz	20 x 19 x 19	290 lbs.

Plug-In Oscillators

Frequency	1ϕ*	3ϕ	Frequency Stability			
			.25	.1	.01	.001
400	SSG14	SSG34	A	B	—	—
400	STG14	STG34	—	—	E	G
50	SSG11	SSG31	A	B	—	—
50	STG11	STG31	—	—	E	G
60	SSG12	SSG32	A	B	—	—
60	STG12	STG32	—	—	E	G
45-70	SSG13	SSG33	A	C	—	—
350-450	SSG15	SSG35	A	C	—	—
300-2 kHz	SSG16	SSG36	A	C	—	—
45-6 kHz	SSG17	SSG37	A	C	—	—
45-10 kHz	SSG10	SSG30	A	C	—	—
External Signal Adapter (0-5V)	SA2T	N/A	—	—	—	—

* All 1ϕ oscillators have 600 ohm jack receptacle for external oscillators.

C—Available on special order.

- Plug-In Oscillators
- Low Harmonic Distortion
- Outputs 0-65, 0-130, 260V available
- Minimum Package Sizes 500 VA in 7" high standard rack space
- Response time 50 microseconds
- Frequency stability .25% to .001%

Specifications

OUTPUT CONFIGURATION: Single phase two wire isolated. Three phase four wire. WYE with taps for Delta loads.

OUTPUT VOLTAGE: Single phase units, model NAS 500 standard; (-1) 0-130V with full power @ 105-130V. Optional; (-2) 0-65/0-130/0-260V with full power @ 55-65V/105-130V/210-260V respectively. Includes automatic range voltmeter, current meter and range indicator lights. All other models 0-130/0-260V with full power 105-130V/210-260V. All Three Phase units — 105-130V/185-225V line to line WYE or Delta loads.

PROTECTION: Current overload

LOAD POWER FACTOR: .7 lead or lag.

HARMONIC DISTORTION: Less than .5%, 45-10 KHz @ full load. Less than 1% with plug-in oscillator. Less than 2% for 3ϕ units.

REGULATION: ±.25% with ±10% input line variation ±1.0% NF-FL.

OUTPUT PHASE SEPARATION: 120 ±1° for fixed frequency models as well as 350-450 Hz models. 120 ±2° for 45-70 and 300-2,000 Hz models. 120 ±3° for 45-6,000 Hz models.

NOISE LEVEL: 70 db below rated output.

OPERATING TEMPERATURE: −20°C to +40°C.

TEMPERATURE STABILITY: Voltage .05% per degree C typical. Frequency .05% per degree C typical.

METERS: Models 500 VA and up include panel mounted output voltmeters.

CONTROLS: Output voltage and frequency controls mounted on plug-in oscillator panels where required.

CONSTRUCTION: Standard 19" rack mount with full dust covers. Bench adapters (-C) or chassis slides (-S) available at extra cost. Add suffix to Model Number. Rear or side supports required.

FINISH: Front panels finished in ivory paint with black marking. Chassis surfaces are protected by irridite.

MODIFICATIONS AVAILABLE ON SPECIAL ORDER

Single Phase and Two Phase Output

Standard 3 phase power supplies may be used to provide a 2 phase output at ⅔ of rated power. An internal selector switch internally provides either 90 degrees or 120 degrees phase separation for 2 or 3 phases respectively.

Three 1 phase units may be operated as a 2 phase or 3 phase system.

CML MACARR®
POWER SUPPORT EQUIPMENT

MARINE ELECTRIC RPD INC.
CML MACARR DIVISION
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CML MACARR®
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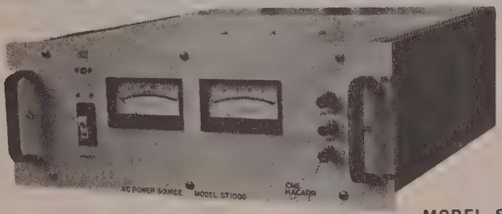
SYNAMP® solid state frequency converters synthesized sine wave
NOW IN STOCK!!

single phase 50-60-400 Hz
ST series 500VA to 2000VA



MODEL ST-1000

Model	Output Power VA	Output Amps Max.	*Input	Dimensions H x W x D	Shipping Weight
ST500	500	4.76	115/230 1φ 47-63 Hz	5¼ x 19 x 21	103 lbs.
ST1000	1000	9.52	115/230 1φ 47-63 Hz	7 x 19 x 21	115 lbs.
ST2000	2000	19.04	208/230 3φ 47-63 Hz	8¾ x 19 x 21	216 lbs.

*400 Hz input available on special order.
**47-63 Hz available on special order.

three phase 50-60-400 Hz
TT series 1500VA to 6000VA

Model	Output Power VA	Output Max. Amps	*Input	Dimensions H x W x D	Shipping Weight
TT1500	1500	4.76	208/230 3φ 47-63 Hz	10½ x 19 x 20	230 lbs.
TT3000	3000	9.52	208/230 3φ **57-63 Hz	14 x 19 x 20	300 lbs.
TT6000	6000	19.04	208/230 3φ **57-63 Hz	17 x 19 x 20	375 lbs.

*400 Hz input available on special order.
**47-63 Hz available on special order.

Ordering Information

To specify give model number and option code number as shown below. For example: 500VA single phase 45-66 Hz. Model ST500-01

Frequency	Code	Mode
45-66 Hz	-01	variable
320-460 Hz	-02	variable
50 Hz	-50	fixed
60 Hz	-60	fixed
400 Hz	-41	fixed

- High Efficiency 75% Typical
- Rack Mount Construction
- Versatility — may be used as a Frequency Converter or Precision AC Power Source
- Output Voltage Range: 105-130V/210-260V
- Output Frequency Range: 45-460 Hz at Full Rated Output
- Modular Power Transistor Assemblies

Specifications

OUTPUT CONFIGURATION: Single phase — two wire isolated. Three phase — four wire WYE with floating neutral and taps for delta load.

INPUT CONFIGURATION: 115/230 ±10% 1φ 47-63 Hz all models thru 1KVA, others 208/230 ±10% 3φ 47-63 Hz. Special voltages available at slight extra cost.

OUTPUT VOLTAGE: Single phase, 105-130V/210-260V @ full power. Three phase, 105-130V/185-225V line to line, or line to neutral @ full power. Preset 117V 1φ line-neutral.

VOLTAGE ADJUSTMENT: Single phase units, internally adjustable. Optional, front panel mounted (add -P) to model number. Three phase units, standard front panel mounted.

PHASE DISPLACEMENTS: Three phase units ±3° with balanced load.

LOAD POWER FACTOR: .8 lead or .7 lag at rated output.

EFFICIENCY: 75% typical.

FREQUENCY STABILITY: .25% standard, options to .001%.

RESPONSE TIME: Less than 200 milliseconds at 60 Hz and 100 milliseconds at 400 Hz.

HARMONIC DISTORTION: 3% maximum at full load; 4% at N.L.

AMBIENT TEMPERATURE: −20°C to +50°C.

TEMPERATURE STABILITY: Voltage .03% per degree C typical. Frequency .05% per degree C typical.

CONTROLS AND METERS: All models 500VA and up include panel voltmeter and ammeter. Variable frequency models have front panel mounted frequency control dial.

VOLTAGE REGULATION: ±1% with ±10% line, ±1% NL-FL.

PROTECTION: Input line circuit breaker. Current limit on output. Output circuit breaker available at extra cost.

TERMINATIONS: Output on front and rear. Input on rear mounted barrier strip.

CONSTRUCTION: Standard 19" rack mount with full dust covers. Bench adaptors (-C) or chassis slides (-S) available at extra cost. Add suffix to Model Number. Rear or side supports required.

FINISH: Front panels finished in ivory paint with black marking. Chassis surfaces are protected by irridite.

ANNOUNCEMENT CONTACT US ON OUR NEW LINE OF DC-AC INVERTERS UP TO 500VA

CML MACARR®
POWER SUPPORT EQUIPMENT

MARINE ELECTRIC RPD INC.
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CML MACARR®™
POWER SUPPORT EQUIPMENT

SYNAMP® power inverters DC to 50-60-400 Hz solid state transistorized bench or rack mounted

POWER ON
DC POWER INVERTER
MODEL DRS1004-FS

MRS series - 50-60 Hz

Output: 115 Volts rms, Single Phase

Input: Standard, 22-30 Volts D.C. also available 41-55V, replace (-24) with (-48) in model no.

Voltage & Frequency Regulated

DRS series - 400 Hz

Output: 115 Volts rms, Single Phase

Input: Standard, 22-30 Volts D.C., also available 41-55V, replace (-24) with (-48) in model no.

Voltage & Frequency Regulated

Specifications

INPUT CONFIGURATION: Two wire, isolated.

OUTPUT CONFIGURATION: Single phase, two wire isolated.

OUTPUT VOLTAGE: MRS & DRS Models are preset at 115 volts rms.

DUTY CYCLE: Continuous duty at full output.

HARMONIC DISTORTION: Less than 3%.

LOAD POWER FACTOR: 0.8 lead or 0.7 lag to unity at rated output .

FREQUENCY STABILITY: 0.25% standard, options to 000.1%. Units in which the frequency may be synchronized with an external source available on special order.

VOLTAGE REGULATION: MRS & DRS Series: Line and load ±2%.

EFFICIENCY: Typically 70% for 500 VA units.

AMBIENT TEMPERATURE: Operating: −20°C to +50°C. Storage: −40°C to +85°C.

TEMPERATURE COEFFICIENT: Frequency: Typically 0.03 Hz/degree C, Voltage: Typically 0.04 V/degree C.

PROTECTIVE CIRCUITS: All models have input fuses. Input fuse will blow on application of input polarity reversal. Output is current limited with automatic reset on removal of short.

PANEL METERS: Voltmeters and ammeter are available at extra charge. Add (-VA) to Model No.

COOLING: Convection cooled up to 200 VA.

TERMINATIONS: Output on front and rear. Input on rear covered mounted barrier strip.

CONSTRUCTION: Bench model with brackets provided for standard 19″ rack mount.

FINISH: Front panels finished in white with black marking. Chassis surfaces are protected by irridite.

Other Products from MARINE ELECTRIC RPD INC. include:

For Commercial and Military Use

- Battery Chargers
- 28V DC Power Supplies
- Temperature Monitoring
- Loudspeaker Systems

For Railroads and Railways

- Combination Hot Bearing-Hot Wheel Detectors
- Magnetic Wheel Detectors

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NEED MORE INFORMATION?

USE ONE OF THE NEW

EEMEDIATE ACTION CARDS

INSIDE THE BACK COVER OF
VOLUMES 1A, 1B & 2

SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
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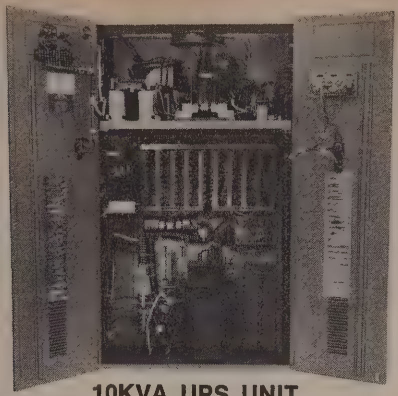


10KVA UPS UNIT
Shown with two front doors open

UPS

Uninterruptible Power Systems

Solid state, battery powered AC • 500 VA to 25 KVA single phase • 3000 VA to 75 KVA three phase • sine wave output • long emergency run time • continuous run • high lightning immunity

These are floor and/or wall mounted, forced cooled UPS units mounted in heavy gauge sheet metal cabinets with front opening key locked doors. The cabinets contain ventilation louvers and knockouts for interwiring with BX, Romex or conduit. The internal construction of each cabinet consists of battery charger, DC to AC inverter and batteries. Above 1.5KVA a separate battery cabinet or open rack is required which is optional. 1.5KVA and below has charger, inverter and batteries all self contained within the cabinet.

ELECTRICAL SPECIFICATIONS

Input voltage: 120V or 240VAC, 2 or 3 wire (specify as required, other voltage available on request).

Input freq.: 60HZ ± 1HZ (50HZ available on request).

Steady state output voltage: 120 or 240VAC ± 5%, for changes in AC load current and battery voltage changes during power failure.

Output freq.: 60HZ (50HZ available on request). Synchronized with AC input, or ± .05HZ.

Output Wave: Sine wave, 5% distortion into resistive load.

Power factor load range: .75 Lag to .9 lead.

Short circuit on input lines: Remote wall breaker and/or fuse protection for protection of the UPS unit itself.

Short circuit and overload protection of output: Electronic and Magnetic.

Time to Transfer to Inverter after a Utility Power Failure: None, as the inverter runs continuously.

Overload capability during emergency: 130% for 5 minutes after utility power failure.

Emergency run time standard: 1½ hours with fully charged batteries, (longer or shorter times available on request).

Front panel controls group: Battery DC voltmeter. Output AC voltmeter. Utility power OK indicator. Inverter bi-passed indicator. System Test Switch. Hi-charge indicator. Battery trickle charge ammeter.

Ambient operating temperature limits: 32°F to 120°F (temperatures above 80°F will shorten battery life considerably).

Battery charger: Automatic boost charge (equalize) is applied with a solid state timer approximately every 3 months. Trickle charge applied constantly.

Battery: Long life lead vented station battery with oversized water reserves and porous rubber separators, and optional hydrometer, thermometer supplied with each unit order. Two visible state of charge indicator discs are built into each battery.

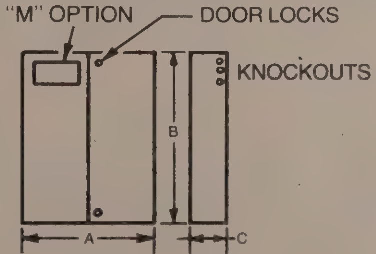
Battery protection: Automatic low battery voltage disconnect protects batteries from sulfation after a prolonged power failure.

Automatic bypass switch: Upon an inverter failure the AC utility automatically transfers to the load with a mechanical switch. (fast solid state 3 to 6MS-switching available on special request).

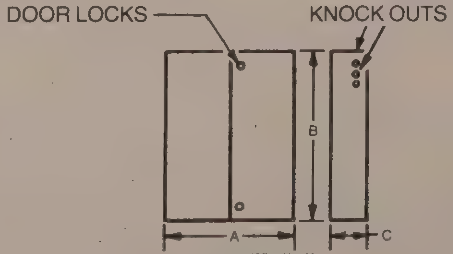
MECHANICAL ENCLOSURES

	ELECTRONICS & BATTERY CABINET				REQUIRED BATTERY CABINET				TOTAL WEIGHT INCLUDING BATTS. FOR 1½ HRS.
MODEL NUMBER	DETAIL	A	B	C	DETAIL	A	B	C	lbs./kg.
UPS-24-500	I	39	48½	10	NONE				415/ 188
UPS-48-1000	I	39	60½	10	NONE				560/ 254
UPS-48-1500	I	39	60½	10	NONE				591/ 268
*UPS-48-2400	I	39	60½	18	II	39	60½	10	1030/ 467
UPS-48-3000	I	39	60½	18	II	39	60½	10	1077/ 488
UPS-48-4500	I	39	68½	18	II	39	48½	18	1634/ 741
UPS-48-6000	I	39	68½	18	II - 2 REQ'D	39	48½	18	2763/1253
UPS-48-7500	I	39	68½	18	II - 2 REQ'D	39	48½	18	2858/1296
UPS-60-10000	I	39	68½	18	II - 2 REQ'D	39	60½	18	3430/1555
UPS-120-16600	I	39	68½	24	II - 4 REQ'D	39	60½	18	6540/2966
UPS-240-25000	I	39	68½	24	II - 6 REQ'D	39	60½	18	8150/3696

*Batteries are external to electronics cabinet above 1.5 KVA, separate cabinet must be ordered if batteries are to be enclosed.
**Above 10 KVA 2 electronics cabinets are required with 1 foot minimum spacing between.



DETAIL I



DETAIL II

COMPUTER POWER INC. 124 W. Main St., High Bridge, NJ 08829 U.S.A. Phone: (201) 735-8000 / Telex: 847481

CONTROLLED POWER COMPANY

1955 STEPHENSON HWY., TROY, MI 48083, (313) 528-3700, TWX: 810-232-3401

CALL TOLL FREE
1-800-521-4792

SERIES 200 POWER TRANSFORMERS

GENERAL

Controlled Power has established an enviable reputation by offering the highest quality products. The quality is reflected in the design, material, workmanship and ultimately in the performance of the products.

Series 200 includes: Single phase, double wound, **Power Transformers**; 600V, 2 KVA-1000 KVA.
Three phase, double wound, **Power Transformers**; 600V, 3 KVA-1000 KVA.
Single phase **Auto Transformers**; 600V, 3 KVA-50 KVA.
Three phase **Auto Transformers**; 600V, 3 KVA-1000 KVA.
Three phase **Controlled Power Testing Transformer** with combined standard auto winding and a multitapped auxiliary winding; 600V, 5 KVA-50 KVA.
Single phase, double wound **Power Transformers**; 5000V, 10 KVA-333 KVA.
Three phase, double wound **Power Transformers**; 5000V, 10 KVA-750 KVA.
All of these transformers are 60 Hertz and utilize Class H insulation. 50 Hertz units available.
Complete specifications available from factory. Ask for Bulletin 200-80A.

The quality features listed below exemplify the quality found in Controlled Power Systems:

- Heavy gauge sheet steel or aluminum enclosures.
- Enclosure is phosphated (sheet steel) and finished with a baked on enamel.
- Drip-proof construction with baffled openings for ventilation.
- Enclosure, core, shield and coil assembly are visibly grounded.
- Floor or wall mounting for industrial units through 50 KVA without accessory brackets (industrial enclosures).
- Commercial units attractively styled and color co-ordinated for computer room application or office placement are available.
- Dry Nitrogen Annealed electric steel cores retain the high magnetic properties after shearing and forming operations through the Controlled Power Annealing Process.
- Higher efficiency and power factor results from stress relieving the steel and restoring the electrical grade silicon steel magnetic characteristics.
- Quiet operation on all systems.

ENCLOSURES

Phosphatized sheet metal cabinets are completely rust proof and corrosion resistant. Baked on enamel ensures long life.
Formed and flanged from extra heavy gauge steel or aluminum.
Removable or hinged panels for excellent accessability.
Thermally designed vented openings offer optimum cooling for long life.
Solid top covering shields units from foreign matter and liquids entry.
Commercial enclosure suitable for computer room or office environment available.
Prominent non-corrosive diagrammatic data nameplate attached.

TRANSFORMER TAPS

Taps are added to the high voltage or low voltage windings of transformers to compensate for changing voltage conditions at the input transformer. They are rated at a fixed percentage of the nominal input. The correct way to check for the best tap to be used is to ascertain the present incoming voltage and also check the output voltage of the secondary with the load connected to see if it is within one or two percent of the desired output voltage. Frequently voltage is correct when first installed but when other loads are added, voltage to or from the transformer drops. This will require a change of taps to compensate for this drop.

ELECTRICAL AND MECHANICAL ASSEMBLY

Extra strong and flexible core and coil support materials used for bracing result in high mechanical strength to withstand surges.
Terminal connections marked and easily accessible through removable panels.
10 KV BIL certifications for 600 Volt Class, High BIL ratings available.

CORE AND COIL CONSTRUCTION

Computer assisted design for optimum results. Windings are in tight, even layers keeping core losses and noise to a minimum.
Silicon grain-oriented low magnetostriction steel is precisely cut, interleaved, formed, rigidly clamped and firmly bonded.
Completed steel cores retain the high magnetic properties after shearing and blanking operations through the Controlled Power Dry Nitrogen Annealing Process. Higher efficiency and power factor results from stress relieving the steel and restoring the electrical grade silicon steel magnetic characteristics.
Coil insulating blocks create tunnel cooling effect increasing safety factor against overloads and excessive temperature rise.
Low losses through use of optimum conductor to core loss ratios.
Electrical silicon steel offers high efficiency, long life and complete reliability.
Temperature and noise levels equal to or below NEMA, CSA, U.L., and ASA standards.
Insulators are selected for best thermal properties and high dielectric strength.

SHIELDING

Single shielded transformers are available in most of the sizes listed below.

CALL OR WRITE FACTORY FOR COMPLETE DETAILED BROCHURE OF OUR POWER TRANSFORMERS

SOUND LEVELS

Controlled Power's quiet performance transformers start with quality steel. By using an electrical grade steel having a high rating of withstanding magnetostriction vibrations caused by magnetic force fields and proper varnish impregnation, quiet operation is insured.
Further minimization of any transmitted pulsation is reduced by rigid mechanical bracing. By utilizing grades of insulation that allow forming tighter, smaller coils with closer air gaps the sound level is lowered.

SINGLE PHASE DOUBLE WOUND POWER TRANSFORMERS 600V CLASS 2 KVA-500 KVA	2 KVA THRU 5 KVA — SINGLE PHASE POWER TRANSFORMERS — 600V CLASS 7.5 KVA THRU 25 KVA — SINGLE PHASE POWER TRANSFORMERS — 600V CLASS 37.5 KVA THRU 100 KVA — SINGLE PHASE POWER TRANSFORMERS — 600V CLASS 167 KVA THRU 500 KVA — SINGLE PHASE POWER TRANSFORMERS — 600V CLASS
THREE PHASE DOUBLE WOUND POWER TRANSFORMERS 600 VOLT CLASS 3 KVA-1000 KVA	3 KVA THRU 15 KVA — THREE PHASE POWER TRANSFORMERS — 600V CLASS 30 KVA THRU 1125 KVA — THREE PHASE POWER TRANSFORMERS — 600V CLASS 150 KVA THRU 450 KVA — THREE PHASE POWER TRANSFOMERS — 600V CLASS 500 KVA THRU 1000 KVA — THREE PHASE POWER TRANSFORMERS — 600V CLASS
AUTO TRANSFORMERS SINGLE & THREE PHASE 600 VOLT CLASS 3 KVA-1000 KVA	3 KVA THRU 50 KVA — SINGLE PHASE AUTO TRANSFORMERS — 600V CLASS 3 KVA THRU 1000 KVA — THREE PHASE AUTO TRANSFORMERS — 600V CLASS 5 KVA THRU 50 KVA — TESTING THREE PHASE AUTO TRANSFORMERS
SINGLE PHASE DOUBLE WOUND POWER TRANSFORMERS 5000 VOLT CLASS 10 KVA-333 KVA	10 KVA THRU 37.5 KVA — SINGLE PHASE POWER TRANSFORMERS — 5 KV CLASS 50 KVA THRU 150 KVA — SINGLE PHASE POWER TRANSFORMERS — 5 KV CLASS 167 KVA THRU 333 KVA — SINGLE PHASE POWER TRANSFORMERS — 5 KV CLASS
THREE PHASE DOUBLE WOUND POWER TRANSFORMERS 5000 VOLT CLASS 10 KVA-750 KVA	10 KVA THRU 45 KVA — THREE PHASE POWER TRANSFORMERS — 5 KV CLASS 75 KVA THRU 225 KVA — THREE PHASE POWER TRANSFORMERS — 5 KV CLASS 300 KVA THRU 750 KVA — THREE PHASE POWER TRANSFORMERS — 5 KV CLASS

CONTROLLED POWER COMPANY

1955 STEPHENSON HWY., TROY, MI 48083, (313) 528-3700, TWX: 810-232-3401

CALL TOLL FREE
1-800-521-4792

SERIES 500 POWER LINE REGULATOR

GENERAL

The Series 500 Power Line Regulator is a light weight, efficient, distortion free method of regulating line voltage. It utilizes a tapped auto-transformer with either triacs or inverse-parallel silicon controlled rectifiers to automatically change taps and regulate the output voltage. It is an excellent low cost method of correcting for high or low line voltage conditions automatically. An auto-transformer does not isolate the incoming from outgoing lines, and does not eliminate noise or transients.

APPLICATIONS

The Series 500 utilizes an auto-transformer. Hence, it does not isolate the incoming and outgoing lines. This unit should be applied where brownouts or surges are the main power line problem. It does not protect agaist noise, transients, or distortions.

FEATURES AND BENEFITS

Lower Cost: The Series 500 Power Line Regulator is one of the lowest cost methods of regulating line voltage. This is especially true in the larger KVA sizes.

Efficient: Because the Series 500 is an auto-transformer regulator with a limited regulating range, it is one of the most efficient means of regulating line voltage. Efficiency in the order of 98% and higher can be expected.

Fast Response: The Series 500 Line Voltage Regulator will respond to line voltage changes within one cycle of the operating frequency.

Low Distortion: The Series 500 Line Voltage Regulator will add less than 1.0% distortion to the incoming waveform.

Wide Input Frequency Range: The Series 500 operates over a wide input frequency range (+5%, −5%) which enables it to supply constant voltage to the load even with a fluctuating input frequency.

SPECIFICATIONS

Line Voltage Regulation: The output of the Series 500 is held constant ±5% of the nominal with input voltage variation of +10%, −20%. (±3% available)

Input Voltage Range: Input voltage may vary from +10% to −20% from nominal and still maintain regulation specifications.

Efficiency: Efficiency in the order of 98% or better can be expected.

Operating Temperature: The normal operating temperature range is 0°C to 40°C.

Output Distortion: Adds less than 1.0% total harmonic distortion to the input waveform.

Response Time: 1 cycle maximum.

Load Regulation: Less than ±2% from no load to full load.

SINGLE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nominal Input Voltage and Plug Type x	Input Voltage Range	(2) Output Voltage and Receptacle	(2) No. of Standard Outputs	(3) Weight Pounds	(4) Basic Model Number
1000	120V, 5-15P	95-132	120V 5-20R	4	61	5AAX-1K-5
1500	120V, 5-20P	95-132	120V 5-20R	4	66	5AAX-1.5K-5
2000	120V, 5-30P	95-132	120V 5-20R	4	68	5AAX-2K-5
2500	120V, 5-30P	95-132	120V 5-20R	4	70	5AAX-2.5K-5
3000	208 H.W.	166-228	208 H.W.	0	74	5BBX-3K-5
3000	240 H.W.	192-264	240 H.W.	0	74	5CCX-3K-5
5000	208 H.W.	165-228	208 H.W.	0	78	5BBX-5K-5
5000	240 H.W.	192-264	240 H.W.	0	78	5CCX-5K-5
8000	208 H.W.	185-228	208 H.W.	0	165	5BBX-8K-5
8000	240 H.W.	192-264	240 H.W.	0	165	5CCX-8K-5
10,000	208 H.W.	165-228	208 H.W.	0	176	5BBX-10K-5
10,000	240 H.W.	192-264	240 H.W.	0	176	5CCX-10K-5
15,000	208 H.W.	165-228	208 H.W.	0	195	5BBX-15K-5
15,000	240 H.W.	192-264	240 H.W.	0	195	5CCX-15K-5
20,000	208 H.W.	165-228	208 H.W.	0	230	5BBX-20K-5
20,000	240 H.W.	192-264	240 H.W.	0	230	5CCX-20K-5
25,000	208 H.W.	165-228	208 H.W.	0	250	5BBX-25K-5
25,000	240 H.W.	192-264	240 H.W.	0	250	5CCX-25K-5

All transformers above are 60 Hertz and utilize Class H Insulation. 50 Hertz models available on request.

(1) Commercial Enclosures have plugs noted with 8 ft. cord and circuit breaker input. Inputs are hard wired. H.W. denotes hard wiring.

(2) Commercial Enclosures have receptacles noted. When applicable, they are circuit breaker protected. Outputs are hard wired.

(3) Shipping weights are approximate. Actual weights may be higher due to packing and crating.

* Other KVA sizes, input and output voltages are available on request.

- Open type systems are available for OEM utilization.

THREE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nominal Input Voltage	(2) Input Voltage Range	Output Voltage	(3) Weight Pounds	(4) Basic Model + Number
9 KVA	600	480-660	600 Hard Wired	245	8EEX-9K-5
9 KVA	480	384-528	480y/277 Hard Wired	245	8DDX-9K-5
9 KVA	240	192-264	240 Hard Wired	245	8CCX-9K-5
9 KVA	208	166-228	208y/120 Hard Wired	245	8BBX-9K-5
15 KVA	600	480-660	600 Hard Wired	375	8EEX-15K-5
15 KVA	480	384-528	480y/277 Hard Wired	375	8DDX-15K-5
15 KVA	240	192-264	240 Hard Wired	375	8CCX-15K-5
15 KVA	208	166-228	208y/120 Hard Wired	375	8BBX-15K-5
25 KVA	600	480-660	600 Hard Wired	450	8EEX-25K-5
25 KVA	480	384-528	480y/277 Hard Wired	450	8DDX-25K-5
25 KVA	240	192-264	240 Hard Wired	450	8CCX-25K-5
25 KVA	208	166-228	208y/120 Hard Wired	450	8BBX-25K-5
50 KVA	600	480-660	600 Hard Wired	650	8EEX-50K-5
50 KVA	480	384-528	480y/277 Hard Wired	650	8DDX-50K-5
50 KVA	240	192-264	240 Hard Wired	650	8CCX-50K-5
50 KVA	208	166-228	208y/120 Hard Wired	650	8BBX-50K-5
75 KVA	600	480-660	600 Hard Wired	950	8EEX-75K-5
75 KVA	480	384-528	480y/277 Hard Wired	950	8DDX-75K-5
75 KVA	240	192-264	240 Hard Wired	1250	8CCX-75K-5
75 KVA	208	166-228	208y/120 Hard Wired	1250	8BBX-75K-5
112.5 KVA	600	480-660	600 Hard Wired	1450	8EEX-112K-5
112.5 KVA	480	384-528	480y/277 Hard Wired	1450	8DDX-112K-5
112.5 KVA	240	192-264	240 Hard Wired	1450	8CCX-112K-5
112.5 KVA	208	166-228	208y/120 Hard Wired	1450	8BBX-112K-5
150 KVA	600	480-660	600 Hard Wired	1700	8EEX-150K-5
150 KVA	480	384-528	480y/277 Hard Wired	1700	8DDX-150K-5
150 KVA	240	192-264	240 Hard Wired	1700	8CCX-150K-5
150 KVA	208	166-228	208y/120 Hard Wired	1700	8BBX-150K-5

All transformers above are 60 Hertz and utilize Class H Insulation. 50 Hertz models available on request.

(1) All units have a hard wired input. Other voltages available on request.

(2) Commercial Enclosures have receptacles noted. When applicable they are circuit breaker protected. Outputs are hard wired.

(3) Shipping weights are approximate. Actual weights may be higher due to packing and crating.

* Other KVA sizes, input and output voltages are available on request.

- Open type systems are available for OEM utilization.

CONTROLLED POWER COMPANY

1955 STEPHENSON HWY., TROY, MI 48083, (313) 528-3700, TWX: 810-232-3401

CALL TOLL FREE
1-800-521-4792

SERIES 600 MAX-E-ISOLATION TRANSFORMER

CONTROLLED POWER COMPANY
TROY, MICHIGAN

GENERAL

The Series 600 Max-E-Isolation Transformers are used to protect sensitive equipment from power line noise and transients. There are common disturbances on the line caused by lighting, motor starting-stopping, utility network switching, and general electrical noise which will adversely affect sensitive electronic equipment. The Series 600 Max-E-Isolation Transformer utilizes a unique method of shielding which provides low capacitive coupling between input and output circuits. The Series 600 does not have the capability of regulating long duration changes of input voltage.

FEATURES AND BENEFITS

Lowest Cost: The Series 600 Max-E-Isolation Transformer is one of the lowest cost methods of protecting sensitive electronic equipment from line noise and transients.

Efficient: The Series 600 Max-E-Isolation Transformer is a highly efficient means of isolating the line and attenuating noise and transients. Efficiencies of better than 95% can be expected.

Multiple Shielding: A unique method of shielding and isolation of the primary and secondary is responsible for the excellent attenuation of both Common Mode Noise and Transverse Noise.

Common-Mode Noise Attenuation: The Series 600 Max-E-Isolation Transformer has a Common Mode Noise Attenuation of 140 db.

Transverse-Mode Noise Attenuation: 3 db down at 600 Hertz, 40 db per decade to well below 50 db with resistive loads.

SPECIFICATIONS

Line Voltage Regulation: No regulating means incorporated. Output voltage will vary with input voltage.

Load Regulation: ±2% No load to full load.

Efficiency: 95% minimum.

Operating Temperature: 0°C to 40°C.

Distortion: 0.1% total harmonic distortion.

Operating Frequency: 47-53 Hertz for 50 Hertz Models. 57-63 Hertz for 60 Hertz Models.

SINGLE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nominal Input Voltage and Plug Type	(2) Output Voltage and Receptacle	(2) No. of Standard Outputs	(3) Weight Pounds	MODEL NUMBER Basic Model + Number
125	120V, 5-15P	120V 5-20R	2	18	5AAX-125-6
250	120V, 5-15P	120V 5-20R	2	21	5AAX-250-6
500	120V, 5-15P	120V 5-20R	4	26	5AAX-500-6
750	120V, 5-15P	120V 5-20R	4	36	5AAX-750-6
1000	120V, 5-15P	120V 5-20R	4	46	5AAX-1K-6
1500	120V, 5-20P	120V 5-20R	4	68	5AAX-1.5K-6
2000	120V, 5-30P	120V 5-20R	4	72	5AAX-2K-6
2500	120V, 5-30P	120V 5-20R	4	83	5AAX-2.5K-6
3000	208/240 6-30P	120V 5-20R 240V H.W.	4	85	5MGX-3K-6
5000	208/240 6-30P	120V 5-20R 240V H.W.	4	125	5MGX-5K-6
8000	208/240 H.W.	120V 5-20R 240V H.W.	4	160	5MGX-8K-6
10,000	208/240 H.W.	120V 5-20R 240V H.W.	4	200	5MGX-10K-6
15,000	208/240 H.W.	120V 5-20R 240V H.W.	4	275	5MGX-15K-6
20,000	208/240 H.W.	120V 5-20R 240V H.W.	4	340	5MGX-20K-6
25,000	208/240 H.W.	120V 5-20R 240V H.W.	4	450	5MGX-25K-6

THREE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nominal Input Voltage	(2) Output Voltage and Receptacle	No. of Standard Outputs	(3) Weight Pounds	MODEL NUMBER Basic Model + Number	Power Rating V.A.*	(1) Nominal Input Voltage	(2) Output Voltage and Receptacle	No. of Standard Outputs	(3) Weight Pounds	MODEL NUMBER Basic Model + Number
3 KVA	240	208y/120 H.W. +5-20R	4	120	8CLX-3K-6	112 KVA	600	208y/120 H.W. +5-20R	4	1300	8ELX-112K-6
3 KVA	208	208y/120 H.W. +5-20R	4	120	8BLX-3K-6	112 KVA	480	208y/120 H.W. +5-20R	4	1300	8DLX-112K-6
6 KVA	240	208y/120 H.W. +5-20R	4	210	8CLX-6K-6	112 KVA	240	208y/120 H.W. +5-20R	4	1300	8CLX-112K-6
6 KVA	208	208y/120 H.W. +5-20R	4	210	8BLX-6K-6	112 KVA	208	208y/120 H.W. +5-20R	4	1300	8BLX-112K-6
9 KVA	600	208y/120 H.W. +5-20R	4	260	8ELX-9K-6	150 KVA	600	208y/120 H.W. +5-20R	4	1500	8ELX-150K-6
9 KVA	480	208y/120 H.W. +5-20R	4	260	8DLX-9K-6	150 KVA	480	208y/120 H.W. +5-20R	4	1500	8DLX-150K-6
9 KVA	240	208y/120 H.W. +5-20R	4	260	8CLX-9K-6	150 KVA	240	208y/120 H.W. +5-20R	4	1500	8CLX-150K-6
9 KVA	208	208y/120 H.W. +5-20R	4	260	8BLX-9K-6	150 KVA	208	208y/120 H.W. +5-20R	4	1500	8BLX-150K-6
15 KVA	600	208y/120 H.W. +5-20R	4	360	6ELX-15K-6	225 KVA	600	208y/120 H.W.	0	1850	8ELX-225K-6
15 KVA	480	208y/120 H.W. +5-20R	4	360	8DLX-15K-6	225 KVA	480	208y/120 H.W.	0	1850	8DLX-225K-6
15 KVA	240	208y/120 H.W. +5-20R	4	360	8CLX-15K-6	225 KVA	240	208y/120 H.W.	0	1850	8CLX-225K-6
15 KVA	208	208y/120 H.W. +5-20R	4	360	8BLX-15K-6	225 KVA	208	208y/120 H.W.	0	1850	8BLX-225K-6
30 KVA	600	208y/120 H.W. +5-20R	4	540	8ELX-30K-6	300 KVA	600	208y/120 H.W.	0	2500	8ELX-300K-6
30 KVA	480	208y/120 H.W. +5-20R	4	540	8DLX-30K-6	300 KVA	480	208y/120 H.W.	0	2500	8DLX-300K-6
30 KVA	240	208y/120 H.W. +5-20R	4	540	8CLX-30K-6	300 KVA	240	208y/120 H.W.	0	2500	8CLX-300K-6
30 KVA	208	208y/120 H.W. +5-20R	4	540	8BLX-30K-6	300 KVA	208	208y/120 H.W.	0	2500	8BLX-300K-6
45 KVA	600	208y/120 H.W. +5-20R	4	750	8ELX-45K-6	450 KVA	600	208y/120 H.W.	0	3200	8ELX-450K-6
45 KVA	480	208y/120 H.W. +5-20R	4	750	8DLX-45K-6	450 KVA	480	208y/120 H.W.	0	3200	8DLX-450K-6
45 KVA	240	208y/120 H.W. +5-20R	4	750	8CLX-45K-6	450 KVA	240	208y/120 H.W.	0	3200	8CLX-450K-6
45 KVA	208	208y/120 H.W. +5-20R	4	750	8BLX-45K-6	450 KVA	208	208y/120 H.W.	0	3200	8BLX-450K-6
75 KVA	600	208y/120 H.W. +5-20R	4	950	8ELX-75K-6	500 KVA	600	208y/120 H.W.	0	3500	8ELX-500K-6
75 KVA	480	208y/120 H.W. +5-20R	4	950	8DLX-75K-6	500 KVA	480	208y/120 H.W.	0	3500	8DLX-500K-6
75 KVA	240	208y/120 H.W. +5-20R	4	950	8CLX-75K-6	500 KVA	240	208y/120 H.W.	0	3500	8CLX-500K-6
75 KVA	208	208y/120 H.W. +5-20R	4	950	8BLX-75K-6	500 KVA	208	208y/120 H.W.	0	3500	8BLX-500K-6

All transformers above are 60 Hertz and utilize Class H Insulation. 50 Hertz models available on request.

(1) Commercial Enclosures have plugs noted with 8 ft. cord and circuit breaker input. Inputs are hard wired. Other inputs and outputs available on request.

* Other KVA sizes, input and output voltages are available on request.

(2) Commercial Enclosures have receptacles noted. When applicable they are circuit breaker protected. Outputs are hard wired.

(3) Shipping weights are approximate. Actual weights may be higher due to packing and crating.

- Open type systems are available for OEM utilization.

CONTROLLED POWER COMPANY

1955 STEPHENSON HWY., TROY, MI 48083, (313) 528-3700, TWX: 810-232-3401

CALL TOLL FREE
1-800-521-4792

SERIES 700 POWER LINE CONDITIONER

GENERAL

The Series 700 Power Line Regulator and Conditioner combine the characteristics of the Series 500 and Series 600. The Series 700 will regulate the input voltage in the event of line voltage brownouts or surges in addition to having Max-E-Isolation capability to protect the load from line voltage noise and transients. The unit should be applied where line voltage sags, surges, noise or transients are a problem.

APPLICATIONS

The Series 700 Power Line Conditioner should be applied where isolation, regulation, noise and transients are the predominant power line problem. The units does not correct for power line outages or distortion.

FEATURES AND BENEFITS

Wide Input Range: The input voltage range of the Series 700 Power Line Conditioner is +10%, −20%. With input voltage covering this range, the output voltage is held to a very narrow band.
Narrow Output Regulation Band: The output is held to within ±5%. (±3% available)
Multiple Shielding: A unique method of multiple shielding and isolation of the primary and secondary is responsible for the excellent attenuation of both Common-Mode Noise and Transverse-Mode Noise.

Excellent Response Time: The Series 700 Power Line Conditioner has a response time of 1 cycle or less to input voltage change beyond the threshold voltage band.
High Efficiency. Overall efficiency of 95% or better can be expected.
Low Output Impedance: Output impedance ranging from 2% to 5% (depending on size of unit.)
Common-Mode Noise Attenuation: The Series 700 Power Line Conditioner has a Common-Mode Noise Attenuation of 140 db.
Transverse-Mode Noise Attenuation: The Transverse-Mode Noise Attenuation of the Series 700 is 3 db down at 600 Hertz; 40 db down per decade to well below 50 db with resistive load.
Low-Audible Noise Level: All Series 700 Power Line Conditioners are vacuum impregnated with a special epoxy resin to deliver the lowest possible sound level.

SPECIFICATIONS

Input Voltage Range: +10%, −20% of Nominal Input.

Line Voltage Regulation: The output of the Series 700 is held constant ±5% of nominal with input voltage variation of +10%, −20%, (±3% Regulation available)
Load Regulation: Less than ±2% from no load to full load.

Response Time: Typically 1 cycle for 100% correction.

Impedance: 2% to 5% depending on size of unit.

Efficiency: 95% minimum.

Operating Temperature: 0°C to 40°C.

Operating Frequency: 47-53 Hertz (50 Hertz Models). 57-63 Hertz (60 Hertz Models).

Transverse-Mode Noise Attenuation: 3 db down at 600 Hertz: 40 db per decade to well below 50 db with resistive load.

Common-Mode Noise Attenuation: 140 db.

Output Distortion: No spikes; adds less than 1.0% total harmonic distortion.

Audible Noise: 40 db to 50 db depending on size.

Overvoltage Protection: Automatically turns off if output exceeds +10% of nominal. (On units with company provided circuit breaker input and where shut off option is selected).

SINGLE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nominal Input Voltage and Plug Type	Input Voltage Range	(2) Output Voltage and Receptacle	(2) No. of Standard Outputs	(3) Weight Pounds	MODEL NUMBER + Basic Model + Number	Power Rating V.A.*	(1) Nominal Input Voltage and Plug Type	Input Voltage Range	(2) Output Voltage and Receptacle	(2) No. of Standard Outputs	(3) Weight Pounds	MODEL NUMBER + Basic Model + Number
1000	120V, 5-15P	95-132	120V 5-20R	4	54	5AAX-1K-7	8000	240 H.W.	192-264	240/120 H.W.	4	246	5CGX-8K-7
1500	120V, 5-20P	95-132	120V 5-20R	4	92	5AAX-1.5K-7	10,000	208 H.W.	165-228	208 H.W.	0	300	5BBX-10K-7
2000	120V, 5-30P	95-132	120V 5-20R	4	98	5AAX-2K-7	10,000	240 H.W.	192-264	240/120 H.W.	4	300	5CGX-10K-7
2500	120V, 5-50P	95-132	120V 5-20R	4	112	5AAX-2.5K-7	15,000	208 H.W.	165-228	208 H.W.	0	370	5BBX-15K-7
3000	208 H.W.	165-228	208 H.W.	0	115	5BBX-3K-7	15,000	240 H.W.	192-264	240/120 H.W.	4	370	5CGX-15K-7
3000	240 H.W.	192-264	240/120 H.W.	4	115	5CGX-3K-7	20,000	208 H.W.	165-228	208 H.W.	0	450	5BBX-20K-7
5000	208 H.W.	165-228	208 H.W.	0	169	5CCX-5K-7	20,000	240 H.W.	192-264	240/120 H.W.	4	450	5CGX-20K-7
5000	240 H.W.	192-264	240/120 H.W.	4	169	5CGX-5K-7	25,000	208 H.W.	165-228	208 H.W.	0	600	5BBX-25K-7
8000	208 H.W.	165-228	208 H.W.	0	246	5BBK-8K-7	25,000	240 H.W.	192-264	240/120 H.W.	4	600	5CGX-25K-7

THREE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nom. Input Volt.	Input Voltage Range	(2) Output Voltage and Receptacle	(2) No. of Standard Outputs	(3) Wt. Lbs.	MODEL NO. (4) Basic Model + Number	Power Rating V.A.*	(1) Nom. Input Volt.	Input Voltage Range	(2) Output Voltage and Receptacle	(2) No. of Standard Outputs	(3) Wt. Lbs.	MODEL NO. (4) Basic Model + Number
3 KVA	240	192-264	208y/120 H.W. +5-20R	4	220	8CLX-3K-7	45 KVA	600	480-660	208y/120 H.W. +5-20R	4	1180	8ELX-45K-7
3 KVA	208	166-228	208y/120 H.W. +5-20R	4	220	8BLX-3K-7	45 KVA	480	384-528	208y/120 H.W. +5-20R	4	1180	8DLX-45K-7
6 KVA	240	192-264	208y/120 H.W. +5-20R	4	300	8CLX-6K-7	45 KVA	240	192-264	208y/120 H.W. +5-20R	4	1180	8CLX-45K-7
6 KVA	208	166-228	208y/120 H.W. +5-20R	4	300	8BLX-6K-7	45 KVA	208	166-228	208y/120 H.W. +5-20R	4	1180	8BLX-45K-7
9 KVA	600	480-660	208y/120 H.W. +5-20R	4	410	8ELX-9K-7	75 KVA	600	480-660	208y/120 H.W.	0	1720	8ELX-75K-7
9 KVA	480	384-528	208y/120 H.W. +5-20R	4	410	8DLX-9K-7	75 KVA	480	384-528	208y/120 H.W.	0	1720	8DLX-75K-7
9 KVA	240	192-264	208y/120 H.W. +5-20R	4	410	8CLX-9K-7	75 KVA	240	192-264	208y/120 H.W.	0	2020	8CLX-75K-7
9 KVA	208	166-228	208y/120 H.W. +5-20R	4	410	8BLX-9K-7	75 KVA	208	166-228	208y/120 H.W.	0	2020	8BLX-75K-7
15 KVA	600	480-660	208y/120 H.W. +5-20R	4	620	8ELX-15K-7	112.5 KVA	600	480-660	208y/120 H.W.	0	2450	8ELX-112K-7
15 KVA	480	348-528	208y/120 H.W. +5-20R	4	620	8DLX-15K-7	112.5 KVA	480	384-528	208y/120 H.W.	0	2450	8DLX-112K-7
15 KVA	240	192-264	208y/120 H.W. +5-20R	4	620	8CLX-15K-7	112.5 KVA	240	192-264	208y/120 H.W.	0	2450	8CLX-112K-7
15 KVA	208	166-228	208y/120 H.W. +5-20R	4	620	8BLX-15K-7	112.5 KVA	208	166-228	208y/120 H.W.	0	2450	8BLX-112K-7
30 KVA	600	480-660	208y/120 H.W. +5-20R	4	850	8ELX-30K-7	150 KVA	600	480-660	208y/120 H.W.	0	3100	8ELX-150K-7
30 KVA	480	384-528	208y/120 H.W. +5-20R	4	850	8DLX-30K-7	150 KVA	480	384-528	208y/120 H.W.	0	3100	8DLX-150K-7
30 KVA	240	192-264	208y/120 H.W. +5-20R	4	850	8CLX-30K-7	150 KVA	240	192-264	208y/120 H.W.	0	3100	8CLX-150K-7
30 KVA	208	166-228	208y/120 H.W. +5-20R	4	850	8BLX-30K-7	150 KVA	208	166-228	208y/120 H.W.	0	3100	8BLX-150K-7

All transformers above are 60 Hertz and utilize Class H Insulation. 50 Hertz models available on request.

(1) Commercial Enclosures have plugs noted with 8 ft. cord and circuit breaker input. H.W. denotes hard wiring.

* Other KVA sizes, Input and Output voltages are available on request.

(2) Commercial Enclosures have receptacles noted. When applicable, they are circuit breaker protected. Outputs are hard wired.

(3) Shipping weights are approximate. Actual weights may be higher due to packing and crating.

• Open type systems are available for OEM utilization.

CONTROLLED POWER COMPANY

1955 STEPHENSON HWY., TROY, MI 48083, (313) 528-3700, TWX: 810-232-3401

CALL TOLL FREE
1-800-521-4792

SERIES 800 POWER PURIFICATION SYSTEMS

FEATURES AND BENEFITS

Regulation Bandwidth: One of the major benefits of a Power Purification System is its ability to regulate the output voltage to within −3%, +3% with an input variation of −20% to +10% and even wider depending on the load of the system.

Regulation and Isolation: The Power Purification System combines the common mode noise rejection capabilities of a multi-shielded transformer with a voltage regulating capability. In addition to rejecting common mode noise it virtually eliminates transverse noise and distortion coming in on the power line. The unique capability of the Power Purifier to eliminate almost any power malady is what makes it an essential addition to power sensitive electronic equipment.

Unique "Ride Through" Capability: The output of the Power Purifier does not go to zero with the loss of input power for a ¼ cycle (4 msec), a ½ cycle (8 msec) or even for a complete cycle (16.6 msec. — depending on load). The voltage from the Power Purifier is generated essentially by a circuit operating as a powerful oscillator with energy stored in the unit. For this reason, the output is much more immune to the input than other regulating systems.

Voltage Transformation: The Series 800 Power Purification System, in addition to conditioning, regulating, and purifying power, can also be used to step voltage up or down.

Transformation of Square Wave to Sine Wave: The output of the Series 800 Power Purification System is a near perfect sine wave even when the supply voltage is a square wave. A battery supplied power, chopped into a square wave, is converted into an excellent sine wave by the Power Purifier.

Rugged Static Magnetic Circuit: The Power Purifier is a ruggedly constructed static magnetic device which will deliver many years of reliable operation because it is virtually impossible to abuse electrically. It is circuit breaker protected against internal shorts, and cannot be damaged by electrical shorts in the load.

Voltage Recovery: The output voltage returns to 95% of nominal level within 2 cycles and to 100% within 3 cycles when going from no load to full load or visa-versa. Recovery from partial load changes is correct in a shorter period of time.

SPECIFICATIONS

Line Regulation: The output voltage will maintain itself constant to within ±3% with input voltage variations of +10% to −20%.

Load Regulation: The output voltage will maintain itself to within ±0.5% with output loads variations of 0 to 100%.

Frequency Variations: A 1% change in line frequency from the nominal design frequency changes output voltage approximately 1.5% in the same direction as the frequency change.

Efficiency: Full load efficiency is in the order of 90% for standard input and output voltage levels.

Operating Temperature: Power Purifiers are designed to operate within specifications in an ambient temperature range from −20°C to +50°C.

Effect of Load Power Factor: The regulation specifications stated above is for unity power factor. Regulation will improve with a leading power factor and become wide with a lagging power factor.

Distortion: On Harmonically Neutralized Systems harmonic content is 3% or less.

SINGLE PHASE — 60 HERTZ

Power Rating V.A.*	(1) Nominal Input Voltage and Plug Type X	Input Volt. Range	(2) Output Volt. and Receptacle	(2) No. of Stand. Outputs	Input V.A.	Audible Noise Level	(3) Wt. Lbs.	(4)(5) Basic Model + Number
60	120V, 5-15P	95-130	120V 5-20R	2	80	45db	12	5AAX-60-8
120	120V, 5-15P	95-130	120V 5-20R	2	160	45db	18	5AAX-120-8
200	120V, 5-15P	95-130	120V 5-20R	4	265	45db	25	5AAX-200-8
250	120V, 5-15P	95-130	120V 5-20R	4	295	45db	28	5AAX-250-8
500	120V, 5-15P	95-130	120V 5-20R	4	590	45db	58	5AAX-500-8
750	120V, 5-15P	95-130	120V 5-20R	4	880	45db	68	5AAX-750-8
1000	120V, 5-15P	95-130	120V 5-20R	4	1250	45db	83	5AAX-1K-8
1500	120V, 5-20P	95-130	120V 5-20R	4	1760	45db	110	5AAX-1.5K-8
2000	120V, 5-30P	95-130	120V 5-20R	4	2350	45db	125	5AAX-2K-8
2500	120V, 5-30P	95-130	120V 5-20R	4	2770	50db	163	5AAX-2.5K-8
3000	208/240 6-30P	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	3330	50db	180	5MGX-3K-8

Power Rating V.A.*	(1) Nominal Input Voltage and Plug Type X	Input Voltage Range	(2) Output Voltage and Receptacle	(2) No. of Stand. Outputs	Input V.A.	Audible Noise Level	(3) Wt. Lbs.	(4)(5) Basic Model + Number
5000	208/240 6-50P	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	5550	55db	336	5MGX-5K-8
8000	208/240 H.W.	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	8880	55db	460	5MGX-8K-8
10,000	208/240 H.W.	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	11,100	60db	536	5MGX-10K-8
15,000	208/240 H.W.	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	16,600	60db	920	5MGX-15K-8
20,000	208/240 H.W.	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	22,200	60db	1100	5MGX-20K-8
25,000	208/240 H.W.	165-225 (208 tap) 190-260 (240 tap)	120V 5-20R 240V Hard Wire	4	27,700	60db	1425	5MGX-25K-8

(1) Commercial enclosures have plugs noted with 8 ft. cord and circuit breaker or fused input. Industrial and Panel Mount enclosures do not have plug, or circuit breaker or fused input. Inputs are hard wired. Dual input voltages of 240/480 available (input range 190-260 x 380-520). Other Inputs and Outputs available on request.

(2) Commercial enclosures have receptacles noted. When applicable, they are circuit breaker protected. Industrial and Panel Mount enclosures do not have receptacles. Outputs are hard wired.

(3) Panel Mount enclosures up to 3 KVA can be wall mounted.

(4) For Commercial Cabinet model number consult factory.

(5) For Industrial or Panel Mount Cabinet model number consult factory.

+ When ordering specify basic model number plus either the Commercial Cabinet model number or the Industrial Cabinet model number.

* Other KVA sizes, input and output voltages are available on request.

° Open type and uncompensated power purification systems are available for OEM utilization.

THREE PHASE — 60 HERTZ

Power Rating V.A.	(1) Nom. Input Volt.	Input Voltage Range	(2) Output Voltage and Receptacle	No. of Stand. Outputs	Input V.A.	Audible Noise Level	(3) Wt. Lbs.	(4) Basic Model + Number
3 KVA	600	480-660	208/120 Hard Wired	0	3.5 KVA	45db	255	8ELX-3K-8
3 KVA	480	384-528	208y/120 H.W.	0	3.5 KVA	45db	255	8DLX-3K-8
3 KVA	240	192-264	208y/120 H.W.	0	3.5 KVA	45db	255	8CLX-3K-8
3 KVA	208	166-228	208y/120 H.W.	0	3.5 KVA	45db	255	8BLX-3K-8
6 KVA	600	480-660	208/120 Hard Wired	0	7.1 KVA	50db	480	8ELX-6K-8
6 KVA	480	384-528	208y/120 H.W.	0	7.1 KVA	50db	480	8DLX-6K-8
6 KVA	240	192-264	208y/120 H.W.	0	7.1 KVA	50db	480	8CLX-6K-8
6 KVA	208	166-228	208y/120 H.W.	0	7.1 KVA	50db	480	8BLX-6K-8
7.5 KVA	600	480-660	208/120 Hard Wired	0	8.3 KVA	50db	550	8ELX-7.5K-8
7.5 KVA	480	384-528	208y/120 H.W.	0	8.3 KVA	50db	550	8DLX-7.5K-8
7.5 KVA	240	192-264	208y/120 H.W.	0	8.3 KVA	50db	550	8CLX-7.5K-8
7.5 KVA	208	166-228	208y/120 H.W.	0	8.3 KVA	50db	550	8BLX-7.5K-8
9 KVA	600	480-660	208/120 Hard Wired	0	10 KVA	55db	630	8ELX-9K-8
9 KVA	480	348-528	208y/120 H.W.	0	10 KVA	55db	630	8DLX-9K-8

Power Rating V.A.	(1) Nom. Input Volt.	Input Voltage Range	(2) Output Voltage and Receptacle	No. of Stand. Outputs	Input V.A.	Audible Noise Level	(3) Wt. Lbs.	(4) Basic Model + Number
9 KVA	240	192-264	208y/120 H.W.	0	10 KVA	55db	630	8CLX-9K-8
9 KVA	208	166-228	208y/120 H.W.	0	10 KVA	55db	630	8BLX-9K-8
15 KVA	600	480-660	208/120 Hard Wired	0	16.6 KVA	55db	1160	8ELX-15K-8
15 KVA	480	384-528	208y/120 H.W.	0	16.6 KVA	55db	1160	8DLX-15K-8
15 KVA	240	192-264	208y/120 H.W.	0	16.6 KVA	55db	1160	8CLX-15K-8
15 KVA	208	166-228	208y/120 H.W.	0	16.6 KVA	55db	1160	8BLX-15K-8
24 KVA	600	480-660	208/120 Hard Wired	0	26.6 KVA	60db	1860	8ELX-24K-8
24 KVA	480	384-528	208y/120 H.W.	0	26.6 KVA	60db	1860	8DLX-24K-8
24 KVA	240	192-264	208y/120 H.W.	0	26.6 KVA	60db	1860	8CLX-24K-8
24 KVA	208	166-228	208y/120 H.W.	0	26.6 KVA	60db	1860	8BLX-24K-8
30 KVA	600	480-660	208/120 Hard Wired	0	33.3 KVA	65db	2000	8ELX-30K-8
30 KVA	480	384-528	208y/120 H.W.	0	33.3 KVA	65db	2000	8DLX-30K-8
30 KVA	240	192-264	208y/120 H.W.	0	33.3 KVA	65db	2000	8CLX-30K-8
30 KVA	208	166-228	208y/120 H.W.	0	33.3 KVA	65db	2000	8BLX-30K-8

(1) All units have a hard wired input.

(2) Commercial enclosures have no receptacles. Industrial enclosures do not have receptacles. Outputs are hard wired.

(3) Industrial enclosures are not circuit breaker protected.

(4) For Commercial or Industrial Cabinet model number consult factory.

+ When ordering specify basic model number plus either the commercial cabinet model number or the industrial model number.

NOTE: With unbalanced loads, there is a phase shift with a Series 800 Power Purification System that can result in poor voltage regulation. If unbalanced loading is expected, use a Series 700 or Series 900 regulator.

+ Open Type and Uncompensated Type of Power Purification Systems are available for OEM utilization.

CONTROLLED POWER COMPANY
1955 STEPHENSON HWY., TROY, MI 48083, (313) 528-3700, TWX: 810-232-3401

CALL TOLL FREE
1-800-521-4792

SERIES 900 ELECTRONIC LINE VOLTAGE REGULATORS

GENERAL

The Series 900 Electronic Line Voltage Regulator delivers the most accurate regulated line voltage available to industry.

The Series 900 when used with a Series 600 Max-E-Isolation Transformer will allow sensitive electronic equipment to operate with poorly regulated and noisy power lines.

Series 900 Electronic Line Voltage Regulators provide solutions to electrical power — or disturbance problems. They are available in single phase models, 60 Hertz with output power ratings from 25 KVA to 150 KVA. The three phase models are 60 Hertz with output ratings from 1.5 KVA to 500 KVA.

All units are hard wired to terminals at both input and output and all units utilize Class H insulation. Complete specifications are available from the factory. Ask for Bulletin 900-80A.

FEATURES AND BENEFITS

Adjustable Output: The output voltage is adjustable over a range of ±10% from nominal with an internal potentiometer.

Remote Sensing: The voltage to be regulated can be sensed at the load to automatically compensate for line and wire losses to the load.

Excellent Load Regulation: Output voltage is regulated to within ±0.5%.

Wide Input Voltage Range: The output is regulated to within ±1% with input voltage excursion of +10% to −20% from nominal on small sizes and ±10% on larger sizes.

Filtered Output: The output of the Series 900 is filtered to free the waveform of noise and excessive harmonic content.

No Moving Parts: The Series 900 is electronically and magnetically regulated. There are no moving parts and virtually no preventative maintenance required.

Fast Response: Response starts immediately and is complete in 5 cycles (under worst case conditions).

Enclosures: Available in either industrial, commercial (computer type).

Wide Range Of Types Available: The Series 900 Electronic Line Voltage Regulator is available in single phase and three phase configurations and in 50 Hertz or 60 Hertz models. In addition a wide range of KVA sizes are available.

SPECIFICATIONS

Input Voltage: See sizing charts on subsequent pages.

Output Voltage: See sizing charts on subsequent pages.

Regulation: ±1% for any combination of line variation, load variation, thermal drift, and warm-up.

Remote Sensing: Remote sensing available to compensate for series drop to the load.

Frequency Range: 57 to 63 Hertz on 60 Hertz Models. 48 to 52 Hertz on 50 Hertz Models.

Output Voltage Adjustment Range: +10%, −10% Adjustable with internally located potentiometer.

Response Time: Starts immediately and complete within 5 cycles under worst case conditions.

Efficiency: 95% Typical.

Power Factor: Approximately 95% at full load.

Harmonic Content: See sizing chart.

SINGLE PHASE — 60 HERTZ — 25 KVA TO 150 KVA

Output Power Rating V.A.	(1) Nom. Input and Output Volt.	(2) Input Voltage Range	Output Voltage Adjust-ability	Max. Har-monic Content	(3) Wt. Lbs.	MODEL NUMBER (4)(5)(6) Model + Number	Output Power Rating V.A.	(1) Nom. Input and Output Volt.	(2) Input Voltage Range	Output Voltage Adjust-ability	Max. Har-monic Content	(3) Wt. Lbs.	MODEL NUMBER (4)(5)(6) Model + Number
25 KVA	120	+10%, −20%	108-132	5%	830	3AAX-25K-9	75 KVA	120	±10%	108-132	9%	2700	3AAX-75K-9
25 KVA	208	+10%, −20%	187-228	5%	830	3BBX-25K-9	75 KVA	208	±10%	187-228	9%	2700	3BBX-75K-9
25 KVA	240	+10%, −20%	216-264	5%	830	3CCX-25K-9	75 KVA	240	±10%	216-264	9%	2700	3CCX-75K-9
25 KVA	480	+10%, −20%	432-528	5%	830	3DDX-25K-9	75 KVA	480	±10%	432-528	9%	2700	3DDX-75K-9
25 KVA	600	+10%, −20%	540-660	5%	830	3EEX-25K-9	75 KVA	600	±10%	540-660	9%	2700	3EEX-75K-9
37.5 KVA	120	±10%	108-132	8%	940	3AAX-37.5K-9	100 KVA	120	±10%	108-132	9%	3200	3AAX-100K-9
37.5 KVA	208	±10%	187-228	8%	940	3BBX-37.5K-9	100 KVA	208	±10%	187-228	9%	3200	3BBX-100K-9
37.5 KVA	240	±10%	216-264	8%	940	3CCX-37.5K-9	100 KVA	240	±10%	216-264	9%	3200	3CCX-100K-9
37.5 KVA	480	±10%	432-528	8%	940	3DDX-37.5K-9	100 KVA	480	±10%	432-528	9%	3200	3DDX-100K-9
37.5 KVA	600	±10%	540-660	8%	940	3EEX-37.5K-9	100 KVA	600	±10%	540-660	9%	3200	3EEK-100K-9
50 KVA	120	±10%	108-132	9%	1800	3AAX-50K-9	150 KVA	120	±10%	108-132	9%	3700	3AAX-150K-9
50 KVA	208	±10%	187-228	9%	1800	3BBX-50K-9	150 KVA	208	±10%	187-228	9%	3700	3BBX-150K-9
50 KVA	240	±10%	216-264	9%	1800	3CCX-50K-9	150 KVA	240	±10%	216-264	9%	3700	3CCX-150K-9
50 KVA	480	±10%	432-528	9%	1800	3DDX-50K-9	150 KVA	480	±10%	432-528	9%	3700	3DDX-150K-9
50 KVA	600	±10%	540-660	9%	1800	3EEX-50K-9	150 KVA	600	±10%	540-660	9%	3700	3EEX-150K-9

THREE PHASE — 60 HERTZ — 1.5 KVA TO 75 KVA

Output Rating V.A.	(1) Nominal Input and Output Voltage	(2) Input Voltage Range	Output Voltage Adjust-ability (Line-to Neutral)	Maxi-mum Har-monic Content	(3) Wt. Lbs.	MODEL NUMBER Basic Model + Number	Output Rating V.A.	(1) Nominal Input and Output Voltage	(2) Input Voltage Range	Output Voltage Adjust-ability (Line-to Neutral)	Maxi-mum Har-monic Content	(3) Wt. Lbs.	MODEL NUMBER Basic Model + Number
1.5 KVA	208/120Y	−10%, +20%	108-132	5%	180	3LLX-1.5K-9	45 KVA	600/347Y	−10%, +20%	312-381	5%	1700	3EEX-45K-9
3 KVA	208/120Y		108-132	5%	370	3LLX-3K.9	75 KVA	208/120Y		108-132	5%	2200	3LLX-75K-9
6 KVA	208/120Y		108-132	5%	370	3LLX-6K-9	75 KVA	480/277Y		250-304	5%	2200	3NNX-75K-9
6 KVA	480/277Y		250-304	5%	370	3NNX-6K-9	75 KVA	600/347Y		312-381	5%	2200	3EEK-75K-9
6 KVA	600/347Y		312-381	5%	370	3EEX-6K-9	112.5 KVA	208/120Y		108-132	5%	2900	3LLX-112K-9
9 KVA	208/120Y		108-132	5%	430	3LLX-9K-9	112.5 KVA	480/277Y		250-304	9%	2900	3NNX-112K-9
9 KVA	480/277Y		250-304	5%	430	3NNX-9K-9	112.5 KVA	600/347Y		312-381	9%	2900	3EEX-112K-9
9 KVA	600/347Y		312-381	5%	430	3EEX-9K-9	150 KVA	208/120Y		108-132	9%	5000	3LLX-150K-9
15 KVA	208/120Y		108-132	5%	600	3LLX-15K-9	150 KVA	480/277Y		250-304	9%	5000	3NNX-150K-9
15 KVA	480/277Y		250-304	5%	600	3NNX-15K-9	150 KVA	600/347Y		312-381	9%	5000	3EEX-150K-9
15 KVA	600/347Y		312-381	5%	600	3EEX-15K-9	225 KVA	208/120Y		108-132	9%	8000	3LLX-225K-9
22.5 KVA	208/120Y		108-132	5%	750	3LLX-22K-9	225 KVA	480/277Y		250-304	9%	8000	3NNX-225K-9
22.5 KVA	480/277Y		250-304	5%	750	3NNX-22K-9	225 KVA	600/347Y		312-381	9%	9200	3EEX-225K-9
22.5 KVA	600/347Y		312-381	5%	750	3EEK-22K-9	300 KVA	208/120Y		108-132	9%	9200	3LLX-300K-9
30 KVA	208/120Y		108-132	5%	900	3LLX-30K-9	300 KVA	480/277Y	±10%	250-304	9%	9200	3NNX-300K-9
30 KVA	480/277Y		250-304	5%	900	3NNX-30K-9	300 KVA	600/347Y		312-381	9%	9200	3EEX-300K-9
30 KVA	600/347Y		312-381	5%	900	3EEX-30K-9	500 KVA	208/120Y		108-132	9%	Consult Factory	3LLX-500K-9
45 KVA	208/120Y		108-132	5%	1700	3LLX-45K-9	500 KVA	480/277Y		250-304	9%		3NNX-500K-9
45 KVA	480/277Y		250-304	5%	1700	3NNX-45K-9	500 KVA	600/347Y		312-381	9%		3EEX-500K-9

All regulators listed above are 60 Hertz and utilize Class H insulation. 50 Hertz units are available on request.

(1) All units are hard wired to terminals at both the input and output.

(2) The input voltage range is based on the output voltage setting. The output voltage is adjustable ±10% of the rated nominal output by means of an internal potentiometer.

(3) Shipping weights are approximate. Actual weights may be higher due to packing, crating or design.

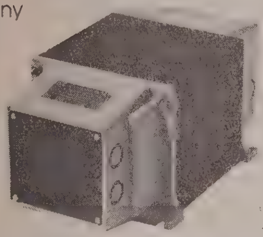
ELGAR

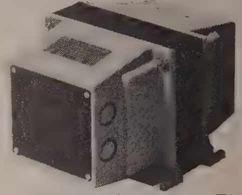
An Onan/McGraw-Edison Company

HIGH ISOLATION TRANSFORMERS

8225 Mercury Court, San Diego, California 92111,
Phone (619) 565-1155, TWX: 910-335-1246 Telex: 6834028

A HIT is a power transformer that provides an extremely low effective interwinding capacitance (0.005 to 0.0005 pF) between primary and secondary windings. It is triple shielded—a barrier or Faraday shield separates the box shielded primary and secondary windings.





A HIT will isolate sensitive equipment from noisy power lines, or it will isolate noise-producing equipment that shares the same power lines. While virtually eliminating common-mode noise problems, the HIT provides excellent attenuation of HF transverse-mode noise. Elgar's transformer operates on either a 50Hz to 60Hz power line at various nominal voltages, and can be used as a step-up or step-down transformer.

GENERAL SPECIFICATIONS

Input/Output Voltages: All HITs (except U.L. Listed and receptacle-type units) feature dual primary and secondary windings and are designed to operate with voltages that vary ±15% of nominal (see tables below for standard voltages).

Operating Frequency: 47 to 63Hz

Regulation: 3% No-load to Full Load Resistive

Dielectric Strength:

1.0 to 7.5KVA Single Phase, 2500VAC;

3.0 to 22.5KVA Three Phase, 2500VAC;

10.0 to 20KVA Single Phase, 4000VAC;

30.0 to 60.0KVA Three Phase, 4000VAC.

Full Rated Operating Temperature Range: 0-55°C designed for Class B (80°C) temperature rise, using a Class H (180°C) "UL Recognized" insulation system.

Overload: 200% of full rated current for 30 minutes.

U.L. Listed Units Available**

Efficiency: Greater than 97% at rated load.

Common Mode Noise Attenuation: .005pF-126dB; .001pF-140dB; .0005pF-146dB

DC Isolation: 10,000 megohms minimum; primary-to-secondary, and either primary or secondary to ground.

Receptacle Type Units, 1KVA & 2.4KVA only ("R" suffix): All are wired for 120VAC single phase service.

STANDARD ELGAR SINGLE PHASE HITs

Model No.	Rating (KVA)	Input Voltage (VAC)	Output Voltage (VAC)	Dimensions (inches/mm) H	W	L	Weight (lbs./kg.)
** HIT-1.0*	1.0	120/240	120/240	6.7/170	8.5/216	10.25/260	36/16.3
HIT-1.0*R	1.0	120	120	6.7/170	8.5/216	10.25/260	37/16.8
HIT-2.4*R	2.4	120	120	6.7/170	8.5/216	12.25/311	59/26.8
** HIT-2.5*	2.5	120/240	120/240	6.7/170	8.5/216	12.25/311	58/26.3
HIT-5.0*	5.0	120/240	120/240	6.7/170	8.5/216	15.0/381	93/42.2
HIT-7.5*	7.5	120/240	120/240	6.7/170	8.5/216	20.0/508	146/66.2
HIT-10.0*	10.0	240/480	120/240	14.75/375	12.34/313	26.25/667	238/108
HIT-15.0*	15.0	240/480	120/240	14.75/375	12.34/313	28.25/718	300/136
HIT-20.0*	20.0	240/480	120/240	14.75/375	12.34/313	30.75/781	369/167

*The complete model number includes the effective interwinding capacitance. Thus, for a 1KVA with 140dB (.001pF) common mode noise attenuation, specify a Model HIT-1.0-.001.

THREE PHASE SYSTEMS

The user has the choice of ordering three each of the standard single-phase HITs and connecting them in the desired three-phase configuration, or ordering an Elgar three-phase system which also utilizes three single-phase HITs. In the latter case, the user only concerns himself with input/output wiring. To attain maximum noise immunity in a three-phase system, it is desirable to operate from a DELTA source and have a WYE connected secondary with balanced loads on each phase. This minimizes current flow in the neutral line. As with the single-phase units, the effective interwinding capacitance becomes part of the model number; thus a HIT-45.0-.001T is a three-phase unit providing 140dB of common-mode noise attenuation.

STANDARD ELGAR THREE PHASE HITs

Model No.	Rating (KVA)	Input Voltage (specify WYE or DELTA when ordering)		Output Voltage (VAC)	Dimensions (inches/mm)			Weight (lbs./kg.)
		WYE	DELTA		H	W	L	
HIT-3.0*T	3.0	208Y/120	240	208Y/120	7.7/196	38.5/978	10.25/260	135/61.2
HIT-7.5*T	7.5	208Y/120	240	208Y/120	7.7/196	38.5/978	12.25/311	200/90.7
HIT-15.0*T	15.0	208Y/120	240	208Y/120	7.7/196	38.5/978	15.0/381	305/139
HIT-22.5*T	22.5	208Y/120	240	208Y/120	7.7/196	38.5/978	20.0/508	465/211
HIT-30.0*T	30.0	N/A	240 or 480	208Y/120	16.5/419	53.0/1346	26.25/667	715/325
HIT-45.0*T	45.0	N/A	240 or 480	208Y/120	16.5/419	53.0/1346	28.25/718	1000/454
HIT-60.0*T	60.0	N/A	240 or 480	208Y/120	16.5/419	53.0/1346	30.75/781	1220/554

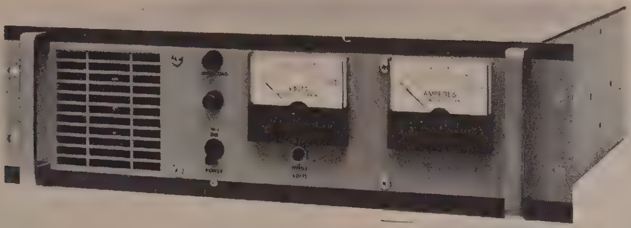
*Add desired effective interwinding capacitance.

ELGAR

An Onan/McGraw-Edison Company

ULTRA PRECISION AC LINE CONDITIONERS

8225 Mercury Court, San Diego, California 92111,
Phone (619) 565-1155, TWX: 910-335-1246 Telex: 6834028



Elgar's Ultra Precision AC Line Conditioners provide precise, clean AC power to critical loads by eliminating high-speed AC line and load transients and distortion as well as providing precise regulation. These versatile instruments have response times 5,000 times faster than the fastest conventional AC line regulators and line isolation of 70 to 100 dB, far superior to mere isolation transformers. All Elgar AC line conditioners are designed for continuous operation and are contained in rack-mount enclosures. Front panel controls include meters to monitor input and output voltages and output load current, an overload indicator and an input circuit breaker.

Users of voltage-sensitive equipment need isolation from high-speed AC line transients. These transients can cause erratic operation, component failures, and a reduction in equipment life. In sensitive instrumentation and data processing equipment, high-speed line transients often are the cause of erroneous information.

Elgar AC Line Conditioners are the best, most reliable solution to these problems.

GENERAL SPECIFICATIONS

INPUT / OUTPUT ISOLATION: 100 dB (60 Hz)

OUTPUT DISTORTION: 0.2% max for up to 10% input harmonic distortion

LINE REGULATION: ±0.025% for ±10% input AC line variation

LOAD REGULATION: ±0.025% for no load/full load full current into unity to zero lagging or leading load.

REDUCES 500V 10μ SEC TRANSIENTS BY 1000:1

SUPPLIES PEAK CURRENTS 3.5 TIMES RMS RATING

TEMPERATURE COEFFICIENT: 0.005% per °C

PEAK AMPLITUDE STABILITY: ±0.01% (cycle to cycle)

AMPLITUDE DRIFT: ±0.05% 24 hrs constant line, load and temperature

IMPULSE SETTLING TIME: less than 20μsec

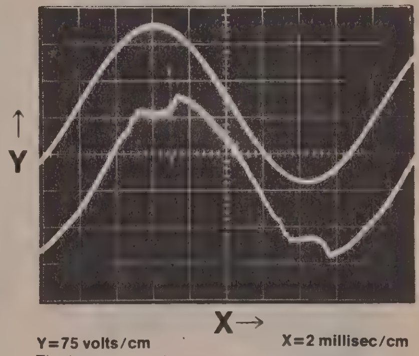
AMBIENT TEMPERATURE: 0 to +55°C operating, −20 to +85°C storage

OVERLOAD INDICATION: Front panel lamp lights when rated output current is exceeded

OVERLOAD PROTECTION: Continuous overload actuates front panel circuit breaker

METERING: Reads: input voltage, output voltage, & output current

COOLING: Forced Air



The lower trace shows a very distorted input AC line waveform with a 75 volt peak spike riding on it. The upper trace shows the output of the Elgar AC Line Conditioner which is perfectly clean and shows no trace of the AC input anomalies.

STANDARD MODELS

MODEL	OUTPUT POWER, VA Cont.	OUTPUT POWER, VA Peak	OUTPUT Voltage VRMS	FREQ HZ	INPUT Voltage Range[1]
6006B	1000	5000	115	57-63	94-138
6226B	1000	5000	220	57-63	180-260
6246B	1000	5000	240	57-63	200-280
6005B	1000	5000	115	47-53	95-135
6225B	1000	5000	220	47-53	180-260
6245B	1000	5000	240	47-53	200-280
3006B	3000	15000	115	57-63	95-135[2]
3226B	3000	15000	220	57-63	180-260
3246B	3000	15000	240	57-63	200-280

MODEL	OUTPUT POWER, VA Cont.	OUTPUT POWER, VA Peak	OUTPUT Voltage VRMS	FREQ HZ	INPUT Voltage Range[1]
3005B	3000	15000	115	47-53	95-135[2]
3225B	3000	15000	220	47-53	180-260
3245B	3000	15000	240	47-53	200-280
5006B	5000	25000	115	57-63	95-135[2]
5226B	5000	25000	220	57-63	180-260
5246B	5000	25000	240	57-63	200-280
5005B	5000	25000	115	47-53	95-135[2]
5225B	5000	25000	220	47-53	180-260
5245B	5000	25000	240	47-53	200-280

MODEL	SIZE—Inches/mm Height	SIZE—Inches/mm Width	SIZE—Inches/mm Depth	WEIGHT Lbs./Kg.
SERIES 6000B	5.25/133	19/483	16/406	65/30
SERIES 3000B	12.25/311	19/483	20/508	175/80
SERIES 5000B	24.5/622	19/483	20.2/513	375/170

NOTES:

1. Input voltage ranges selected by 3 position tap switch
   94-116, 103-127, 112-138V for 94-138V range
   80-100, 90-110, 100-120V for 80-120V range
   180-220, 198-212, 216-268V for 180-260V range
   198-242, 216-264, 234-286V for 200-280V range
2. 115V output with 230V input available. Add −230 to model number, e.g., 3006B-230

ELGAR
An Onan/McGraw-Edison Company

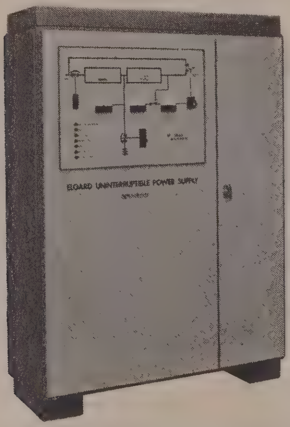
REGULATING LINE CONDITIONER (RLC)

8225 Mercury Court, San Diego, California 92111,
Phone (619) 565-1155, TWX: 910-335-1246 Telex: 6834028

Elgar's new RLC provides a low cost alternative for furnishing critical loads with clean regulated power. For input voltage variations of +12.5%/−20.8%, the output voltage is 120VAC ±5%. The unit can be connected to a 120V, 208V or 240V, 2-wire single phase source and provide the specified 120V output.

The unit provides a minimum of 140dB of common mode noise attenuation, up to 55dB normal mode noise attenuation, less than one cycle response time, and isolation as well as voltage regulation for critical loads. Available in 1.0, 1.5, and 3.0 KVA models.

UPS / INVERTERS

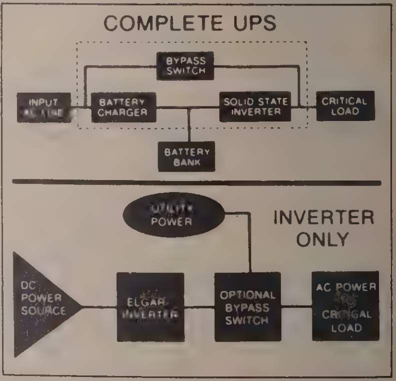


Elgar's, all solid-state Uninterruptible Power Systems (UPS), combine a battery charger, battery bank, solid-state inverter and bypass switch to provide clean, continuous power to critical loads. The battery charger converts AC line power to DC. Normally, this DC power simultaneously float-charges the battery bank and powers the inverter. Upon loss of input AC, the inverter continues to furnish the critical load with uninterruptible AC power by drawing its energy from the battery bank. Since the battery bank is always connected to the inverter as well as to the battery charger, there is no switchover time. AC output frequency from the Uninterruptible Power Source is phase-locked to the input AC or bypass input AC, under normal conditions. When there is no input AC or bypass input AC, the output frequency is automatically determined by the stable internal oscillator.

In the unlikely event of a component failure within the Uninterruptible Power Source, the bypass switch will be activated and the critical load will automatically transfer to the input AC line or bypass input AC. Elgar single-phase UPS rated 5.0, 6.5 and 10.0KVA come equipped with an electromechanical contactor which performs the reverse transfer with a 50- to 150-millisecond interruption. An optional solid-state bypass switch (SBS) that can make the transfer with less than 1ms interruption is available for all single-phase UPS and Inverter models, and is standard in all Elgar UPS rated 15KVA and above.

Elgar Inverters are designed to accept DC input power (derived from a nominally 125 or 130VDC rectifier system or from a battery bank with a final discharge voltage of 105VDC) and convert it to tightly regulated, single-phase AC power.

Elgar UPS are designed for a useful life of 15 to 20 years. Mathematical analysis and operating history indicate the anticipated mean-time between failures (MTBF) will be about 20,000 hours, depending upon the model and features selected. With appropriate interface of the bypass switch (electromechanical or static) with the load, so that bypass action does not cause a transient greater than the load can tolerate, an MTBF in excess of 100,000 hours for the output load bus can be demonstrated.

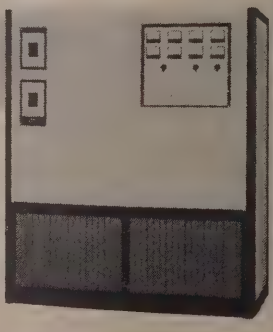


NEW "B" SERIES UPS

Elgar's new "B" series of UPS now provides lighter weight, reduced size, higher efficiency and better dynamic characteristics at a lower price. The improved performance characteristics of the "B" series units stems from a change in UPS inverter technology. Elgar's proven quasi type inverter designs have been replaced in the "B" series units with pulse width modulation (PWM) inverter technology. The technology was gained through Elgar's experience in providing (PWM) inverters and UPS to the nuclear power generation industry.

The "B" series units now incorporate standard operational and alarm features which were formerly offered only as options. The automatic forward transfer of static switches feature is a standard on all units thereby allowing the UPS to start loads that demand abnormally high in-rush currents.

Available in sizes from 1KVA single phase to 50KVA three phase.



ELGAR
An Onan/McGraw-Edison Company

STANDARD UPS MODELS

8225 Mercury Court, San Diego, California 92111,
Phone (619) 565-1155, TWX: 910-335-1246 Telex: 6834028

UPS GENERAL SPECIFICATIONS

Voltage Regulation: ±2%
Instantaneous Transient (30% load change):
- Single phase models: ±10%
- Three phase models: ±6%

Frequency Stability: ±0.25%
Continuous Power: Rated KVA at 0.8 to 1.0 P.F.
Load Power Factor: 0.7 lag to unity
Harmonic Distortion: 5% THD maximum
Overload Rating:
- 0.5 to 2.5KVA:
  - 110% for 15 minutes
  - 150% for 5 cycles
- 5KVA and above:
  - 125% for 20 minutes
  - 150% for 10 seconds

Inverter Efficiency at Full Load:
- 0.5 to 2.5KVA: 75% minimum
- 5KVA to 15KVA: 80% minimum
- 20KVA and above: 82% minimum

STANDARD INSTRUMENTS:
- DC Voltmeter, AC Voltmeter, Output AC Ammeter—5KVA & above

STANDARD INDICATORS:
- Input Power On
- Low DC
- Bypass Switch Position
- Fuse(s) Open—5KVA & above
- Battery Operation
- Overtemperature—5KVA & above
- Overload

CONSTRUCTION:
- In accordance with applicable NEMA standards and the National Electric Code (NEC).

ENVIRONMENT:
- Operating Temperature: 0 to 50°C
- Humidity: to 95%

MINI-UPS, 0.5 TO 3.0 KVA, RACK MOUNTABLE

Model	Output Rating	Inverter Input Current at Cut Off End Point of Discharge Voltage (1)	Dimensions in./mm — HxWxD	Weight lbs./kg.
60Hz, 115VAC INPUT & OUTPUT MODELS				
UPS-501-1*	500VA	7.2A @ 73.5V	7/178x19/483x19/483	128/58.2
UPS-501-1-113	500VA	7.2A @ 73.5V	7/178x19/483x19/483	93/42.3
UPS-102-1*	1000VA	14.1A @ 73.5V	12.25/311x19/483x19/483	186/84.6
UPS-102-1-132	1000VA	14.1A @ 73.5V	12.25/311x19/483x19/483	133/60.5
UPS-102-1B	1000VA	16.5A @ 63.0V	8.75/222x19/483x20/508	100/45.5
UPS-172-1	1750VA	24.4A @ 73.5V	12.25/311x19/483x19/483	182/82.8
UPS-252-1	2500VA	34.9A @ 73.5V	14/356x19/483x19/483	213/96.9
UPS-302-1B	3000VA	47.7A @ 63.0V	14/356x19/483x19/483	225/102
50Hz, 230VAC INPUT & OUTPUT MODELS				
UPS-1025-1*	1000VA	14.2A @ 73.5V	12.25/311x19/483x19/483	218/99.1
UPS-1025-1-102	1000VA	14.2A @ 73.5V	12.25/311x19/483x19/483	165/75.0
UPS-1025-1B	1000VA	18.4A @ 63.0V	8.75/222x19/483x20/508	125/56.7
UPS-2525-1	2500VA	34.9A @ 73.5V	19.25/489x19/483x19/483	318/144.6
UPS-3025-1B	3000VA	47.7A @ 63.0V	24.5/622x19/483x20/508	330/149.7
50Hz, 115VAC INPUT & OUTPUT MODELS				
UPS-4015-1*	400VA	5.8A @ 73.5V	7/178x19/483x19/483	132/60
UPS-4015-1-113	400VA	5.8A @ 73.5V	7/178x19/483x19/483	109/49.6

* 10 minute internal battery included in these models only.

SINGLE PHASE UPS, 5-25 KVA

Model	Input/Output Frequency, Hz	Output Rating	Standard Input Voltage/Config. (2) (4)	Standard Output Voltage (4)	Nominal Battery Bus VDC	Inverter Input Range VDC	Inverter Input Current	Dimensions In./mm — HxWxD	Weight lbs./kg.
UPS-502-1A	60	5KVA	115/230, split ϕ	115/230, split ϕ	120	105-145	48A	60.5/1537x43/1092x17.5/445	1240/564
UPS-652-1A	60	6.5KVA	115/230, split ϕ	115/230, split ϕ	120	105-145	62A	64.5/1639x43/1092x17.5/445	1280/582
UPS-103-1A	60	10KVA	115/230, split ϕ	115/230, split ϕ	120	105-145	94A	72.5/1842x55/1397x19/483	1800/818
UPS-153-1*	60	15KVA	120/208, 3ϕ	115/230, split ϕ	120	105-145	143A	72.5/1842x55/1397x19/483	2300/1045
UPS-203-1A	60	20KVA	120/208, 3ϕ	115/230, split ϕ	120	105-145	188A	80/2032x60/1524x24/610	2600/1182
UPS-253-1B	60	25KVA	120/208	120	240	210	107A	78/1981x66/1676x307/780	2800/1270
UPS-5025-1A	50	5KVA	230, 2 wire	230, 2 wire	120	105-145	48A	60.5/1537x43/1092x17.5/445	1280/582
UPS-6525-1A	50	6.5KVA	230, 2 wire	230, 2 wire	120	105-145	62A	64.5/1639x43/1092x17.5/445	1330/605
UPS-1035-1A	50	10KVA	230, 2 wire	230, 2 wire	120	105-145	94A	72.5/1842x55/1397x19/483	2000/909
UPS-1535-1*	50	15KVA	230/400, 3ϕ	230, 2 wire	120	105-145	143A	72.5/1842x55/1397x19/483	2500/1136
UPS-2535-1B	50	25KVA	240/415, 3ϕ	240, 2 wire	240	210-285	107A	78/1981x66/1676x30.7/780	3700/1680

* Includes SBS (Static Bypass Switch) as standard feature.

THREE PHASE UPS WITH BUILT-IN STATIC BYPASS SWITCHES

Model	Input/Output Frequency, Hz	Output Rating	Standard Input/Output Voltage (4)	Nominal Battery Bus VDC	Inverter Input Range VDC	Inverter Input Current at Cut Off	Dimensions in./mm — HxWxD	Weight lbs./kg
UPS-103-3A	60	10KVA	120/208	120	105-145	96A	72.5/1842x55/1397x19/483	2000/909
UPS-153-3C	60	15KVA	120/208	120	105-145	143A	76.5/1943x55/1397x26/660	2250/1023
UPS-183-3	60	17.5KVA	120/208	120	105-145	164A	76.5/1943x55/1397x26/660	2550/1159
UPS-253-3B	60	25KVA	120/208	240	210-285	110A	78/1981x66/1676x30.7/780	2800/1270
UPS-373-3B	60	37.5KVA	120/208	240	210-285	163A	78/1981x66/1676x30.7/780	3700/1680
UPS-503-3B	60	50KVA	120/208	240	210-285	217A	78/1981x66/1676x30.7/780	4300/1950
UPS-1035-3A	50	10KVA	230/400	120	105-145	96A	72.5/1842x55/1397x19/483	2240/1018
UPS-1535-3A	50	15KVA	230/400	120	105-145	143A	76.5/1943x55/1397x26/660	2500/1136
UPS-2535-3B	50	25KVA	240/415	240	210-285	110A	78/1981x66/1676x30.7/780	3700/1680
UPS-3735-3B	50	37.5KVA	240/415	240	210-285	163A	78/1981x66/1676x30.7/780	4300/1950

(1) Based upon full inverter output load at 0.8 p.f.
(2) Input taps provided on 50Hz units for nominally 220 or 240.
(3) Breaks into two sections (Charger & Inverter) for shipment.
(4) Many optional input and output voltages are available at additional cost.

OPTIONAL FEATURES INCLUDE:

Additional Annunciation, Float Equalize Switch and/or Timer, Maintenance Bypass Switch, Narrow Frequency Sync Window, Slow Slew Circuit, and Remote Status Panels. Consult factory for details.

FREQUENCY CONVERSION WITH AN ELGAR UPS

An Elgar AC Power Source is suitable for more frequency conversion requirements. For 10KVA and above (where neither variable frequency nor voltage is required), a UPS may be ordered for 60Hz input to 50Hz output or vice versa.

ELGAR

An Onan/McGraw-Edison Company

AC POWER SOURCES

8225 Mercury Court, San Diego, California 92111,
Phone (619) 565-1155, TWX: 910-335-1246 Telex: 6834028

AC POWER SOURCE
MODEL 121
ELGAR
FREQ MULTIPLIER
SERIES 400V

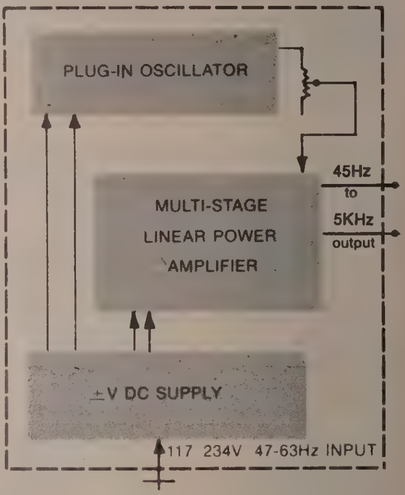
Elgar has long been the industry leader in producing solid-state Frequency Converters (AC Power Sources) for a variety of applications. These include laboratories, receiving inspection, production testing, computer-controlled automatic test systems, and facilities which require variable voltage, fixed or variable frequencies independent of power line and load variations.

Think of an Elgar AC power source as a high-power linear amplifier driven by a precision oscillator. Actually, the basic power amplifier consists of a ±DC supply and a multi-stage amplifier with a multiple-tap power output transformer. Output frequency is established by a plug-in oscillator.

Although frequently classed as instruments, Elgar power sources are actually power systems. They can deliver a variety of voltages and frequencies at the output, and the phase angles of the oscillators can be controlled, enabling the user to interconnect the output of two or more power sources into 2-phase and either Delta or Wye, 3-phase configurations.

Because of the relative ease of control of the output frequency, amplitude and phase angle, Elgar power sources can be externally programmed by a computer or other digital commands via an Elgar Digital/Analog Programmer Oscillator. This enables avionics and other system designers to automatically "exercise" their end products under simulated power conditions.

Since the many possible output variations are achieved either by a plug-in device or by external interconnection, Elgar power sources can serve many needs without fear of obsolescence.



GENERAL SPECIFICATIONS

Input: 115 or 230VAC, 47-63Hz single-phase, standard for all models through 1500VA; 230/400V or 120/208V 3-phase for 1751B, 3001, 1753B.
Output Voltage Ranges: 0-32, 0-130, 0-260
Output Frequency Range: 45-5,000 Hz
Load Power Factor: ±0.7 at full VA
Output Harmonic Distortion: 0.6% THD worst case
Line Regulation:
±0.25% at full load vs. ±10% change of input line voltage.
Load Regulation:
±1% from no load to full load over full frequency range and ±10% input range. Adjustable to better than 0.1% for specific load conditions. Fixed frequency systems always less than ±0.25%.
Response Time: Less than 50 μsec.

STANDARD MODELS

SINGLE PHASE		TWO PHASE		THREE PHASE			
MODEL	RATING VA	MODEL	RATING VA	MODEL	RATING VA	MODEL	RATING VA
121B	120	240-2	240	153B	150	2000-3D	2000
251B	250	500-2	500	240-3D	240	2250-3	2250
501B	500	1000-2	1000	360-3	360	3000-3	3000
751B	750	1500-2	1500	503A	500	3500-3D	3500
1001B	1000	2000-2	2000	500-3D	500	5250-3	5250
1751B	1750	3500-2	3500	750-3	750	9000-3	9000
2000-1	2000	6000-2	6000	1000-3D	1000	10500-3	10500
3001	3000			1500-3	1500	18000-3	18000
3500-1	3500			1753B	1750	27000-3	27000
6000-1	6000					36000-3	36000

Note: D is an open delta configuration.

Noise Level: 70db below full output. Includes plug-in oscillator.
Gain Stability:
±0.25% for 24 hours at constant line, load and temperature.

Temperature Range:
Operating, −20° to +50°C;
Storage, −40° to +80°C.

STANDARD AMPLIFIER MAIN FRAME DATA

MODEL	OUTPUT POWER VA	Height In./mm.	Width In./mm.	Depth In./mm.	Weight Lbs./kg.
121B	120	3.5/89	19/482	15/381	45/20
251B	250	5.25/133	19/482	16/406	70/32
501B	500	7/178	19/482	17/432	100/46
751B	750	7/178	19/482	19/482	115/52
1001B	1000	12.25/311	19/482	19/482	210/96
1751B	1750	14/356	19/482	19/482	230/105
3001	3000	17.5/445	19/482	22/560	310/141
153B	150	5.25/133	19/482	16.5/419	70/32
503A	500	8.75/220	19/482	19/482	115/52
1753B	1750	14/256	19/482	19/482	230/105

COMPACT "C" SERIES MODELS

Elgar's "C" series provides lighter weight, reduced size and higher efficiency than the standard line. While available only with a single range output (0-125V) due to the transformerless approach employed, an optional auto-transformer is available to provide 250V output ranges. Frequency range 15Hz to 10KHz without auto-transformer.

MODEL	OUTPUT POWER VA	Height In./mm.	Width In./mm.	Depth In./mm.	Weight Lbs./kg.
501C	500	5.25/133	19/482	16/406	46/21
1001C	1000	8.75/222	19/482	20/508	76/35
1503C	1500	8.75/222	19/482	20/508	110/45

ELGAR

An Onan/McGraw-Edison Company

OSCILLATORS FOR AC POWER SOURCES

8225 Mercury Court, San Diego, California 92111,
Phone (619) 565-1155, TWX: 910-335-1246 Telex: 6834028

FREQ MULTIPLIER
ELGAR
VERNIER
OSCILLATOR MODEL 403-V

VARIABLE FREQUENCY OSCILLATOR

FREQUENCY GENERATION TECHNIQUES

The output frequency of the power source is determined by the plug-in oscillator which develops the low distortion sine wave to the power amplifier. A variety of interchangeable versions are available, including 45Hz to 10KHz, narrow range variable or fixed frequencies with accuracies to 0.0001%.

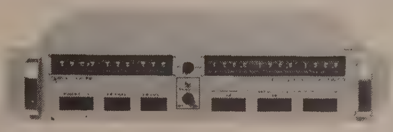
Depending on the accuracy of frequency control desired, either of two methods of frequency generation is utilized. One method employs a modified phase shift oscillator.

This technique is used in both the variable and fixed frequency plug-ins since it requires only a change of resistance to produce a change in frequency. External sync capability is a standard option to this group of oscillators and the external sync signal can be sine or square wave, fundamental or odd order harmonics. The other method uses a crystal for precision fixed frequency. By utilizing these two methods of frequency generation, Elgar offers over 50 standard plug-in oscillators and programmable oscillators as well.

PLUG-IN OSCILLATOR MODULES AVAILABLE FOR USE WITH ALL ELGAR AC POWER SOURCES

Type	Model	Frequency Range (Hz)	Phase	Calibration Accuracy	Phase Angle	Frequency Temp. Coeff.
VARIABLE FREQUENCY						
Synthesized Decade Dial	400SD-1	15-9999*	1	±0.001%	----	3PPM/0°
	400SD-2	15-9999*	2	±0.001%	90° ± 1°	3PPM/0°
	400SD-3	15-9999*	3	±0.001%	120° ± 1°	3PPM/0°
Continuous Dial	431-V	300-500	1	± 0.25%	----	± 0.02%/°C
	432-V	300-500	2	"	90 ± 1°	"
	433-V	300-500	3	"	120 ± 1°	"
	461-V	45-70	1	"	----	"
	462-V	45-70	2	"	90 ± 1°	"
	463-V	45-70	3	"	120 ± 1°	"
	4641-V	45-70 & 350-450	1	"	----	"
	4642-V	45-70 & 350-450	2	"	90 ± 1°	"
	4643-V	45-70 & 350-450	3	"	120 ± 1°	"
				*Normally restricted to 45-5000 Hz		
FIXED FREQUENCY						
R-C Phase Shift	451-.1	50	1	± 0.1%	----	± 0.015%/°C
	452-.1	50	2	"	90 ± 1°	"
	453-.1	50	3	"	120 ± 1°	"
	461-.1	60	1	"	----	"
	462-.1	60	2	"	90 ± 1°	"
	463-.1	60	3	"	120 ± 1°	"
	441-.1	400	1	"	----	"
	442-.1	400	2	"	90 ± 1°	"
	443-.1	400	3	"	120 ± 1°	"
Crystal Control	Any fixed frequency available in the range of 15Hz to 9999Hz; from 15.00Hz to 99.99Hz in 0.01Hz increments; 100.0Hz to 999.9Hz increments; 1000Hz to 9999Hz in 1Hz increments. Examples:					
	400SPI-50	50Hz	1	±0.001%	----	3PPM/0°
	400SP2-60	60Hz	2	±0.001%	90° ± 1°	3PPM/0°
	400SP3-400	400Hz	3	±0.001%	120° ± 1°	3PPM/0°

DIGITAL/ANALOG PROGRAMMERS



DAP SERIES

PIP SERIES

PROGRAMMABLE OSCILLATORS

Digital/Analog Programmers (DAPs) and Plug-In-Programmable oscillators (PIPs) which provide the interface between a computer and any Elgar AC Power Source System are available to enable programming of every function controllable in an AC Source including frequency, voltage amplitude, and phase angle in multi-phase systems. Special purpose programmable oscillators such as Elgar's TG-704A are also available to simulate transients and line distortion as well.

Available with BCD inputs or per the IEEE standard interface bus, Elgar's DAPs enable the use of Elgar AC Power Sources with the most advanced Automatic Test Equipment.

DISPLEX LC Line Conditioners

OUTPUT VOLTAGE
POWER
OUTPUT CURRENT
120V. OUT
LINE CONDITIONER MODEL
DISPLEX, INC.

Voltage Regulation

Unit maintains an output voltage of 105-125 volts for an input voltage range of 88 to 130 volts ac. For input voltages above and below the specified ranges, the output voltage will rise above 125 Vac or fall below 105 Vac in proportion to the input changes. The output wave shape will not distort until the input voltages falls below 65 Vac (78 Vac output voltage). Optional adjustable under/overvoltage trip circuit will shut off unit at preset output voltage between 78 and 105 Vac and 125 and 135 Vac.

Power Output:	1 kVA, 2 kVA and 3 kVA models.
Regulation Response Time:	Typically less than 1 cycle for 100% correction.
Efficiency:	Better than 96% at full load and half load.
Load Power Factor:	Unit operates over any power factor.
Overload Rating: (Circuit Breaker Curve)	10x Rated Current ≅ 10 ms 3x Rated Current ≅ 1 sec. 1.5x Rated Current 10 sec. Other overload profiles available.
Output Distortion:	No spikes. Adds no harmonic distortion to sine wave over input range 65-130 Vac.
Operating Temperature:	0° to 50°C
Output Impedance:	2% of rated load impedance at 50 or 60 Hz.
Operating Frequency:	47-53 Hz (50 Hz models), 57-63 Hz (60 Hz models).
Under & Overvoltage Trip (Optional):	Power is shut off when output voltage drops below pre-set level in the 78-105 Vac range or above 125-135 Vac range.
Overload & Short Circuit Protection:	Magnetic circuit breaker trips when output current exceeds safe limits for the line conditioner. Unit can safely operate into a short circuit.
Filter Response:	RFI noise between frequencies of 150 to 2500 kHz is attenuated between 30 and 50 dB. **Note: For optimum noise immunity, load must have a solid ground connection.**
Surge Arrestor (Optional):	A disposable transient voltage suppression network absorbs up to 70 joules of surge energy keeping voltages between high and ground and neutral to ground within safe limits. An indicator will signal when surge arrester requires replacement due to surge fatigue.

The Displex series of LC Line Conditioners supply clean regulated power to computers and other digital control and data processing equipment by conditioning power in three critical ways.

REGULATES VOLTAGE

The LC unit maintains rated output voltage level even during periods of BROWN-OUTS and other low voltage conditions. Furnishes 105-125 Vac clean output for an input range of 88 to 130 Vac.

FILTERS POWER LINE

The LC unit provides clean power to the computer by filtering RFI (Radio Frequency Interference) on the power line.

SURGE ARRESTING

The LC unit levels voltage spikes on the power line caused by lightning and/or heavy equipment operating on the same power line.

LC FEATURES

- Replaces a dedicated line. Combination regulator, filter, surge arrestor and power distribution center.
- Silent operation. Rugged, light weight.
- Short-circuit proof.
- Provides up to 10 times rated current for starting surges.
- Maintains clean sine wave output even under severe brown-out conditions.
- Handles loads of wide power factor.

UNIT SPECIFICATIONS

Nominal Output Power	1 kVA	2 kVA	3 kVA
Size: Height	5″	5″	5½″
Width	10″	10″	11½″
Depth	13¾″	13¾″	15⅞″
Weight:	23 lbs.	25 lbs.	33 lbs.
60 Hz Models	LC108	LC116	LC124
Output Voltage Range	105-125 Vac		
Input Voltage Range	88-130 Vac		
Output Current	8A	16A	24A
50 Hz Models	LC204	LC208	LC212
Output Voltage Range	200-240 Vac		
Input Voltage Range	170-250 Vac		
Output Current	4A	8A	12A

Options: Model Suffix
M = Volt and Ammeters
P = Surge Arrestor Protection
T = Over/Undervoltage Trip

DISPLEX, INC.

ALEXANDER PLACE, GLEN COVE, NY 11542
(516) 671-4400/Telex: 640476 (NORTHILLS GOVE)

EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

HELIONETICS, INC.

AC Power Sources · Frequency Changers
Power Conditioners

These solid-state systems provide precisely controlled AC power at any of the popular power/load configurations with standard models ranging from 12-72 kVA.

85-90% Efficiency with PWM Technology: Helionetics, a leader in Pulse Width Modulation technology, offers the highest efficiency available in AC power systems. Total system efficiency of 85-90% is typical.

Reliability Insured Thru Conservative Design and Fail-Safe Features: Conservative design and careful derating of all components insure reliability. Self-healing circuits and redundant features allow failure of a device or module without disturbing or derating the entire system. Included are:

Self-Clearing Input Rectifiers: If a diode is shorted it clears itself. Operation can continue with several diodes missing.

Self-Clearing Output Transistors: If output device should fail it clears itself from the circuit allowing continued operation.

Redundant Cooling Fans: If fan fails, its pair will supply adequate cooling for full load operation. (4 pairs supplied).

Module Disconnect: Auto-disconnect also exists at the module level allowing operation to continue derated by one module's capacity.

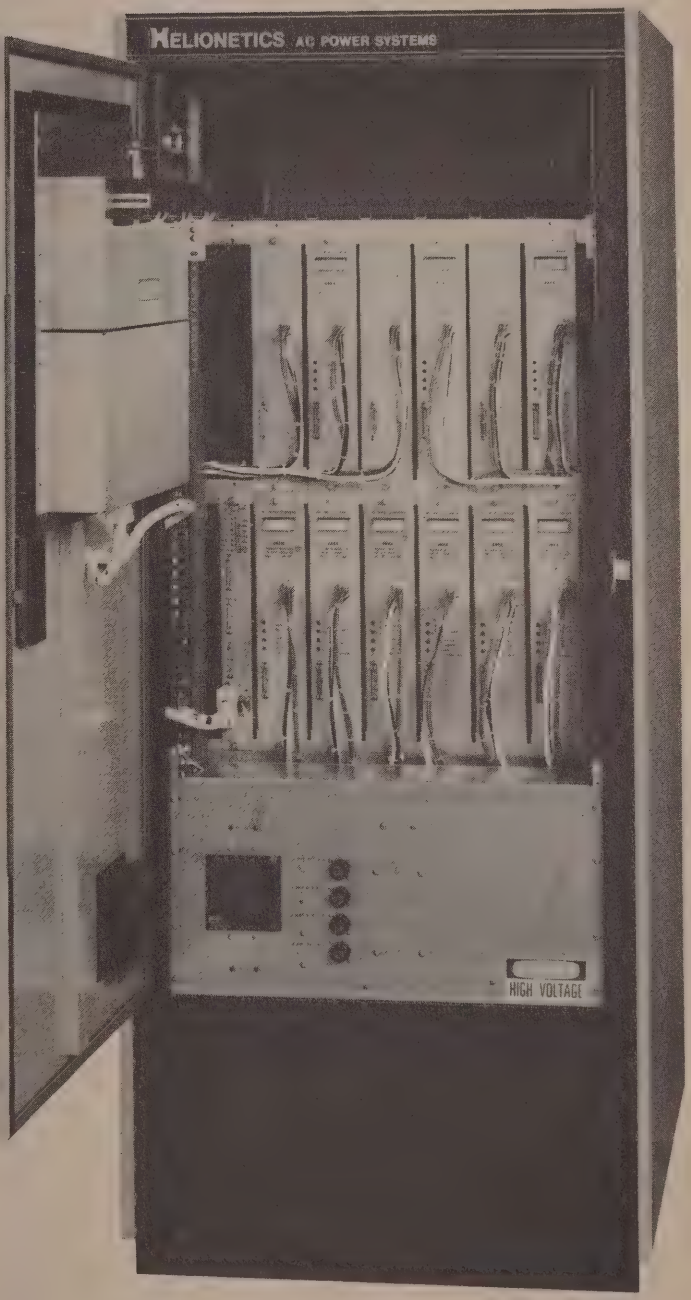
Convenient and easy servicing: Modular solid-state design minimizes MTTR. Self-healing circuitry allows serving when convenient at regularly scheduled times.

See pages 3•1864, 3•1865 for a complete listing of available models

HELIONETICS AC POWER SYSTEMS
HELIONETICS AC POWER SYSTEMS
HELIONETICS AC POWER SYSTEMS

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290
INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**
SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.



MODULAR CONSTRUTION

- EASILY UPGRADED
- MINIMUM MTTR
- LOW COST REDUNDANCY
- SELF-DIAGNOSTICS

A Control Panel Module: Provides oscillator signals, metering, adjustment controls and switches. Available in fixed or variable modes for one or three phase models, (see page **3**•1867 for details).

B Logic Module: Converts oscillator signals to digital drive signals with feedback control and status monitoring.

C Power Amplifier Module: Converts pulse-width-modulated logic signals to precision, high power sinewave output with 94% module efficiency. These 4.0 kW modules can be chained together to meet virtually any standard power/load requirement.
Other system elements include:

D Cooling Fans: Multiple fans efficiency, redundancy and reliability.

E Input & Output Transformers: Construction to MIL-T-27 insures long life.

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

AC Power Sources · Frequency Changers Power Conditioners

3-PHASE VARIABLE

USER SELECTABLE OUTPUT CONFIGURATIONS (AMPS PER LEG)

OUTPUT POWER (kVA)	FRAME SIZE	MODEL NUMBER	120/208 WYE	208 VAC DELTA	120 VAC DELTA	240 VAC DELTA	220/380 WYE	480 VAC DELTA
12	6 MF	3031-AVR3 3031-AVT2 3031-AVT3	32 32 32	32 32 32	32 32 55	— 27 —	— 16 —	— 14 —
24	6 MF	3061-AVR3 3061-AVT2 3061-AVT3	64 64 64	64 64 64	64 64 110	— 54 —	— 32 —	— 28 —
36	12 MF	3091-AVR3 3091-AVT2 * 3091-AVT3 *	96 96 96	96 96 96	96 96 166	— 81 —	— 48 —	— 40 —
48	12 MF	3121-AVR3 3121-AVT2 * 3121-AVT3 *	128 128 128	128 128 128	128 128 221	— 108 —	— 64 —	— 54 —
72	18 MF	3181-AVR3 3181-AVT2 * 3181-AVT3 *	192 192 192	192 192 192	192 192 332	— 162 —	— 96 —	— 81 —

3-PHASE FIXED

USER SELECTABLE OUTPUT CONFIGURATIONS (AMPS PER LEG)

OUTPUT POWER (kVA)	FRAME SIZE	MODEL NUMBER	120/208 WYE	208 VAC DELTA	120 VAC DELTA	240 VAC DELTA	220/380 WYE	480 VAC DELTA
12	6 MF	3031-AFR3 3031-AFT2 3031-AFT3	32 32 32	32 32 32	32 32 55	— 27 —	— 16 —	— 14 —
24	6 MF	3061 AFR3 3061-AFT2 3061-AFT3	64 64 64	64 64 64	64 64 110	— 54 —	— 32 —	— 28 —
36	12 MF	3091-AFR3 3091-AFT2 * 3091-AFT3 *	96 96 96	96 96 96	96 96 166	— 81 —	— 48 —	— 40 —
48	12 MF	3121-AFR3 3121-AFT2 * 3121-AFT3 *	128 128 128	128 128 128	128 128 221	— 108 —	— 64 —	— 54 —
72	18 MF	3181-AFR3 3181-AFT2 * 3181-AFT3 *	192 192 192	192 192 192	192 192 332	— 162 —	— 96 —	— 81 —

◄ ADDITIONAL SPECS

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

OPTIONS: Many options are available. Some of the more popular ones include:
- DIGITAL METERING
- CONFORMAL COATING
- SHOCK MOUNTING KITS
- CUSTOM COLORS
- REMOTE LOCATION OF CONTROL PANEL
- BATTERY INPUT ADAPTER
- NEMA ENCLOSURE
- EXTENDED TEMP RANGE (−40°C to +60°C)
- LOW FREQUENCY OPERATION (4.7 Hz)
- WIDE RANGE INPUT VOLTAGE (±30%)

SINGLE PHASE VARIABLE

USER SELECTABLE OUTPUT CONFIGURATIONS				
OUTPUT POWER (kVA)	FRAME SIZE	MODEL NUMBER	120 VAC (AMPS)	240 VAC (AMPS)
12	6 MF	1031-AVR1 1031-AVT1	93 93	— 46
24	6 MF	1061-AVR1 1061-AVT1	186 186	— 93
36	12 MF	1091-AVR1 1091-AVT1 *	279 279	— 140
48	12 MF	1121-AVR1 1121-AVT1 *	372 372	— 186
72	18 MF	1181-AVR1 1181-AVT1 *	558 558	— 279

SINGLE PHASE FIXED

USER SELECTABLE OUTPUT CONFIGURATIONS				
OUTPUT POWER (kVA)	FRAME SIZE	MODEL NUMBER	120 VAC (AMPS)	240 VAC (AMPS)
12	6 MF	1031-AFR1 1031-AFT1	93 93	— 46
24	6 MF	1061-AFR1 1061-AFT1	186 186	— 93
36	12 MF	1091-AFR1 1091-AFT1 *	279 279	— 140
48	12 MF	1121-AFR1 1121-AFT1 *	372 372	— 186
72	18 MF	1181-AFR1 1181-AFT1 *	558 558	— 279

* Models with "T" designations above 24 kVA utilize an external output transformer mounted in its own enclosure. All others are single cabinet systems.

MODEL NUMBER LEGEND

3 031 1 A V R3

Output Phases

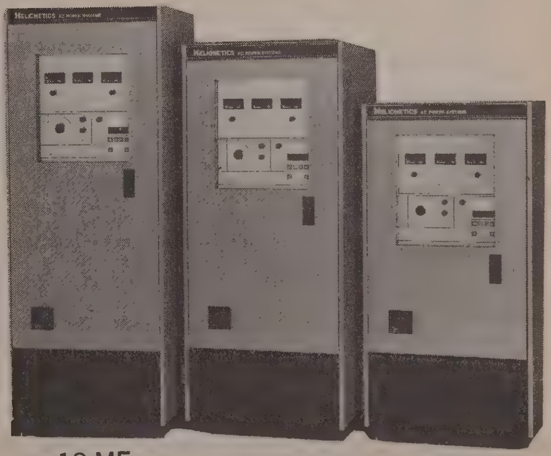
Number of P.A. Modules

P.A. Series

Equipment Series

Output Configuration
R1 = 0-130 Vac 1 Phase
R3 = 0-130 L-N 5 wire WYE
T1 = 0-260 I Phase
T2 = 0-260 L-N 5 wire WYE
T3 = 0-130 L-L 4 wire Delta

Control Package: V = Variable
F = Fixed



18 MF 12 MF 6 MF

Frame Size	Dimensions	Weight
6 MF	29″Wx34″Dx59″H	750
12 MF	29″Wx34″Dx72″H	875
18 MF	29″Wx34″Dx78″H	950

ADDITIONAL SPECS ►

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

AC Power Sources · Frequency Changers Power Conditioners

PERFORMANCE SPECIFICATIONS

The following performance specifications are typical of all Helionetics AC Power Sources and unless otherwise specified assume worst case combination of line, load and temperature. For three phase units the performance listed is per phase. See pages **3•**1864, **3•**1865 for complete listing of available standard models.

Line Regulation: ±1% max for ±15% line change. Up to ±30% line range is available as an option.

Load Regulation: ±1% max for 100% load change.

Response Time: Less than 1 millisecond.

Output Voltage: Single phase, zero to 130 VAC; Three phase WYE or Delta, zero to 225 VAC line-to-line. An auto-transformer is used for other output ranges.

Output Overload Capability: 120% of rating indefinitely; 150% of rating for 10 seconds.

Power Factor: Zero to unity PF, inductive or capacitive at 100% rated current. Unit unconditionally stable in any load P.F.

Input Current Distortion: 10% max assured by 12-phase input rectification and filter.

Output Distortion: 3% max THD for non-linear loads; 1.5% typical for linear loads.

Efficiency: 85-90%.

Load Imbalance: Zero to 100%. Each phase is totally independent.

Ride Through: Sustains rated output voltage at full power with a 16 millisecond line interruption.

Output Protection: Full overload and short circuit protection.

Self-Healing Circuits: The Power Amplifier Module circuitry automatically disconnects defective output transistors, allowing the unit to continue operation with only a small reduction in capacity. Diagnostic lights locate the defective device for serving when convenient.

INPUT POWER

The input transformer has multiple taps to allow for a wide variety of inputs. The listed input types have to move the nominal operating point ±5%.

INPUT POWER					Recommended Input Service Frame Size		
Type	Description				6 MF	12 MF	18 MF
A	120/208 Vac ±15%	47 to 63 Hz	3 phase WYE		100 Amps	200 Amps	300 Amps
B	240 Vac ±15%	47 to 63 Hz	3 phase Delta		90 Amps	180 Amps	270 Amps
C	220/380 Vac ±15%	47 to 63 Hz	3 phase WYE		60 Amps	120 Amps	180 Amps
D	460 Vac ±15%	47 to 63 Hz	3 phase Delta		50 Amps	100 Amps	150 Amps

◄ ADDITIONAL SPECS

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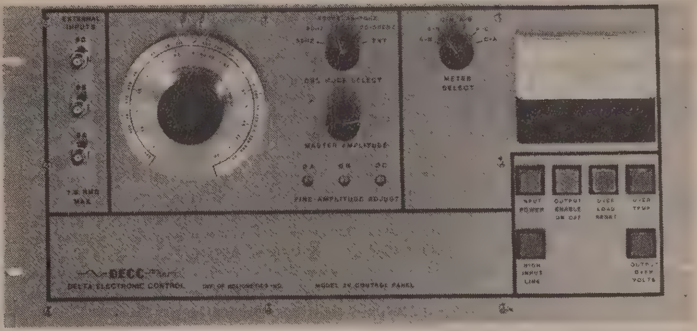
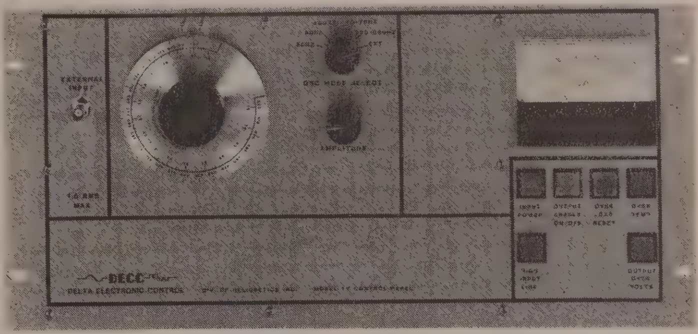
SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

CONTROL PANELS


EXTERNAL INPUTS
MASTER AMPLITUDE
FINE AMPLITUDE ADJUST
METER SELECT
INPUT POWER
OUTPUT ENABLE ON OFF
OVER LOAD RESET
OVER TEMP
HIGH INPUT LINE
OUTPUT OVER VOLTS
DECC
DELTA ELECTRONIC CONTROL
DIV. OF HELIONETICS INC.
MODEL 3V CONTROL PANEL

Model 3V — Variable 3-Phase Control


EXTERNAL INPUT
AMPLITUDE
INPUT POWER
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OVER LOAD RESET
OVER TEMP
HIGH INPUT LINE
OUTPUT OVER VOLTS
DECC
DELTA ELECTRONIC CONTROL
DIV. OF HELIONETICS INC.
MODEL 1V CONTROL PANEL

Model 1V — Variable 1-Phase Control

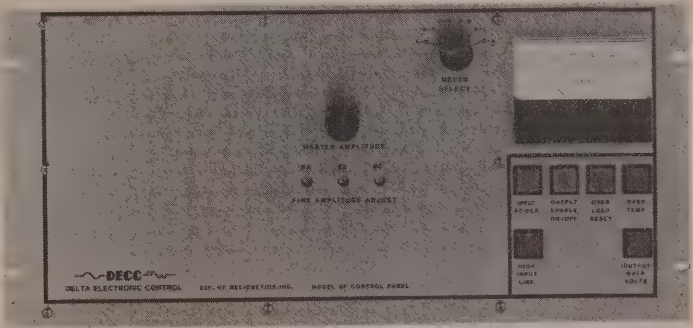
VARIABLE CONTROL; ONE AND THREE PHASE

Frequency Range: Switch selectable allowing variable, fixed or external drive modes.

- Variable: 47-500 Hz; 2% accuracy.
- Fixed: 50, 60 or 400 Hz; 0.25 accuracy.
- External Input: Allows remote drive signals to be utilized. 1K ohm impedance. Voltage gain 30.

Amplitude Control: Zero to full output. 3-Phase model allows ±10% trim on each phase.

Metering: 4″ voltmeter; 3% accuracy. 3-Phase model is switch selectable A to N, B to N, C to N, A to B, B to C and A to C.


METER SELECT
MASTER AMPLITUDE
FINE AMPLITUDE ADJUST
INPUT POWER
OUTPUT ENABLE ON/OFF
OVER LOAD RESET
OVER TEMP
HIGH INPUT LINE
OUTPUT OVER VOLTS
DECC
DELTA ELECTRONIC CONTROL
DIV. OF HELIONETICS INC.
MODEL 3F CONTROL PANEL

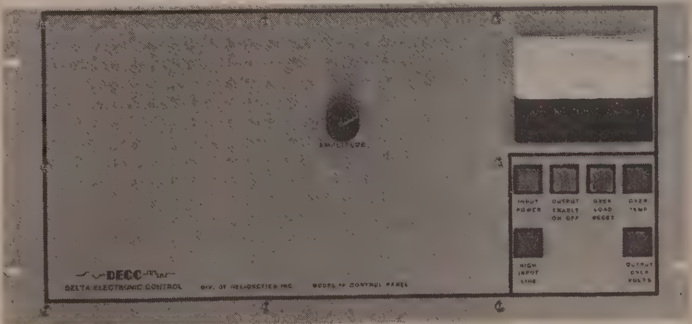
Model 3F — Fixed 3-Phase Control

FIXED CONTROL; ONE AND THREE PHASE

Frequency: User specified within range of 47-500 Hz; 0.25% accuracy.

Amplitude Control: Zero to full output.

Metering: 4″ voltmeter; 3% accuracy. 3-Phase model is switch selectable A to N, B to N, C to N, A to B, B to C and A to C.


AMPLITUDE
INPUT POWER
OUTPUT ENABLE ON OFF
OVER LOAD RESET
OVER TEMP
HIGH INPUT LINE
OUTPUT OVER VOLTS
DECC
DELTA ELECTRONIC CONTROL
DIV. OF HELIONETICS INC.
MODEL 1F CONTROL PANEL

Model 1F — Fixed 1-Phase Control

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**

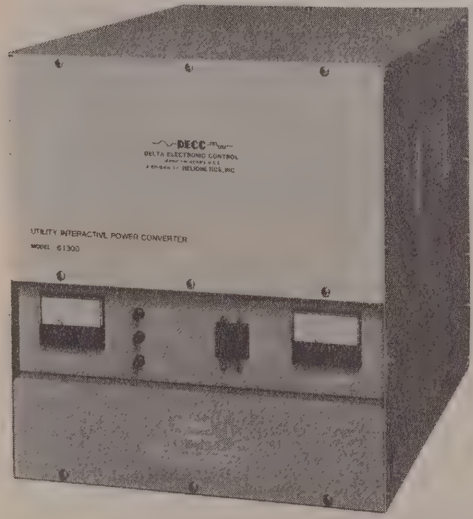
SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

PHOTOVOLTAICS

2.5-5 kW Solar Inverters w/Utility Interface

- PEAK POWER TRACKING
- UP TO 93% EFFICIENT
- LOW AUDIBLE NOISE
- FULLY ISOLATED
- LESS THAN 2% CURRENT DISTORTION


DECC
DELTA ELECTRONIC CONTROL
HELIONETICS, INC
UTILITY INTERACTIVE POWER CONVERTER
MODEL 61300

- OVER/UNDER LINE FREQUENCY PROTECTION
- OVER/UNDER LINE VOLTAGE PROTECTION
- PLUG-IN MODULAR CONSTRUCTION

These residential-sized inverters provide power to the user and sell excess power to the utility during low-use periods.

Conservative solid-state switching design and careful derating of all components insures many years of trouble-free service.

SOLAR ARRAY VOLTAGE: 190-250 VDC operating; 300 VDC Max

INPUT POWER: 2.5 kW — Model 61300-11
5.0 kW — Model 61300-21

UTILITY VOLTAGE: 207-254 VAC

PEAK POWER TRACKING: Automatically tracks peak power of array. May also operate in constant voltage mode.

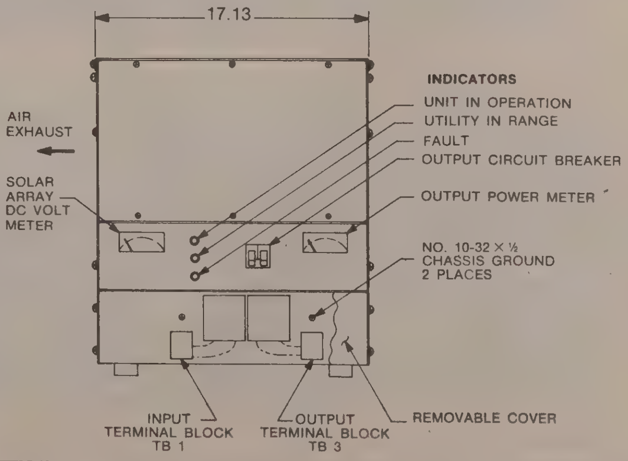
POWER FACTOR: >.98 from 10% to full load at unity P.F.

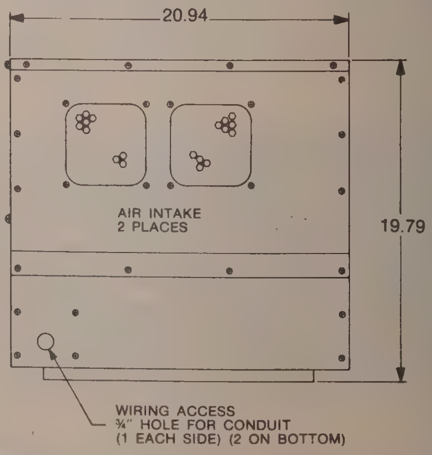
EFFICIENCY: >92% from half load to full load

CURRENT DISTORTION: Less than 2% THD of full load current at all loads

OPERATION: Automatic start-up and shut-down

UTILITY ISOLATION: Includes isolation transformer


17.13
AIR EXHAUST
SOLAR ARRAY DC VOLT METER
INDICATORS
UNIT IN OPERATION
UTILITY IN RANGE
FAULT
OUTPUT CIRCUIT BREAKER
OUTPUT POWER METER
NO. 10-32 × ½ CHASSIS GROUND 2 PLACES
INPUT TERMINAL BLOCK TB 1
OUTPUT TERMINAL BLOCK TB 3
REMOVABLE COVER


20.94
19.79
AIR INTAKE 2 PLACES
WIRING ACCESS
¾" HOLE FOR CONDUIT
(1 EACH SIDE) (2 ON BOTTOM)

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

PHOTOVOLTAICS

1.2 to 5 kW Stand-Alone Solar Inverters

These Helio-verters are compact, rugged efficient inverters designed to provide regulated 110 VAC power from low voltage storage batteries (12, 24 or 48 VDC).

Conservative solid-state switching design and careful derating of all components insures many years of trouble-free service.

Optional Auto-Turn-On circuitry provides enough power for your digital clock or timer with minimum battery drain of less than 250 milliamps, unloaded.

OUTPUT WAVEFORM: Quasi sinewave (4 step formation)

OUTPUT POWER RATING: See model listing below

AMBIENT TEMP RATING: 0°F to 120°F

OVERLOAD PROTECTION: Electronic current limiting to 150% of rating. Input/output circuit breakers supplied.

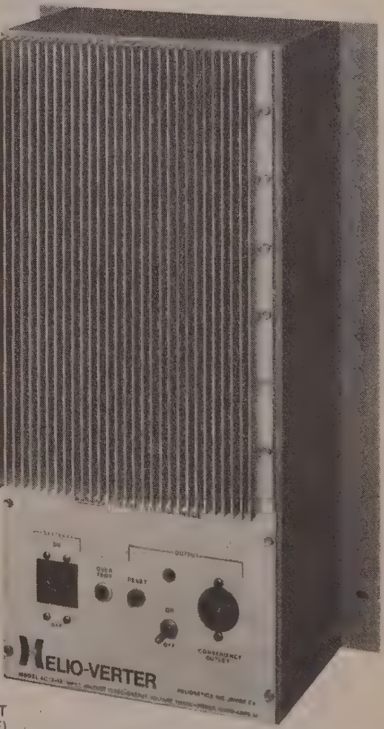
LOAD REGULATION: ±3%; no load to full load with fixed input voltage

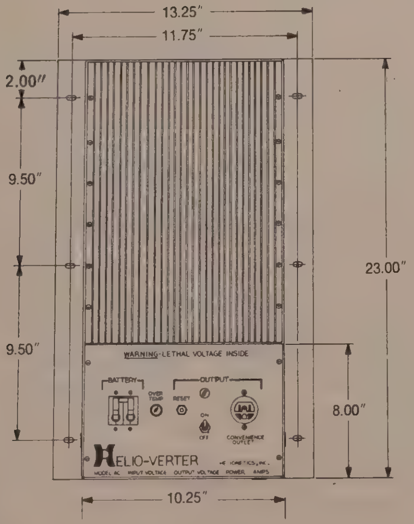
INPUT REGULATION: ±3% of specified battery range

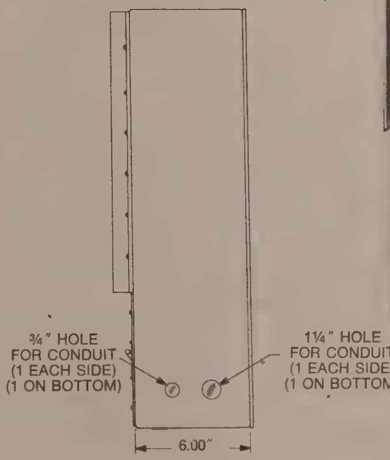
EFFICIENCY: 85% at full load

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGE	AMPS	OUTPUT POWER
AC12-12	10-15 VDC	120 VAC	10	800W continuous at 75°F 1000W 45 minutes at 75°F 1200W 15 minutes at 75°F
AC24-24	20-30 VDC	120 VAC	20	2.4 kW continuous at 75°F
AC48-48	40-60 VDC	120 VAC	40	4.8 kW continuous at 75°F

The dimensions shown are in inches and are for the Model AC12-12 only. Other models come in a 39″ tall cabinet with slightly different widths and depths.


HELIO-VERTER


13.25″
11.75″
2.00″
9.50″
9.50″
23.00″
8.00″
10.25″
WARNING-LETHAL VOLTAGE INSIDE
BATTERY
OUTPUT
OVER TEMP
RESET
ON
OFF
CONVENIENCE OUTLET
HELIO-VERTER


¾″ HOLE
FOR CONDUIT
(1 EACH SIDE)
(1 ON BOTTOM)
1¼″ HOLE
FOR CONDUIT
(1 EACH SIDE)
(1 ON BOTTOM)
6.00″

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**

SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

GROUND

HELIONETICS, INC.

External Environment, 47-63 Hz Frequency Changers/Power Conditioners

10 kVA

MODEL 61296: This 10 kVA AC Power Source meets the rigid military requirements for external environment extremes.

INPUT
Voltage: 120/208 VAC; 3-Phase
Tolerance: +10%, −15%
Transient: ±25% for 5 Sec.
Frequency: 47-63 Hz

OUTPUT
Voltage: 120 VAC; 1-Phase
Distortion: 3% THD
Voltage Regulation: 0.5%
Power: 10 kVA
Power Factor: 0.8 Leading or Lagging
Frequency: 60 Hz, ±0.1%

EFFICIENCY: 85% at Nominal Input and Full Output Power

TEMP RANGE: Operating: −40°C to +50°C
Non-Operating: −50°C to +65°C

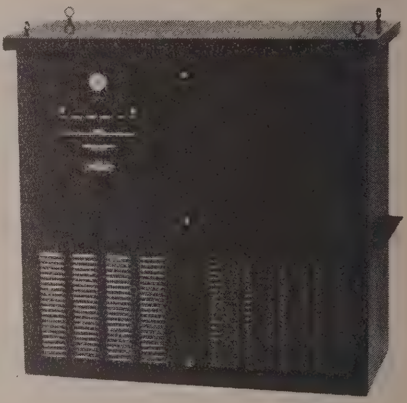
HUMIDITY: 95% at +50°C w/Condensation

COOLING: Fan Cooled

SIZE: 27″W x 27″D x 38″H

WEIGHT: 600 lbs.

18 kVA



MODEL 61304: Fully militarized 18 kVA AC Power Source meets the rigid military requirements for external environment extremes.

INPUT
Voltage: 120/208 VAC; 3-Phase or
220/308 VAC; 3-Phase
Tolerance: ±10%
Transient: ±25% for 5 Sec.
Frequency: 47-63 Hz

OUTPUT
Voltage: 120/208 VAC; 3-Phase
Distortion: 3% THD
Voltage Regulation: 0.5%
Power: 18 kVA
Power Factor: 0.8 Leading or Lagging
Frequency: 60 Hz, ±0.1%

EFFICIENCY: 85% at Nominal Input and Full Output Power

TEMP RANGE
Operating: −40°C to +50°C with 330 BTU/Ft.² Solar Loading
Non-Operating: −50°C to +65°C

HUMIDITY: 100% at +27°C w/Condensation

WEIGHT: 1500 lbs.

SIZE: 51″W x 48″H x 27″D

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

SHIPBOARD

HELIONETICS, INC.

50 Hz-10 kHz Wide Band Class-D Amplifier

MODEL 61123: Fully militarized, rugged amplifier for such applications as wide band random noise, underwater communications or other sonar-type applications. Operates into reactive loads of any power factor.

INPUT

Voltage: 140 VAC ±10%
Line to Line;
3-Phase Isloated
Frequency: 60 Hz

OUTPUT: 5 kVA

FREQUENCY RESPONSE: 50 Hz to 10 kHz

DISTORTION

Harmonic: 2% THD
Intermodulation: 2%

DYNAMIC RANGE: 70 dB

COOLING: Integral Blower

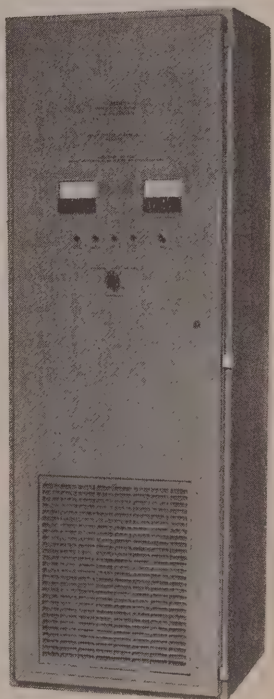
DUTY FACTOR: Continuous

TEMP. RANGE: −20°C to +55°C

SIZE: 10.03″W x 8.0″H x 19.0″D

WEIGHT: 52 lbs.

10 kVA, Single Phase Frequency Changer



MODEL 61258: High efficiency switching-type modular design power conditioner and frequency changer with single phase output. Other models in this series are available in single- or three-phase configurations up to 24 kVA for shipboard and other applications.

INPUT

Voltage: 115/200 VAC; 3-Phase
Tolerance: ±10% Steady State
Transient: ±30% for 5 sec.
Frequency: 47-63 Hz

OUTPUT

Voltage: 115 VAC; ±5%; Single-Phase
Frequency: 60 Hz, ±0.1 Hz (50 Hz and 400 Hz Available)
Distortion: 3% Max THD
Power: 10 kVA
Power Factor: .8 Leading or Lagging

OVERLOAD CAPABILITY: 250% for 3 Cycles; 120% Continuous

EFFICIENCY: 85% Min. at Full Load

TEMP RANGE:

Operating −20°C to +45°C
Non-Operating: −45°C to +55°C

HUMIDITY: 0 to 95%

COOLING: Integral Forced Air

SIZE: 24″W x 24″D x 60″H

WEIGHT: 700 lbs.

Our Complete Line of Commercial Frequency Changers/Power Conditioners Featured on Pages 3·1862-3·1867

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

GROUND

HELIONETICS, INC.

Protected Environment Frequency Changer/Power Conditioner; 18 kVA

For protected, or quasi-military environments, such as closed vans, trailers or other mobile installations, Helionetics offers a wealth of proven field reliability with several series of designs. Virtually any standard operating voltage and frequency can be configured with ease using Helionetics modular construction.

Every series of power conditioners uses pulse width modulation circuitry developed and patented by our technical personnel. Full load efficiency of 92% is typically achieved.

MODEL 61322

INPUT
Voltage: 120/208 VAC; 3-Phase
Tolerance +10%, −15%
Transient: ±25% for 2 Sec.
Frequency: 47-63 Hz

OUTPUT
Voltage: 120/208 VAC; 3-Phase
Frequency: 60 Hz, ±0.1%
Distortion: 5% THD
Voltage Regulation: 0.5%
Power: 18 kVA
Power Factor: .8 Leading or Lagging; 14.5 kW

EFFICIENCY: 85% at Nominal Input and Full Output Power

OVERLOAD CAPABILITY: 150% for 3 Cycles, 120% Continuous

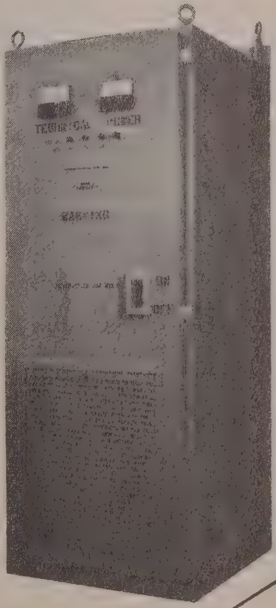
TEMP RANGE: 0°C to 50°C

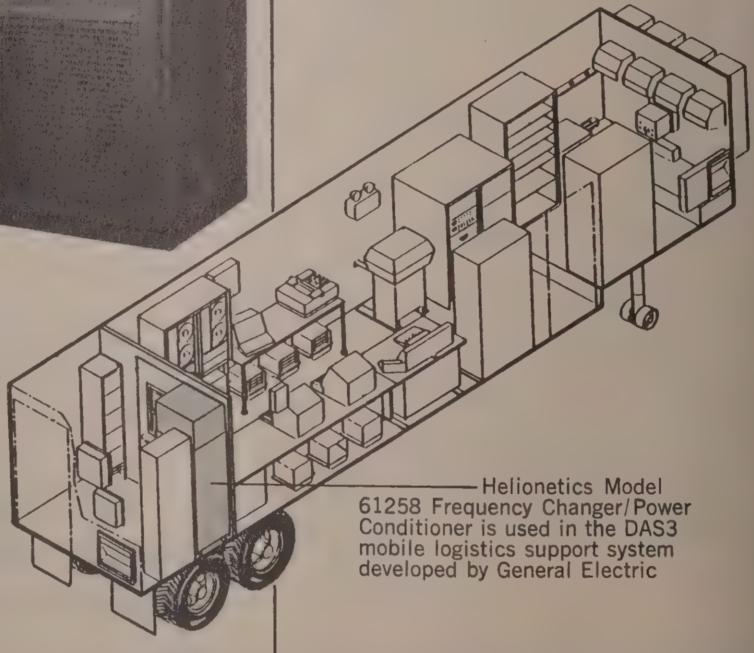
HUMIDITY: 10%-90% Non-Condensing

COOLING: Fan Cooled

SIZE: 24"W x 24"D x 60"H

WEIGHT: 700 lbs.





Helionetics Model 61258 Frequency Changer/Power Conditioner is used in the DAS3 mobile logistics support system developed by General Electric

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

HELIONETICS, INC.

Spare Module Price List

MIL-STD-461A MIL-STD-810C MIL-E-16400G
MIL-STD-454 MIL-STD-633E MIL-STD-1275A

HELIONETICS modular systems have an established record of field reliability on thousands of modules already in operation. Standard Power Amplifier and Logic Modules provide redundancy, field upgradability and easy servicing. Fault isolation, together with automatic self-healing circuitry, aids scheduled maintenance and insures reliable operation.

POWER MODULE FEATURES:

- 2 kW AND 2.5 kW MODULES AVAILABLE
- 94% MODULE EFFICIENCY (FULL LOAD)
- PULSE WIDTH MODULATION (CLASS D) TECHNOLOGY
- MODULE REDUNDANCY INSURES RELIABLE OPERATION
- CONSERVATIVE DESIGN AND SELF HEALING CIRCUITRY
- FAULT ISOLATION INDICATOR ON 2.5 kW MODULE

HELIONETICS MODEL NUMBER LOGIC MODULES	DESCRIPTION	HELIONETICS SYSTEM USED IN	UNIT PRICE 1-24	25-99	100 and up
501-1728-103	1ϕ Inverter Logic Module	61200	$2500.00	$2375.00	$2250.00
501-1728-104	1ϕ Inverter Logic Module	61258	2500.00	2375.00	2250.00
501-1728-109	1ϕ Inverter Logic Module	61258-2	2500.00	2375.00	2250.00
501-2987-101	3ϕ Inverter Logic Module	61304	3000.00	2850.00	2700.00
501-3806-101	Amplifier Logic Module	61348	2500.00	2375.00	2250.00
POWER MODULES					
501-1726-103	2.0 kW Inverter Power Module	61258, 61304	$2100.00	$1995.00	$1890.00
501-1726-104	2.5 kW Inverter Power Module	61200	2100.00	1995.00	1890.00
501-3618-101	2.5 kW Inverter Power Module	61258-2	2400.00	2280.00	2160.00
501-2897-104	2.5 kW Amplifier Power Module	61348, 61349	2400.00	2280.00	2160.00

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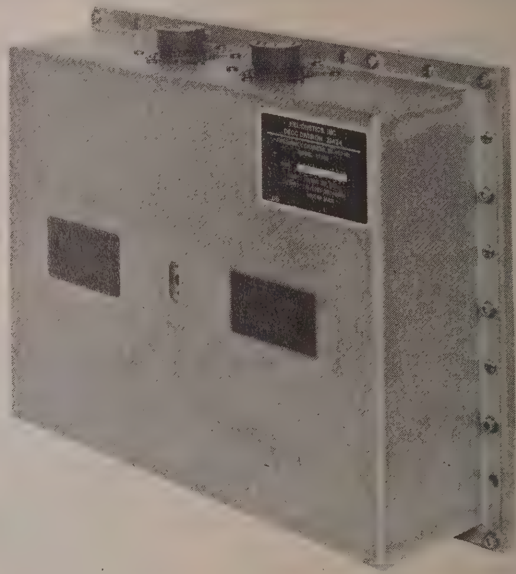
SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

SHIPBOARD

HELIONETICS, INC.

1.6 kVA, 3-Phase Frequency Changer; 400 Hz Output



MODEL 61340: Fully Militarized 60-400 Hz Frequency Changer for submarine and naval shipboard applications. Special design techniques provide a high density conduction-cooled package which minimizes acoustical noise.

INPUT
- Voltage: 115 VAC, 3-Phase Delta
- Tolerance: ±10% Steady State
- Transient: ±25%
- Frequency: 60 Hz ±4 Hz

OUTPUT
- Voltage: 115/200 VAC. 3-Phase 4-Wire WYE
- Frequency: 400 Hz
- Distortion: 5% Max THD; 3% Max Single Harmonic
- Voltage Regulation: 5% Max Line & Load
- Power: 1.6 kVA
- Power Factor: 0.8 Lag to 0.9 Lead

EFFICIENCY: 75% Min at Nominal Input & Output & Max Load

TEMP RANGE
- Operating: Heat Sink 0°C to +60°C Ambient; Tracking Heat Sink within ±20°C
- Non-operating: −55°C to +71°C

HUMIDITY: MIL-STD-810C, Method 507.1, Procedure 4; 50°C Max

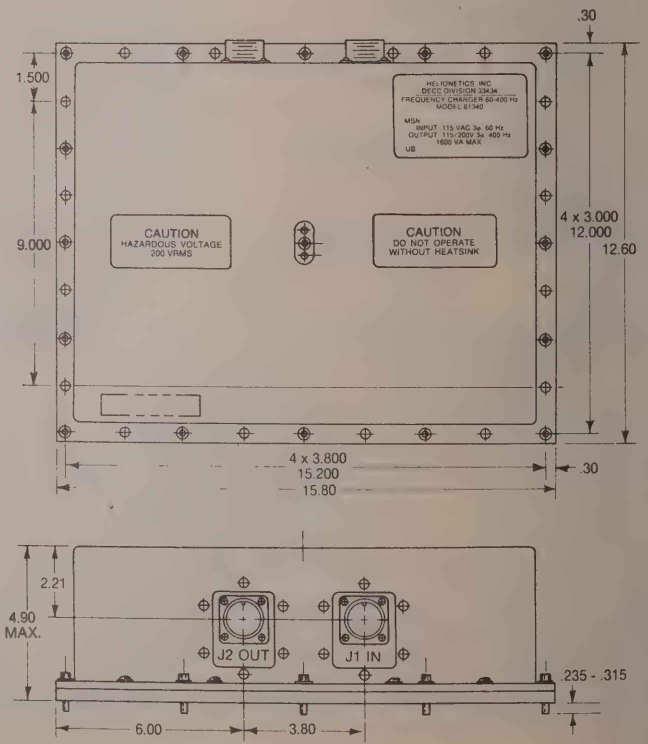
COOLING: Liquid Cooled Through Base Mounting Plate

SIZE: 12.6″W x 4.87″H x 15.8″D

WEIGHT: 60 lbs.

SHOCK: 150 G, 11 Milliseconds, Total 12 Shocks All Axes

MTBF: 50,000 Hrs. at 50°C (MIL-HDBK-217)


.30
1.500
HELIONETICS INC
DECC DIVISION 33434
FREQUENCY CHANGER 60-400 Hz
MODEL 61340
MSN
INPUT 115 VAC 3ø 60 Hz
OUTPUT 115/200V 3ø 400 Hz
1600 VA MAX
US
CAUTION
HAZARDOUS VOLTAGE
200 VRMS
CAUTION
DO NOT OPERATE
WITHOUT HEATSINK
9.000
4 x 3.000
12.000
12.60
4 x 3.800
15.200
15.80
.30
2.21
4.90
MAX.
J2 OUT
J1 IN
.235 - .315
6.00
3.80

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

SHIPBOARD

HELIONETICS, INC.

640 Watt Computer Power Supply; Multi-Output

MODEL 61282: Fully militarized 3-output power supply for shipboard weather, navigation and other computer applications.

- REMOTE SENSING ALL OUTPUTS
- PARALLEL OPERATION ON +5 VDC OUTPUT
- POWER SEQUENCING: +5 VDC; ON FIRST, OFF LAST
- OVERVOLTAGE CROWBARS ON ALL OUTPUTS
- DATA SAVE — ALL TTL COMPATIBLE

INPUT
Voltage: 120 VAC ± 13%; Single Phase
Frequency: 47-63 Hz
OUTPUT 1: +5 VDC at 80 Amps
OUTPUT 2: +15 VDC at 15 Amps
OUTPUT 3: −5 VDC at 2.5 Amps
ALL OUTPUTS
Power: 640 Watts Total
Regulation: ±0.5% Line and Load
Ripple: 50 Millivolts Peak to Peak
Adjust Range: ±5%
HUMIDITY: 0 to 90% Relative
COOLING: Integral Forced Air
SIZE: 19.0"W x 7.0"H x 19.0"D (20.5"D w/handle)
WEIGHT: 44 lbs.
SHOCK: 30 G, 30 Milliseconds, ½ Sine
VIBRATION: MIL-STD-167, Type 1
TEMPERATURE: Operating: 0°C to 55°C
Non-operating: −62°C to +75°C

50-100 kHz Wide Band Class-B Amplifier

POWER ON
OVER TEMP
OVER CURRENT
RESET
1 KW LINEAR AMPLIFIER

MODEL 61055: Extremely low distortion, very wide bandwidth, and an ability to operate into highly reactive loads provides application to both sonar and VLF/ELF communications. Up to four 61055's can be ganged to cover the ranges 50-300 Hz, 300-2000 Hz, 2-20 kHz and 20-100 kHz.

INPUT: 110 VDC ±5 VDC, 15 Amps
OUTPUT: 1.5 kVA (0.7 to 1.0 PF) 0-67 Vrms
FREQUENCY RESPONSE: 50 Hz to 100 kHz
DISTORTION: 0.3% Max THD
INPUT SIGNAL RANGE: 0-1.0 Volt RMS
DUTY FACTOR: Continuous
TEMP RANGE: 0°C to 50°C
COOLING: Integral Forced Air
SIZE: 8.25"W x 8.25"H x 20"D
WEIGHT: 40 lbs.

MODEL 61056: POWER SUPPLY FOR ABOVE
Simultaneously furnishes power to two 61055 amplifiers. 3-phase matched supply is also available.

INPUT: 115 VAC ±10%; 1-Phase; 60 Hz ±5%
OUTPUT: 110 ±1 VDC; 20 Amps; 2200 Watts
MTBF: 2100 Hours at Max Temp (MIL-HDBK-217)
MTTR: 1 Hour Max (MIL-HDBK-472)

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290
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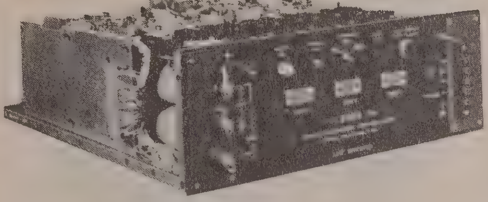
SPECIALISTS IN POWER CONVERSION EQUIPMENT

MILITARY

AIRBORNE

HELIONETICS, INC.

3 kW Modular Inverter



MODEL 61179: This fully militarized 3 kW inverter features modular construction allowing enhanced maintainability. Multiple outputs are switch selectable.

INPUT: 36-70 VDC

OUTPUTS
Voltage (Switch Selectable)
- 120 VAC; 1-Phase
- 240 VAC; 1-Phase
- 120/280 VAC; 3-Phase

Frequency: 50, 60 or 400 Hz (Switch Selectable)
Distortion: 3%
Regulation: 3%
Power: 3.0 kW

EFFICIENCY: Exceeds 90%

SIZE: 18″W x 5″H x 24″D

WEIGHT: 25 lbs.

TEMP RANGE: 0°C to +55°C

Air or Ground Battery Charger Power Supply

MODEL 61276: Designed for either aircraft or ground use charging lead-acid or lead-calcium batteries.

INPUT
Voltage: 115/230 VAC; 1-Phase or 3-Phase
Transient: MIL-STD-704
Frequency: 50/60 Hz or 400 Hz

OUTPUT: 35 Amps or 36 Amps at 28 VDC. End points can be adjusted at factory and slope moved vertically as a function of ambient temperature.

EFFICIENCY: 85% at Full Load

TEMP. RANGE: −40°C to +70°C

HUMIDITY: 100% w/condensation

SHOCK: MIL-STD-810C

EMI: MIL-STD-461

SIZE: 5″W x 6″H x 16″D or 8.3″W x 5″H x 20″D

WEIGHT: 16 lbs. or 35 lbs.

ALTITUDE: 50,000 ft.

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SPECIALISTS IN POWER CONVERSION EQUIPMENT

500 VA and 1 kVA FREQUENCY CHANGERS

DIEGO POWER

DIEGO POWER
MODEL 1025
AC POWER SOURCE
OUTPUT FREQUENCY
50Hz
60Hz
CENTER FREQ.
0Hz
-3Hz
+3Hz
FREQ. VERNIER
RMS
OUTPUT
117.9
VOLTS
AMPS
MONITOR
ON
INPUT POWER
INHIBIT
ENABLE
OUTPUT
OUTPUT VOLTS

$1695* 1 kVA

Advanced pulse width modulation (PWM) technology greatly enhances efficiency, allows compact packaging and dramatically reduces cost. Important features include soft-start, overload and short-circuit protection, fast response time, output isolation, optional volt and current meter (true RMS) and optional IEEE interface.

Input: 45 to 440Hz

Output: 47 to 63Hz in 3Hz steps

PWM Switching Design

True RMS Current and Volt Meter as Option

Performance Specifications for 1 kVA Models

Input

Voltage: 115 or 230 VAC ±10%. Selected by jumpers

Frequency: 45 to 440Hz (no fans used)

Protection: Fuse (slo-blo)

Output

Voltage: 0 to 130 Vac or 0 to 260 Vac

Frequency: Adjustable in 3Hz steps from 47 to 63Hz

Power: 1 kW

Protection: Current limiting and thermal protection

Efficiency: >80% at full load

Distortion: <2% THD into full linear load

Power Factor: .7 lead to .7 lag (no derating)

Response Time: <2ms with 50% load change

Regulation: ±2% line and load

Frequency Stability and Accuracy: ±0.25%

Temperature Range
Operating: −10°C to +50°C
Storage: −40°C to +75°C

Mechanical: 19″W x 7″H x 15″D; 50 lbs

Prices

Model 510 (500 VA, no monitor):	$1395.00
Model 525 (500 VA, with monitor):	$1640.00
*Model 1010 (1 kVA, no monitor):	$1695.00
Model 1025 (1 kVA, with monitor):	$1940.00

Ask for: **JOHN FRANEK** P.O. BOX 11752, SANTA ANA, CA 92711, 714-832-0290

INSIDE CALIFORNIA **800-468-6808** / OUTSIDE CALIFORNIA CALL TOLL FREE **800-854-9420**

SPECIALISTS IN POWER CONVERSION EQUIPMENT

NOBRUSH® FREQUENCY GEORATOR™ CORPORATION

PERMANENT MAGNET GENERATOR DESIGN

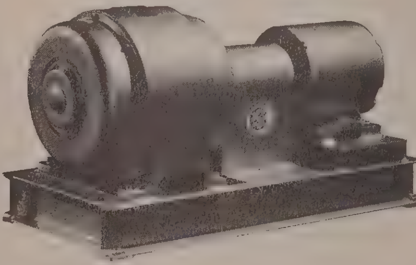
"NoBrush" Motor Generators and Frequency Converters are efficient, compact, dependable, quiet running units for powering all types of electronic systems and electrical equipment. The heart of each "NoBrush" power system is a "NoBrush" permanent magnet generator which features a cast aluminum rotor designed to give superior voltage stability. • A typical "NoBrush" generator is mounted with a high quality induction or synduction motor within a single aluminum alloy shell. • Oversize lubricated for life ball bearings, coupled with the absence of brushes, commutators or slip rings, insure long-term maintenance-free operation. • Georator brushless permanent magnet generators are noted for their compact construction, ruggedness, ability to withstand short circuits, and excellent wave form. • All Georator power systems whether utilized for frequency conversion or basic power requirements, provide true "line isolation and stabilization" for protecting sensitive electronic systems from momentary power interruptions, switching transients, brown outs, or voltage spikes.

60 TO 60 Hz LINE ISOLATOR SERIES 30 UNIT SHELL

This small isolator stabilizer Motor-Generator offers full line isolation for small power requirements up to 1 KVA. Permanent magnet field generator coupled with the high inertia of the rotating system assures maximum electrical isolation between line and load. The rugged unit shell construction gives long, maintenance-free operation.

Model No.	KVA Rating	Phase In/Out	Output Voltage	Input Voltage	Dimensions H"/L"/Weight
30-194	0.5	3/1	115/230	230/460	14.8"/16.1"/120 lbs.
30-198	0.5	1/1	115/230	115/230	14.8"/16.1"/120 lbs.
30-195	1.0	3/3	120/208	230/460	14.8"/16.1"/130 lbs.
30-199	1.0	1/3	120/208	115/230	14.8"/16.1"/130 lbs.

These 60 to 60 Hz brushless generators, including those in the next column are designed to accept long term input variation of up to ±15% from nominal with no change in output. Inertia stabilization allows these units to absorb input line transients of as much as 30% for as long as 500 milliseconds with less than 1% change in output.



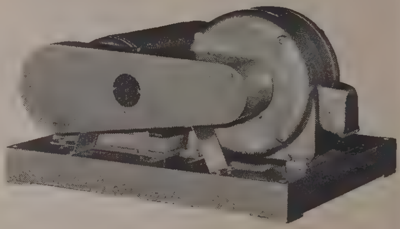
60 TO 60 Hz ISOLATOR STABILIZER SERIES 37 IN LINE

Larger Motor Generators in ratings up to 125 KVA are also available to provide full line isolation and distortion free power to protect electronic equipment from power line excursions and momentary power loss.

Model No.	KVA Rating	Phase In/Out	Output Voltage	Input Voltage	Dimensions H"/L"/Weight
37-015	1.5	3/1	115/230	220/440	18.3"/34.0"/300 lbs.
37-118	1.5	1/1	115/230	230	18.3"/34.0"/315 lbs.
37-130	2.5	3/3	120/208	220/440	18.3"/34.0"/215 lbs.
37-133	2.5	1/3	120/208	230	18.3"/34.0"/400 lbs.
37-070	2.5	3/1	115/230	220/440	18.3"/34.0"/335 lbs.
37-134	2.5	1/1	115/230	230	18.3"/34.0"/400 lbs.
37-123	5.0	3/3	120/208	220/440	18.3"/38.0"/410 lbs.
37-227	6.25	3/1	120/240	220/440	26.0"/48.0"/650 lbs.
37-312	6.25	3/3	120/208	220/440	33.0"/48.0"/650 lbs.
37-285	12.5	3/1	120/240	230/460	29.0"/62.0"/910 lbs.
37-135	12.5	3/3	120/208	230/460	29.0"/62.0"/910 lbs.
37-136	18.75	3/3	120/240	230/460	37.5"/70.0"/1300 lbs.
37-137	18.75	3/1	120/208	230/460	29.0"/63.0"/1000 lbs.
37-138	25	3/3	120/240	230/460	37.5"/72.0"/1550 lbs.
37-139	25	3/1	120/208	230/460	29.0"/65.0"/1230 lbs.
37-278	37.5	3/3	120/208	230/460	30.8"/65.5"/1550 lbs.
37-327	50	3/3	120/208	230/460	30.8"/66.5"/1595 lbs.
37-XXX	75	3/3	120/208	230/460	49.0"/80.1"/2350 lbs.
37-317	100	3/3	120/208	460	49.0"/80.1"/2550 lbs.

PERMANENT MAGNET FEATURES:

- ☐ *Line Isolation and Stabilization*
- ☐ *Stable Output Voltage*
- ☐ *High Overload Capacity*
- ☐ *Withstands Short Circuits*
- ☐ *Extremely Low R. F. Noise*
- ☐ *Minimum Maintenance*
- ☐ *Lightweight*
- ☐ *Low Audible Noise*
- ☐ *Cool Operation*
- ☐ *Operates in Adverse Environments*



50 TO 60 Hz and 60 TO 50 Hz FREQUENCY CONVERTERS

These ruggedly built, belt driven, motor-generator sets are mounted on a sturdy steel frame base. Units in the 0.5 to 5 KVA power range are designed around the highly efficient NoBrush Permanent Magnet Generator. Units in the 6.25 to 125 KVA power range have brushless rotating rectifier type generators with voltage regulators, to provide ±1% output voltage regulation, and voltage adjustment of ±10%. These motor-generators provide frequency conversion, basic power, and superior line isolation and stabilization for exported and imported electrical and electronic equipment. Other voltages available upon request.

50 to 60 Hz

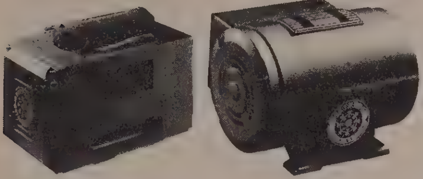
Model No.	KVA Rating	Phase In/Out	Voltage Output	Approx. Wt. lbs.
37-097	0.5	1/1	115/230	230
37-044	1.5	1/1	115/230	400
37-151	2.5	3/1	115/230	420
37-177	6.25	3/1	115/230	650
37-144	12.5	3/3	120/208	1,050
37-218	12.5	3/1	115/230	1,050
37-272	18.75	3/1	115/230	1,250
37-334	25.0	3/3	120/208	1,600
37-311	37.5	3/3	120/208	1,600

60 to 50 Mz

Model No.	KVA Rating	Phase In/Out	Voltage Output	Approx. Wt. lbs.
37-105	0.5	1/1	115/230	230
37-102	1.5	1/1	115/230	400
37-111	1.5	3/1	115/230	400
37-095	2.5	3/1	115/230	440
37-210	6.25	3/1	115/230	750
37-284	6.25	3/3	220/380	650
37-186	12.5	3/1	115/230	1,220
37-180	12.5	3/3	220/380	1,000
37-283	18.75	3/1	115/230	1,560
37-192	25.0	3/1	115/230	1,580
37-164	25.0	3/3	220/380	1,580
37-306	31.3	3/3	220/380	1,485
37-276	37.5	3/3	220/380	1,700
37-298	50.0	3/3	220/380	1,810
37-301	50.0	3/1	115/230	2,315
37-335	75.0	3/3	220/380	3,708
37-288	100.0	3/3	220/380	3,337

CONVERTERS & GENERATORS

The simplest, most rugged, most dependable power source.



60 TO 400 Hz FREQUENCY CONVERTERS SERIES 30 UNIT SHELL

A highly compact, brushless, Motor Generator Set for conversion of 50 or 60 Hz power to 400 Hz or higher frequencies. Generator and Motor Rotors are pressed on a common shaft, with shielded ball bearing at ends of shaft, all contained within an aluminum alloy shell.

Model No.	KVA Rating	Phase In/Out	Output Voltages Full Load *	Input Voltage **	Dimensions H"/L"/Weight
30-021	0.15	1/1	115/200	115/230	8"/11"/40 lbs.
30-001	0.25	1/1	115	115/230	8"/11"/43 lbs.
30-004	0.25	1/3	115/200	115/230	8"/11"/43 lbs.
30-002	0.5	1/1	115	115/230	8"/11"/51 lbs.
30-005	0.5	1/3	115/200	115/230	8"/11"/51 lbs.
30-016	0.5	3/3	115/200	208-220/440	8"/11"/51 lbs.
30-006	0.75	3/3	115/200	208-220/440	8"/11"/51 lbs.
30-003	1.0	1/1	115	115/230	12¼"/15¼"/118 lbs.
30-025	1.0	1/3	115/200	115/230	12¼"/15¼"/107 lbs.
30-007	2.0	1/3	115/200	115/230	12¼"/15¼"/137 lbs.
30-020	2.0	3/3	115/200	208-220/440	12¼"/15¼"/121 lbs.
30-029	2.5	3/3	115/200	208-220/440	12¼"/15¼"/153 lbs.

☐ Other Generator Outputs Available: 120, 180, 280, 360, and 840 Hz
☐ Other Standard and Non-Standard Voltages.
☐ Exact 400 Hz Output.
☐ DC Outputs at Low or High Voltage.

60 to 400 Hz FREQUENCY CONVERTER SERIES 33 VERTICAL

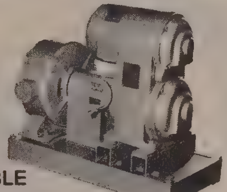
High quality induction motor is close coupled to a "NOBRUSH" generator providing a very compact high power to weight and size ratio. Available variations include: 50 Hz input; multiple standard and non-standard AC output voltages; Dual AC and DC outputs; and militarized construction.

MODEL NO.	KVA RATING	PHASE IN/OUT	OUTPUT VOLTAGES FULL LOAD	DIMENSIONS DIAMETER"/H"/Lbs.
33-001	2.5	3/3	115	16.8"/18.3"/173
33-002	3.5	3/1	115	16.8"/18.3"/178
33-003	5.0	3/1	115	16.8"/18.3"/273
33-004	5.0	3/3	115/200	16.8"/18.3"/250
33-005	7.5	3/3	115/200	16.8"/19.5"/259
33-006	10.0	3/3	115/200	16.8"/19.5"/280
33-103	10.0	3/1	115	20.6"/21.8"/405
33-124	12.5	3/3	115/200	20.6"/21.6"/410
33-102	15.0	3/3	115/200	20.6"/24.2"/485
33-154	20.0	3/3	115/200	20.6"/26.6"/491
30-120	25.0	3/3	115/200	23.0"/26.5"/1213

EXACT 400 Hz FREQUENCY CONVERTERS SYNCHRONOUS DRIVEN SERIES 35 IN LINE

60 Hz to exact 400 Hz frequency conversion. Low rotational speed (1200 RPM) provides long life and minimum audible noise (65db). High/low AC and DC outputs available.

MODEL NO.	KVA RATING	PHASE IN/OUT	OUTPUT VOLTAGE FULL LOAD	OUTPUT FREQUENCY EXACT	DIMENSIONS H"/L"/WEIGHT
35-001	2.5	3/1	115	400 Hz	16.5/26/470 Lbs.
35-003	3.0	3/3	115/200	400 Hz	16.5/26/472 Lbs.
35-002	5.0	3/1	115	400 Hz	16.5/30/620 Lbs.
35-004	5.0	3/3	115/200	400 Hz	16.5/28/586 Lbs.
35-005	10.0	3/3	115/200	400 Hz	16.5/30/665 Lbs.



VARIABLE FREQUENCY CONVERTERS SERIES 32

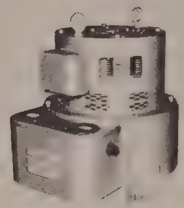
Available both in standard designs and to customer specifications—in ratings from 0.5 to 15 KVA. Variacs supplied with unit for voltage adjustment. Other frequency variations available.

MODEL NO.	KVA RATING	PHASE OUT	VARIABLE FREQUENCY	OUTPUT VOLTAGE
32-037	2.5	1	45-65 Hz	100-140/180-240
32-040	5	3	45-65 Hz	105-125/183-217
32-002	1	3	380-420 Hz	105-125/183-217
32-022	1	1	380-420 Hz	105/127
32-016	5	3	380-420 Hz	105-125/183-127
32-038	5	1	380-420 Hz	100-140/180-240
32-035	10	3	380-420 Hz	105-125/183-217
32-043	15	3	380-420 Hz	105-125/183-217

LIGHTWEIGHT 400 Hz ENGINE-GENERATORS

Lightweight 400 Hz permanent magnet engine-generators are available with 1Ø, or 3Ø, or DC, or dual AC/DC outputs. Applications include: geophysical, navigation, and communication systems; also fish conservation.

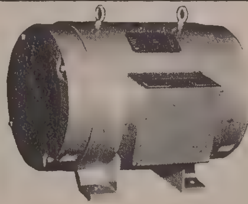
MODEL NO.	KVA RATING	DC/PHASE OUT	OUTPUT VOLTAGE	WEIGHT
31-001	0.5	1Ø AC	115/230	43
31-002	0.5	DC/1Ø AC	115/230	44
31-008	0.75	3Ø AC	115/200	50
31-014	0.5	DC	250/500	44



VOLTAGE REGULATED 60 TO 400 Hz FREQUENCY CONVERTERS

This new, Series 39, Regulated, Vertical Frequency Converter combines the "No-Brush" permanent magnet generator together with control windings and simplified sensing electronics, to provide both the traditional "Brushless" rugged design and a closely regulated 400 Hz power system. Voltage regulation is ± 1.5% no load to full load, 0.8 to 1.0 power factor, with a voltage adjustment feature of ± 5%.

MODEL NO.	KVA RATING	VOLTAGE OUTPUT	VOLTAGE REGULATION	PHASE IN/OUT
39-001	5	120/208	±1.5%	3/3
39-002	5	115/230	±1.5%	3/1
39-004	6.5	120/208	±1.5%	3/3



60 TO 180 Hz, 360 Hz, 840 Hz FREQUENCY CONVERTERS FOR HIGH FREQUENCY TOOLS, MOTORS, AND LIGHTING

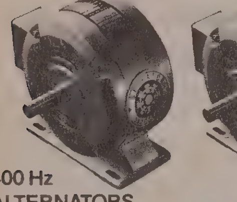
These frequency converters are available for powering high frequency metal-working tools, wood-working tools, motors, and lighting systems. The highly dependable, minimum maintenance, PERMANENT MAGNET BRUSHLESS DESIGNS are available in many ratings up to: 5 KVA for 180 Hz applications; 10 KVA for 360 Hz applications; and 30 KVA for 840 Hz applications.

GEORATOR™ CORPORATION
Makers of NOBRUSH® power systems
9617 Center Street • P.O. Box 70
Manassas, Virginia 22110
Telephone (703) 368-2101

GEORATOR™ CORPORATION PERMANENT MAGNET ALTERNATORS

FEATURES:

☐ High Efficiency
☐ Excellent Wave Form
☐ Stable Output Voltage
☐ Short Circuit Immunity
☐ High Overload Capacity
☐ Essentially "0" RF Noise
☐ Brushless
☐ Compact Design
☐ Cool Operation



400 Hz ALTERNATORS PERMANENT MAGNET

The original, revolutionary, "NoBrush" generator. Permanent magnets yield stability, reproducibility, ruggedness and virtually zero R.F. noise. Available in large variety of ratings, frequencies and voltages. Supplementary windings with rectifiers available for D.C. output.

400 Hz ALTERNATORS

Model No.	KVA Rating	Phase Out	Speed RPM	Dimensions H"/L"/Weight
36-001	0.25	1	3428	8¼"/4 1/16"/17 lbs.
36-003	0.5	1	3428	8¼"/4 1/16"/22 lbs.
36-030	0.5	3	3428	8¼"/4 1/16"/21½ lbs.
36-006	1.0	1	1714	12 3/16"/4 9/16"/35½ lbs.
36-007	1.0	3	1714	13 3/16"/4 9/16"/35½ lbs.
36-008	2.0	3	1714	13 3/16"/4 9/16"/45 lbs.
36-009	2.5	1	1714	17¼"/6¾"/105 lbs.
36-010	5.0	1	1714	17¼"/6¾"/137 lbs.
36-011	5.0	3	1714	17¼"/6¾"/103½ lbs.
36-012	7.5	3	1714	17¼"/6¾"/120 lbs.
36-013	10.0	3	1714	17¼"/6¾"/135 lbs.
36-151	15.0	3	1714	25"/11.2"/310 lbs.
36-152	25.0	3	1714	25.3"/17"/730 lbs.

☐ Alternator Frequencies Available Include: 50, 60, 120, 180, 240, 300, 360, 420, 840 and 1000 Hz.

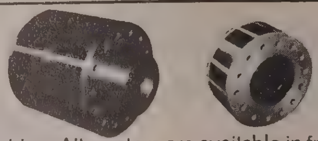
☐ Units are Available with:
- Standard and Non-Standard AC Voltages.
- Multiple DC Outputs/Low Voltage taps.
- Special Housings for Flange Mountings.
- Double Shafts.
- Militarized Construction.

60 Hz ALTERNATORS 50 Hz ALTERNATORS PERMANENT MAGNET

These industrial type generators provide output voltage stability within ±1% for constant load and constant driving speed (from cold to hot and ambient temperatures of −20° F to 130° F).

MODEL NO.	KVA RATING	PHASE OUT	OUTPUT VOLTAGE NOMINAL	FREQUENCY Hz	SPEED RPM	DIMENSIONS H"L"/WEIGHT
36-138	0.5	1	115/230	60	1800	12/10.3/90 lbs.
36-103	1.0	3	120/208	60	1800	12/10.3/90 lbs.
36-021	1.5	1	115/230	60	1800	14/19/185 lbs.
36-149	2.5	3	120/208	60	1800	14/19/185 lbs.
36-135	2.5	1	115/230	60	1800	14/19/200 lbs.
36-006	5.0	3	120/208	60	1800	14/19/200 lbs.
36-154	10.0	3	120	60	3600	18/25/753 lbs.

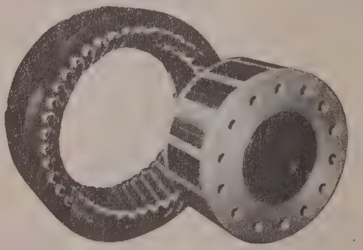
☐ Units are available with 50 Hz output.



APPLICATIONS:

Permanent Magnet Brushless Alternators are available in frequencies up to 1,000 Hz and in power ratings from 150 VA to 25 KVA. Wherever a rugged, continuous duty, industrial type, long life generator is required for:

- Special industrial applications 120 Hz, 180 Hz, 360 Hz.
- High frequency power up to 1,000 Hz.
- Low frequency power 60 Hz, 50 Hz or lower.
- Variable frequency....
- Electrical power source in hazardous locations.
- Military 400 Hz electronic equipment.
- Source of multiple AC outputs for rectification to DC power.
- Power static exciter—voltage regulators of large engine generators.
- Pilot excitation and field flashing of large generators.
- Tachometer feedback for large rotating apparatus.
- Lighting Systems.
- Electric brake excitation.
- Power for process control equipment in hazardous environments.
- Special vehicular applications.
- As computer peripheral rotating power supply providing basic power, line isolation, ride through, and multiple outputs.



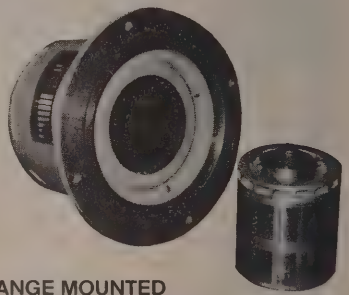
ROTORS AND STATORS

Separate permanent magnet rotors and stators are available for a wide range of OEM applications engineered to fit customer shaft or shaft extensions. From speeds as low as 720 RPM to 12,000 RPM in selected ratings. In power ratings from 50 VA to 25 KVA.

TOTALLY ENCLOSED AND EXPLOSION PROOF

Totally enclosed and explosion proof designs are available in selected ratings. Some typical units are:

MODEL NO.	KVA RATING	PHASE OUT	VOLTAGE OUT	FREQUENCY/ RPM	DESCRIPTION
36-168	1.5	1	120	60 Hz/1800	Totally enclosed.
36-173	1.5	1	115/230	60 Hz/1800	Explosion Proof.



FLANGE MOUNTED ROTORS AND STATORS

Cast aluminum alloy housings to fit on customer stub shaft.

SPECIAL PM DESIGNS

Examples of special 2 bearing units of unique industrial application-

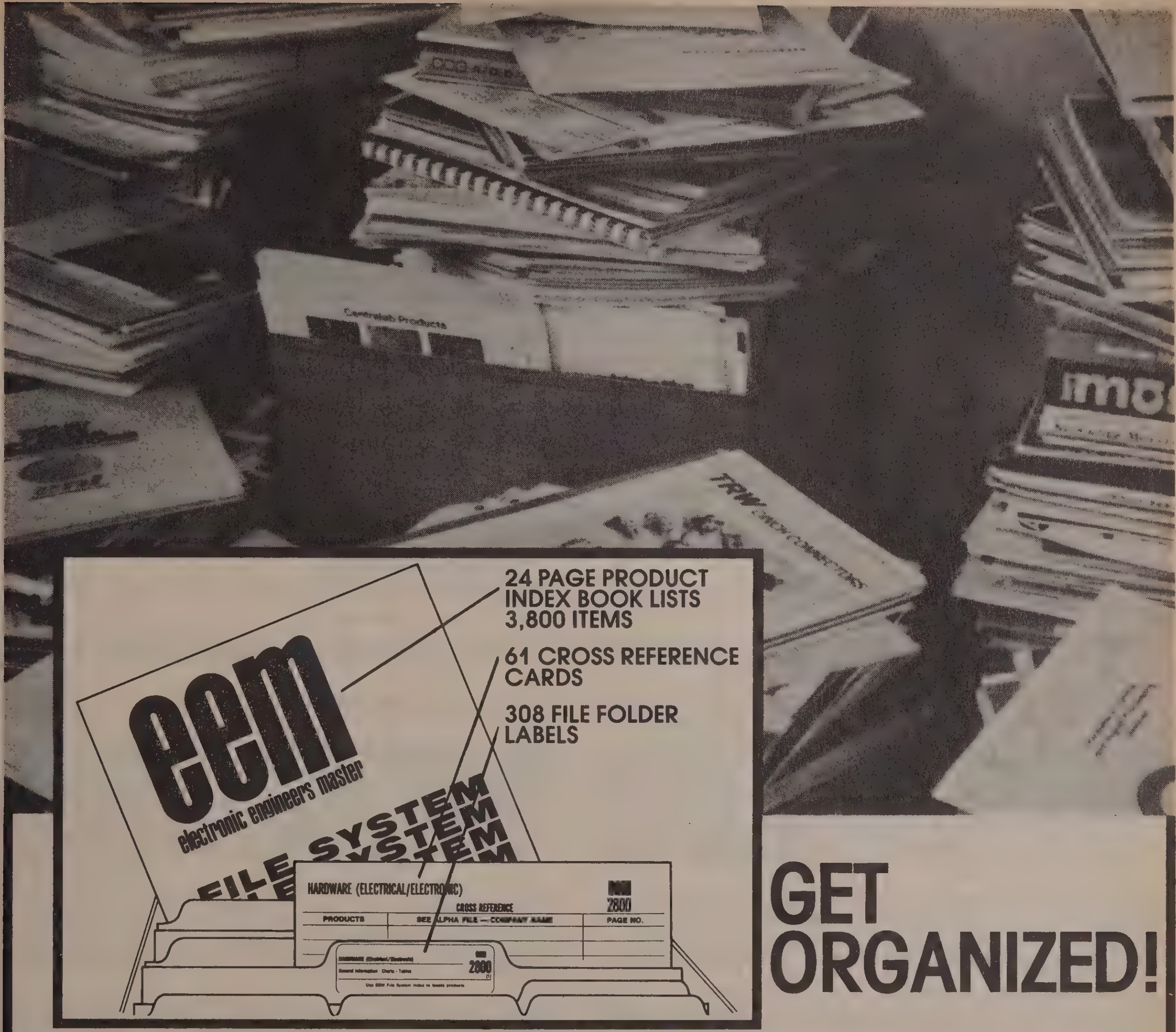
MODEL NO.	RATING	PHASE OUT	VOLTAGE OUT	DESCRIPTION
36-094	165 watts	DC	5, 12, 24, 48 VDC	Multiple DC outputs for computer peripheral.
36-169	2.5 KVA	1Ø	240 VAC	1000 Hz, 4286 RPM Unique Industrial Application.
36-167	3.0 KVA	3Ø	115/200 VAC	200 Hz, 3000 RPM Vehicular application.

GEORATOR T.M.
CORPORATION

Makers of NOBRUSH® power systems

P.O. Box 70
9617 Center Street
Manassas, Virginia 22110
Telephone (703) 368-21

TELEX 892-431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Hipotronics

Automatic Voltage Regulators

THREE PHASE INPUT VOLTAGE RANGE: +9%, -14% OF NOMINAL

INPUT: 240 Volts, 220 Volts, 208 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
40	17	A240-40Y	A	10	300 (136)
60	25	A240-60Y	A	10	300 (136)
100	42	A240-100Y	A	10	350 (159)
150	62	A240-150Y	B	10	550 (249)
200	83	A240-200Y	B	10	650 (295)
300	125	A240-300Y	B	10	700 (318)
400	166	A240-400Y	C	10	850 (386)
500	208	A240-500Y	C	10	950 (431)
600	249	A240-600Y	C	10	1000 (454)
700	291	A240-700Y	C	10	1150 (522)
800	333	A240-800Y	D	10	1200 (544)

INPUT: 415 Volts, 380 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
40	29	A415-40Y	A	15	400 (181)
60	43	A415-60Y	A	15	440 (200)
100	72	A415-100Y	B	15	620 (281)
150	108	A415-150Y	B	15	800 (363)
200	144	A415-200Y	C	15	880 (399)
300	216	A415-300Y	C	15	1000 (454)
400	288	A415-400Y	C	15	1040 (472)
500	359	A415-500Y	C	15	1200 (544)
600	431	A415-600Y	D	15	1270 (576)
700	503	A415-700Y	D	15	1550 (703)
800	575	A415-800Y	E	15	1750 (794)

INPUT: 480 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
40	33	A480-40Y	A	20	450 (204)
60	50	A480-60Y	A	20	500 (227)
100	83	A480-100Y	B	20	700 (318)
150	125	A480-150Y	B	20	950 (431)
200	166	A480-200Y	C	20	1000 (454)
300	249	A480-300Y	C	20	1200 (544)
400	333	A480-400Y	D	20	1350 (612)
500	416	A480-500Y	D	20	1400 (635)
600	499	A480-600Y	D	20	1550 (703)
700	582	A480-700Y	E	20	1900 (862)
800	665	A480-800Y	E	20	2000 (907)

THREE PHASE INPUT VOLTAGE RANGE: ± 20% OF NOMINAL

INPUT: 240 Volts, 220 Volts, 208 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
40	17	D240-40Y	A	10	375 (170)
60	25	D240-60Y	A	10	400 (181)
100	42	D240-100Y	B	10	450 (204)
150	62	D240-150Y	B	10	700 (317)
200	83	D240-200Y	C	10	760 (345)
300	125	D240-300Y	C	10	820 (372)
400	166	D240-400Y	D	10	1000 (454)
500	208	D240-500Y	D	10	1180 (535)
600	249	D240-600Y	D	10	1450 (658)
700	291	D240-700Y	E	10	1730 (785)
800	333	D240-800Y	E	10	1800 (816)

INPUT: 415 Volts, 380 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
40	29	D415-40Y	A	15	475 (215)
60	43	D415-60Y	A	15	550 (249)
100	72	D415-100Y	B	15	700 (318)
150	108	D415-150Y	B	15	900 (408)
200	144	D415-200Y	C	15	1000 (454)
300	216	D415-300Y	C	15	1150 (522)
400	288	D415-400Y	D	15	1450 (658)
500	359	D415-500Y	D	15	1600 (726)
600	431	D415-600Y	E	15	1900 (862)
700	503	D415-700Y	E	15	2200 (998)
800	575	D415-800Y	E	15	2500 (1134)

INPUT: 480 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
40	33	D480-40Y	A	20	500 (227)
60	50	D480-60Y	A	20	600 (272)
100	83	D480-100Y	B	20	800 (363)
150	125	D480-150Y	B	20	1000 (454)
200	166	D480-200Y	C	20	1140 (517)
300	249	D480-300Y	C	20	1300 (590)
400	333	D480-400Y	D	20	1650 (748)
500	416	D480-500Y	D	20	1800 (816)
600	499	D480-600Y	E	20	2700 (1225)
700	582	D480-700Y	E	20	2950 (1338)
800	665	D480-800Y	E	20	3800 (1724)

*Approx. volts per second

Sizes and weights are subject to change. If sizes and weights are critical, request drawing from factory.

Hipotronics Inc. ■ P.O. Drawer A, Route 22, Brewster, New York ■ Phone (914) 279-8091 ■ Twx: 710-574-2420 HIPO BRWS NY

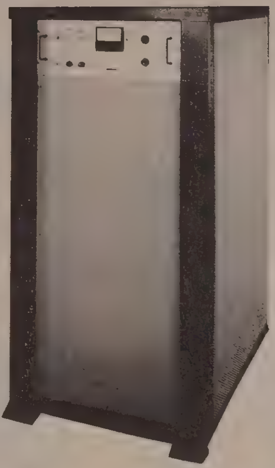
Hipotronics

Automatic Voltage Regulators

CABINET

CABINET DIMENSIONS

CABINET	WIDTH in (mm)	DEPTH in (mm)	HEIGHT in (mm)
A	25″ (635)	30″ (762)	30″ (762)
B	25″ (635)	30″ (762)	52″ (1320)
C	25″ (635)	30″ (762)	72″ (1829)
D	30″ (762)	42″ (1067)	72″ (1829)
E	36″ (914)	48″ (1219)	76″ (1930)



PESCHEL AUTOMATIC VOLTAGE REGULATOR™

- 99% EFFICIENT
- NO WAVEFORM DISTORTION
- VERY LOW INTERNAL IMPEDANCE
- NO PHASE SHIFT
- NO EFFECT ON POWER FACTOR
- UP TO 20 VOLTS PER SECOND CORRECTION RATE
- TEMPERATURE RANGE -10°C to +50°C
- OUTPUT ACCURACY ±1% ADJUSTABLE TO ±5%
- VOLTMETER WITH EXPANDED SCALE
- DRY TYPE, CONVECTION COOLED

The Peschel Automatic Voltage Regulator is a 50/60 Hz., wye connected, dry-type, convection cooled, ac line voltage regulator. It is designed to maintain line voltage to within ±1% of nominal, with an input voltage variation of +9/-14% or ±20%, due to line and/or load changes. The PAVR introduces no harmful waveform distortion, has a very low internal impedance, causes no phase shift, is insensitive to load power factor, has no effect on system power factor, and is approx. 99% efficient.

The PAVR is neither an impedance changing nor a ferroresonant device and uses no SCRs. It is an electromechanical device using electro-magnetic transformer action to regulate. Its high efficiency and reliability make it the best solution to today's voltage problems.

ONE PHASE INPUT VOLTAGE RANGE: +9%, -14% OF NOMINAL

INPUT: 240 Volts, 220 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. * (kg)
50	12	A240-50	A	9	275 (125)
100	24	A240-100	B	9	300 (136)
150	36	A240-150	B	9	350 (159)
200	48	A240-200	B	9	380 (172)
300	72	A240-300	B	9	510 (231)
400	96	A240-400	B	9	580 (263)
500	120	A240-500	C	9	620 (281)
600	144	A240-600	C	9	750 (340)
700	168	A240-700	C	9	900 (408)

INPUT: 480 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
50	24	A480-50	A	18	350 (159)
100	48	A480-100	A	18	450 (204)
150	72	A480-150	A	18	600 (272)
200	96	A480-200	B	18	750 (340)
300	144	A480-300	B	18	850 (386)
400	192	A480-400	B	18	1050 (476)
500	240	A480-500	C	18	1200 (544)
600	288	A480-600	C	18	1300 (590)
700	336	A480-700	C	18	1500 (680)

ONE PHASE INPUT VOLTAGE RANGE: ±20% OF NOMINAL

INPUT: 240 Volts, 220 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
50	12	D240-50	A	15	330 (150)
100	24	D240-100	B	15	350 (159)
150	36	D240-150	B	15	400 (181)
200	48	D240-200	B	15	475 (215)
300	72	D240-300	B	15	650 (295)
400	96	D240-400	C	15	800 (363)
500	120	D240-500	C	15	825 (374)
600	144	D240-600	C	15	1000 (454)
700	168	D240-700	C	15	1200 (544)

INPUT: 480 Volts

AMPS	KVA	MODEL	CABINET	CORRECTION RATE *	WEIGHT lbs. (kg)
50	24	D480-50	A	25	450 (204)
100	48	D480-100	B	25	575 (261)
150	72	D480-150	B	25	800 (363)
200	96	D480-200	C	25	925 (420)
300	144	D480-300	C	25	1000 (454)
400	192	D480-400	C	25	1450 (658)
500	240	D480-500	C	25	1590 (721)
600	288	D480-600	C	25	1700 (771)
700	336	D480-700	C	25	1900 (862)

*Approx. volts per second

Sizes and weights are subject to change. If sizes and weights are critical, request drawing from factory.

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HITRAN
Division of AGEX

Key source for reliable magnetic components, power supplies and control systems for over 40 years.

500VA TO 150KVA LINE CONDITIONED POWER SYSTEMS

Also see our catalog pages under TRANSFORMERS and DC POWER SOURCES.

UPS SERIES — UNINTERRUPTIBLE POWER SYSTEMS

The ultimate in line conditioning equipment. The Hitran UPS Series provides low distortion, sinusoidal, computer grade, voltage regulated power under all line conditions. The UPS Series is designed to eliminate more than 99% of common power line problems — power outages, line interruptions, brownouts and short term transients. It protects the load against line disturbances resulting from switching in the transmission system, clearing of line faults, starting of motor loads and even lightning strikes. The associated battery bank is sized to provide continuous power during line interruptions for the period required for an orderly shutdown of computer or process control systems.

Standard Features

- Online System Design - No switchover time in the event of power interruption.
- Easy Maintenance - Subassemblies are modular for rapid trouble shooting or replacement.
- High Efficiency - Total system efficiency ranges from 72% to 80% depending on KVA size. Inverter efficiency - 80% to 89%.
- Auto Electro-mechanical Bypass Switch with Manual Override - Standard on all models.
- Static Bypass Switch (SBS) - Operates automatically within ¼ cycle. Equipped with Automatic Retransfer and Manual Override. Optional on 1KVA & 2.5 KVA single phase models.
- Double Isolation - Doubly isolated from input line via input isolation transformer and output ferroresonant transformer.
- Battery Protection - Automatic current limit circuit in the battery charger for built-in protection. Low battery shutdown disconnects battery from load after extended AC line failure.
- Operating Temperature - 0 to 50°C.

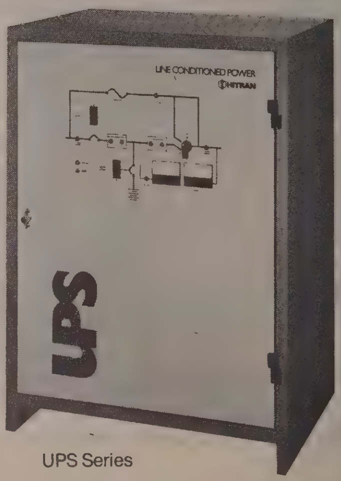
Electrical Specifications

Input

- Input Voltage Range - ±10% of nominal
- Input Frequency range - ±5% of nominal
- Power Factor - 0.8 lagging, nominal.

Output

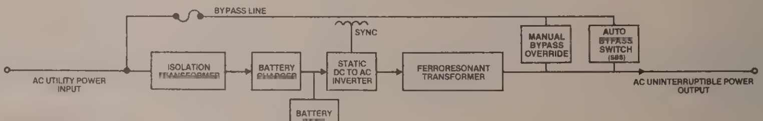
- Output Harmonic Distortion - Less than 5% total harmonic distortion and less than 3% of any single harmonic.
- Output Voltage Regulation - Dynamic: ±10% with recovery to ±3% in 50ms as a result of step load changes or AC line failure. Static: ±3% for the combined effects of line, load and temperature.
- Output Frequency Stability - ±0.25%
- Output Frequency Regulation - ±1.0% when not in synchronization with input frequency. (Units are automatically synchronized to input frequency when within range of nominal ±1Hz.)
- Output Power - Provides full output KVA for load power factors from 0.8 lagging to unity. (HITRAN's UPS will operate with such highly reactive loads as Ultra Isolation Transformers.)
- Overload Capacity - 125% for 20 minutes. 140% for 10 minutes. (The Bypass Feature automatically transfers to bypass line if an overload causes an inverter output reduction.)



UPS Series

Battery Packs

- Battery Types - The UPS is compatible with any type of battery of proper voltage and capacity. Hitran offers a complete selection of Lead-Calcium, wet and gel-cell battery packs specifically designed for UPS applications. Other battery types available.
- Reserve Time - Standard packs available with reserve time from 10 to 120 minutes. Longer times available.



TYPICAL UPS BLOCK DIAGRAM

	UPS		60Hz UPS INPUT (1)		60Hz UPS OUTPUT (3)		INVERTER INPUT		DIMENSIONS (5) (inches)			WEIGHT
	OUTPUT KVA	PART NO	VOLTAGE	CURRENT (2)	VOLTAGE	CURRENT	VOLTS DC NOMINAL	CURRENT DC MAXIMUM (@ VDC MIN.)	H	W	D	APPROX. (lbs.)
SINGLE PHASE INPUT	1	BA0206-00	120 (1φ)	20	120 (1φ)	8.3	48Vdc	29Adc	52	38	24	450
		BA0206-03	208 (1φ)	12	208 (1φ)	4 8	48Vdc	29Adc	52	38	24	450
		BA0206-04 (4)	120/240 (1φ)	10	120/240 (1φ)	4.2	48Vdc	29Adc	52	38	24	450
	2.5	BA0207-00	120 (1φ)	41	-120 (1φ)	21	48Vdc	73Adc	52	38	24	675
		BA0207-03	208 (1φ)	24	208 (1φ)	12	48Vdc	73Adc	52	38	24	675
		BA0207 04 (4)	120/240 (1φ)	21	120/240 (1φ)	11	48Vdc	73Adc	52	38	24	675
	5	BA0208-00	120 (1φ)	90	120 (1φ)	42	120Vdc	55Adc	62	42	24	1250
		BA0208 02	208 (1φ)	52	208 (1φ)	24	120Vdc	55Adc	62	42	24	1250
		BA0208-01 (4)	120/240 (1φ)	45	120/240 (1φ)	21	120Vdc	55Adc	62	42	24	1250
	7.5	BA0209 00	120 (1φ)	130	120 (1φ)	63	120Vdc	84Adc	62	42	24	1450
		BA0209-02	208 (1φ)	75	208 (1φ)	36	120Vdc	84Adc	62	42	24	1450
		BA0209-01 (4)	120/240 (1φ)	65	120/240 (1φ)	32	120Vdc	84Adc	62	42	24	1450
	10	BA0237 02	208 (1φ)	101	208 (1φ)	48	120Vdc	112Adc	62	42	24	1750
		BA0237-01 (4)	120/240 (1φ)	87	120/240 (1φ)	42	120Vdc	112Adc	62	42	24	1750
	15	BA0238-02	208 (1φ)	150	208 (1φ)	72	180Vdc	112Adc	80	58	30	2100
		BA0238-01 (4)	120/240 (1φ)	130	120/240 (1φ)	63	180Vdc	112Adc	80	58	30	2100
THREE PHASE INPUT	5	BA0250-00	208-240/480 (3φ)	30-26/13	120 (1φ)	42	120Vdc	55Adc	62	42	24	1250
	7 5	BA0251 00	208 240/480 (3φ)	45 39/19	120 (1φ)	63	120Vdc	84Adc	62	42	24	1450
	10	BA0252-00	208-240/480 (3φ)	60-52/26	120 (1φ)	83	120Vdc	112Adc	62	42	24	1750
	15	BA0253-00	208 240/480 (3φ)	89-77/39	120 (1φ)	125	180Vdc	112Adc	80	58	30	2100
	20	BA0254-00	208-240/480 (3φ)	117-101/51	120 (1φ)	167	180Vdc	149Adc	80	58	30	2600

(1) 50Hz units and special voltages available. Consult factory.
(2) Worst case - Discharged batteries, at full load and at low input line voltage.
(3) All Outputs are Single Phase, ± 1% of nominal.
(4) Units can operate as 120/240V split-phase 3-wire systems or 240V-1φ 2-wire systems
(5) Dimensions listed are not to be used for construction purposes.

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HITRAN

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Key source for reliable magnetic components, power supplies and control systems for over 40 years.

500VA TO 150KVA LINE CONDITIONED POWER SYSTEMS

Also see our catalog pages under TRANSFORMERS and DC POWER SOURCES.

SFR SERIES — SINUSOIDAL FERRORESONANT REGULATOR

The SFR provides low distortion, sinusoidal, computer grade power. It provides a high degree of electrical noise rejection as well as output voltage regulation. Designed to eliminate power line problems caused by brownouts, short term transients and electrical noise, the SFR protects against switching disturbances, clearing of line faults, starting of motor loads and lightning strikes.

Standard Features

- Computer grade sinusoidal output - less than 5% harmonic distortion.
- Electrical noise rejection - Common Mode: greater than 120dB, 1 KHz to 1MHz. - Transverse Mode: greater than 60dB, 10KHz to 1MHz.
- Wide input voltage range - +10%, −20% of nominal input
- Tightly regulated output - ±1% of nominal output voltage.
- Input to Output Coupling Capacitance - Less than 0.005pF.
- Operating Temperature - 0-50°C.

Electrical Specifications

Input

- Nominal Standard Voltages - 1φ: 120, 208, 240, 480 (+10, −20%) 3φ: 208Δ, 240Δ, 480Δ (+10, −20%)
- Frequency - 60Hz or 50Hz ±2Hz.

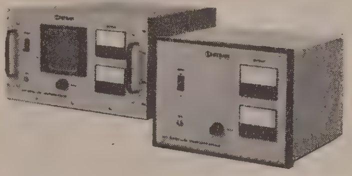
Output

- 1φ - 120/240-277V ±1%
- 3φ - 208Y/120V ±1%
- 3φ - 480Y/277V ±1%
- Frequency - Same as Input.
- Regulation - Static: ±1%; Dynamic: ±4% with recovery to ±1% in 50ms.
- Load PF - 0.8 lagging
- Overload Recovery - Automatic within 50ms.
- Ride Through - Continuous power during line outages lasting as long as 25ms (1.5 cycles).
- Protection - Self current limiting
- Efficiency - Greater than 90%

Complete Line Conditioner Systems

The SFR Series is also available as a Complete Line Conditioner System. It includes all the standard features listed plus the following accessories:

- *Output Ammeter and Voltmeter*
- *Input Circuit Breaker*
- *Input Power "ON" Indicating Light*
- *Output Fusing and Receptacles*
- *Input Receptacles or Line Cord*
- *19-inch Rack Mount or Free-Standing Desk Top Assembly*



SFR Series - Rack Mount and Desk Top Complete Systems.

SFR SERIES – SINGLE PHASE

60Hz • 600V CLASS • 220°C INSULATION CLASS • NEMA I ENCLOSURE

	DIMENSIONS IN INCHES*			APPROX. WT. LBS.	TYPE MOUNTING
KVA	H	W	D		
0.5	22	18	17	75	Floor/Wall
1	22	18	17	100	Floor/Wall
2	22	18	17	160	Floor/Wall
3	33	24	20	225	Floor (W)
5	33	24	20	350	Floor (W)
7.5	39	30	20	490	Floor (W)
10	39	30	20	600	Floor (W)
15	43	36	26	815	Floor
20	43	36	26	1070	Floor

(W) Wall mounting brackets available

SFR SERIES–THREE PHASE

60Hz • 600V CLASS • 220°C INSULATION CLASS • NEMA I ENCLOSURE

	DIMENSIONS IN INCHES*			APPROX. WT. LBS.	TYPE MOUNTING
KVA	H	W	D		
3	16	40	12	250	Floor
6	25	56	17	445	Floor
9	25	56	17	575	Floor
15	43	36	26	970	Floor
22.5	43	36	26	1300	Floor
30	48	48	32	1690	Floor
45	60	54	40	2325	Floor
60	60	54	40	2975	Floor

UIS SERIES — ULTRA ISOLATION SYSTEM

The UIS effectively eliminates common-mode and transverse-mode power line noise in transformer applications for computers, programmable controllers and sensitive instruments.

Standard Features

- High degree of electrical noise rejection,- Common-mode: greater than 140dB, 1KHz to 1Mhz; Transverse-mode: greater than 60db, 10KHz to 1MHz.
- Input to output capacitance coupling - 0.001pF
- DC insulation resistance - 10,000MΩ
- Dielectric strength - 4000Vac min.
- Operating Temperature - 0-50°C
- Efficiency - 97% min. at full load.
- Line Cord & Output Receptacles - Standard on 120V single phase models up through 2.4KVA.

Electrical Specifications

	KVA	INPUT (V)	Hz	OUTPUT (V)
1φ	0.5-2.4	120	50/60	120
	2.5	120/208-240	50/60	120/240
	5-20	120/208-240 or-480	60	120/240
3φ	3	208Y/120	60	208Y/120
	7.5	208Δ or 240Δ	60	208Y/120
	15 & 22.5	208Δ, 240Δ, or 480Δ	60	208Y/120
	30-150	208-240/480Δ	60	208Y/120 or 480Y/277

LINE CONDITIONED POWER
HITRAN
UIS
UIS

UIS Series

UIS SERIES–SINGLE PHASE

50/60Hz • 600V CLASS • 220°C INSULATION CLASS • NEMA I ENCLOSURE

	DIMENSIONS IN INCHES*			APPROX. WT. LBS.	TYPE MOUNTING
KVA	H	W	D		
0.5	4.9	7.2	9.5	25	Floor/Wall
1.0	6.8	8.5	10.2	40	Floor/Wall
2.4	6.8	8.5	12.8	60	Floor/Wall
2.5	6.8	8.5	12.8	60	Floor/Wall
5.0	6.8	8.5	14.8	90	Floor/Wall
7.5	6.8	8.5	18.5	145	Floor/Wall
10.0	15.0	12.0	27.0	235	Floor/Wall
15.0	15.0	12.0	29.0	280	Floor/Wall
20.0	15.0	12.0	31.0	355	Floor/Wall

UIS SERIES–THREE PHASE

60Hz • 600V CLASS • 220°C INSULATION CLASS • NEMA I ENCLOSURE

	DIMENSIONS IN INCHES*			APPROX. WT. LBS.	TYPE MOUNTING
KVA	H	W	D		
3.0	9.2	39.0	10.2	140	Floor
7.5	9.2	39.0	12.2	205	Floor
15.0	9.2	39.0	14.8	300	Floor
22.5	9.2	39.0	18.5	470	Floor
30.0	16.4	52.0	27.0	825	Floor
45.0	16.4	52.0	29.0	1000	Floor
60.0	16.4	52.0	31.0	1200	Floor
75.0	48.0	48.0	32.0	1600	Floor
100.0	48.0	48.0	32.0	1900	Floor
130.0	60.0	54.0	40.0	2400	Floor
150.0	60.0	54.0	40.0	2700	Floor

*Dimensions listed are not to be used for construction purposes.

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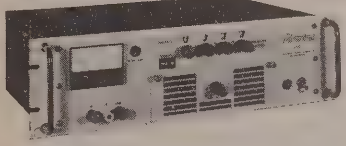
Powertron SOLID STATE AC POWER SUPPLIES

The Powertron AC Power Supplies provide stable, low distortion, AC power at frequencies within the audio frequency spectrum. These highly reliable and versatile power sources find wide application in calibration and test stations, motor drives, gyro wheel supplies, laboratory use, military component testing, and operating foreign equipment. These supplies may be used whenever it is necessary to provide AC power at a frequency not available from the power lines.

The various supplies feature all solid state construction, wide operating frequency range, low distortion, and a wide variety of output voltages and impedances. The units are designed to be used in modular form so that a single unit can provide single phase output, and two or three units may be used to provide two phase or three phase outputs respectively.



AMPLIFIER SPECIFICATIONS

(Series 250S, Illustrated)

Output Circuit:
Single phase, isolated (Ground terminal is provided for optional grounding of output.)

Output Power:
250 VA

Load Power Factor:
.7 Lead through .7 Lag for full power output. Useable to .2 at reduced power.

Output Voltage Range:
0-130 V RMS (An output connector provided at the rear of the unit may readily be reconnected to provide optimum power output at other voltages. Ranges available are 0-260 V, 0-190 V, 0-130 V, 0-90 V, 0-75 V, 0-67 V, 0-60 V, 0-38 V, 0-30 V, and 0-17 V.

Output Frequency Range:
45 Hz to 10,000 Hz for full power out. 20 Hz to 20,000 Hz at reduced power.

Output Distortion:
0.1% mid band

Load Regulation:
Factory set to ±0.5% mid band (A control is provided for zero regulation adjustment over most of frequency range.)

Line Regulation:
±0.1% for ±5% line change.

Transient Response:
50 Microseconds.

Hum Level:
80 db approx. below rated output voltage.

Thermal Overload Protection:
Output transistors protected by thermal cut-out circuit.

Short Circuit Protection:
Output may be shorted indefinitely without damage to unit.

External Amplifier Input:
An input connector is provided at the rear of the unit when it is desired to drive the amplifier from an external source. Model XA-1 plug-in Module is required for this mode of operation.

External Sync. Input:
An input connector is provided at the rear when it is desired to synchronize the plug in oscillator with an external frequency source.

Convenience Outlets:
Two convenience outlets controlled by the power switch are provided at the rear of the unit. These permit single control operation of one or two additional amplifiers when 2ø or 3ø outputs are required. When not used for this purpose, the outlets may also be used to turn on auxiliary equipment which is mounted in the same test console.

Meter:
A voltmeter with range of 0-150 V RMS is provided to monitor the output voltage.

Input Power:
115 V or 230 V, 50-60 Hz (400 Hz input available).

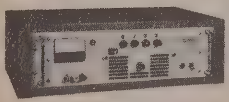
Ambient Temperature Range:
0° C to 55° C.

Dimensions:
5¼ x 19″ Rack Panel x 14″ Deep.

Weight:
75 Lbs. Approx.

The ordering designations listed below are for convenience of specifying the components required for various power supply configurations. To select an appropriate unit for your requirements first determine which category, 1-phase, 2-phase, or 3-phase, is most suitable to your intended load. Then use the ordering designation adjacent to the required output power within that category. For the complete ordering designation replace the asterisk with the ordering code letters of the plug-in-oscillator listed.

10 Power Supplies (For use with Single Phase Loads)



Model 500S-1-K

Ordering Designation	Total Output Power	Output Voltage Range	Input
80S-1-*	80VA	17, 30, 38, 60, 67, 75, 90, 130, 190, 260	1 phase 115, 230
250S-1-*	250VA		
350S-1-*	350VA		
500S-1-*	500VA		
1000S-1-*	1KVA	65, 76, 130, 140, 150, 260, 300	3 phase line to line 190, 208, 225, 380, 450
1500S-1-*	1.5KVA		
2000S-1-*	2KVA		
3000S-1-*	3KVA		
4000S-1-*	4KVA	130, 150, 260, 280, 300	
6000S-1-*	6KVA		

20 - 30 (Open Delta) Power Supplies

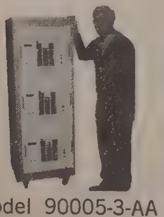
(For use with 2ϕ loads and 3ϕ, 3 wire Delta Loads)

Model 500S-23-KK

Ordering Designation	Total Output Power	Output Voltage Range	Input
160S-23-*	160VA	17, 30, 38, 60, 67, 75, 90, 130, 190, 260	1 phase 115, 230
500S-23-*	500VA		
700S-23-*	700VA		
1000S-23-*	1KVA		
2000S-23-*	2KVA	65, 76, 130, 140, 150, 260, 300	3 phase line to line 190, 208, 225, 380, 450
3000S-23-*	3KVA		
4000S-23-*	4KVA		
6000S-23-*	6KVA		
8000S-23-*	8KVA	130, 150, 260, 280, 300, 600	

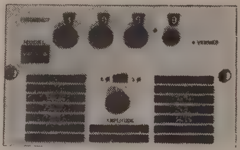
30 Wye-Delta Power Supplies

(For use with 3ϕ, 4 wire wye loads or 3ϕ, 3 wire, Delta Loads)



Model 90005-3-AA

Ordering Designation	Total Output Power	Output Voltage Range (line to neutral)	Input
240S-3-*	240VA	17, 30, 38, 60, 67, 75, 90, 130, 190, 260	1 phase 115, 230
750S-3-*	750VA		
1000S-3-*	1KVA		
1500S-3-*	1.5KVA		
3000S-3-*	3KVA	65, 76, 130, 140, 150, 260, 300	3 phase line to line 190, 208, 225, 380, 450
4500S-3-*	4.5KVA		
6000S-3-*	6KVA		
9000S-3-*	9KVA		
12000S-3-*	12KVA	130, 150, 260, 280, 300, 600	



PLUG-IN OSCILLATORS

Single phase (1ϕ) and polyphase (Pϕ) oscillators are available for both fixed frequency and variable frequency output. Polyphase oscillators include a switch on the front panel which provides either two-phase or three-phase output. Thus, the Pϕ oscillators are used in conjunction with two or three Powertron amplifiers to provide 2ϕ or 3ϕ power. With the exception of the Code S and Code SS Models, the output frequency of the variable frequency oscillators is determined by the setting of BCD rotary switches, the frequency being read directly on the switch dials. These oscillators are provided with Sync. capability which permits locking-in their output frequency with an external source of the same nominal frequency. The Code S and Code SS oscillators have their frequency determined by the continuous rotation of a multiturn potentiometer panel control. The output frequency for these oscillators is indicated on a precision digital LED readout.

CODE		FREQUENCY	ACCURACY
Single Phase	Poly Phase		
A	AA	400 Hz	0.1%
B	BB	60 Hz	0.1%
C	CC	Specify	0.1%
E	EE	Specify	0.001%
F	FF	Specify (2 Freq.)	0.1%
K	KK	10 Hz - 10 KHz	1.0%
L	LL	10 Hz - 100 Hz	1.0%
M	MM	100 Hz - 1 KHz	1.0%
N	NN	350 Hz - 450 Hz	0.25%
P	PP	300 Hz - 500 Hz	0.25%
Q	QQ	1 KHz - 10 KHz	1.0%
LM	LL MM	10 Hz - 1 KHz	1.0%
MQ	MM QQ	100 Hz - 10 KHz	1.0%
S	SS	10 Hz - 10 KHz	0.1%

A wide variety of special purpose plug-in oscillators is also available for use with the Powertron amplifiers.

WRITE FOR CATALOG 682

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Powertron SOLID STATE AC POWER SUPPLIES

MODEL 5700 BCD, IEEE BUS PROGRAMMER

The AC Power Programmer 5700 is used in conjunction with the various AC power amplifiers to provide precisely controlled frequency, amplitude, and phase angle displacement. The programmer includes the capability for 3 modes of control, by front panel BCD thumbwheel switches, by remote BCD signals, or by remote IEEE-488 GPIB. The modular construction of the programmer allows the user to purchase only the modules required for the application, and to expand the system as required. Thus, a single-phase application would require only a frequency module, and an amplitude module, a two-phase application requires a frequency module, two amplitude modules, and a phase shift module, and a three-phase system requires the full compliment of frequency module, three amplitude modules, and two phase shift modules. Remote programming is also optional and expandable in that separate modular plug-ins are available for remote BCD, or IEEE Bus operation.

The digital techniques employed in the frequency and phase modules of the programmer insure precise control of these functions. The amplitude modules provide servo loop control of the respective output amplifiers insuring precise amplitude stability and control. Local or remote programming for each function is selected by a front panel switch. Remote programming status is displayed on LED indicators of the respective control modules.

SPECIFICATIONS:

FREQUENCY CONTROL MODULE — The frequency control module provides 3 programmable ranges with provisions for locking out any range. Frequency accuracy is ±.005% as determined by internal crystal reference oscillator.

Ranges:	40.00 Hz to 99.99 Hz in .01 Hz steps 40.0 Hz to 999.9 Hz in .1 Hz steps 40 Hz to 9999 Hz in 1 Hz steps
Distortion:	Less than 1%

AMPLITUDE CONTROL MODULE — The amplitude control module provides 2 ranges with provision for range programming when used with appropriately modified amplifiers. Independent or simultaneous programming capability is provided for polyphase applications.

Ranges:	0—130 volts RMS or 0—260 volts RMS
Resolution:	0.1 volt steps
Load Regulation:	±.01%
Line Regulation:	±.01%

PHASE SHIFT CONTROL MODULE — The phase shift control module provides precise digital phase control over the frequency range of the equipment. Overall phase displacement accuracy will depend upon the amplifier and amplifier load symmetry.

Range:	0 to 399 degrees
Resolution:	1 degree steps
Accuracy:	±0.1 degrees

BCD INTERFACE MODULE — The BCD interface module is interchangeable with the IEEE BUS Module and is readily installed by simply plugging in at the rear of the equipment. Appropriate interface connectors are included on the modules. The input is TTL compatible.

IEEE BUS INTERFACE MODULE — The IEEE Bus Module is interchangeable with the BCD interface module and is readily installed by simply plugging in at the rear of the equipment. The GPIB interface connector is included in the module. The module is microprocessor controlled with programming codes residing in PROM. This arrangement allows for modifications to meet special user requirements. Automatic diagnostics are provided to indicate incorrect character prefix, incorrect place, incorrect digit, incorrect function, and too low frequency. Error lights, and audible alarm indicate fault.

PLUG IN MODULES

MODEL XA

The Model XA module plugs into the various Powertron solid state series amplifiers in the same space normally provided for the plug-in oscillator. The circuit board in the XA module completes the external input circuit for the amplifier and provides a limited adjustment range for vernier control of the amplitude. This plug-in is used for each subsidiary amplifier (those not including the plug-in oscillator), when 2ϕ or 3ϕ amplifier combinations are specified, or when amplifiers are coupled together for higher single phase output power. It is also used when the amplifier is used with the Model 5700 Programmer.

MODEL XA-1

The XA-1 module is similar to the XA module described above except that it provides amplitude adjustment from zero to full output. This module is used primarily when it is desired to drive an amplifier with an external signal source or when individual amplitude control is desired for the subsidiary amplifier of a 2ϕ or 3ϕ system.

INTERCONNECTING CABLE SETS

The cables specified below are for the purpose of interconnecting two or more Powertron solid-state series amplifiers for the various output configurations. Each set consists of an input cable assembly and an output cable assembly. The cables and connectors are factory wired to provide any of the standard output voltages for the various combinations of units. Output connector may readily be rewired by the user to provide any of the available full power output voltages. An appropriate cable set is normally supplied with the specified equipment at no additional charge. Additional cables may be purchased as required.

PART#	APPLICATION
CA1	Plug set only for Models 80S, 250S, 350S, or 500S
CA3	Interconnects 3 Model 80S, 250S, 350S or 500S for 3ϕ wye-delta output
CA5	Interconnects 2 Model 80S, 250S, 350S, or 500S for 1ϕ output
CA11	Plug set only for Model 1000S, 1500S, 2000S, or 3000S
CA12	Interconnects 2 Model 1000S, 1500S, 2000S, or 3000S for 1ϕ output
CA23	Interconnects 2 Model 80S, 250S, 350S, or 500S for 2ϕ or 3ϕ open delta output
CA31	Interconnects 3 Model 1000S, 1500S, 2000S or 3000S for 3ϕ wye-delta output
CA36	Interconnects 6 Model 2000S for 3ϕ wye-delta output
CA232	Interconnects 2 Model 1000S, 1500S, 2000S, or 3000S for 2ϕ or 3ϕ open delta output
CA234	Interconnects 4 Model 2000S for 2ϕ, or 3ϕ open delta output

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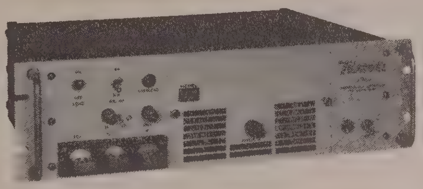
Powertron SOLID STATE AC POWER SUPPLIES

CONSTANT CURRENT AC SUPPLIES



In addition to constant voltage amplifiers a full line of constant current amplifiers is available. The inherent ability of these amplifiers to maintain a preset current through a load whose impedance may vary makes them ideally suited to the testing of ammeters, wattmeters, relays, circuit breakers, current transformers, and other current sensitive devices. These amplifiers may be driven by the plug-in oscillators. All amplifiers are protected for open load circuit conditions.

SPECIFICATIONS

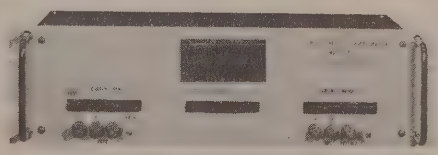
Output Frequency	Determined by plug-in oscillator
Current Regulation	±1% for loads ranging from short circuit to maximum rate load impedance for the respective amplifier.
Output Distortion	Less than 1%

The chart to the right lists the current ranges, compliance voltages, and impedance ranges for the various units available.

Constant current amplifiers may be used with similar outputs in parallel when it is desired to increase the current capacity. Constant current supplies may also be used for 3ϕ wye connected load applications. As the standard output transformers may not always provide the optimum current range and compliance voltage, special output transformers may be supplied to meet user requirements.

Model	Current Range Amps	Max. Compliance Voltage	Impedance Range Ohms
250S-1-CR	0—0.5 0—1 0—1.5 0—3.3 0—7.5 0—15	200 100 70 30 13 7	0—400 0—100 0—45 0—9 0—1.7 0—.45
500S-1-CR	0—1 0—2 0—3 0—6.5 0—15 0—30	200 100 70 30 13 7	0—200 0—50 0—23 0—4.5 0—.85 0—.23
1000S-1-CR	0—2 0—4 0—8	200 100 50	0—100 0—25 0—6
1500S-1-CR	0—3 0—6 0—12	200 100 50	0—66 0—16.5 0—4
2000S-1-CR	0—4 0—8 0—16	200 100 50	0—50 0—12.5 0—3
250S-1-CRH	0—1 0—10 0—50 0—200	100 10 2 0.5	0—100 0—1 0—.04 0—.0025
1000S-1-CRH	0—1 0—10 0—100 0—400	400 40 4 1	0—400 0—4 0—.04 0—.0025

POLYPHASE WATTMETER MODEL 600



FEATURES

- 1ϕ, 2ϕ, and 3ϕ power measurements
- DIRECT DIGITAL READOUT
- HIGH SENSITIVITY — NEGLIGIBLE INSTRUMENT LOSS
- WIDE FREQUENCY RANGE
- AUTOMATIC OVERLOAD PROTECTION
- ANALOG output — BCD output (optional)

The Model 600 is A TRUE THREE—WATTMETER instrument capable of measuring 3 independent loads simultaneously. As such, its operation is not limited to balanced 3ϕ loads, and may be used readily with wye or delta type loads. Front panel switches select the appropriate load or loads to be measured. Applications include laboratory and production testing of synchros, servo motors, 3ϕ motors, and other 1ϕ 2ϕ, and 3ϕ devices.

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eem

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A

AC alternating current
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AF audio frequency
AFC automatic frequency control
ALGOL algorithmic language
AM amplitude modulation
AND a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
AWG American wire guage

B

BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction code
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility system

C

CAD computer aided design
CAM computer aided manufacture
CATV cable television or community antenna television
CERMET ceramic metal element
Comm. communications
CMOS complementary metal-oxide semiconductor
CPS characters per second
CPU central processing unit

D

D/A digital to analog
DAC digital to analog converter
DC direct curent
DIL dual in-line
DIP dual in-line package
DPM digital panel meter
DTL diode transistor logic

E

EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EMC electromagnetic compatibility
EMI electromagnetic interference
EPROM electrically programmable ROM
ESR equivalent series resistance

F

FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G

GaAsFET gallium arsenide field effect transistor
GPIB general purpose interface bus

H

HF high frequency (3 to 30 MHz)
HIPOT test, measurement and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I

IC integrated circuit
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared

J

JFET junction field effect transistor
JMOS junction metal oxide semiconductor

K

kHz kilohertz (10^3 hertz)
KSR keyboard send receive

L

LC inductance capacitance
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LSI large scale integration
LVDT linear velocity displacement transformer

M

MATV master antenna television
μF microforad
MHz megahertz
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor field effect transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N

NBS National Bureau of Standards
NIM nuclear instrumentation module
NOR not OR

O

OEM original equipment manufacturer
OR a logical operator

P

pF picofarad
PC printed circuit
PCB printed circuit board
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PPI plan position indicator
PROM programmable read only memory
PUT programmable unijunction transistor

Q

QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R

RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S

SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SIP single in-line package
SSI small scale integration
SSR solid state relay
STL Schottky transistor logic

T

TC temperature coefficient
TCXO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TTL transistor-transistor logic
TTY teletypewriter

U

UHF ultra high frequency (300 MHz to 3 GHz)
UL Underwriters Laboratory
UPS uninterruptible power supply

V

VAC volts (of) alternating current
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W

WPS word processing software

Y

YIG yttrium iron garnet

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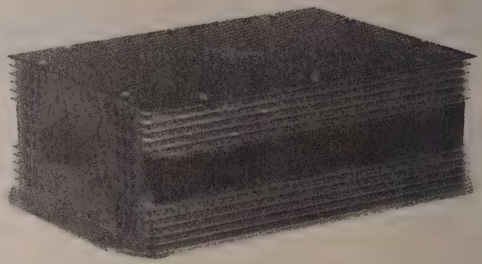
60 Hz/50 Hz STATIC INVERTER



These inverters are particularly applicable as a source of 60 Hz power for the operation of Projectors, Tape Recorders, TV systems, Typewriters, on Aircraft that have a 28 Volt DC electrical system. For applications requiring greater power the inverters can be paralleled for higher output.

The inverters available in various voltages, frequency and power are listed in the table below.

GENERAL SPECIFICATIONS

Input Voltage:	1. 28 VDC ±2 Volts, 14 VDC for SPS-316 2. Withstands 88 Volt Transient for 1 Millisecond
Power Factor:	.8 to 1.0
Amplitude Distortion:	Less than 7%
Wave Form:	Sine Wave except SPS-1308
Phase:	Single
Short-Circuit:	Withstand for 1 minute or longer
Temperature:	−65°F to +160°F (−55°C to +70°C)
Altitude:	45,000 ft.

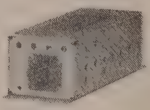
MODEL	OUTPUT VOLTAGE	OUTPUT POWER VA	FREQ. Hz	INPUT VOLTS	INPUT AMPS	WEIGHT LBS. (KG)	SIZE INCHES W x L x H
SPS-206	115 VAC	200	60±1	28 VDC	10.5 DC	14.5 (6.6 Kg)	7¾ x 12 x 4
SPS-306	115 VAC	300	60±1	28 VDC	15.8 DC	18.0 (8.2 Kg)	7¾ x 12 x 4
SPS306B	115 VAC	375	60±1	28 VDC	18.5 DC	18.0 (8.2 Kg)	7¾ x 12 x 4
SPS-305	115 VAC	270	50±1	28 VDC	15.8 DC	18.0 (8.2 Kg)	7¾ x 12 x 4
SPS-3052	230 VAC	270	50±1	28 VDC	15.8 DC	18.0 (8.2 Kg)	7¾ x 12 x 4
SPS-316	115 VAC	300	60±1	14 VDC	32.0 DC	18.0 (8.2 Kg)	7¾ x 12 x 4
SPS-1307	115 VAC	1000	60±1	28 VDC	53.0 DC	24.5 (11.12 Kg)	7¾ x 13¼ x 4
SPS-1308	115 VAC	1000	60±1	115, 3 ph, 400		12 (5.5 Kg)	7¾ x 13¼ x 4

DC TO DC POWER CONVERTER

The KGS ELECTRONICS Model LT-SERIES are pulse width-modulated DC to DC converters that provide regulated power.

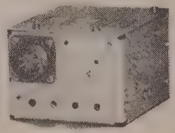
These converters transform an unregulated 28 VDC to a regulated and adjustable DC output via a remote control potentiometer.

The Model LT-SERIES are used to control the light intensity of incandescent bulbs in aircraft instrument lighting when voltage control is required.



LT-50

LT-52A



LT-55

LT-352

MODEL LT-SERIES SPECIFICATIONS

Input Voltage:	28 VDC nom., 20 to 40 VDC.
Output Voltage:	Adjustable with external rheostat or potentiometer.
Regulation:	2% for line, 2% load and 2% temperature.
Output Ripple:	50 mVp-p max.
Altitude:	55,000 ft.
Protection: (Overvoltage)	Output voltage is limited to approximately 125% of rating even though remote control rheostat opens or shorts, or internal failure occurs.
Temperature:	−55°C to +71°C (sufficient cooling required @ +71°C ambient).
Protection: (Overload)	Input and output current pulse when overload exceeds approximately 125% of rating.

MODEL	OUTPUT VOLT DC	OUTPUT AMPS	OUTPUT WATTS	OUTPUT RIPPLE RM*	INPUT CURR. @ 28 VDC	EFFICIENCY % TYPICAL	SIZE (INCHES) W x L x H	WT. (LBS.)
LT-50	0 to 5	7.5	40	5 mVp-p	1.7 Amps	75	2.3 x 6.9 x 2	1.2
LT52A	0 to 5	10	50	8 mVp-p	2.5 Amps	73	2.4 x 5.8 x 2.3	1.5
LT-55( )	0 to 5	15	75	5 mVp-p	3.6 Amps	75	3.4 x 4 x 2.6	1.2
LT-70	0 to 12	5.8	70	8 mVp-p	4.2 Amps	84	2.3 x 5.8 x 2.0	1.5
LT-100	0 to 28	3.6	100	8 mVp-p	4.2 Amps	84	2.3 x 6.8 x 2.4	1.5
LT-352	0 to 5 (Three)	0-28 (Total)	150	8 mVp-p	7.5 Amps	73	6.7 x 6 x 2.4	3.6
LT-3100	0 to 28 (Three)	0-10 (Total)	300	10 mVp-p	13.0 Amps	84	6.7 x 6 x 2.4	3.6

* RM: typical at room ambient

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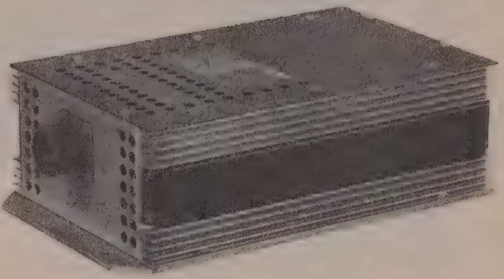
TSO'D 400 Hz STATIC INVERTER

The KGS ELECTRONICS's static inverter utilizes solid state circuitry to convert 28 VDC to 115 VAC, 400 Hz sine wave power. Design features include sine to sine or square to sine wave power conversion permitting lightweight and reliable operation.



GENERAL SPECIFICATIONS

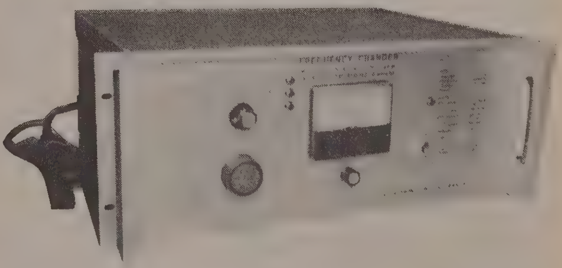
Input Voltage:	20 to 32 VDC
Output Voltage:	115 VAC and/or 26 VAC
Phase/Waveform:	Single/Sine Wave
Frequency:	400 Hz ±1%
Ampl. Distortion:	Less than 7% (3% Typ.)
Power Factor:	.8 to −.95
Input Overvoltage:	Operate up to 37 VDC input while supplying full rated VA output power. Output voltage under this condition is 115 VAC +5%, −7%
Input Transient Protection:	Withstands transients of 88 volts lasting 1 millisecond on the 28 VDC input line
Overload & Short-Circuit Protection:	Withstands without damage or degradation load exceeding 150% of rated output to an output dead short. Inverter delivers rated output on removal of above condition.
Altitude:	45,000 ft.
Temperature:	−64°F to +160°F (−55°C to +71°C)
Humidity:	Tested to greater than 95% for 10 days, temperature was cycled between 75°F to 160°F.
Environmental:	Meets RTCA Paper DO-160 Env. Cat. D2BR---

SPC-SERIES SPECIFICATIONS

MODEL	OUTPUT VOLTAGE VAC	OUTPUT POWER	INPUT CURRENT ADC	EFFICIENCY % TYPICAL	POWER CONVERSION	WEIGHT LBS. (KG.)	SIZE INCHES W x L x H
SPC-5( )	115/26	50	2.6	67 to 72	PWM to SINE	3.0 (1.3)	4.1 x 6.5 x 2.7
SPC-10( )	115/26	100	4.8	75 to 78	PWM to SINE	5.2 (2.4)	4.5 x 8.3 x 3.5
SPC-30( )	115/26	300	16	70	SINE to SINE	8.1 (3.7)	6 x 11 x 3
SPC-38( )	115/26/5	380	16	83	PWM to SINE	8.9 (3.7)	6 x 11 x 3
SPC-60( )	115/26	600	31	70	SINE to SINE	14.7 (6.8)	7.7 x 12 x 4
SPC-75( )	115/26/5	750	32	83	PWM to SINE	14.2 (6.4)	7.7 x 12 x 4

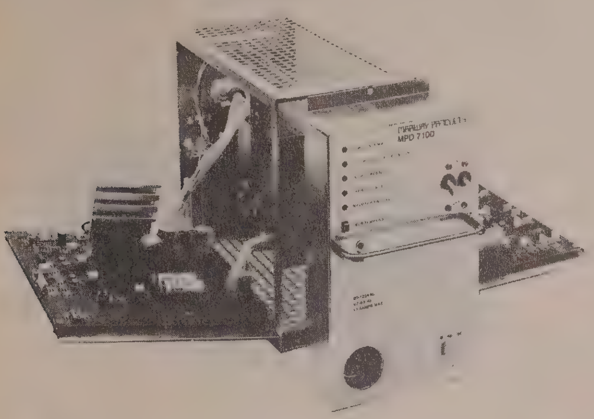
FREQUENCY CHANGER
MODEL SPC-6-( ) SERIES
50 to 60 Hz to 400 Hz

KGS ELECTRONICS' solid state frequency changer converts 115 VAC 50 to 60 Hz to 115 VAC 400 Hz sine wave power. These frequency changers are suitable for use on test benches or labs to check radars, compasses, gyros, synchros, fuel flow gauges, etc. SPC-6-750 is single phase output. SPC-6-1000-3ϕ is three (3) phase output. Output is monitored via analog meter and is adjustable from 105 to 126 VAC line to neutral. Amplitude distortion is typically 1½%.



MODEL	INPUT	OUTPUT / OUTPUT VA	OUTPUT FREQUENCY	SIZE IN. W x D x H	WT. (LBS.)
SPC-6-750	115 VAC 50 to 60 Hz	115 VAC / 750 VA, 26 VAC / 150 VA	400 Hz	19 x 13 x 7	30
SPC-6-750 A	115 VAC 50 to 60 Hz	115 VAC / 250 VA, 26 VAC / 500 VA	400 Hz	19 x 13 x 7	30
SPC-6-1000-3 pH	115 VAC 50 to 60 Hz	120/208 L-L / 1000 VA	400 Hz	19 x 13 x 7	36
SPC-2250-3 pH	115/200 or 230/400 VAC	110/200 WYE / 2250 VA	400 Hz	19 x 17 x 10	71

MARWAY PRODUCTS INC.™



DC Power Supplies for DEC Computers From The Industries Leading Manufacturer of DEC® Compatible Power Products

MPS 7100 (VAX) SWITCHING POWER SUPPLY

- High Reliability Via All Solid State Circuitry With Reduced Component Count
- Low Common And Differential Mode Output Noise
- Over Voltage Shutdown And Current Fold back To Protect Logic Cards
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- Modular Sub-Assemblies For Ease Of Field Maintenance
- Industry Standard Components For Ease Of Repair
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- 5 V DC @ 100 Amps

MPR 744 Switching Regulator

- Pulse Width Modulation With Constant Operating Frequency To Eliminate Audible Noise
- Overvoltage Crowbar To Protect Logic Cards
- Foldback Current Limiting
- Over Temperature Shutdown
- Standard Components For Ease Of Repair
- 5 V DC @ 32 Amps

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MARWAY Reserves The Right To Make Specification Changes Without Notice. Consult The Factory For Current Information.

DEC Compatible AC Power Controllers For All Types Of DEC Computer Installations

MPD 861

- Three Models
  - **MPD 861C** For 120 V AC @ 24 Amps
  - **MPD 861B** For 240 V AC @ 16 Amps
  - **MPD 861A** For 240 V AC / 120 V AC
- 12 Receptacles

MPD 869

- Two Models
  - **MPD 869D** For 208 V AC @ 72 Amps
  - **MPD 869E** For 416 V AC @ 36 Amps
- 18 Receptacles

MPD 871

- Two Models
  - **MPD 871A** For 120 V AC @ 12 Amps
  - **MPD 871B** For 416 V AC @ 12 Amps
- Six Receptacles

MPD 872

- Three Models
  - **MPD 872D** For 120 V AC @ 24 Amps
  - **MPD 872C** For 240 V AC @ 16 Amps
  - **MPD 872E** For 240 V AC / 120 V AC @ 24 Amps
- 10 Receptacles

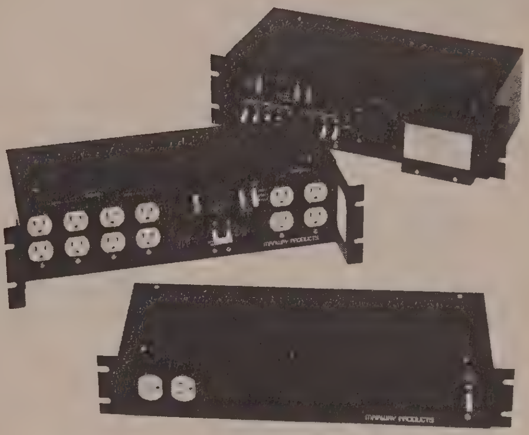
MPD 874

- Three Models
  - **MPD 874A** For 120 V AC @ 12 Amps
  - **MPD 874D** For 120 V AC @ 24 Amps
  - **MPD 874B** For 240 V AC @ 16 Amps

MARWAY PRODUCTS INC.™

POWER PRODUCTS FOR COMPUTERS

311 No. Clara St. Santa Ana, Ca. 92703 (714) 973-1800



Front Panel Mount AC Power Distributor Units For Instrumentation, Test Equipment, Etc.

Featuring:

- Optional Remote Control/Shutdown Panel
- Sturdy Rack Panel Construction With Handles And Painted Front Panel
- Standard 3½", 5¼", 7" & 8⅞" Panel Heights
- Single And Multiple Phase Electrical Configurations With Up To 150 Amp Capacity
- Optional Remote Control Via Safe Low Voltage Switch Closure
- High Performance T Section EMI Filter For Noise Free Operation
- Fast, Accurate Magnetic Circuit Breakers For Overload Protection
- High Energy Transient Suppression To Protect Valuable Equipment
- **Custom Configurations Available**

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P. D. U.

(Power Distribution Units)

Distribution Of Popular Line Voltages

120 V AC

- **MPD 117A**
  - -15 Amp Service
  - -8 Outlets
- **MPD 110**
  - -15 Amp Service
  - -10 Outlets
  - -Rack Mount
- **MPD 115**
  - -30 Amp Service
  - -12 Outlets
  - -Rack Mount

240 V AC

- **MPD 220**
  - -15 Amp Service
  - -8 Outlets
- **MPD 230**
  - -20 Amp Service
  - -12 Outlets

240 / 120 V AC 4 WIRE

- **MPD 2010**
  - -30 Amp Service
  - -8 Outlets
- **MPD 872E**
  - -30 Amp Service
  - -10 Outlets
- **MPD 861A**
  - -30 Amp Service
  - -12 Outlets

208 / 120 V AC 5 WIRE

- **MPD 208A**
  - -90 Amp Service
  - -18 Outlets

416 / 240 V AC 5 WIRE

- **MPD 416A**
  - -60 Amp Service
  - -18 Outlets

Marway Power Distribution Units Include Features Such As:

- High Performance EMI Filtering
- Transient Supression
- Remote Control
- Overvoltage Protection
- **Custom Configurations Available**

MARWAY PRODUCTS INC.™

POWER PRODUCTS FOR COMPUTERS

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NEED MORE INFORMATION?

USE ONE OF THE NEW

EEMEDIATE ACTION CARDS

INSIDE THE BACK COVER OF
VOLUMES 1A, 1B & 2

SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
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QUOTES?
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LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

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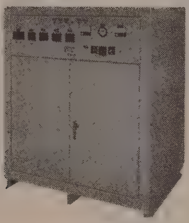
TAURUS™ by Nova

INVERTERS • UNINTERRUPTIBLE POWER SYSTEMS • FREQUENCY CHANGERS



15KVAUPS

TAURUS™ Uninterruptible Power Systems are designed to supply interrupted, conditioned, transient-free power to computers, process control equipment, emergency lighting and communications systems.

Single and Three Phase Systems are available at all standard voltages and at 60 Hz. and 50 Hz.

1φ SYSTEMS		3φ SYSTEMS	
KVA	Model No.	KVA	Model No.
.5KVA	11-5060	5KVA	11- 5K-3/6
1KVA	11-1K60	10KVA	11-10K-3/6
2KVA	11-2K60	15KVA	11-15K-3/6
3KVA	11-3K60	20KVA	11-20K-3/6
5KVA	11-5K60	30KVA	11-30K-3/6
7.5KVA	11-7.5K60	37.5KVA	11-37.5K-3/6
10KVA	11-10K60	50KVA	11-50K-3/6
15KVA	11-15K60		

Systems are available with solid state (one-quarter cycle) transfer switches or electro-mechanical switches.

Many options are available.

Nova TAURUS™ systems are backed by nationwide service.

For more information call or write for catalog.

1φ Sine Wave INVERTERS 3φ
50 Hz. 60 Hz. 400 Hz.
OVER 50 MODELS

Nova solid state INVERTERS are designed for commercial applications requiring high quality, durable equipment for continuous operation at 100% of rating. INVERTERS are available from 125VA to 50KVA.

Nova INVERTERS are available with a wide range of input voltages from 12VDC - 750VDC.

All common output voltages are available at 50 Hz., 60 Hz., or 400 Hz.

Nova INVERTERS are currently in use in communications (telephone, TV and microwave), automotive testing, utilities, the petroleum industry, aircraft, the steel industry and in rapid transit.

Call us or our local representative for catalog information.

1φ FREQUENCY CHANGERS 3φ
50 Hz. 60 Hz. 400 Hz.
OVER 50 MODELS

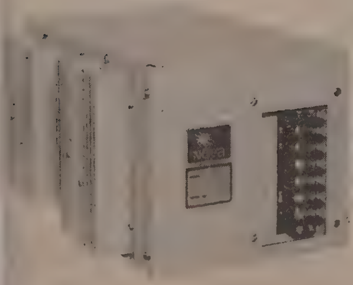
Nova solid state FREQUENCY CHANGERS are designed for continuous operation at rated power. They are available from 125VA to 50KVA.

They operate from any input frequency between 48-440 Hz. and produce a regulated sine wave with a stability of ±0.5% (±0.05% optional).

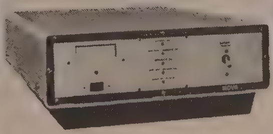
All common input voltages (input and output, single and three phase) are available.

These devices are used in computer systems testing, aircraft, the petroleum industry and in communications.

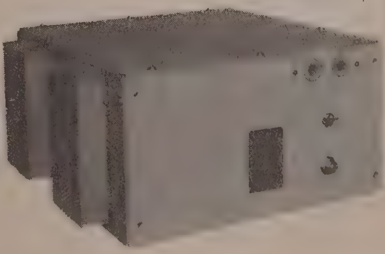
Call us or your local representative for catalog information.



500VA Inverter



1KVA



250VA Frequency Changer

20KVA Frequency Changer

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code **3**•1103
Batteries, Product Selection Guide **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide **2**•1003
Capacitors, Basic Formulas **1A**•1093
Capacitors, Miniglossary **1A**•1069
Capacitors, Product Selection Guide **1A**•1003
Circuit Boards (Printed), Product Selection Guide **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide **1A**•1219
Connectors, Miniglossary **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide **1A**•1309
Delay Lines, Product Selection Guide **1A**•1445
Discrete Semiconductors, Product Selection Guide **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide **1B**•1021
EBCDIC Code **3**•1153
Encapsulation, Miniglossary **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide **2**•1801
Filters, Product Selection Guide **1A**•1577
Instruments, Graphic Recording, Product Selection Guide **3**•1381
Instruments, Panel Meters, Product Selection Guide **3**•1321
Instruments, Test & Measuring, Product Selection Guide **3**•1182
Interconnection Systems, Product Selection Guide **2**•1873
Keyboards & Keypads, Product Selection Guide **1B**•1759
Microwave Components, Product Selection Guide **1A**•1685
Military Qualified Products Lists **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide **1B**•1121
Opto Semiconductors, Miniglossary **1B**•1218
Oscilloscopes, Product Selection Guide **3**•1361
Panel Hardware, Product Selection Guide **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide **1A**•2017
Power Supplies, Miniglossary **3**•1455
Power Supplies, AC, Product Selection Guide **3**•1815
Power Supplies, DC, Product Selection Guide **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide **1B**•1255
Relay Contact Forms **1B**•1317
Relays, Electromechanical, Miniglossary **1•B**1292
Relays, Product Selection Guide **1B**•1289
Resistor Color Codes **1A**•1791
Resistors, Product Selection Guide **1A**•1789
Servo Components, Miniglossary **3**•1935
Solenoids, Product Selection Guide **1B**•1481
Switches, Product Selection Guide **1B**•1499
Thyristors/High Power Diodes, Miniglossary **1A**•1652
Transducers & Encoders, Product Selection Guide **1B**•1827
Transformers, Product Selection Guide **1A**•2115
Wire & Cable, Product Selection Guide **2**•1935

Quality Solid-State Linear AC POWER

PACIFIC
POWER SOURCE CORP.

300KVA to 250VA

AC POWER CONVERSION

Pacific's power conversion equipment is specifically recommended as an AC power converter for generation of 50, 60, and 400 Hz power. The converted power is extremely pure, very highly regulated and virtually immune to load induced cross-talk. Typical applications are generation of U.S. and Non-U.S. power forms for facilities power. This equipment is designed for long term unattended use. It is highly reliable and easy to maintain through module exchange by relatively untrained personnel.

LINE CONDITIONER/NOISE ELIMINATOR/UPS

Pacific's AC Power Sources are also used as line conditioners due to their excellent noise rejection properties. While most line conditioners can only reject a small amount of line disturbances, you can expect to eliminate virtually all line disturbances effecting the most sensitive loads. These systems provide clean, highly regulated power, free of load induced transients because they are designed to respond to any step load change in 50 microseconds, usually less.

Adding an UPS support cabinet to the AC power source ensures that your most critical load will be immune to all power line disturbances, including complete loss of line for extended periods.

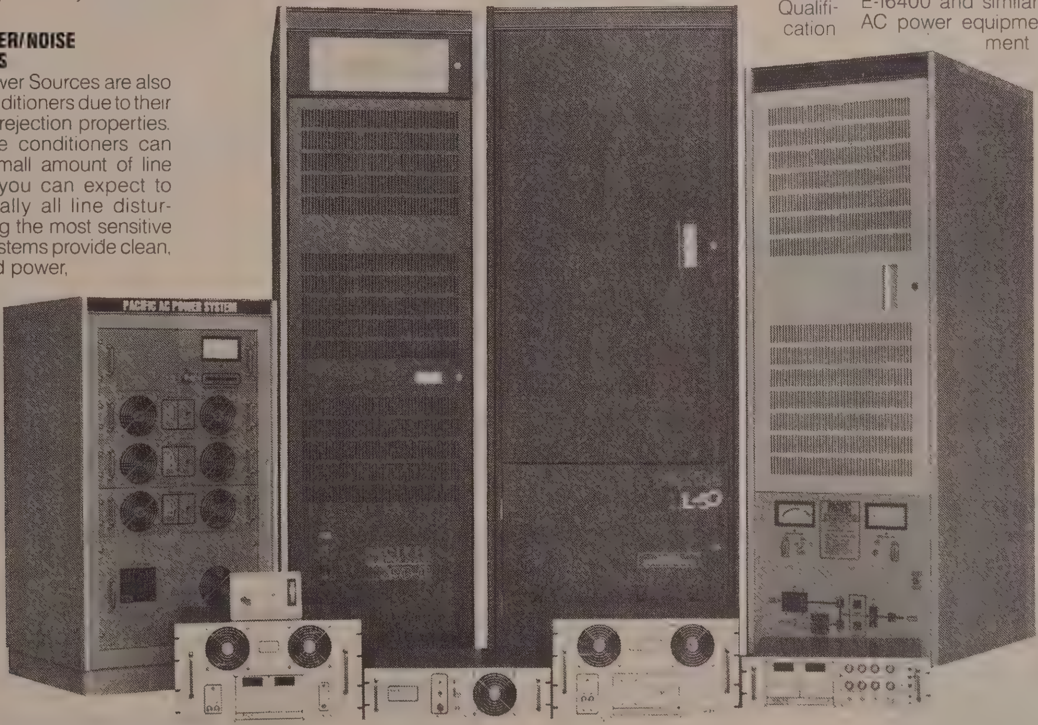
TEST POWER/PRODUCTION BURN-IN

Applications requiring multi-functional AC power at both fixed and variable frequency are ideal for this family of power equipment. Pacific's equipment is designed for use as a broad band linear AC power source; applications requiring highly reliable operation over virtually all power frequencies (and even below 47 Hz and above 500 Hz) are standard on most of Pacific's equipment.

Production testing and burn-in of equipment for shipment abroad is a common application for AC power systems from Pacific. Qualification testing of electronic equipment demands an AC power source with quality and reliability. Quality Solid-State Linear AC Power is standard with *all* Pacific AC power equipment.

PROGRAM POWER & TRANSIENT SIMULATION

When used in conjunction with the MODEL 8037 Transient Generator, Pacific's systems serve as an excellent device for simulation of envelop power transients in accordance with MIL-STD-704, MIL-STD-1399 or MIL-E-16400 and similar standards for AC power equipment. The equipment is usable with any external wave - form generator to produce power with simulated harmonic distortion.



GENERAL PERFORMANCE SPECIFICATIONS

- Power Forms: Virtually all input and output AC power forms are available on most systems.
- Load Power Factor: No load power factor restrictions, leading or lagging.
- Regulation: Line (0.1% max. for 10% change), Load (0.25% at the sense point).
- Load Transient Response: 50 μs max. (Typ. 30μs).
- Output Distortion: 0.75% THD (Typ. 0.5%)
- Output Isolation: Fully isolated from input and frame ground.
- Output Protection: Integral electronic current limiting with auto-recovery.
- 1Ø/3Ø Operation: Some models are user selectable by key locking switch
- Failure Isolation System: Failed devices are auto-disconnected without output voltage waveform disturbances.
- System Efficiency: 85% Large Systems. 60%-71% Small Systems
- Parallelable: Systems are parallelable and serve as building blocks for high power level systems; most are user parallelable by your electrical personnel

FOR MODEL SELECTIONS, TURN TO THE NEXT 4 PAGES ▶▶▶

800-854-2433
In CA, Call 800-472-8465; Corporate Office: 714-898-2691
Ask for an Applications Engineer or your Local Rep. Office
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G-SERIES
Multi-Function AC Power Sources 6-90 KVA

Model 390-G Model 360-G Model 330-G

APPLICATIONS

- AC Frequency Changer
- Facility Power
- Program Power & Transient Simulation
- Line Conditioner / Noise Eliminator / UPS
- Variable Frequency Test Source

CONTROL CHARACTERISTICS:
"H" Type Systems — Fixed frequency 1ø or 3ø switch selectable operation. Output frequency — specified by the user within the range of 47-1000 Hz. Accuracy ±0.1% ±0.5 Hz. Stability ±0.1%

"C" Type Systems — Variable frequency 1ø or 3ø switch convertible operation. 1 continuous variable range of 47-500 Hz. dial accuracy ±1% stability 0.25%. 3 pushbutton selection preset frequencies of 50, 60, 400 Hz. Accuracy ±0.1% ±0.5 Hz. Stability ±0.1%. NOTE: Pushbutton switches are equipped with a lockout feature to prevent accidental changes. External input — one per phase, fully isolated. Allows system to operate as 3 independent amplifiers (3 phase mode).

Standard Models are complete systems ready for use, including cabinets, oscillators, input circuit breakers and output contactors

MODEL			OUTPUT POWER (KVA)	1 PHASE OUTPUT			3 PHASE OUTPUT			CABINETS	
				VOLTS (RMS)	AMPS (RMS)	AMPS (PEAK)	VOLTS (RMS)	AMPS/LEG (RMS)	AMPS/LEG (PEAK)		
330-G	☐	☐	6	120	48	144	120/208 WYE or 208 DELTA	16	48	1 ea. 330-G	FIXED AND/OR VARIABLE FREQUENCY 1 PHASE/ 3 PHASE USER SWITCH CONVERTIBLE MODELS
360-G	☐	☐	12	120	96	288	120/208 WYE or 208 DELTA	32	96	1 ea. 360-G	
390-G	☐	☐	18	120	144	432	120/208 WYE or 208 DELTA	48	144	1 ea. 390-G	
3120-G	☐	☐	24	120	192	576	120/208 WYE or 208 DELTA	64	192	2 ea. 360-G	
3150-G	☐	☐	30	120	240	720	120/208 WYE or 208 DELTA	80	240	2 ea. 390-G	
3180-G	☐	☐	36	120	288	864	120/208 WYE or 208 DELTA	96	288	2 ea. 390-G	
3210-G	☐	☐	42	120	336	1008	120/208 WYE or 208 DELTA	112	336	3 ea. 390-G	
3240-G	☐	☐	48	120	384	1152	120/208 WYE or 208 DELTA	128	384	3 ea. 390-G	
3270-G	☐	☐	54	120	432	1296	120/208 WYE or 208 DELTA	144	432	3 ea 390-G	
3360-G	☐	☐	72		—		120/208 WYE or 208 DELTA	176	528	4 ea. 390-G	
3450-G	☐	☐	90	—	—	—	120/208 WYE or 208 DELTA	208	624	5 ea. 390-G	

→SECONDARY OUTPUT TRANSFORMER: Indicate **"T"** for 0-250 (L-N) or leave blank for 0-125V (L-N).

→CONTROL CHARACTERISTICS: Indicate either **"H"** or **"C"**

UG-SERIES UPS OPERATION: Each cabinet has provisions for UPS operation. Only adapters, external batteries and battery charger are required. Ask for form **"U"** input.

FEATURES

- **Parallelable** by user for up to 90 KVA output
- **Easy Installation** locate anywhere, just connect input service
- **Fast Response** 50 μs to full step load changes
- **No Load P.F. Restrictions** output will drive any P.F. leading or lagging full power to ±0.7 P.F. loads
- **High Peak Current** up to 300%
- **Fail Safe Circuits** patented auto-disconnect & current limiting with auto-recovery
- **Use & Service Training** by factory specialists
- **Field Proven** linear technology in wide spread use for over 10 years
- **1ø / 3ø Switch Selectable Output** by user and key lockable
- **Tamper Proof Doors** with front filtered air intake
- **Front Access** for convenient maintenance & module exchange

Ordering Information for G-Series & UG-Series

1. Select the basic model from the chart above. Consider your your control needs (**"H"** models for precision fixed frequency operation — **"C"** models for variable frequency; and both allow selectable 1ø - 3ø control). If **"H"** model is chosen, specify ouytput frequency.

2. Specify input service to the unit, e.g. Volts line to neutral for 3ø WYE, Volts line to line for 3ø DELTA, and frequency.

3. If secondary output is desired, add Suffix **"T"** to model number, and specify secondary output voltage form.

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PACIFIC
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MODEL 130-UG
DIMENSIONS: 71"H x 23"W
34.5"D
WEIGHT: 900 lbs.

130-UG SERIES

Complete Single Cabinet Self Contained UPS 2-6 KVA

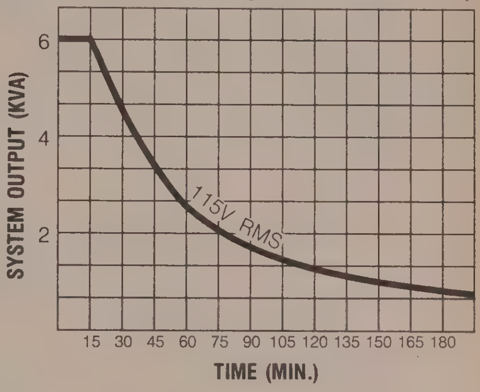
The 130-UG series is a self contained single cabinet UPS for low power (2-6 KVA) single phase applications. These units are especially designed for the most sensitive computer and EDP loads. Output frequency is fixed at user specified value 50-400 Hz.

METERS & INDICATORS

- OUTPUT BATTERY VOLTAGE
- OUTPUT AC VOLTAGE
- BATTERY CHARGER CURRENT
- OUTPUT CURRENT
- INPUT POWER "ON" LAMP
- OUTPUT POWER "ON" LAMP
- BATTERY DISCHARGE LAMP
- UPS OPERATION LAMP
- OVERLOAD LAMP

BATTERY OPERATION TIME

38 A.H. Maintenance Free, Rechargeable 12VDC Gell Cell Battery

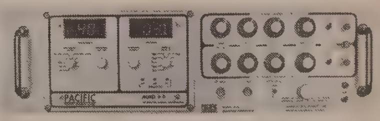


Transient Generator Model 8037

A most useful extension to any PACIFIC AC power source is the Model 8037 transient signal generator. The Model 8037 variable frequency, transient generator is capable of simultaneously simulating both AC line voltage and frequency transient excursions. These excursions are capable of simulating the various transient envelopes of MIL-STD-1399, MIL-E-16400 and MIL-STD-704A.

FEATURES

- Precision digital sine wave formation, single or three phase
- Separate time base controls for voltage and frequency excursions
- Plus or minus transients capability
- 20Hz to 2KHz frequency range - full range manual adjustments of transient magnitude, rise time, duration, fall time, and execution
- Precision monitor output for external charting of transients
- Analog programmable frequency and/or voltage excursions



MODEL 8037
DIMENSIONS: 5¼" H x 19" W x 17"D
Rack Mountable

L-Series

Solid State AC Power Systems 25-250 KVA

PACIFIC'S "L" SERIES equipment is the latest generation of solid state AC power converters. It is superior to motor-generator sets, and other types of solid state units because of its great versatility, economy and reliability. The basic "L" series unit is the 3240-L.

As a frequency changer the user is assured that the output is always precisely regulated in frequency, voltage and waveform purity, regardless of variations in input power or load currents.

As a line transient eliminator, the "L" Series equipment is much superior to isolation transformers, since it not only eliminates common mode noise, but line spikes of as much as 100% of line voltage of several millisecond duration.

Multiple cabinets can be paralleled for higher capacity. Standard units can be combined up to 5 cabinets for 250 KVA capacity. Higher capacity systems can be assembled, if desired, by the use of special drivers and junction equipment.

MODEL 3240-L
50KVA AC Power Source
DIMENSIONS: 78"H x 27"W x 30"D
WEIGHT: 1600

STANDARD MODELS

Each of the following listed models are complete systems ready for use.

3-PHASE WYE SYSTEMS

	OUTPUT RATINGS				
MODEL	POWER (KVA)	VOLTS RMS	CURRENT PER LEG AMPS RMS	CURRENT PER LEG AMPS PEAK	NO. OF CABS.
3120-L	25	120/208Y	64	160	1
3180-L	36	120/208Y	96	240	1
3240-L	50	120/208Y	128	320	1
3360-L	75	120/208Y	192	480	2
3480-L	100	120/208Y	256	640	2
3720-L	150	120/208Y	384	960	3
3960-L	200	120/208Y	512	1280	4
31200-L	250	120/208Y	640	1600	5

SINGLE PHASE SYSTEMS

	OUTPUT RATINGS				
MODEL	POWER (KVA)	VOLTS RMS	CURRENT PER LEG AMPS RMS	CURRENT PER LEG AMPS PEAK	NO. OF CABS.
1120-L	25	120	192	480	1
1180-L	36	120	288	720	1
1240-L	50	120	384	960	1
1360-L	75	120	576	1440	2
1480-L	100	120	768	1920	2
1720-L	150	120	1152	2880	3
1960-L	200	120	1536	3840	4
11200-L	250	120	1920	4800	5

800-854-2433

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K-SERIES
Bench Top Rack Mount Multi-Function AC Power Sources 250 VA-4.5KVA

STANDARD MODELS

Model	Output Power	Output Current (Amps RMS)	Voltage (Volts RMS)	Case	Weight (lbs)
SINGLE PHASE MODELS					
103K-☐ R	250VA	2	0-125	A	30
103K-☐ T	250VA	2/1	0-125/0-250	A	35
105K-☐ R	500VA	4	0-125	A	40
105K-☐ T	500VA	4/2	0-125/0-250	A	48
108K-☐ R	750VA	6	0-125	A	54
108K-☐ T	750VA	6/3	0-125/0-250	A	65
110K-☐ R	1KVA	8	0-125	B	80
110K-☐ T	1KVA	8/4	0-125/0-250	B	95
112K-☐ R	1.25KVA	10	0-125	B	92
112K-☐ T	1.25KVA	10/5	0-125/0-250	B	107
115K-☐ R	1.5KVA	12	0-125	B	105
115K-☐ T	1.5KVA	12/6	0-125/0-250	B	125
THREE PHASE DELTA MODELS					
205K-☐ R	430VA	2	0-125	A	40
210K-☐ R	860VA	4	0-125	B	80
210K-☐ T	860VA	4/2	0-125/0-250	B	95
215K-☐ R	1.3KVA	6	0-125	B	105
215K-☐ T	1.3KVA	6/3	0-125/0-250	B	125
220K-☐ R	1.7KVA	8	0-125	B (2)	160
220K-☐ T	1.7KVA	8/4	0-125/0-250	B (2)	190
225K-☐ R	2.2KVA	10	0-125	B (2)	184
225K-☐ T	2.2KVA	10/5	0-125/0-250	B (2)	214
230K-☐ R	2.6KVA	12	0-125	B (2)	210
230K-☐ T	2.6KVA	12/6	0-125/0-250	B (2)	250
THREE PHASE WYE MODELS					
305K-☐ R	500VA	2	0-125	A	44
308K-☐ R	750VA	2	0-125	A	55
315K-☐ R	1.5KVA	4	0-125	B	115
323K-☐ R	2.25KVA	6	0-125	A (3)	165
323K-☐ T	2.25KVA	6/3	0-125/0-250	A (3)	195
330K-☐ R	3KVA	8	0-125	B (3)	240
330K-☐ T	3KVA	8/4	0-125/0-250	B (3)	285
338K-☐ R	3.75KVA	10	0-125	B (3)	325
338K-☐ T	3.75KVA	10/5	0-125/0-250	B (3)	325
345K-☐ R	4.5KVA	12	0-125	B (3)	315
345K-☐ T	4.5KVA	12/6	0-125/0-250	B (3)	375

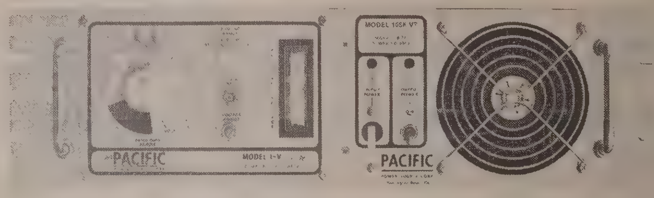
↳ Fill in box with OSCILLATOR type desired: V,F,D, or X

↳ CASE DIMENSIONS
Case Size A — 5¼''H x 19''W x 19''D
Case Size B — 10½''H x 19''W x 19''D

The "K" series family — covers the power range 250 to 4500 VA single and three phase, in light-weight one-man-portable units. A variety of plug-in signal generators are available for adaptation to either laboratory variable, or fixed parameter OEM application.

FEATURES:
- Lightweight one-man-portable systems
- 1ø or 3ø capability
- Precision AC Power
- Direct coupled output

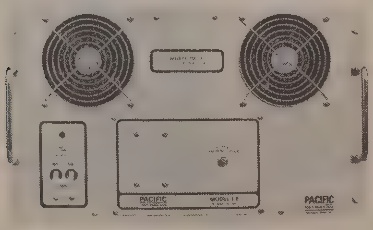
APPLICATIONS:
- Variable frequency test source
- O.E.M.
- Motor control
- Local AC source



Model 105K-VT
SIZE: 10.5''H x 19''W x 19''D

PLUG-IN OSCILLATORS
See Next Page ▶▶▶

E-SERIES Standalone or Parallelable 1ø or 3ø AC Power Source 1-9KVA



Model 110-E
DIMENSIONS: 10.5''H x 19''W x 19''D
WEIGHT: 80 lbs

Models 110E- ▽ R
110E- ▽ T

↳ Fill in triangle with K-SERIES type OSCILLATOR or "E" type standard fixed frequency plug-in: V, F, D, X, or E.

FEATURES:
- Parallelable for up to 3KVA 1ø or 3ø
- Variable output voltage
  110E- ▽ R = 0-125 VAC
  110E- ▽ T = 0-125/0-250VAC
- High surge and peak current capability
- Bench top or rack mountable
- Overload protected
- Precision sine wave output
- External input (optional)
- Operates from normal 115VAC wall outlet
- Output is full isolated and either leg may be grounded
- Lightweight/Portable

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POWER SOURCE CORP.

800-854-2433
In CA, Call 800-472-8465; Corporate Office: 714-898-2691
Ask for an Applications Engineer or your Local Rep. Office
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OSCILLATOR SELECTION for K-SERIES and E-SERIES

The K and E-Series Systems are available with a variety of interchangeable oscillator plug-ins as listed below:

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"D" SUFFIX DIGITAL OSCILLATORS

The "D" module is recommended for all variable 3 phase applications, and single phase applications requiring a high degree of control versatility.

The digital signal generator forms both single and three phase vectors from a common high frequency clock. It produces sinusoidal waveforms of exceptional purity and stability over a wide range of frequencies.

Frequency Control: Two continuously variable ranges 20-200 and 200-2000 Hz. plus three precision fixed frequencies at 50, 60, 400.

NOTE: Units with internal autoformer; Model numbers with suffix D will have the low frequency range restricted to 45 Hz and the high frequency range restricted to 500 Hz.

Amplitude Control: Continuously variable O to V max. Three phase units include balance controls for each phase with a range of ±10%.

Phase Separation Accuracy: — 1% max. (3 ø units only)

Signal Distortion: 0.25% max.

The "D" signal generators include two 3½ digit 0.6" LED readouts. The first monitors frequency continuously, the other is switch selectable to read volts of any phase. Special frequency control ranges and digital control interface can be supplied to users special requirements.

Amplitude Stability: 0.01% per °C
Frequency Stability: 0.01% per °C
Freq. Meter Accuracy: 1% ±1 digit
Freq. Meter Resolution: 0.1 Hz on 20-200 range
1.0 Hz on 200-2000 range

Voltmeter Function: Nine position function switch permits user to monitor volts any phase to neutral, and volts phase to phase.

Voltmeter Accuracy: 1% ±1 digit

"V" SUFFIX VARIABLE OSCILLATOR

The "V" module consists of a FET stabilized, dual range variable, linear oscillator. Its two frequency ranges are centered around the popular power frequencies, continuously variable by multiturn control and calibrated frequency dial. The module includes a panel voltmeter which monitors output voltage.

This module is recommended for single or three phase power sources where only narrow range frequency control is required.

Frequency Control: Two continuously variable ranges, 45 to 75 Hz and 300 to 500 Hz. (1ø only); 47-500 Hz on 3ø models.

Dial Accuracy: 1%.

Frequency Stability: 0.01 per °C.

Amplitude Control: 0 to V max. by panel control.

Voltmeter Accuracy: 3%.

Distortion: 0.25% max.

External Input: Allows the power source to be used as an amplifier only Gain = 100. BW = 20-2000 Hz full scale. 5-20,000 Hz small signal input impedence 600 ohms. (1ø model only).

"F" SUFFIX FIXED OSCILLATORS

The "F" suffix module provides a single fixed frequency, specified by the user. High stability frequency determining components are used, as well as a FET stabilized amplitude control loop. This module is recommended for fixed parameter, low cost OEM, and all unattended use applications requiring high long term stability.

Panel voltmeter (3% accuracy) is included in both single and 3 phase version.

Frequency Control: Fixed as specified by user, within the range 20-2000 Hz

Amplitude Control: O to V max. by panel control with lockout.

Frequency Stability: 0.01% per °C.

Amplitude Statility: 0.003% per °C.

Distortion: 0.25% max.

Phase Angle Accuracy: 1° (3ø units only)

Balance Controls: ±5% control range, adjustable through front panel (3ø units only).

"E" SUFFIX INTERNAL FIXED FREQUENCY OSCILLATOR

The "E" suffix module provides an economical single fixed frequency specified by the user. Only amplitude control is provided.

Frequency Control: As specified by user within the range 47-500Hz.

Amplitude Control: O to V max. by panel control with locknut.

Frequency Stability: 0.1% long term.

Accuracy: 0.25%

"X" SUFFIX AMPLIFIER ADAPTER

The "X" suffix adapter allows any power source to be used as a wideband linear amplifier. Input signal is applied through a front panel BNC connector to a small signal audio transformer. Input is isolated from chassis and amplifier output.

Gain = 25

Bandwidth = 20-2000 Hz full power
5 Hz - 20,000 Hz Small Signal

Input Impedence = 50 ohms

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In CA, Call 800-472-8465; Corporate Office: 714-898-2691
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USE ONE OF THE NEW

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VOLUMES 1A, 1B & 2

SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?
AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
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AVAILABILITY?
LOCAL SOURCE?
MIL SPECS?
CUSTOM?
COMPATIBILITY?
SPECS?
DRAWINGS?
LIFE TEST?
QUOTES?

MINIGLOSSARIES
FORMULAS • CHARTS
PRODUCT SELECTION GUIDES
FORMS
CODES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 84/85 EDITION OF EEM

Abbreviations/Acronyms .... **1A**•1137, **1B**•1035, **2**•1014, **3**•1014
ASCII Code .... **3**•1103
Batteries, Product Selection Guide .... **3**•1399
Cabinets, Enclosures, Racks, & Chassis, Product Selection Guide .... **2**•1003
Capacitors, Basic Formulas .... **1A**•1093
Capacitors, Miniglossary .... **1A**•1069
Capacitors, Product Selection Guide .... **1A**•1003
Circuit Boards (Printed), Product Selection Guide .... **2**•1089
Coils, Chokes, & Inductors, Product Selection Guide .... **1A**•1219
Connectors, Miniglossary .... **2**•1264
Connectors, Terminals, & Sockets, Product Selection Guide .... **2**•1097
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide .... **1A**•1309
Delay Lines, Product Selection Guide .... **1A**•1445
Discrete Semiconductors, Product Selection Guide .... **1A**•2087
Displays, Readouts, Lamps, & Lights, Product Selection Guide .... **1B**•1021
EBCDIC Code .... **3**•1153
Encapsulation, Miniglossary .... **2**•1082
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide .... **2**•1801
Filters, Product Selection Guide .... **1A**•1577
Instruments, Graphic Recording, Product Selection Guide .... **3**•1381
Instruments, Panel Meters, Product Selection Guide .... **3**•1321
Instruments, Test & Measuring, Product Selection Guide .... **3**•1182
Interconnection Systems, Product Selection Guide .... **2**•1873
Keyboards & Keypads, Product Selection Guide .... **1B**•1759
Microwave Components, Product Selection Guide .... **1A**•1685
Military Qualified Products Lists .... **1B**•1003
Motors, Drives, & Rotating Components, Product Selection Guide .... **1B**•1121
Opto Semiconductors, Miniglossary .... **1B**•1218
Oscilloscopes, Product Selection Guide .... **3**•1361
Panel Hardware, Product Selection Guide .... **2**•1757
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide .... **1A**•2017
Power Supplies, Miniglossary .... **3**•1455
Power Supplies, AC, Product Selection Guide .... **3**•1815
Power Supplies, DC, Product Selection Guide .... **3**•1439
Protective Components (Fuses, Circuit Breakers, etc.), Product Selection Guide .... **1B**•1255
Relay Contact Forms .... **1B**•1317
Relays, Electromechanical, Miniglossary .... **1**•**B**1292
Relays, Product Selection Guide .... **1B**•1289
Resistor Color Codes .... **1A**•1791
Resistors, Product Selection Guide .... **1A**•1789
Servo Components, Miniglossary .... **3**•1935
Solenoids, Product Selection Guide .... **1B**•1481
Switches, Product Selection Guide .... **1B**•1499
Thyristors/High Power Diodes, Miniglossary .... **1A**•1652
Transducers & Encoders, Product Selection Guide .... **1B**•1827
Transformers, Product Selection Guide .... **1A**•2115
Wire & Cable, Product Selection Guide .... **2**•1935

POWERMARK
DIVISION OF TOPAZ
SQUARE D COMPANY

AC Voltage Regulators

Complete protection against voltage sags and surges

Three-Phase Model
24 kVA and 30 kVA

Features

- 98% efficiency
- Lightweight and compact
- Cool and quiet
- Fast response
- Low output impedance
- Low distortion
- Attractive design

Powermark AC Voltage Regulators are the smallest, lightest, most efficient, most distortion-free voltage regulators commercially available. Powermark AC Voltage Regulators completely eliminate those computer problems associated with high and low voltage conditions, such as extensive downtime, memory loss, and expensive, time-consuming reprogramming.

Benefits

- *Fast Response:* Powermark AC Voltage Regulators monitor line voltage and respond to fluctuations in less than one cycle of operating frequency.
- *Low Distortion:* Powermark Regulators provide less than 0.1% total waveform distortion. (Other line regulators produce input waveform distortion and distort output waveform up to 5%. This distortion can significantly degrade equipment performance.)
- *Input Power Factor:* Powermark Regulators reflect the power factor of the load almost exactly. This eliminates the need for expensive power factor correction equipment which is sometimes required with other types of regulators.
- *Wide Input Frequency Range:* Powermark AC Voltage Regulators operate over a wide range of input frequencies (47-63 Hz). This enables them to provide constant, steady voltage to sensitive equipment even when input frequencies are outside the tolerances of other types of regulators.
- *Compact:* Powermark AC Voltage Regulators are one-half the size and weight of other regulators.
- *Inrush current tolerance:* can handle the inrush currents associated with motor/drive startup.

Specifications

Line Voltage Regulation:
±7% maximum for Series 77000
±5% maximum for Series 75000
±3.3% maximum for Series 73000

Efficiency:
98% minimum

Output Distortion:
No spikes; adds less than 0.1% total harmonic distortion

Response Time:
1 cycle maximum

Output Impedance:
Less than 2% full-load impedance

Operating Frequency:
47-63 Hz, sine wave

Load Regulation:
Less than 1% from no load to full load

Operating Temperature:
0°C to 50°C

Temperature Coefficient:
0.05%/°C maximum

SERIES 77000 AC VOLTAGE REGULATORS are intended for use in applications where power lines are subject to severe low voltage (brownout) conditions. Output voltage is regulated to within ±7% of nominal.

Single-Phase Models

Model Number	Power Rating	Output Voltage	Input Voltage	Approx. Weight lb/kg
77101	1 kVA	117 VAC	85-125 VAC	25/11
77101-30	1 kVA	117 VAC	85-125 VAC	25/11
77201	1 kVA	220 VAC	160-235 VAC	25/11
77102	2 kVA	117 VAC	85-125 VAC	40/19
77202	2 kVA	220 VAC	160-235 VAC	40/19
77302	2 kVA	230 VAC	167-246 VAC	40/19
77402	2 kVA	240 VAC	175-255 VAC	40/19
77104	4 kVA	117 VAC	85-125 VAC	50/23
77204	4 kVA	220 VAC	160-235 VAC	50/23
77304	4 kVA	230 VAC	167-246 VAC	50/23
77404	4 kVA	240 VAC	175-255 VAC	50/23
77108	8 kVA	117 VAC	85-125 VAC	100/46
77208	8 kVA	220 VAC	160-235 VAC	100/46
77308	8 kVA	230 VAC	167-246 VAC	100/46
77408	8 kVA	240 VAC	175-255 VAC	100/46
77216	16 kVA	220 VAC	160-235 VAC	165/75
77316	16 kVA	230 VAC	167-246 VAC	165/75
77416	16 kVA	240 VAC	175-255 VAC	165/75

NOTE: Models with -30 suffix feature a six-foot line cord and a duplex receptacle (NEMA type 5-20R).

Three-Phase Models (WYE Input, WYE Output)

Model Number	Power Rating	Output Voltage	Input Voltage	Approx. Weight lb/kg
77506	6 kVA	117 VAC	85-125 VAC	120/55
77606	6 kVA	220 VAC	160-235 VAC	120/55
77706	6 kVA	240 VAC	175-255 VAC	120/55
77512	12 kVA	117 VAC	85-125 VAC	160/73
77612	12 kVA	220 VAC	160-235 VAC	160/73
77712	12 kVA	240 VAC	175-255 VAC	160/73
77538	24 kVA	117 VAC	85-125 VAC	340/155
77638	24 kVA	220 VAC	160-235 VAC	380/73
77550	50 kVA	117 VAC	85-125 VAC	825/375
77575	75 kVA	117 VAC	85-125 VAC	1200/546
77580	100 kVA	117 VAC	85-125 VAC	1500/682

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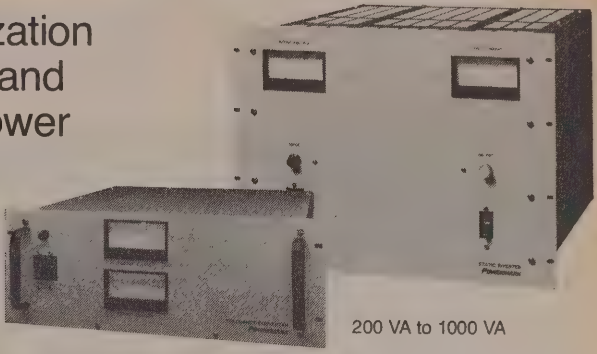
Inverters and Converters

For voltage regulation, frequency stabilization and frequency conversion of AC power; and for efficient, reliable conversion of DC power into sinusoidal AC power.


200 VA to 1000 VA

Inverters

Powermark Series Z Inverters (200 VA to 2 kVA) provide reliable conversion of DC power into highly regulated sinusoidal AC power. They feature ferroresonant transformer simplicity, high reliability, excellent isolation, current limiting capability and very good waveform shaping.

Series X Inverters (2 kVA to 10 kVA) use *pulse-width modulation* technology and harmonic-suppressing transformer filters to provide excellent output regulation.

Frequency Converters

Powermark Series Z Frequency Converters (200 VA to 2 kVA) are used to change available frequency to regulated outputs of 50 Hz, 60 Hz or 400 Hz. They offer the same operational advantages as the Series Z Inverters.

Series X Frequency Converters (2 kVA to 10 kVA) are used to convert available frequency to regulated output voltages of 50 Hz or 60 Hz. These converters offer the same operating features as the Series X Inverters.

Specifications

Input Protection:
High and low voltage reverse polarity protection.

Static Regulation:
Line regulation ±1% maximum for line variations between low line and high line at half load.
Load regulation ±2% maximum for load variations between no load and full load at nominal line.

Frequency Stability:
Series Z, ±0.5% of fixed frequency (±0.01% optional); Series X, ±0.5% of fixed frequency (±0.05% optional).

Output Protection:
Overload and short-circuit protection.

Total Harmonic Distortion:
Less than 5% at full load and nominal line.

Operating Temperature:
Series Z, −10°C to +55°C;
Series X, 0°C to +55°C

External Phase and Frequency Synchronization:
Optional for Series X.

Recovery Time:
50 milliseconds for 20% load change for Series X; 100 milliseconds for 50% load change for Series Z.

Input Frequency Ranges:
Series Z, 45 to 65 Hz
Series X, 48 to 420 Hz

Inverters

Power Rating	Product Series	Input Voltage	Output Frequency	Output Voltage	Size Code	Approx. Weight lb/kg
200 VA	Z	12/24, 28, 48 or 125*	50 Hz	115/230 VAC	A	45/21
400 VA	Z	12/24, 28, 48 or 125*	50 Hz	115/230 VAC	A	70/32
800 VA	Z	12/24, 28, 48 or 125*	50 Hz	115/230 VAC	A	100/46
1,600 VA	Z	12/24 or 28*	50 Hz	115/230 VAC	C	195/89
2,000 VA	X	48 or 125*	50 Hz	115 or 230 VAC*	G	190/87
4,000 VA	X	48 or 125*	50 Hz	115 or 230 VAC*	H	270/123
8,000 VA	X	125 or 250*	50 Hz	115 or 230 VAC*	I	710/323
250 VA	Z	12/24, 28, 48 or 125*	60 Hz	115 VAC	A	45/21
500 VA	Z	12/24, 28, 48 or 125*	60 Hz	115 VAC	A	70/32
1,000 VA	Z	12/24, 28, 48 or 125* (250)	60 Hz	115 or 115/230 VAC*	A(B)	100/46
2,000 VA	Z	12/24 or 28*	60 Hz	115 or 115/230 VAC*	C	195/89
2,500 VA	X	48 or 125*	60 Hz	115 or 230 VAC*	G	190/87
5,000 VA	X	48 or 125*	60 Hz	115 or 230 VAC*	H	270/123
10,000 VA	X	125 or 250*	60 Hz	115 or 230 VAC*	I	710/323
250 VA	Z	12/24 or 28*	400 Hz	115 VAC	A	30/14
500 VA	Z	12/24 or 28*	400 Hz	115 VAC	A	45/21
1,000 VA	Z	12/24 or 28*	400 Hz	115 VAC	A	55/25
2,000 VA	Z	12/24 or 28*	400 Hz	115 VAC	C	110/50

*Specify with order

Sizes

Size Code	Height in./cm	Width in./cm	Depth in./cm
A	7/18	19/48	13/33
B	7/18	19/48	18.5/47
C	14/36	19/48	13/33
D	14/36	19/48	18.5/47

Size Code	Height in./cm	Width in./cm	Depth in./cm
E	21/54	19/48	13/33
G	14/36	19/48	21/53
H	21/53	19/48	21/53
I	62/157	23 3/59	31/79

Frequency Converters

Power Rating	Product Series	Input Voltage	Output Frequency	Output Voltage	Size Code	Approx. Weight lb/kg
200 VA	Z	115	50 Hz	115/230 VAC	A	50/23
200 VA	Z	230	50 Hz	115/230 VAC	A	65/30
400 VA	Z	115	50 Hz	115/230 VAC	B	80/37
400 VA	Z	230	50 Hz	115/230 VAC	B	90/41
800 VA	Z	115	50 Hz	115/230 VAC	B	115/53
800 VA	Z	230	50 Hz	115/230 VAC	B	140/64
1,600 VA	Z	115	50 Hz	115/230 VAC	D	225/103
1,600 VA	Z	230	50 Hz	115/230 VAC	D	275/125
2,000 VA	X	115, 208, 230 or 240*†	50 Hz	115 or 230 VAC*	G	245/112
4,000 VA	X	208, 230 or 240*†	50 Hz	115 or 230 VAC*	H	330/150
8,000 VA	X	115, 208, 230 or 240*†	50 Hz	115 or 230 VAC*	I	860/391
250 VA	Z	115	60 Hz	115 VAC	A	50/23
250 VA	Z	230	60 Hz	115 VAC	A	65/30
500 VA	Z	115	60 Hz	115 VAC	B	80/37
500 VA	Z	230	60 Hz	115 VAC	B	90/40
1,000 VA	Z	115	60 Hz	115 or 115/230 VAC*	B	115/53
1,000 VA	Z	230	60 Hz	115 or 115/230 VAC*	B	140/64
2,000 VA	Z	115	60 Hz	115 or 115/230 VAC*	D	225/103
2,000 VA	Z	230	60 Hz	115 or 115/230 VAC*	D	275/125
2,500 VA	X	115, 208, 230 or 240*†	60 Hz	115 or 230 VAC*	G	245/112
5,000 VA	X	208, 230 or 240*†	60 Hz	115 or 230 VAC*	H	330/150
10,000 VA	X	115, 208, 230 or 240*†	60 Hz	115 or 230 VAC*	I	860/391
250 VA	Z	115	400 Hz	115 VAC	A	35/16
250 VA	Z	230	400 Hz	115 VAC	A	50/23
500 VA	Z	115	400 Hz	115 VAC	B	55/25
500 VA	Z	230	400 Hz	115 VAC	B	70/32
1,000 VA	Z	115	400 Hz	115 VAC	B	70/32
1,000 VA	Z	230	400 Hz	115 VAC	B	95/44
2,000 VA	Z	115	400 Hz	115 VAC	D	140/64
2,000 VA	Z	230	400 Hz	115 VAC	D	190/87

*Specify with order
†All three-phase inputs are 208Y/120 VAC or 240 coils VAC

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Static Transfer Switches

Static Transfer Switches are designed to give Powermark Series X or any similar inverters automatic reverse transfer capability, thereby providing an inexpensive source of uninterruptible power. When used in combination with these types of inverters, a transfer switch automatically connects the critical load to an alternate power source whenever the primary source falls below a preselected level. Static Transfer Switches are compact, easy to install and are available in power ratings from 2.5 kVA to 10 kVA.

Specifications

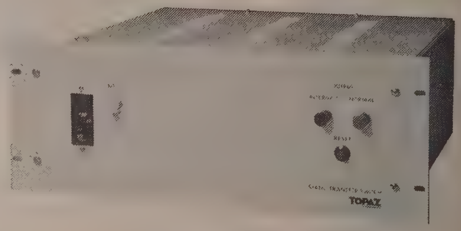
Frequency Range:
47-63 Hz

Cooling:
Natural convection

Mounting:
Standard 19-inch relay rack

Forward Transfer Time:
Manual, 25 milliseconds typical

Reverse Transfer Time:
Typically 4 milliseconds or less



5 kVA Static Transfer Switch
Model 3168

Models

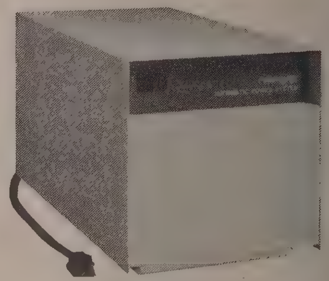
Power Rating	Model Number	Nominal Input and Output Voltage	Input and Output Voltage Range	Maximum Output Current	Weight lb/kg	Size of Switch
50/60 HZ						
2.5 kVA	3114	115 VAC	105-125 VAC	23A	10/4.5	3.5 in. H x 19 in. W x 18 in. D 9cm H x 48cm W x 46cm D
5 kVA	3168	115 VAC	105-125 VAC	45A	20/9	7 in. H x 19 in. W x 18 in. D 18cm H x 48cm W x 46cm D
2.5 kVA	3171	230 VAC	210-250 VAC	12A	10/4.5	3.5 in. H x 19 in. W x 18 in. D 9cm H x 48cm W x 46cm D
5 kVA	3172	230 VAC	210-250 VAC	23A	20/9	7 in. H x 19 in. W x 18 in. D 18cm H x 48cm W x 46cm D
10 kVA	**	115 VAC	105-125 VAC	100A	Internal to Series X Inverter	
10 kVA	**	230 VAC	210-230 VAC	50A	Internal to Series X Inverter	

**Consult factory for system model number.

NOTE: Static Transfer Switch is for use with any single-phase inverter equipped with external frequency synchronization and phase synchronization.

Automatic Power Systems

300 VA of square wave AC power in the event of primary power failure



300 VA

Model Numbers 85000-1 and 85000-2 include maintenance-free batteries

Features

- UL Listed Models
- Rugged Construction
- Compact Size
- High Efficiency
- Simple Installation
- Long Life and High Reliability
- Short-Circuit and Overload Protection
- Reverse Polarity Protection

Powermark square wave Automatic Power Systems protect critical equipment against losses of primary AC power. They are ideal for equipment that can withstand a short power interruption during transfer from the primary power source to the UPS inverter output. Typical transfer time is 4 milliseconds for Series 85000 models and 15 milliseconds for Model 9234.

UL Listed	Power Rating	Model Part Number	Input		Output			Frequency	Battery	Full Load Backup Time	Battery Charging Current or Recharge Time	Size in./cm	Approximate Weight lb/kg
			VAC	Phase	VAC	Phase	Current						
	300 VA	9234	120	1	120	1	2.6A	60 Hz	External 12V	Dependent on batteries	3 Amperes	7/18 H 7/18 W 5.5/14 D	15/7
UL	300 VA	85000-1	120	1	120	1	2.6A	60 Hz	Internal	10 minutes minimum 12 minutes typical	24 hours full charge	9.5/24 H 8.5/22 W 16/41 D	40/19
UL	300 VA	85000-2	120	1	120	1	2.6A	60 Hz	Internal	27 minutes minimum 35 minutes typical	24 hours full charge	9.5/24 H 8.5/22 W 16/41 D	55/25

POWERMARK • DIVISION OF TOPAZ 3855 RUFFIN ROAD, SAN DIEGO, CALIFORNIA 92123-1875 U.S.A. • PHONE (619) 565-8363

AC POWER LINE CONDITIONING EQUIPMENT

RTE technology brings you AC Power Line Conditioning products that keep your computer or other critical equipment running smoothly throughout a wide variety of power line disturbances. Our products will always keep you in power because we keep our design simple. We use the minimum number of conservatively rated parts. The results of this simple logic are MTBFs from 50,000 hours to over 100,000 hours, depending on the product you select to solve your specific power problem.

Uninterruptible Power Systems

Single and Three Phase, 500VA to 50KVA, 50 and 60Hz

RTE UPS provide complete protection against blackouts, brownouts, spikes, surges and sags, in short, any disturbance in your power line. From our tiny, silent 500VA MICRO-UPS to our 50KVA Model 6000 with Digital Information System, we have the right UPS for your specific needs. All standard 60Hz models are available with stock to 3-week delivery; 50Hz models are stock to 6 weeks.

Super Isolation Transformers

Single and Three Phase, 250VA to 15KVA, 50/60Hz

RTE's Super Isolation Transformers (SIT) provide a low-cost solution to the most common power line problem, noise. Surveys of power quality indicate up to 88% of the disturbances are noise. RTE's SITs eliminate common-mode noise and greatly reduce transverse-mode noise. All standard models are in stock, and come with a 5-Year warranty.

AC Line Conditioners

Single and Three Phase, 150VA to 60KVA, 50 and 60Hz

RTE's AC Line Conditioners eliminate power line noise and regulate AC line voltage to within the tight limits modern computers require. In fact, they solve all power line problems except outages (only an UPS will handle those). RTE has a complete selection of AC Line Conditioners using either of two technologies: rugged, reliable Ferroresonant, or compact, silent Electronic. All popular sizes are available with stock to 2-week delivery.

Need to know more about AC Power Problems and the alternate technologies available to solve them? Send for RTE's **AC Power Handbook.** Written in layman's language, copies are available at our cost of $4.00 each.

Note: This book is yours FREE if our representative delivers it to you personally.

RTE DELTEC

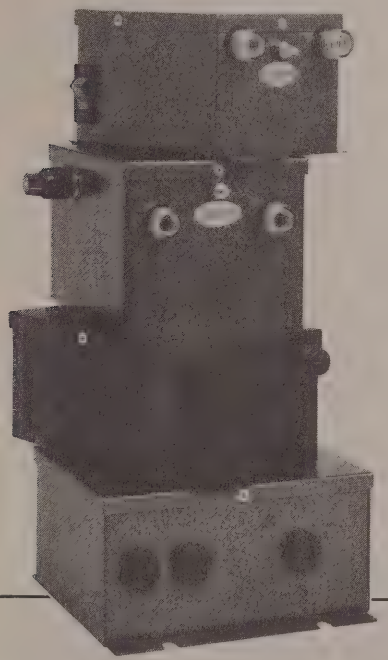
Formerly Gould Inc. Power Conversion Division

RTE DELTEC CORPORATION
2727 Kurtz Street
San Diego, CA 92110 U.S.A.
Phone (800) 854-2658
In California (619) 291-4211
TWX (910) 335-1241

THE MOST RELIABLE POWER SUPPLIES FOR HIGH VOLTAGE DC POWER

- Delivery from stock
- Standard or custom design
- Regulated, short circuit and arc protected
- All units available — 120/220, 50/60 Hz
- Special input voltages available

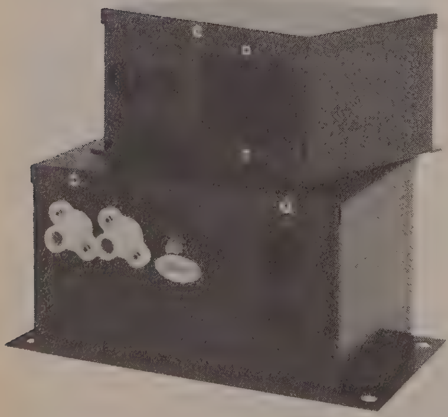
S&H manufactures a wide range of High Voltage Power Supplies, both in stock and custom designs. Our Application Engineers can work with your special requirements and match them to either a cataloged unit or they will be pleased to quote to your exact specifications.



SINGLE OUTPUT VOLTAGE

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	POWER OUTPUT
DC-1205	120V/60 Hz	5000 VDC	20 VA
DC-1206	120V/60 Hz	6000 VDC	20 VA
DC-1207	120V/60 Hz	7000 VDC	20 VA
DC-1208	120V/60 Hz	8000 VDC	20 VA
DC-1209	120V/60 Hz	9000 VDC	20 VA
DC-12010	120V/60 Hz	10,000 VDC	20 VA
DC-12012	120V/60 Hz	12,000 VDC	20 VA
DC-12014	120V/60 Hz	14,000 VDC	20 VA
DC-12016	120V/60 Hz	16,000 VDC	20 VA
DC-12018	120V/60 Hz	18,000 VDC	20 VA

Units are also available for 230 and/or 50 Hz. The output of above models are isolated. Either output terminal may be grounded for positive or negative applications.



DUAL OUTPUT VOLTAGE

MODEL NUMBER	PRIMARY INPUT	POLARITY	OUTPUT VOLTAGE
DC-1205/9	120V/60 Hz	Positive	9000/5000
DCN-1205/9	120V/60 Hz	Negative	9000/5000
DC-1205/10	120V/60 Hz	Positive	9500/5000
DCN-1205/10	120V/60 Hz	Negative	9500/5000
DC-1205/11	120V/60 Hz	Positive	10,500/5000
DCN-1205/11	120V/60 Hz	Negative	10,500/5000

Above units also available for 230V and/or 50 Hz.

All S&H power sources utilized epoxy molded ferroresonant transformers and are therefore line and load regulated.

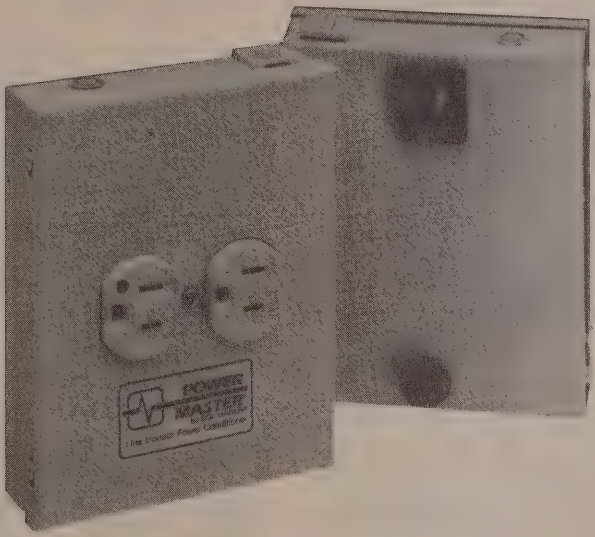
Ideal for use in precipitators, microfiche copiers, plain paper copiers and many other electrostatic charge and discharge applications.

SEE OUR OTHER PAGE IN SECTION 4100 PAGE 3•1928

S&H INDUSTRIES, INC.

119 GLEN COVE DRIVE • GLEN HEAD, NEW YORK 11545 • (516) 671-5600

AVOID EQUIPMENT FAILURE!



UL

NEW FROM SGL WABER®

The electricity that powers your sensitive electronic testing equipment is "polluted." Filled with voltage spikes and noise interference that can cause premature circuit failure and incorrect readings.

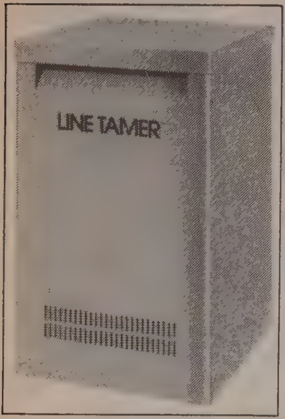
Protect your data and equipment. Purify your power with a new POWER MASTER™ Line Monitor Power Conditioner. Ready to use — just plug in. Free 28 page catalog featuring 15 models.

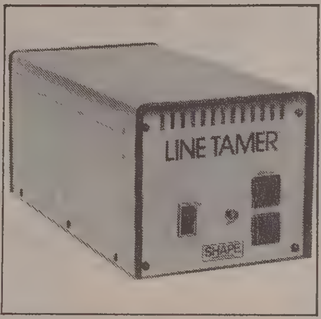
POWER
MASTER™
by SGL WABER
Line Monitor Power Conditioner

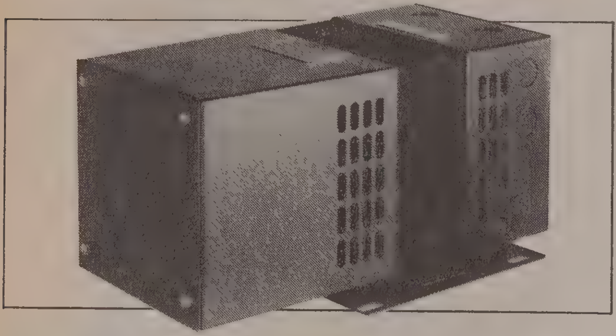
SGL WABER/a division of SGL Industries, Inc.
300 Harvard Avenue/Westville, NJ 08093/In NJ (609) 456-5400 **Toll-free 800-257-8384**

Shape: The Solution to Power Pollution

Line Tamer™ Ferroresonant Transformers for Line Isolation and Voltage Regulation







CLT – FLOOR MOUNT/HARDWIRED SINGLE PHASE 60 Hz

KVA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±3%)	Ship Wt	H″	W″	D″
5	CLT-5000-CSO	120/208/240	120/208/240	315	40	19	22
6	CLT-6000-CSO	120/208/240	120/208/240	365	40	19	22
7.5	CLT-7500-CSO	120/208/240	120/208/240	420	40	19	22
10	CLT-1001-CSO	120/208/240	120/208/240	590	40	19	22
15	CLT-1501-CSO	120/208/240	120/240	800	40	19	22
22 5	CLT-2251-CBD	120/208/240	120/240	1055	36	32	21 5
25	CLT-2501-CBD	120/208/240	120/240	1170	36	32	21.5
33	CLT-3301-CBF	120/208/240	120/240	1590	46	32	35
50	CLT-5001-CBF	120/208/240	120/240	2175	46	32	35
75	CLT-7501-CBH	120/208/240	120/240	3370	46	64	35

CLT – FLOOR MOUNT/HARDWIRED THREE PHASE 60 Hz

KVA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±3%)	Ship Wt	H″	W″	D″
10	CLT-1001-HGD	208Y/120	208Y/120	750	36	32	21.5
15	CLT-1501-HGD	208Y/120	208Y/120	830	36	32	21.5
25	CLT-2501-HGD	208Y/120	208Y/120	1170	36	32	21.5
50	CLT-5001-HGF	208Y/120	208Y/120	2175	46	32	35
75	CLT-7501-HGH	208Y/120	208Y/120	3370	46	64	35
100	CLT-1002-HGF†	208Y/120	208Y/120	4775	46	32	35
125	CLT-1252-HGF†	208Y/120	208Y/120	5650	46	32	35
150	CLT-1502-HGF†	208Y/120	208Y/120	6525	46	32	35
175	CLT-1752-HGH†	208Y/120	208Y/120	8360	46	64	35
200	CLT-2002-HGH†	208Y/120	208Y/120	9240	46	64	35
250	CLT-2502-HGH†	208Y/120	208Y/120	11000	46	64	35

†Consists of three enclosures. Size shown is for each individual enclosure. Weight listed is approximate total. Detailed wiring and mounting dimensions are shown on Form DD-1180.

Wye/Wye is shown, however, Delta/Wye units are also available. For details, contact the factory.

50 Hz CLTs are available for all sizes shown.

Shape Magnetronics, Inc. Line Tamer™ ferroresonant transformers condition power to solve 99% of power problems encountered by computers and other sensitive equipment. The ferroresonant design provides instant response to line or load changes, protects against both transverse mode and common mode noise, and requires no step-up or step-down transformers.

Computer Line Tamer™ Specifications

VA RATINGS: 70 – 250 KVA
UL LISTING: all sizes to 7.5 KVA
REGULATION: ±3% for input range of +10%, –20% of nominal voltage
NOISE REJECTION: common mode better than 120 db
– transverse mode better than 60 db
VOLTAGE SPIKE: attenuation of 250:1
HARMONICS: 140 VA – 7.5 KVA is approximately 3%.
10 KVA and up is approximately 5%.

CLT – PORTABLE/PLUG IN SINGLE PHASE 60 Hz UL LISTED

VA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±3%)	Ship Wt	H″	W″	D″
70	CLT-0070-AAA	120	120	14	7	6	12.5
140	CLT-0140-AAA	120	120	17	7	6	12.5
250	CLT-0250-AAA	120	120	23	7	6	12.5
500	CLT-0500-AAA	120	120	43	8.75	8.5	17.5
750	CLT-0750-AAA	120	120	52	8.75	8.5	17.5
1,000	CLT-1000-AAA	120	120	60	8.75	8.5	17.5
1,500	CLT-1500-AAA*	120	120	89	11	11	19
2 000	CLT-2000-AAA*	120	120	105	11	11	19

*Requires customer supplied NEMA type LS-30R receptacle

CLT – PORTABLE/PLUG IN SINGLE PHASE 50 Hz UL LISTED

VA	Catalog Number	Voltage		Approximate Dimensions			
		Input	Output (±3%)	Ship Wt	H″	W″	D″
70	CLT-0070-KJA	180-260	220	16	6	6	12.5
140	CLT-0140-KJA	180-260	220	22	6	6	12.5
250	CLT-0250-KJA	180-260	220	27	6	6	12.5
500	CLT-0500-KJA	180-260	220	49	8.5	8.5	17.5
1,000	CLT-1000-KJA	180-260	220	70	8.5	8.5	17.5
2,000	CLT-2000-KJA*	180-260	220	118	11	11	19

*Requires customer supplied NEMA type LS-30R receptacle

CLT – WALL OR FLOOR MOUNT/HARDWIRED SINGLE PHASE 60 Hz UL LISTED

VA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±3%)	Ship Wt	H″	W″	D″
140	CLT-0140-AAB	120	120	14	5.5	3.5	8.5
250	CLT-0250-BAB	120/240	120	19	6	4.5	10
500	CLT-0500-BAB	120/240	120	33	6.5	6.5	12.5
750	CLT-0750-CBB	120/208/240	120/240	40	6.5	6.5	13.5
1,000	CLT-1000-CBB	120/208/240	120/240	47	6.5	6.5	14.5
1,500	CLT-1500-CBB	120/208/240	120/240	65	9.5	10	17.5
2,000	CLT-2000-CBB	120/208/240	120/240	79	9.5	10	18
2,500	CLT-2500-CBB	120/208/240	120/240	92	10	12	18.5
3,000	CLT-3000-CBB	120/208/240	120/240	122	9.5	10	20
3,000	CLT-3000-DBB	240/480	120/240	122	9.5	10	20
4,000	CLT-4000-DBB	240/480	120/240	159	10	11	22
5,000	CLT-5000-CBB*	120/208/240	120/240	200	10	26	18.5
5,000	CLT-5000-DBB*	240/480	120/240	200	10	26	18.5
7,500	CLT-7500-DBB*	240/480	120/240	335	10	26	22

*Consists of two parallel mounted enclosures. Weights listed are approximate totals for both enclosures.

SHAPE
MAGNETRONICS, INC.

901 DUPAGE AVENUE • LOMBARD, IL 60148 • 312 620-8394 • TWX 910-991-2352

Shape: The Solution to Power Pollution

Industrial Line Tamer™ Specifications

VA RATINGS: 15 – 250 KVA
UL LISTING: all sizes to 7.5 KVA
REGULATION: ±1% for input range of +10%, −20% of nominal voltage
NOISE REJECTION: common mode: better than 95 db
— transverse mode: better than 50 db
VOLTAGE SPIKE: attenuation of 150:1
HARMONICS: 15VA – 7.5KVA is 3% max. 10 KVA and up is 5% max.

ILT – INDUSTRY STANDARD MOUNT SINGLE PHASE 60 Hz

VA	Catalog Number	Voltage		Approximate Dimensions			
		Input	Output (±3%)	Ship Wt	H"	W"	D"
60	ILT-0060-LKB	90-130/180-260	110/220	12	5.5	3.5	7.5
120	ILT-0120-LKB	90-130/180-260	110/220	15	6	4.5	9
250	ILT-0250-LKB	90-130/180-260	110/220	21	6.5	6.5	12
500	ILT-0500-LKB	90-130/180-260	110/220	38	6.5	6.5	13
1,000	ILT-1000-LKB	90-130/180-260	110/220	54	9.5	10	17.5
2,000	ILT-2000-LKB	90-130/180-260	110/220	91	9.5	10	18.5
3,000	ILT-3000-LKB	90-130/180-260	110/220	141	9.5	10	21
5,000	ILT-5000-LKB†	90-130/180-230	110/220	230	10	26	19

†Consists of two parallel mounted enclosures.
Dimensions listed are for each enclosure. Weights listed are the approximate totals for both enclosures.

ILT – FLOOR MOUNT/HARDWIRED THREE PHASE 60 Hz

KVA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±1%)	Ship Wt	H"	W"	D"
9	ILT-9000-HGD	208Y/120	208Y/120	640	36	32	21.5
15	ILT-1501-HGD	208Y/120	208Y/120	830	36	32	21.5
22.5	ILT-2251-HGD	208Y/120	208Y/120	1055	36	32	21.5
30	ILT-3001-HGF	208Y/120	208Y/120	1500	46	32	35
45	ILT-4501-HGF	208Y/120	208Y/120	1955	46	32	35
67.5	ILT-6751-HGH	208Y/120	208Y/120	3040	46	64	35
75	ILT-7501-HGH	208Y/120	208Y/120	3370	46	64	35
100	ILT-1002-HGF†	208Y/120	208Y/120	4775	46	32	35
125	ILT-1252-HGF†	208Y/120	208Y/120	5650	46	32	35
150	ILT-1502-HGF†	208Y/120	208Y/120	6525	46	32	35

†Consists of three enclosures. Size show is for each individual enclosure. Weight listed is approximate total.
Wye/Wye is shown, however, Delta/Wye units are also available. For details, contact factory.
50 Hz ILTs are available for all sizes shown.

ILT – INDUSTRY STANDARD MOUNT SINGLE PHASE 60 Hz

VA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±1%)	Ship Wt	H"	W"	D"
30	ILT-0030-AAB	120	120	6	5.5	3.5	6.5
60	ILT-0060-AAB	120	120	10	5 5	3 5	7
60	ILT-0060-DAB	240/480	120	10	5.5	3.5	7
120	ILT-0120-BAB	120/240	120	13	5 5	3 5	8
120	ILT-0120-DAB	240/480	120	13	5.5	3.5	8
250	ILT-0250-BAB	120/240	120	19	6	4 5	10
250	ILT-0250-DAB	240/480	120	19	6	4.5	10
500	ILT-0500-BAB	120/240	120	33	6 5	6 5	12 5
500	ILT-0500-DBB	240/480	120/240	33	6 5	6.5	12.5
750	ILT-0750-CBB	120/208/240	120/240	40	6 5	6 5	13 5
1,000	ILT-1000-CBB	120/208/240	120/240	47	6.5	6.5	14.5
1,000	ILT-1000-DBB	240/480	120/240	47	6.5	6.5	14 5
1,500	ILT-1500-CBB	120/208/240	120/240	65	9 5	10	17.5
2,000	ILT-2000-CBB	120/208/240	120/240	79	9 5	10	18
2,000	ILT-2000-DBB	240/480	120/240	79	9.5	10	18
2,500	ILT-2500-CBB	120/208/240	120/240	92	10	12	18.5
3,000	ILT-3000-CBB	120/208/240	120/240	122	9.5	10	20
3,000	ILT-3000-DBB	240/480	120/240	122	9 5	10	20
5,000	ILT-5000-CBB†	120/208/240	120/240	200	10	26	18.5
5,000	ILT-5000-CBO	120/208/240	120/240	315	40	19	22
5,000	ILT-5000-DBB†	240/480	120/240	200	10	26	18.5
7,500	ILT-7500-CBO	120/208/240	120/240	420	40	19	22
7,500	ILT-7500-DBB†	240/480	120/240	335	10	26	22

†Consists of two parallel mounted enclosures. Weights listed are the approximate totals for both enclosures.
Factory installed end plates with single receptacle and line cord can be purchased upon request for units up to 2KVA.

ILT – FLOOR MOUNT/HARDWIRED SINGLE PHASE 60 Hz

KVA	Catalog Number	Voltage		Approximate Dimensions			
		Input (+10-20%)	Output (±1%)	Ship Wt	H"	W"	D"
10	ILT-1001-CBO	120/208/240	120/240	590	36	32	21.5
15	ILT-1501-CBO	120/208/240	120/240	800	36	32	21 5
22.5	ILT-2251-CBD	120/208/240	120/240	1055	36	32	21.5
25	ILT-2501-CBD	120/208/240	120/240	1170	36	32	21 5
33	ILT-3301-CBF	120/208/240	120/240	1590	46	32	35
50	ILT-5001-CBF	120/208/240	120/240	2175	46	32	35

CUSTOM MAGNETICS

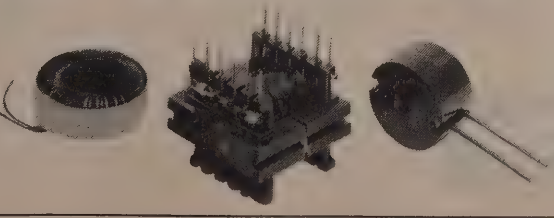
Shape Magnetronics, with facilities in Chicago and Phoenix, also offers complete custom design and manufacturing capabilities for specialty transformers and magnetic-electronic devices.
Prototypes can be delivered within one to three weeks.

Special CVT Transformers

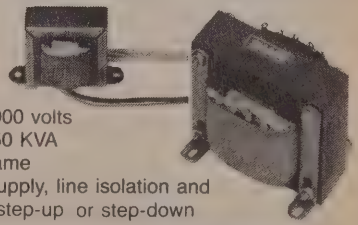
Capacity:	15 VA to 250 KVA
Input Range:	Up to ±20%
Line Regulation:	±1%
Frequency:	50, 60 or 50/60 Hz
Applications:	DC power supplies, relays, solenoids, heaters, filaments and other loads that are insensitive to harmonics

Ferrite Transformers

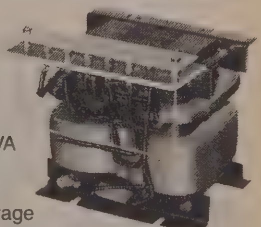
Applications:	High frequency switching power supplies



Power Transformers



Input and output voltage ranges:	Up to 6000 volts
Capacity:	Up to 250 KVA
Construction:	Open frame
Applications:	Power supply, line isolation and voltage step-up or step-down



Mercury-Vapor Ballasts

Capacity:	200 watts to 25 KVA
Input Range:	±10%
Output Voltages:	Up to 6000 volts
Line Regulation:	±2% of lamp wattage
Frequency:	50, 60 or 50/60 Hz
Application:	Power supply and starting circuit for mercury arc lamps

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Sola Mini UPS

True UPS:

The Mini UPS is always between the AC line and the critical load.

Inverter Design:

Multiple pulse width modulation with switching transistors.

Complete Brownout and Noise Protection:

The rectifier charger powers the inverter at all times; line noise and transients are isolated from the load. The AC line never directly powers the load.

Regulated Output:

The Mini UPS output voltage is regulated to ±3% when operating from the AC line as well as when operating from the internal battery.

Sine Wave Output:

The output waveshape is a sine wave with less than 3% of any single harmonic and less than 5% total harmonic distortion (THD).

Overload Capability:

The Mini UPS is designed to handle load starting surges and fault clearing by providing 125% overload for 30 seconds, 150% overload for one second and 200% into a short circuit with two automatic restrikes before shutdown.

Maintenance Free Battery:

A long life, maintenance free, sealed lead acid battery is built into the unit to provide uninterrupted inverter operation (without a switching relay) when the AC line fails.

SOLA
MINI UPS

Battery Backup:

If the Mini UPS is operated at less than full load the battery backup time will be extended. If operated at full laod and additional backup time is needed, add on battery packs are available. See Table 4.

Battery Protection:

Automatic shut-off circuitry disconnects the battery during prolonged power outages to prevent battery damage. Upon return of the AC input, the battery is automatically recharged (without operator action) to 95% of capacity in less than 10 times the discharge time.

Controls and Indicators

The front panel on/off switch controls the inverter but does not affect charger operation to insure that the battery is always fully charged. The inverter "on" lamp, "charger on" lamp and "line present" lamp provide quick visual status indications.

Compact Design:

The compact design, input line cord and output receptacle permit simplified installation without the need of rewiring or remodeling. Whether installed with the initial equipment or added later, installation is as simple as plugging in a radio.

Deluxe Models:

The deluxe models (Table 2) incorporate automatic inverter restart and a battery supplying power alarm circuit. The automatic inverter restart allows the inverter to restart once AC input power is restored after a shutdown due to a discharged battery. The battery supplying power alarm provides an isolated set of relay contacts to indicate that the inverter is being powered by the battery as in the case of an AC line failure.

High Inrush Models:

The high inrush models (Table 3) are available for applications requiring large inrush currents. These models will supply up to 6 times rated current for very short durations, as when powering a capacitive input load, such as a power supply.

A UNIT OF GENERAL SIGNAL GS
SOLA
1717 BUSSE ROAD, ELK GROVE VILLAGE, IL 60007
Phone: 312/439-2800 Telex 28-0538

Specifications

Electrical Specifications:

Input Voltage:	See table, 1Ø, +10, −15%
Input Frequency:	50 Hz or 60Hz, ± 10%
Input Protection:	Line fuse, EMI filtering and rectifier current limiting
Output Voltage:	See table, 1Ø
Output Regulation:	± 3% steady state
Output Frequency:	50Hz or 60Hz, ± 0.01%
Output Waveshape:	Sine wave, 3% maximum single harmonic, 5% total harmonic distortion
Output Overload:	125% for 30 seconds 150% for 1 second 200% shortcircuit
Output Protection:	Automatic shutdown after 2 restrikes

Table 1: Mini UPS Standard Models

Catalog Number	Output Power (At 0.8 Pf)	Input/ Output Frequency	Input/ Output Voltage	Battery Back-Up Time	Approx. Weight	Cooling
26-00-50400-3001	400 VA	60 Hz	120	20 min.	100 lbs.	Conv.
26-29-50600-3000	600 VA	50 Hz	220/240	20 min.	135 lbs.	Fan
56-01-10001-7500	750 VA	SEE BELOW				

Table 2: Deluxe Mini UPS Systems

Catalog Number	Output Power (At 0.8 Pf)	Input/ Output Frequency	Input Output Voltage	Battery Back-Up Time	Approx. Weight	Cooling
26-00-50400-3101	400 VA	60 Hz	120	20 min.	100 lbs.	Conv.
26-29-50600-3100	600 VA	50 Hz	220/240	12 min.	135 lbs.	Fan
56-01-10001-7500	750 VA	60 Hz	120	10 min.	120 lbs.	Fan

Table 3: High Inrush Current Models

Catalog Number	Output Power (At 0.8 Pf)	Input/ Output Frequency	Input/ Output Voltage	Battery Back-Up Time	Approx. Weight	Cooling
26-29-50600-3700	600 VA	50 Hz	220/240	12 min.	135 lbs.	Fan
26-00-50750-3700	750 VA	60 Hz	120	10 min.	120 lbs.	Fan

Table 4: Add-On Battery Packs

Catalog Number	Input Power	Dimensions (Inches) (HxWxD)	Approx. Wt.	Total Reserve Operating Time (2)		
				400 VA Model	600 VA Model	750 VA Model
911-01-00012-0001	120V (1) (60 Hz)	10.5x12.0x20.5	120 lbs.	110 min.	60 min.	50 min.
911-03-00012-0002	None	8.0x12.0x20.0	80 lbs.	110 min.	60 min.	50 min.
911-03-00028-0002	None	9.5x12.5x25.5	145 lbs.	250 min.	150 min.	120 min.

(1) This unit is equipped with an internal battery charger, which offers a shorter recharging time.

(2) Total reserve operating time (including the Mini UPS internal battery) at full load output. Operation at less than full load will greatly extend the reserve time.

Mechanical Specifications:

Input Line Cord:	For 120 VAC Models, 6 ft. with NEMA 5-15 P plug type For 220 & 240 VAC models, 6 ft. with NEMA 6-15 P plug type
Output Receptacle:	For 120VAC models, NEMA 5-15R duplex receptacle For 220 & 240VAC models, NEMA 6-15 R duplex receptacle
Controls & Indicators:	On-Off Switch Amber "Inverter On" Lamp Amber "Charger On" Lamp Amber "Line Present" Lamp Input Fuse Inverter Enable Switch (Screwdriver operated)
Dimensions: (inches)	10.5 H x 12.0 W x 19.0 D

Environmental Specifications

Operating Temperature:	0°C to 40°C
Operating Humidity:	0% to 95% (without condensation)
Operating Altitude:	0 to 5000 ft. (above 5000 ft. consult factory)
Storage Temperature:	0° to 65°C

Sola Standby Power Source

The Sola S.P.S. is an economical standby power source, designed to protect personal, micro, and mini-computers from AC line disturbances and failures. It provides clean, regulated AC power to your critical load when the commercial AC line fails or drops 15% below nominal. The unit contains a sealed, maintenance-free battery that will operate the inverter until the AC returns, or until you complete your computer activity. When the AC is present, it supplies filtered power to the load and maintains the battery in a charged condition.

Electrical Specifications

Input

- 120 VAC, +10%, −15%, 60Hz ±10%
- 220/240 VAC +10%, −15%, 50Hz ±10%

Output

- 120 VAC, ±3%, 60Hz ±1%
- 220/240 VAC ±3%, 50Hz ±1%
- Sine wave, less than 5% T.H.D.
- 130% overload for 3 seconds
- Current limited inverter for short circuit protection
- Line to inverter transfer, 4 to 10 milliseconds at −15% of nominal voltage
- inverter to line retransfer, 2 to 4 milliseconds at −10% of nominal voltage
- Noise attenuation at 10kHz and above, 40 db minimum at 100kHz

Mechanical Specification

- 0°C to 40°C operating temperature
- 0% to 95%, without condensation, operating humidity
- 0 to 8000 ft. operating altitude
- 6 foot power cord with NEMA 5-15P plug for 60Hz, European or British standard for 50Hz
- NEMA 5-15R duplex receptacle for 60Hz, European or British standard for 50Hz
- 15″ high, 7″ wide, 18.5″ deep cabinet
- Maintenance-free, sealed, lead acid battery
- Alarm relay, dry Form C contacts through a ¼″ phone jack

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SOLA

1717 BUSSE ROAD, ELK GROVE VILLAGE, IL 60007
Phone: 312/439-2800 Telex 28-0538

The Sola SPS Offers The Ultimate In Standby Power Protection, With All Of These Features:

- Noise and transient protection when the AC line is present.
- Fast response, ¼ to ½ cycle, when the AC line fails.
- Inverter overcurrent protection, even into a short circuit.
- Simplified installation and operation, just plug it in and turn it on.
- Compact, lightweight design, with hands off operation, including maintenance free battery.
- Relay contact and audible alarm for user annunciation of AC line failure.
- UL listed.

Model Table

Model	Output Power (VA)	Input/Output Voltage (VAC)	Input/Output Frequency (Hz)		Typical Reserve Time (Minutes)		Net Weight (Lbs.)
				½ Load	¾ Load	Full Load	
SPS-400 A	400	120	60	30	20	12	65
SPS-400 B *	400	220/240[1]	50	30	20	12	67
SPS-400 C **	400	220/240[1]	50	30	20	12	67
SPS-800 A	800	120	60	30	20	12	87
SPS-800 B *	800	220/240[1]	50	30	20	12	89
SPS-800 C **	800	220/240[1]	50	30	20	12	89

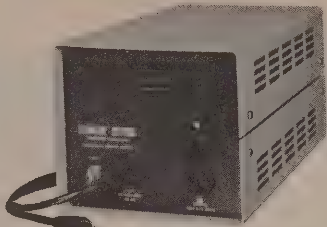
*Equipped with British type plug and outlet. **Equipped with European type plug and outlet.

[1] 50Hz unit shipped set for 240 VAC. Instructions included for 220 VAC operation.

EEM PRODUCT SELECTION GUIDES

There are 33 Guides in this edition of EEM. See page 2 (1A•2, 1B•2, 2•2, 3•2) of each volume to locate the Product Selection Guides that pertain to your needs.

STABILINE® AUTOMATIC VOLTAGE CONTROLS

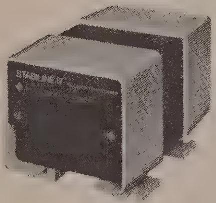


STABILINE® Computer Regulators

Maintain properly conditioned voltage to computers and other voltage critical equipment. Simple cord and plug connection to voltage source; two grounded receptacles for connecting equipment. Provide output of 120 volts rms ±3%, 60 Hz over an input range of 95 to 130 volts rms. Also provide 60dB minimum common-mode noise rejection to help prevent computer errors, loss of information and other noise related problems.

STABILINE® Transient Voltage Suppressors

Suppress momentary voltage spikes on power lines to prevent damage to sensitive equipment. Used to protect medical equipment, computers, word processors, electronic instrumentation, microprocessor based equipment, communications equipment, industrial controls and similar apparatus. Benefits include virtually instantaneous response time, transient reduction of 40dB (100 to 1) per frequency decade above 5kHz, efficiency of 99% at full resistive load and regulation less than 1%. Will attenuate in the same manner regardless of where on the sine wave or in which direction the transient is applied and do not rely on an absolute magnitude before attenuation occurs. Available in 120 and 240 volt models in ratings from 15 to 60 amperes maximum load current.

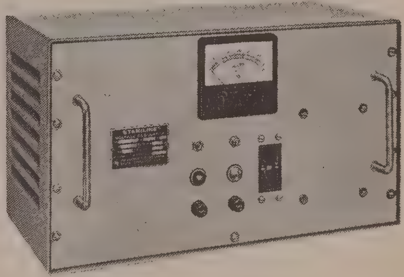


SVR Series STABILINE® Automatic Voltage Regulators

Highly efficient, extremely fast solid-state automatic voltage regulators. Very light in weight when compared with many units of similar kVA ratings. Features include virtually zero waveform distortion, very low internal impedance, negligible phase shift, insensitivity to load power factor and virtually no effect on system power factor. Efficiency is 95 percent at 60 hertz. Models in the SVR Series are available from 0.75 to 4kVA.

STABILINE® Transient Suppressors/Voltage Regulators

In addition to correcting for high or low voltage from power sources, units attenuate transverse-mode (line-to-line) noise and transients. Transient voltage attenuation of 40dB from 5 to 50 kHz. Provide the all-around protection needed by computers, business machines, word processors, microprocessor-based equipment and other voltage sensing devices to reduce or eliminate disruptions, data errors, loss of information and equipment failure. Types SVRS88101C and SVRS88102C are also available with cord/plug sets.



STABILINE® Isolation Transformers

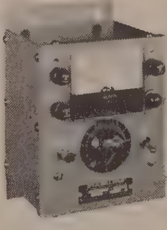
Multi-shielded, ultra-isolation transformers exhibiting low capacitance between primary and secondary windings. Ideal for isolating sensitive equipment and attenuating common mode noise voltage generated by power consuming sources. Common mode noise attenuation is 126dB. Available in four models from 0.5kVA to 5kVA.

Electro Mechanical STABILINE® Automatic Voltage Regulators

Utilize solid-state control circuits, motor-driven POWERSTAT Variable Transformers and buck-boost transformers to regulate line voltage. Widely used in industrial applications or where constant output voltage is required with zero waveform distortion. EMT Series types are offered with ratings from 2.3 to 118kVA; EMS Series in ratings from 25 to 300kVA. The speed of response of EMT and EMS Series units is slower than for some types of automatic voltage regulators, but is sufficiently fast for the majority of applications.

Instantaneous Electronic STABILINE® Automatic Voltage Regulators

Highly accurate, fast-correcting units featuring solid-state circuitry. No vacuum tubes, motors, blowers or relays are used. Benefits include very high accuracy, fast response, low distortion, high efficiency (up to 95 percent) and wide operating frequency range. Models are available in ratings from 0.5 to 15kVA.



STABILINE® Full Range Regulator Controllers

Designed for use with any motor-driven POWERSTAT® Variable Transformer to provide full range regulation of a-c voltage, a-c current or d-c voltage. Output voltage will remain within a 2-volt band when used with 120 volt units and a 4-volt band when used with 240 volt models. Output current can be maintained within ±1% of maximum current setting with user supplied current transformer and Superior Electric transformer T6340. Type FR501BDC and user supplied d-c power will provide regulated d-c voltage.

THE SUPERIOR ELECTRIC COMPANY

1000 Middle Street / Bristol, Connecticut 06010 / Telephone: (203)582-9561

TRIAD-UTRAD

Standard Products

Dept. EM, 1124 East Franklin Street, Huntington, IN 46750 • Phone: (219) 356-6500 • TWX: 810-333-1532

Line Voltage Regulators

Linestar™ portable and hard wire voltage regulators suppress transients and protect against overloading.

Portable Models

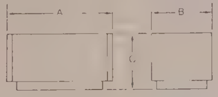
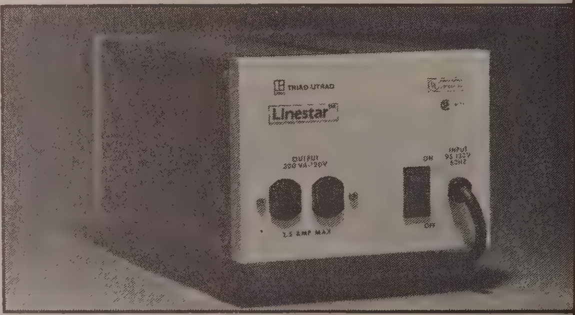


Figure 1



Portable Models, 60 Hertz, Single Phase

Output VA Rating	Catalog Number	Input Voltage Range	Nominal Output Voltage	Approx. Unit Wt. (lbs.)	Figure Code	Dimensions (Inches) A (Length)	B (Width)	C (Height)
70	K6-0400	95-130	120	11	1	$12\frac{5}{8}$	$4\frac{5}{8}$	$7\frac{5}{8}$
140	K6-0600	95-130	120	15½	1	$12\frac{5}{8}$	$4\frac{5}{8}$	$7\frac{5}{8}$
250	K6-0700	95-130	120	20	1	$12\frac{5}{8}$	$4\frac{5}{8}$	$7\frac{5}{8}$
300	K6-0800* •	95-130	120	30	1	$16\frac{1}{8}$	$9\frac{1}{4}$	$8\frac{3}{8}$
500	K6-0900* •	95-130	120	40	1	$16\frac{1}{8}$	$9\frac{1}{4}$	$8\frac{3}{8}$
750	K6-1000* •	95-130	120	49	1	$16\frac{1}{8}$	$9\frac{1}{4}$	$8\frac{3}{8}$
1000	K6-1100* •	95-130	120	59	1	$16\frac{1}{8}$	$9\frac{1}{4}$	$8\frac{3}{8}$
1500	K6-1200	95-130	120	80	1	$16\frac{1}{8}$	$11\frac{1}{2}$	$10\frac{3}{4}$
2000	K6-1300*☐	95-130	120	101	1	$16\frac{1}{8}$	$11\frac{1}{2}$	$10\frac{3}{4}$

*UL LISTED •CSA APPROVED ☐ INPUT PLUG IS A NEMA TYPE L5-30P

Hard Wire Models

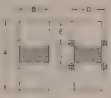


Figure 2

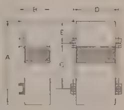


Figure 3

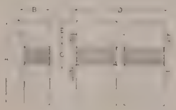


Figure 4

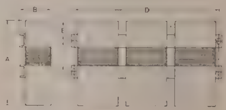
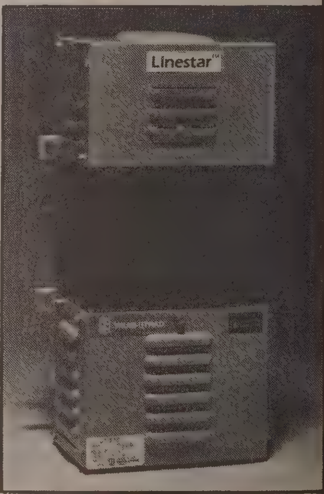


Figure 5



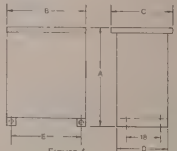


Figure 6

Hard Wire Models, 60 Hertz, Single Phase

Output VA Rating	Catalog Number	Input Voltage Range	Nominal Output Voltage	Approx. Unit Wt. (lbs.)	Figure Code	Dimensions (Inches) A (Length)	B (Depth)	C	D (Width)	E	Mounting Slots
140	K6-0610	95-130, 190-260	120	14	2	$8\frac{3}{4}$	5	3	$3\frac{1}{2}$	$2\frac{7}{8}$	$\frac{7}{32}$x$\frac{3}{4}$
140	K6-0620	190-260, 380-520	120	14	2	$8\frac{3}{4}$	5	3	$3\frac{1}{2}$	$2\frac{7}{8}$	$\frac{7}{32}$x$\frac{3}{4}$
300	K6-0810*	95-130, 190-260	120	28	2	$12\frac{1}{4}$	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
500	K6-0910*	95-130, 190-260	120	37	2	13	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
500	K6-0922*	190-260, 380-520	120 x 240	37	2	13	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
500	K6-0937*	95-130, 175-235, 190-260	120 x 208	47	2	$15\frac{1}{4}$	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
750	K6-1032*	95-130, 175-235, 190-260	120 x 240	47	2	$15\frac{1}{4}$	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
1000	K6-1122*	190-260, 380-520	120 x 240	59	2	$16\frac{1}{4}$	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
1000	K6-1132*	95-130, 175-235, 190-260	120 x 240	59	2	$16\frac{1}{4}$	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
1000	K6-1137*	95-130, 175-235, 190-260	120 x 208	59	2	$16\frac{1}{4}$	$8\frac{3}{8}$	$5\frac{5}{8}$	$8\frac{1}{8}$	5	$\frac{3}{8}$ x $\frac{13}{16}$
1500	K6-1232*	95-130, 175-235, 190-260	120 x 240	78	3	$18\frac{1}{4}$	$8\frac{3}{8}$	$6\frac{5}{8}$	$8\frac{5}{8}$	5	$\frac{13}{32}$ x $\frac{5}{8}$
2000	K6-1322*	190-260, 380-520	120 x 240	101	3	19	$9\frac{3}{4}$	$3\frac{3}{4}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
2000	K6-1332*	95-130, 190-260, 175-235	120 x 240	101	3	19	$9\frac{3}{4}$	$3\frac{3}{4}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
2000	K6-1337*	95-130, 175-235, 190-260	120 x 208	101	3	19	$9\frac{3}{4}$	$3\frac{3}{4}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
2500	K6-1422*	190-260, 380-520	120 x 240	120	3	$19\frac{7}{8}$	$9\frac{3}{4}$	$4\frac{5}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
2500	K6-1432*	95-130, 175-235, 190-260	120 x 240	120	3	$19\frac{7}{8}$	$9\frac{3}{4}$	$4\frac{5}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
3000	K6-1522*	190-260, 380-520	120 x 240	130	3	$20\frac{5}{8}$	$9\frac{3}{4}$	$5\frac{3}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
3000	K6-1532*	95-130, 175-235, 190-260	120 x 240	130	3	$20\frac{5}{8}$	$9\frac{3}{4}$	$5\frac{3}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
3000	K6-1537*	95-130, 175-235, 190-260	120 x 208	130	3	$20\frac{5}{8}$	$9\frac{3}{4}$	$5\frac{3}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
3750	K6-1622*	190-260, 380-520	120 x 240	158	3	$21\frac{7}{8}$	$9\frac{3}{4}$	$6\frac{5}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
3750	K6-1632*	95-130, 175-235, 190-260	120 x 240	158	3	$21\frac{7}{8}$	$9\frac{3}{4}$	$6\frac{5}{8}$	$11\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
5000	K6-1722*	190-260, 380-520	120 x 240	265	4	$19\frac{7}{8}$	$9\frac{3}{4}$	$4\frac{5}{8}$	$24\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
5000	K6-1732*	95-130, 175-235, 190-260	120 x 240	265	4	$19\frac{7}{8}$	$9\frac{3}{4}$	$4\frac{5}{8}$	$24\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
7500	K6-1822*	190-260, 380-520	120 x 240	325	4	$21\frac{7}{8}$	$9\frac{3}{4}$	$6\frac{7}{16}$	$24\frac{3}{4}$	5	$\frac{7}{16}$ x $\frac{11}{16}$
9000	K6-1922*	190-260, 380-520	120 x 240	430	5	$20\frac{5}{8}$	$9\frac{3}{4}$	$5\frac{3}{8}$	37	5	$\frac{7}{16}$ x $\frac{11}{16}$
11000	K6-2022*	190-260, 380-520	120 x 240	480	5	$21\frac{7}{8}$	$9\frac{3}{4}$	$6\frac{5}{8}$	37	5	$\frac{7}{16}$ x $\frac{11}{16}$
15000	K6-2176†	175-235, 190-260, 380-520	120 x 208 x 240	708	6	51	26	27	22	$22\frac{7}{8}$	$\frac{9}{16}$
20000	K6-2276†	175-235, 190-260, 380-520	120 x 208 x 240	853	6	51	26	27	22	$22\frac{7}{8}$	$\frac{9}{16}$
25000	K6-2376†	175-235, 190-260, 380-520	120 x 208 x 240	997	6	51	26	27	22	$22\frac{7}{8}$	$\frac{9}{16}$
30000	K6-2476†	175-235, 190-260, 380-520	120 x 208 x 240	1142	6	51	26	27	22	$22\frac{7}{8}$	$\frac{9}{16}$

*UL LISTED †Eight (8) week lead time.

Hard Wire Models, 60 Hertz, Three Phase

Output VA Rating	Catalog Number	Input Voltage Rating	Secondary Volts	Approx. Unit Wt. (lbs.)	Figure Code	Dimensions (Inches) A (Length)	B (Depth)	C	D (Width)	Mounting Slots
15000	K8-2100†	120/208Y	120/208Y	708	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
15000	K8-2110†	277/480Y	120/208Y	708	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
15000	K8-2140†	240 Δ	120/208Y	708	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
15000	K8-2150†	480 Δ	120/208Y	708	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
20000	K8-2200†	120/208Y	120/208Y	853	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
20000	K8-2210†	277/480Y	120/208Y	853	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
20000	K8-2240†	240 Δ	120/208Y	853	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
20000	K8-2250†	480 Δ	120/208Y	853	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
25000	K8-2300†	120/208Y	120/208Y	997	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
25000	K8-2310†	277/480Y	120/208Y	997	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
25000	K8-2340†	240 Δ	120/208Y	997	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
25000	K8-2350†	480 Δ	120/208Y	997	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
30000	K8-2400†	120/208Y	120/208Y	1142	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
30000	K8-2410†	277/480Y	120/208Y	1142	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
30000	K8-2440†	240 Δ	120/208Y	1142	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$
30000	K8-2450†	480 Δ	120/208Y	1142	6	51	26	27	$22\frac{7}{8}$	$\frac{9}{16}$

†Eight (8) week lead time

TRIAD-UTRAD

Standard Products
Dept. EM, 1124 East Franklin Street, Huntington, IN 46750 • Phone: (219) 356-6500 • TWX: 810-333-1532

Uninterruptible Power Supply

Powerstar™—Lighter, Cooler UPS Units

The Powerstar uninterruptible power supply from Triad ensures continuous power supply for computers, word processors and a wide range of microprocessor-based controls and equipment. And in the event of power failure or lowered voltage, the Powerstar uninterruptible power supply can save you time and money…with battery back-up time to prevent loss of entries or memory…so your operator can re-enter the job on file.

For unsurpassed quality in an uninterruptible power supply, compare the Powerstar models with any other!

Powerstar
TRIAD-UTRAD

60 Hertz

Catalog Number	VA Rating	Approx. Unit Wt. (lbs.)
KU-411	250 VA	145
KU-611	500 VA	155
KU-811	750 VA	160
KU-1011	1000 VA	170

Rack-Mounted Units
1500 VA and 2500 VA rack-mounted Powerstar uninterruptible power supplies are available.

General Specifications

Input frequency—60 or 50 Hz ±3 Hz.

Input Voltage—120 or 220 VAC (95—130 or 180—260) 1 Ø.

Input Protection—Line fuse, EMI filtering and rectifier current limiting.

Output Voltage—120 or 220 VAC, 1 Ø at nominal frequency and resistive load.

Line and Load Regulation—±3% battery operation, ±1% normal operation.

Output Frequency—60 or 50 Hz ±0.5% battery operation.

Output Waveshape—Sinewave, total harmonic distortion 3% at full load max.

Output Overload Capability—150% inverter shutdown, starts restrikes.

Output Protection—Automatic shutdown after three restrikes, inverter shut off and reset provision—alarm.

Operating Temperature—0—40°C.

Type of Operation—Continuous (no interruption).

Bypass Static Switch—maximum 4 milliseconds reverse transfer time.

Power Factor Load—0.8 leading to 0.8 lagging.

Input Linecord—For 120 VAC models, 6 ft. with NEMA 5-15 plug type.

Output Receptacle—For 120 VAC models, NEMA 5-15R duplex receptacle.

Lamp Designations—"Line On," "Inverter On," "Inverter Failure," "Battery On."

Battery Back-Up Time—

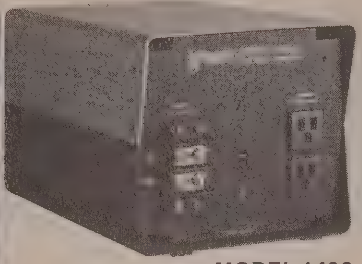
250 VA	45 min.
500 VA	30 min.
750 VA	15 min.
1000 VA	7 min.

Battery Back-Up—If the UPS is operated at less than full load, the battery back-up time will be extended. If operated at full load and additional back-up time is needed, add-on battery packs are available.

Dimensions—$20^1/_4$" deep, 15" wide, $11^1/_8$" high.

DC-to-AC Inverters

MODEL 1404


MODEL 1402

Wilmore®
ELECTRONICS CO., INC.

45 TO 1000 WATTS OF AC POWER FROM DC POWER SOURCES

- HIGHLY EFFICIENT
- FREQUENCY STABLE
- CONSERVATIVELY RATED
- MECHANICALLY RUGGED

Wilmore manufactures solid-state transistor-switching dc-to-ac inverters to power ac loads of up to 1000 volt-amperes from a dc power source. These inverters are characterized by conservative electrical and thermal design, and a great deal of attention has been paid to mechanical layout and structural integrity to ensure trouble-free operation in harsh electrical and mechanical environments. Users can choose between inverters with three different ac-output-voltage waveshapes to more closely match the inverter to the user's load requirements.

Many loads can be adequately powered with a square-wave output. Most small motors, lighting loads, heating and other resistive loads, and some electronic equipment are compatible with this waveshape. Inverters which provide a square-wave output are generally simpler in design and more efficient in operation than those which provide a more refined waveshape. Our Model 1124A and Model 1172 are square-wave inverters featuring high efficiencies and a clean output waveshape. In addition, the Model 1172 is a modular inverter, and two can be easily paralleled in the field using an optional paralleling cable set. The Model 1172 also provides a 2:1 output power surge capability for powering loads with high inrush current.

Some electronic instruments, small computers, chart recorders, and audio and video tape recording equipment require a more refined waveshape than a square-wave. Our Model 1057 and Series 1400 inverters provide a three-level-step waveshape having peak and rms voltages that approximate those of a pure sine wave while maintaining operating efficiencies comparable to square-wave inverters. This waveshape is intended to ensure compatibility with sensitive electronic equipment for which sine-wave power would normally be specified. The Model 1057 inverters provide a regulated output voltage, and the Series 1400 inverters feature a 2:1 output power surge capability. For rare instances where true sine-wave power is required, our Model 1081 provides a closely regulated, low-distortion sinusoidal output with excellent frequency stability.

See Our Pages in Section 4000
DC-to-DC CONVERTERS
PULSED LASER POWER SUPPLIES

Model Number	Output Power[1] (Volt-Amps)	Nominal Input Voltage (Vdc)	Nominal Output Voltage (Vac)	Output Frequency (Hz)	Dimensions (h" x w" x d")	Weight (Pounds)	Efficiency (Typical)
SQUARE-WAVE OUTPUT							
1124A-12	45	12	115	60	4 x 5¼ x 6⅝	6	70%
1124A-24		24					75%
1172-12-115-60	500	12	115	60	7 x 8½ x 11½	30	80%
1172-12-230-50			230	50			
1172-24-115-60		24	115	60			85%
1172-24-230-50			230	50			
1172-32-115-60		32	115	60			85%
1172-32-230-50			230	50			
THREE-LEVEL-STEP-WAVE OUTPUT							
1401-12-115-60	50	12	115	60	4¼ x 5¼ x 7	6	60%
1401-12-230-50			230	50			
1401-24-115-60		24	115	60			65%
1401-24-230-50			230	50			
1401-48-115-60		48	115	60			65%
1401-48-230-50			230	50			
1402-12-115-60	250	12	115	60	7¾ x 9 x 12	31	80%
1402-12-230-50			230	50			
1402-24-115-60		24	115	60			85%
1402-24-230-50			230	50			
1402-48-115-60		48	115	60			85%
1402-48-230-50			230	50			
1057-12-115-60	300	12	115	60	8¼ x 11 x 8¾	25	80%
1057-12-230-50			230	50			
1057-24-115-60		24	115	60			85%
1057-24-230-50			230	50			
1057-28-115-60		28	115	60			85%
1057-28-230-50			230	50			
1057-32-115-60		32	115	60			85%
1057-32-230-50			230	50			
1403-12-115-60	500	12	115	60	8¾x 12½x 11	44	80%
1403-12-230-50			230	50			
1403-24-115-60		24	115	60			85%
1403-24-230-50			230	50			
1403-48-115-60		48	115	60			85%
1403-48-230-50			230	50			
1404-24-115-60	1000	24	115	60	8¾x 12½x 11	47	85%
1404-24-230-50			230	50			
1404-48-115-60		48	115	60			85%
1404-48-230-50			230	50			
SINE-WAVE OUTPUT							
1081-12	500	12	115	60	6¾ x 19 x 20½	95	70% (at Full Load)
1081-48		48				65	
1081-125		125				65	

[1] All models except Model 1124A, Model 1057, and Model 1081 have a 2:1 output power surge capability.

WILMORE ELECTRONICS CO., INC.

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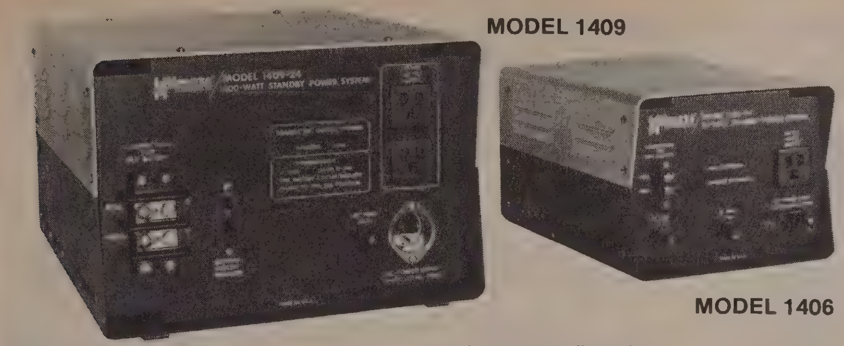
Uninterruptible Power Systems

MODEL 1409



MODEL 1406

Wilmore® ELECTRONICS CO., INC.

RELIABLE PROTECTION AGAINST AC POWER FAILURE

- POWER RATINGS TO 1000 WATTS
- HIGHLY EFFICIENT FOR LONGER BACKUP TIMES
- FREQUENCY-STABLE INVERTER
- 2:1 POWER SURGE CAPABILITY

Serious problems may result when commercial ac power is unexpectedly interrupted to sensitive loads such as point-of-sale terminals, PABX and communications equipment, small computers, or security systems. Wilmore's point-of-use uninterruptible power systems protect these critical loads from severe brownouts and loss of commercial power.

There are two general approaches to the design of an uninterruptible power system (UPS). One method processes commercial power through a battery charger, batteries, and a dc-to-ac inverter, always powering the user's equipment from the UPS's internal inverter. The other method is to power the user's equipment from the inverter only upon failure of commercial power. The first method is inherently more expensive initially and is more costly to operate; it requires both the battery charger and inverter to be sized to the user's full power requirement and all of the output power must undergo ac-to-dc rectification followed by dc-to-ac inversion. Wilmore UPS's use the second method, making them less expensive to purchase and allowing very low operating costs with much higher system efficiencies. Each UPS on this page (except the four Model 1252-SQ types) incorporates an inverter which provides Wilmore's unique three-level-step approximation to a sine wave for powering virtually any load within its output-power rating. In addition, each UPS (except the Model 1252-ST and Model 1406 types) provides a 2:1 output power surge capability for powering loads with high inrush current.

See Our Pages in Section 4000
. DC-to-DC CONVERTERS
PULSED LASER POWER SUPPLIES

Automatic Transfer

Interruption of commercial power causes Wilmore Uninterruptible Power Systems to switch to internal operation in a few milliseconds. The Series 1252 UPS transfers in approximately 25 milliseconds and the Series 1400 UPS switches in approximately 15 milliseconds. Upon restoration of normal ac power, the UPS switches back to supplying the load directly from the commercial line and the internal battery charger begins to recharge the battery.

Batteries

Standby power for the system is provided by external batteries which are maintained at full charge by the built-in battery charger. Backup time is determined by the rating of the battery bank employed by the customer. Units are available for either 12- or 24- Vdc batteries. Batteries are not supplied with Wilmore's UPS units.

Battery Charger

The battery charger, supplied as an integral part of each Wilmore UPS, is a precision current-limited charger which float charges the battery at a pre-established level whenever commercial AC power is present and the charging current demand by the battery does not exceed the current-limit level. The float-charge voltage is factory adjusted to 13.65 Vdc for 12-volt batteries and 27.3 Vdc for 24-volt batteries. The maximum charging current level for each model is given in the table below.

Protection

All models are protected against output overloads and against accidental reversal of the dc input-voltage polarity. An under-voltage sensing circuit helps protect the batteries from possible damage resulting from excessive discharging.

Availability

All models are normally shipped from stock in the 115-Vac 60-Hz versions. Allow two weeks delivery for 230-Vac 50-Hz models. Contact our sales department for information about other standard features and custom-designed units.

Model Number	Output Power[1] (Volt-Amps)	Battery Input Voltage (Vdc)	Battery Charger Current (Adc max)	Nominal Output Voltage (Vac)	Frequency (Hz)	Dimensions (h" x w" x d")	Weight (Pounds)
SERIES 1252 (19" rack mountable)							
1252-ST-250-115-60-12	250	12	3	115	60	5¼ x 17 x 14	43
1252-ST-250-230-50-12				230	50		
1252-ST-250-115-60-24		24	2	115	60		
1252-ST-250-230-50-24				230	50		
1252-SQ-500-115-60-12	500	12	3	115	60		46
1252-SQ-500-230-50-12				230	50		
1252-SQ-500-115-60-24		24	2	115	60		
1252-SQ-500-230-50-24				230	50		
SERIES 1400							
1406-12-115-60	50	12	3	115	60	7 x 8½ x 11½	15
1406-12-230-50				230	50		
1406-24-115-60		24	2	115	60		
1406-24-230-50				230	50		
1407-12-115-60	250	12	3	115	60	8¾ x 12¾ x 11	42
1407-12-230-50				230	50		
1407-24-115-60		24	2	115	60		
1407-24-230-50				230	50		
1408-12-115-60	500	12	6	115	60	9 x 12¾ x 16	56
1408-12-230-50				230	50		
1408-24-115-60		24	3	115	60		
1408-24-230-50				230	50		
1409-24-115-60	1000	24	3	115	60	9 x 12³⁄₁₆ x 16	60
1409-24-230-50				230	50		

[1] All models except Model 1252-ST and Model 1406 have a 2:1 output power surge capability

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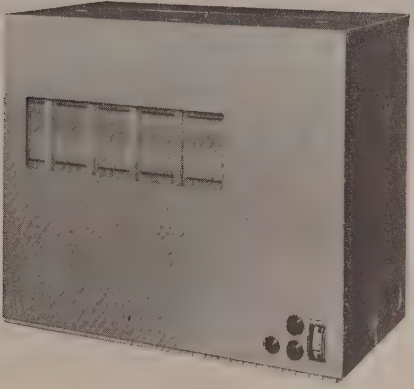
Xylog

M/POWER SYSTEMS

DON'T MISS A BEAT WITH XYLOG CORPORATION UPS OR SPS SYSTEMS



MPS SERIES

- Output Frequency: 60 Hz ±.1%
- Protection: Overload Protection
- Voltage Regulation: 5% Max
- Recharge Time: 12 Hrs.

Model	Battery Type	Output Watts 60HZ AC	Time	Size (LxHxD)	Wgt. (lbs.)
MPA200 VANC	Nickel-Cadmium	200	1½ hrs.	30″x12″x8″	155
MPA400 VANC	Nickel-Cadmium	400	1½ hrs.	30″x12″x8″	160
MPA600 VANC	Nickel-Cadmium	600	1½ hrs.	40″x14″x8″	170
MPA200 VALA	Lead-Acid	200	1½ hrs.	30″x12″x8″	145
MPA400 VALA	Lead-Acid	400	1½ hrs.	30″x12″x8″	150
MPA600 VALA	Lead-Acid	600	1½ hrs.	40″x14″x8″	165

SSG-WM SERIES

SUPERVISORY PANEL INCLUDING:

- AC Voltmeter
- DC Ammeter
- DC Voltmeter
- AC Line Test Lamp
- Inverter On Lamp
- High Charge Lamp

Model	Battery Type	Output VA	Time	Size
SSG-WM-800VA	Lead-Acid	800	1½ hrs.	32⅜″x42″x10⅜″
SSG-WM-1.0KVA	Lead-Acid	1.0K	1½ hrs.	32⅜″x42″x10⅜″
SSG-WM-1.3KVA	Lead-Acid	1.3K	1½ hrs.	32⅜″x42″x10⅜″
SSG-WM-1.5KVA	Lead-Acid	1.5K	1½ hrs.	32⅜″x42″x10⅜″

DESIGN AND OPERATIONAL FEATURES

INPUT—Wide selection of AC 60 Hz voltages.

OUTPUT—60 Hz voltage of essentially utility grade regulated over full load and battery voltage range.

VOLTAGE REGULATION—±10% 10-100% load .8 to 1.0 Power Factor.

FREQUENCY REGULATION—1%.

COMPUTER LOGIC CONTROL—Programmed at the factory, the computer logic cards control the battery charger, monitor line voltage and battery voltage, control inverter and regulate the system in normal and emergency mode.

SURGE CURRENT LIMITING—Limits current drawn by charger during recharge period to maximum safe value.

OVERLOAD PROTECTION—Internal circuitry and specially selected thermal and magnetic tripping devices protect the charger, inverter and batteries from overloads and short circuits.

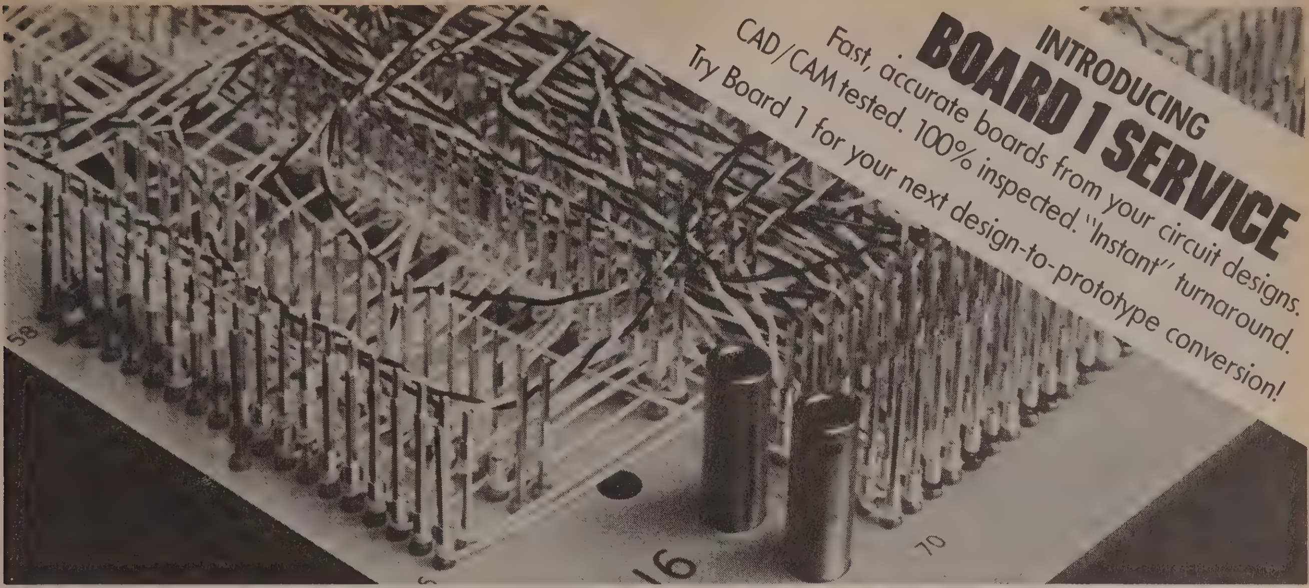
RESTORATION DELAY—Maintains inverter "on" for approximately 8 seconds after normal power is restored. Insures stable voltage to load. Reduces surge on line power circuits during unstable interval when utility is attempting to come on line and start heavy equipment.

SHORT CIRCUIT PROTECTION—Circuitry allows inverter to start full incandescent loads with attendant high starting current, without hesitation. Automatically protects the inverter against load shorts or overloads.

CONSERVATIVE RATING—All Standby Solid State Generators are conservatively rated to allow for minor errors in load calculation or connection.

PERMANENT INVERTER CONNECTION—The inverter is permanently connected to the battery. It is energized at all times to insure maximum reliability and minimum start-up time.

Xylog Corporation DEPT. EM, 150 TILLMAN ST., WESTWOOD, NJ 07675 / TELEPHONE (201) 664-7997


INTRODUCING
BOARD 1 SERVICE
Fast, accurate boards from your circuit designs.
CAD/CAM tested. 100% inspected. "Instant" turnaround.
Try Board 1 for your next design-to-prototype conversion!
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DATACON
EVERYTHING YOU NEED FOR WIRE WRAPPING SERVICE.

- ☐ You provide the panel and wiring information, and dataCon can do everything else. If you prefer, dataCon can even furnish the panel of your choice.
- ☐ Schematic to machine-wired panel in one week.
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- ☐ Round-the-clock operations for on-time deliveries.

Wire wrapping is our only business. And we've become so good at it we're the largest contract wire wrapping company in the world. We've shown many of the biggest companies in electronics that we can do their wire wrapping better and at less cost than their own departments. Let us show you.

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Western Division — 20150 Sunburst Street, Chatsworth, CA 91311, Tel. (818) 700-0600
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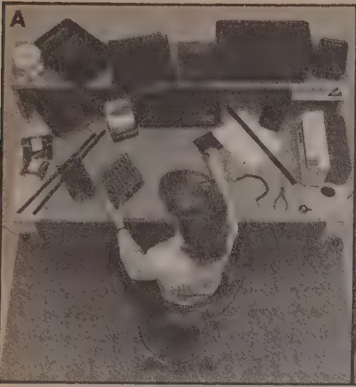
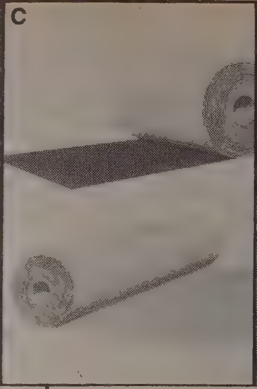
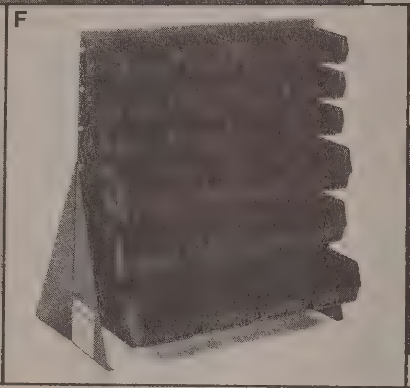
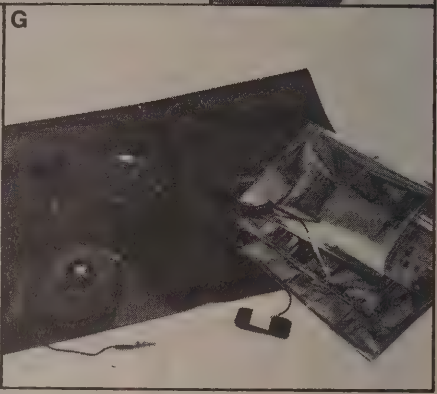




E
911 Heated Ionized Air Blower
3M





Rule #1 Handle all static-sensitive components at a static-safeguarded work area.

A. Safeguard Work Station Kit provides the materials needed to create a static-safe work area. The kit adapts easily to most production operations, including fabrication, assembly, storage, kitting and testing areas. Kit includes:

1. **Conductive Floor Mat** with ground cord, available in 5 colors.
2. **Conductive Table Pad,** available in 5 colors.
3. **Conductive Charge-Guard® Wrist Strap.**
4. **Conductive Ground Cord** that connects table top to floor mat and completes grounding system.
5. **3M Model 911 Ionized Air Blower.**

B. Charge-Guard® Wrist Strap dissipates static charge found on personnel – before static damages sensitive devices. The wrist strap features a new band made of stainless steel fibers woven with an elastic nylon. The result is a highly conductive, corrosion-resistant elastic band that gently and comfortably conforms to the wrist for reliable contact to ground. Comes with a one megohm resistor.

To order, please specify wrist strap model number and size.

Model	Description	Wrist Size
2066	5′ coil cord	Small, up to 6½″ circ. (camel) Large, over 6½″ circ. (navy blue)
2067	4′ straight cord	Small, up to 6½″ circ. (camel) Large, over 6½″ circ. (navy blue)
2071	10′ coil cord	Small, up to 6½″ circ. (camel) Large, over 6½″ circ. (navy blue)

C. 8200 Series Table and Floor Runners drain static charge from personnel and ground conductive objects. Available in 40 ft. rolls and 5 colors.

Model 8230 Series Table Runner includes 2′ x 40′ runner, two 15′ ground cords, two female snap fasteners and ten swivel connectors to terminate wrist straps. Model 8220 Series Floor Runner includes 4′ x 40′ runner, two female snap fasteners and two 15 ft. ground cords. **New Charge-Guard® Static Protective Hard Laminate.** Now available in 3 colors. For workstation table surfaces.

D. VELOSTAT® Non-corrosive, Conductive Foam provides physical and static protection for sensitive components. Keeps leads at equal potential when inserted in the foam and shunted. Improved formula eliminates corrosive chlorides and sulfides even under elevated temperatures and humidities over a long period.

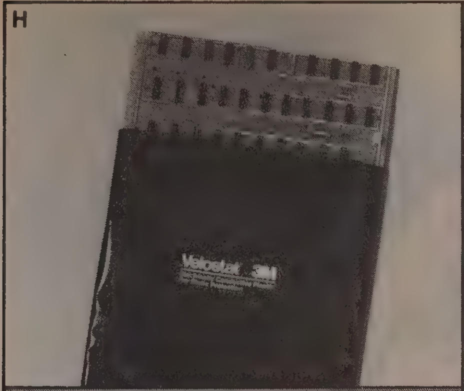
Type 2900 low density and 2910 high density; thickness: ⅛″, ¼″, ⅜″, ½″, ¾″, 1″. Sold in 24″ x 36″ sheets. ⅛″ and ¼″ available in 2 ft. x 50 ft. rolls.

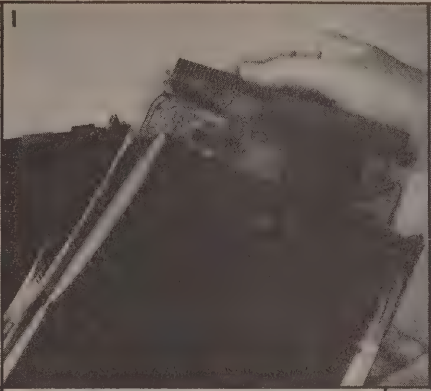
E. Model 911 Heated Ionized Air Blower creates a highly efficient, but low velocity supply of ionized air to evenly blanket a 2′ x 4′ work surface. The ionized air neutralizes static charge on non-conductors such as tape, polyester clothing and polystyrene cups. The Model 911 is purchased, but its static neutralizer element, Model 220, is leased annually.

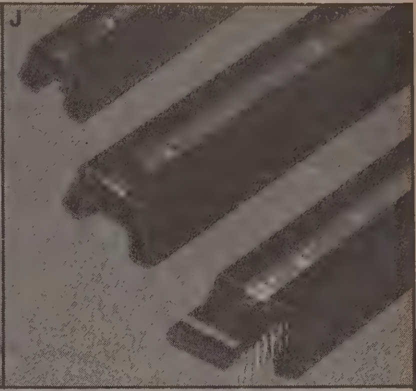
F. VELOSTAT® Conductive Parts Bins and Assembly Stands create an organized, grounded system for assembly. The bins are designed with a hopper front for easy access and identification. They are held by a convenient bench-top rack. The bins are made of conductive plastic, they will never rust or corrode. You can customize the arrangement of parts bins on the assembly stand to meet the needs of each assembly station.

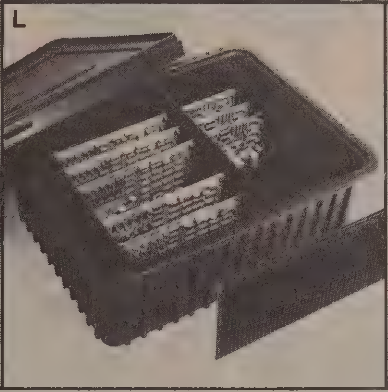
Model	Description	Size
4018	STAND	17⅝″ x 18″
4451	BIN	3″ x 3½″ x 1½″
4452	BIN	4″ x 3½″ x 2½″
4453	BIN	6″ x 3⅜″ x 2½″
4454	BIN	9″ x 4⅜″ x 4⅜″
4455	BIN	8″ x 8¾″ x 6⅜″
4456	BIN	11⅞″ x 6⅝″ x 6⅜″
4457	BIN	11⅞″ x 14¾″ x 6⅜″

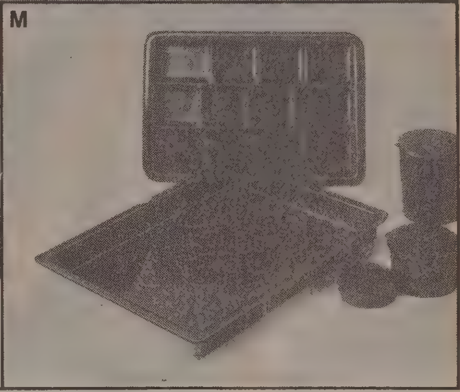
G. VELOSTAT® Conductive 8012 Portable Field Service Kit protects equipment from static damage during field repair. Included is 10 mil. film working surface, ground cord and Charge-Guard Wrist Strap.











Rule#2 Transport all static-sensitive components in static-shielding containers or packages.

H. VELOSTAT® Opaque Electrically Conductive Bags, made of VELOSTAT Conductive Film, provide shielding from static by safely enveloping sensitive devices and boards in a humidity-independent Faraday cage. The bags' effectiveness is unaffected by humidity, age and many chemicals. Available in many sizes. Also manufactured to your specifications. All VELOSTAT Bags are heat-sealable.

I. 3M Transparent Static-Shielding Bags with identification printed on them, feature high-strength metallic-coated polyester film creating an electrostatic shield. The polyester is laminated to a heat-sealable, anti-static polyethylene inner layer that prevents static charge generation inside the bag. Custom manufactured sizes available. Standard sizes (in inches) for 3M Transparent Static-Shielding Bags and VELOSTAT Electrically Conductive Bags above.

Transparent Static-Shielding Bag Sizes		
3″ x 5″	8″ x 10″	15″ x 18″
4″ x 4″	8″ x 12″	18″ x 18″*
4″ x 6″	10″ x 12″	4″ x 24″*
5″ x 8″	10″ x 14″	10″ x 24″*
5″ x 10″	11″ x 15″	4″ x 26″*
6″ x 8″	12″ x 16″	10″ x 26″*
6″ x 10″	12″ x 18″	4″ x 30″*
8″ x 8″	14″ x 18″	10″ x 30″*

*Special order for VELOSTAT

J. Static-Shielding Coextruded Shipping Tubes provide protection from internal and external static fields. Standard sizes for 300 mil. 400 mil and 600 mil. dual in-line packages. Lengths up to 25 inches. Custom sizes and configurations on request. Tubes feature viewing windows and pinholes..Specify pins or plugs with order.

K. Custom Containers and Packages are created to fit your product requirements. Provide physical and static protection. All custom specifications are accepted on a quotation basis. Our capabilities include: design engineering, injection-molding, vacuum-forming, die-cutting, corrogated fabrication, film lamination and film converting.

L. VELOSTAT® Adjustable Electrically Conductive Tote Boxes combine conductivity with rigidity. These totes are injection-molded for strength with a hard formula of VELOSTAT Electrically Conductive material.

Unlike ordinary plastic, VELOSTAT totes are truly conductive and shield static-sensitive parts from static charges that could blow or degrade them.

Adjustable dividers allow you to customize tote boxes to hold several differently sized P.C. boards.

Adjustable dividers complement models 4432, 4435 and 4438. Slip-in dividers and covers are available for all models.

Tote Box Dimensions (Inside)	
4415	9 3/16″ x 6 9/16″ x 4½″
4423	14⅞″ x 9¼″ x 3″
4425	14⅞″ x 9¼″ x 4½″
4428	14⅞″ x 9¼″ x 7½″
4432	20⅜″ x 15⅛″ x 11½″
4435	20⅜″ x 15⅛″ x 4½″
4438	20⅜″ x 15⅛″ x 7½″

M. VELOSTAT® Trays and Containers, made of VELOSTAT Electrically Conductive Plastic, are ideal for static-safe storage, kitting and shipping. Models 4010-20 and 4061 are available in a variety of shapes and sizes.

FOR MORE INFORMATION WRITE:

Static Control Systems Division/3M
Attention Order Department, 223-4N-05,
3M Center, St. Paul, MN 55144, Dept. EEM
Phone: 612/733-9420
OR CALL TOLL-FREE: 1-800-328-1368

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- ■ 120,000 sq. ft. floor space
- ■ over 2.5 million assemblies/yr.

Accurate
- ■ 10,000 sq. ft. test dept.
- ■ incoming test, in-line test, board test, systems test available

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- ■ save on component purchasing thru our volume buying power
- ■ lower cost-per-completed board thru our mechanized assembly technique

High-volume or low-volume, get action today from MEA

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Mechanized Electronic Assembly Division, Dept.33
Universal Instruments Corporation
P.O. Box 825, Binghamton, New York 13902
Tel. 607/772/7563 TWX: 510/252/1990

Universal

The San-Del instrument cleaning systems by M.P. ODELL CO.

Model 16 Cleaner

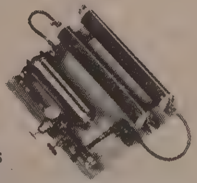
Reduce service and calibration time by keeping instruments clean. Instruments cleaned in Model 16 are easier to calibrate and retain their calibration accuracies longer. The cleaning solution, SAN-DEL No. 2 Technical Cleaner Concentrate is diluted with water and easily applied using our unique cleaning gun. This spray effectively cleans components and wiring, reaching the inaccessible areas. After spraying with the solution the equipment is then spray rinsed with water and excess moisture is removed with an air gun. Thorough drying in a low temperature oven, such as the SAN-DEL Model 46 or Model 58 is recommended.

SPECIFICATIONS

Overall Dimensions	47″H., 32¼″W., 32¼″D.
Material	Welded Steel
Finish	Light Grey Enamel
Net Weight	245 lbs.
Shipping Weight	305 lbs.
Power	115V, single phase, 60 Hz, 360 Watts
Air Source	50 to 200 psi Approx. 6 cfm at 50 psi required
Water	Intake water and drain required
Exhaust	Outside venting recommended, 4″ × 5″ duct flange provided

Specifications subject to change without notice.

Model WF-X-12 Water Conditioner

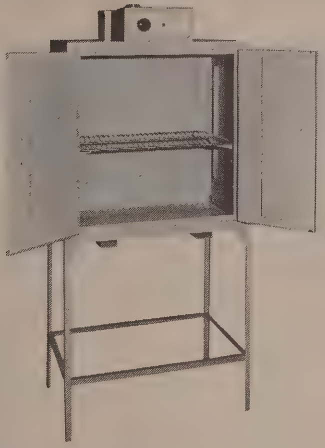


For use in areas with excessive mineral content in the water supply, San-Del conditioners use convenient replaceable deionizing cartridges to remove normal minerals. A prefilter removes suspended particles down to the 20 micron size.

All necessary hose and hardware are provided for easy mounting on the side of San-Del cleaning units.

WF-X-12 WATER CONDITIONER SPECIFICATIONS

Shipping Weight	50 lbs.
Width	18½″
Length	31½″
Depth	6½″



Model 46 Oven

The circulation of warm air up to 150°F around the equipment speeds drying and maintains a low temperature gradient throughout the oven. The power input is limited to prevent the oven from reaching an excessive temperature condition that could damage expensive electronic equipment. There are no working contactors or thermostatic elements to malfunction or otherwise cause an overtemperature condition. All controls and the blower-heater assembly are top mounted to prevent localized excessive temperatures.

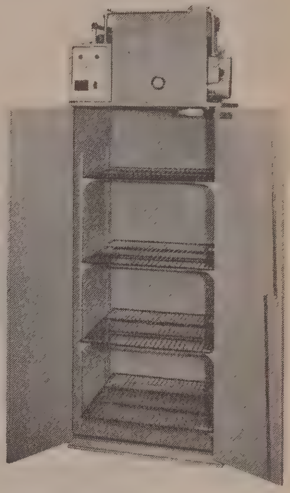
SPECIFICATIONS

Overall Dimensions	45½″H., 34″W., 22″D.
Useable Space	13.5 cubic feet
Material	Cold Rolled Steel Welded Construction
Finish	Baked Light Grey Enamel
Shelves	Heavy duty, one with each oven Additional shelves available
Power Requirements	120V, 1 ph, 50 to 60 Hz 1480 Watts, Max.
Blower	3000 rpm, direct drive, 120V, shaded pole
Temperature	Continuously adjustable from Selector Warm to High Settings establishing nominal oven temperatures from 120° to 150°F. at an ambient room temperature of 72°F.
Heater Protection	Shuts off all power if blower fails to operate.
Net Weight	183 lbs.
Shipping Weight	232 lbs.

San-Del No. 2 Technical Cleaner

- For use with San-Del Model 16 Cleaning Unit
- Formulated for cleaning electronic equipment
- Rapidly removes dirt, dust, oily residue and other leakage causing contaminates
- Safe for materials used in electronic and electrical equipment
- Safe for operating personnel — Non-toxic — No flash point — Biodegradable
- Deoxidizes and brightens switch and wiper contacts
- Economical concentrate form — intended for use with ordinary tap water. To be diluted 5 parts water to 1 part concentrate

San-Del No. 2 is available in cartons of 4 single gallon plastic containers and 55 gallon drums.



Model 58 Oven

The Model 58 Oven offers the same features as the Model 46 with the added advantage of a very large capacity. Equipment is quickly and thoroughly dried by the circulation of a large volume of warm air up to 150°F through and around the instruments.

SPECIFICATIONS

Overall Dimensions	93½″H., 32″W., 32″D.
Usable Space	70″H., 30″W., 28″D.
Construction	Double wall—1″ fiberglass insulation
Material	Cold Rolled Steel
Finish	Light Grey Enamel
Shelves	Heavy duty. Two with each oven. Additional shelves available.
Net Weight	580 lbs. approx.
Shipping Weight	725 lbs. approx.

ELECTRICAL SPECIFICATIONS

Power requirements: 230V, 60 Hz single phase

Maximum input power: 3200 watts

Main blower: 1150 cfm; 1140 rpm, direct drive, capacitor start, 230V motor, rubber mounted.

Purge air blower: 3000 rpm, direct drive, shaded pole, 230V motor.

Input power connection: Terminal block provided in control box.

Input power switching: Hydraulic-magnetic, 3 pole circuit breaker.

Over-temperature switch: 150°F factory set. Adjustable in the field for higher or lower maximum oven temperatures. Trips circuit breaker and cuts all power to oven if set over-temperature is reached.

Air flow switch: Trips circuit breaker and shuts off all power to the oven in the event of main blower failure, thus protecting heater bank from burn-out.

Temperature range selector: Six position switch. Establishes proper drying temperatures (120°F to 145°F) under ambient room temperature conditions of 60 to 100°F.

Temperature indicator: Inert gas-filled bulb type.

Door switch: Trips circuit breaker and shuts off all power to oven when door is opened.

M.P. ODELL COMPANY

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1 (800)-ODELL CO

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STATIC NEUTRALIZERS

ION GENERATORS

S & H units meet UL & CSA standards. Models are available with Line and Load regulation, many meet FCC 80-148/27114 Docket #20780.

These are the workhorses and the most often duplicated models in the S & H product line. Ranging from 3 to 8 KV, they power ionizing bars and grids used to combat static electricity. The most common size of these compact units is only 4½″ long, 2⅞″ deep, and 3½″ wide. All are current limited to 5 milliamperes maximum for all combinations of input and output voltages.

The following models are available for primary voltages from 120 Volts to 550 Volts, 50/60 Hz, and outputs from 4000 Volts to 8000 Volts.

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE
M-1205	120V	5000V
M-1208	120V	8000V
M-2305	230V	5000V
M-2308	230V	8000V
R-1205X	120V	5000V*
R-1207XL	120V	7000V*
T-1204	120V	4000V**
T-1207	120V	7000V**

* Units are both Line and Load Voltage Regulated and will meet FCC Specifications as covered in Docket #20780.
** Line and Load Regulated.

S & H Industries Inc., a leader in miniature hi-voltage AC supplies now manufactures a line of hi-voltage low current DC power supplies. These supplies range up to 25 kilovolts and currents to 10MA. Ideal for use in ION generators, precipitators or duplicating machine applications.

S & H offers complete engineering design and application assistance for your specific requirements. Contact S & H today for more detailed information as well as a copy of our latest catalog featuring the entire S & H product line.

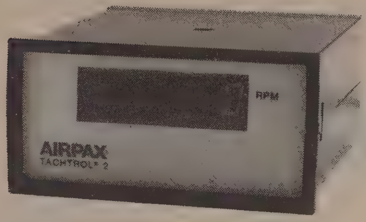
SEE OUR PAGE ON POWER SUPPLIES IN SECTION 4000 PAGE 3•1767

S H

S & H INDUSTRIES, INC.

119 GLEN COVE DRIVE • GLEN HEAD, NEW YORK 11545 • (516) 671-5600

Tachometers and Magnetic Pickups



Tachtrol® 2 – Speed/Rate Monitor

A single input digital instrument, this speed/rate monitor offers fast-response, high-precision monitoring. Measured values are displayed in engineering/units: RPM, FPM, frequency or other values. Rugged, easy to set up, yet costs less than competitive models.

Features:

- Single-channel precision speed or rate monitoring.
- Period mode measuring system.
- Five-digit auto-ranging .56" LED display; full or partial auto-ranging with leading zero suppression. Updates twice per second.
- Active or passive sensor input; accepts any pulse output device, magnetic digital pickup.
- Meets MIL-810C shock and vibration.

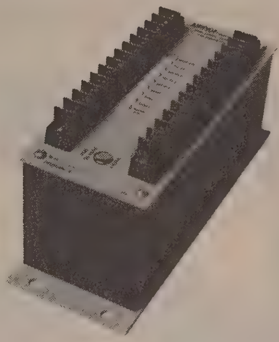
1700
RPM
AIRPAX

Tachtrol® 3 – Dual Input Digital Tachometer

Single or dual channel instrument, this computing tachometer measures input frequencies and displays the resulting quantities in RPM, FPM, % Draw and other rates. A unique method of setting conversion factors and instrument functions allows easy configuring or altering at any time.

Features:

- Measures speed or frequency (2 Hz to 30,000 Hz).
- Active or passive pickup inputs.
- Auto ranging LED or LCD displays.
- Meets MIL-810C shock and vibration.



Series 300 – Analog Tachometer

A precision control tachometer to accurately monitor shaft RPM, flow rates, and other industrial applications. With up to 4 relay setpoints, it can be used for start-up, overspeed shutdown, or other process controls. Many setpoint options are available for special uses.

Features:

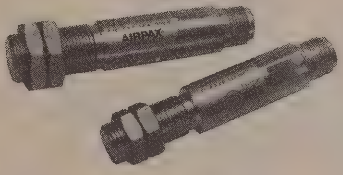
- Accept signals (sine wave, pulse, etc.) from many sensor types.
- Filtered 0-1mAdc meter output, proportional to input frequency, is standard.
- Signal input limiting to 150V is available.
- DPDT relay contact configuration is an option.
- 4-20mAdc industrial output, proportional to input frequency is optional.

1-0001 and 1-0005 – Passive Magnetic Pickups

Convert mechanical motion to AC voltage. The frequency of the AC signal is exactly proportional to the speed or RPM.

Features:

- No moving parts.
- Wide temperature range.
- Stainless steel housing.
- 1-0005 is UL listed.



4-0070 and 4-0036 – Active Magnetic Pickups/Zero Velocity

Either pickup can be used to sense the speed of any rotating machinery, including motors, generators, turbines, compressors, conveyors – wherever speed or RPMs need to be monitored.

Features:

- Low cost.
- 12V ± 2Vdc power supply.
- −25°C to +70°C operating temperature range.
- 4-0036 is UL listed.
- DC to 10K Hz frequency.

8-0006 – Low-Cost Magnetic Speed Pickup

Stainless steel housing and one-piece construction, this pickup has interior section coated with epoxy resin to resist both oil and moisture.

Features:

- Wide operating and storage temperature range: −67°F to +225°F.
- 190-volt minimum output (P-P).
- Mates with MS3106A-10SL-4S.

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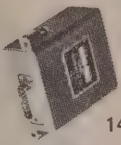
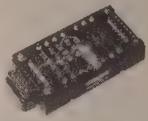
- SPECIAL electronics designed to your detailed specification

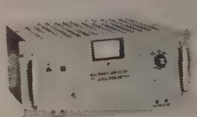
200 HP


141

140

416-3


916 (Flat Pack)


980-1

	MODEL	Output Power	Output Voltage	Output Frequency	Input Signal Frequency	Input Impedance	Gain	Power Required	Temperature Range
AMPLIFIERS FOR A.C. SERVO MOTORS	200-HP	3.5 W	40 VCT	400 Hz	400 Hz	10K	2,500	28VDC	—55°C +125°C
	200-5	3.5 W	40 VCT	400 Hz	400 Hz	10K	5,000	28VDC	—55°C +125°C
	930	3.5 W	40 VCT	400 Hz	400 Hz	250K	2,000	28VDC	—55°C +125°C
	200-8	3.5 W	40 VCT	400 Hz	400 Hz	10K	2,500	115V 400 Hz	—55°C +125°C
	216B	6 W	40 VCT	60 Hz	60 Hz	10K	1,000	28VDC	—55°C +85°C
	140	6 W	40 VCT	400 Hz	400 Hz	50K	1,000	28VDC	—55°C +125°C
	141	6 W (90°)	40 VCT	400 Hz	400 Hz	30K	1,000	28VDC	—55°C +125°C
	416-3	16 W	40 VCT	400 Hz	400 Hz	10K	1,000	28VDC	—55°C +71°C
	416A/D	16 W (0°/90°)	40 VCT	400 Hz	400 Hz (2)	10K	1,000	28VDC	—55°C +100°C
	416M	16 W (90°)	40 VCT	400 Hz	DC (2)	10K	200	28 VDC 115V 400 Hz	—55°C +125°C
	159	16 W	40 VCT	60 Hz	60 Hz	10K	1,000	28VDC	—55°C +100°C
	159A/D	16 W (0°/90°)	40 VCT	60 Hz	DC	100K	1,000	28 VDC	—55°C +100°C
	174	40 W (90°)	40 VCT	60 Hz	60 Hz	20K	1,000	28 VDC	
	956B	40 W (90°)	40 VCT	400 Hz	400 Hz	10K	1,000	28VDC	—55°C +100°C
	956C	40 W (90°)	40 VCT	400 Hz	DC	10K	500	28VDC 115V 400 Hz	—55°C +100°C
	170-1	100 W (90°)	40 VCT	400 Hz	400 Hz	10K	1,000	28VDC	—55C° +85°C
	170-3	180 W (90°)	36 VCT	400 Hz	400 Hz	10K	1,000	28VDC	—55°C +85°C

MODIFICATIONS to gain, input impedance, signal frequency, and power level are available. Matching transformers for driving motors at other voltages in stock.

LINEAR D.C. POWER AMPS	998-2	40 W (Short Proof)	22V	DC	DC (2)	10K	50	28 VDC	—55°C +85°C
	916	110 W (Short Proof)	20V	DC	DC (2)	10K	3x10^5	28 VDC —15 VDC	—55°C +100°C
	987-17	200 W (Short Proof)	20V	DC	DC (2)	10K	10	28 VDC ±15 VDC	—55°C +71°C
	980-1S	500 W (Short Proof)	50V	DC	DC	10K	100	115V 50-400 Hz	—55°C +71°C
	980-28	1350 W (Short Proof)	52V	DC	DC	10K	100	50-400 Hz 3 Phase (1 Phase Available.)	—55°C +71°C
	980-27	3000 W (Short Proof)	95V	DC	DC	10K	100	105 VDC and AC Fan Power	

MODIFICATIONS to gain, input impedance, signal frequency, power level and operating temperature available.

SYNCHRO AMPLIFIERS	180-1	5W	11.8V Synchro	400 Hz	400 Hz SIN/COS	50K	3′	±15 VDC	—55°C +100°C
	180-2	5W	90V Synchro	400 Hz	400 Hz SIN/COS	50K	3′	±15 VDC	—55°C +100°C
	180-3	5W	90V Synchro	50/60 Hz	50/60 Hz SIN/COS	50K	3′	±15 VDC	—55°C +100°C

MODULATORS AND DEMODULATORS	312	Full Wave	10V	DC	60 Hz	10K	10	28VDC 115V Reference	—55°C +125°C
	334-1	Full Wave	50V	DC	400 Hz	10K	180	28VDC 115V 400 Hz	—55°C +125°C
	334-2	Full Wave	30V	DC	400 Hz	125K	1	115V 400 Hz	—55°C +71°C
	312-1	Full Wave	10V	DC	60 to 5000 Hz	10K	10	28 VDC 115V Reference	—55°C +125°C
	350-1	Full Wave	15V	DC	400 Hz	10K	10	28 VDC 115V 400 Hz	—55°C +125°C

MODIFICATIONS to gain, output voltage and input impedance available.

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- Units available which will meet applicable MIL Specifications
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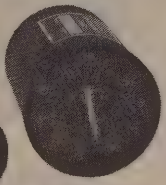
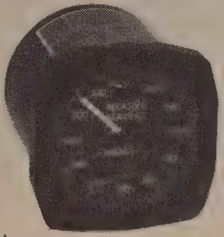
- Special systems can be designed in accordance to your detailed specifications. CTC will also design "Interface" equipment to integrate major control systems.

INDICATORS

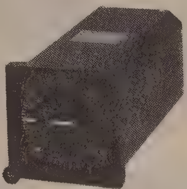
SYNCHRO AND SERVO REPEATERS

MS-33639 Case (1 in.)


MS-33639 Case (2 in.)


MS-33638 Case (3 in.)

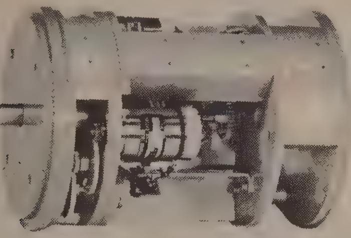
SIMULATOR INSTRUMENTS

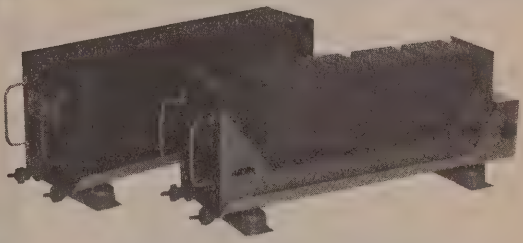

Mach Air Speed

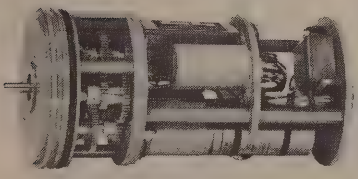
Altimeter

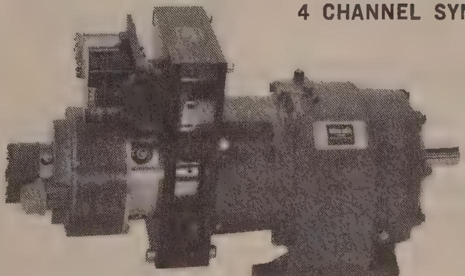
Air Speed

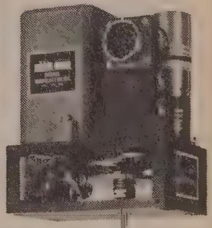
SERVO ACTUATORS


CS-202-2 300 lb. in. actuator

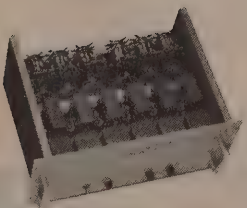

4 CHANNEL SYNCHRO AMPLIFIER

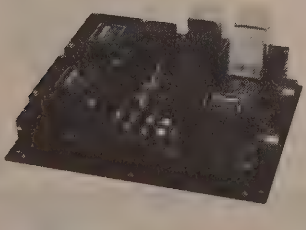

CS-198 250 oz. in. 0.1% accuracy actuator


Antenna Pedestral
Azimuth Servo Drive


Custom Servo Actuator

SPECIAL CONTROL SYSTEMS


Control System used in ASW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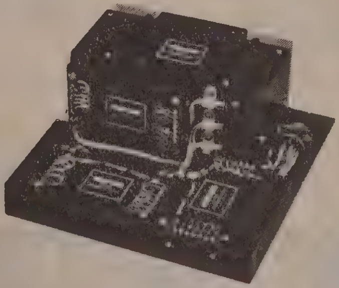
SERVO CONTROL SYSTEM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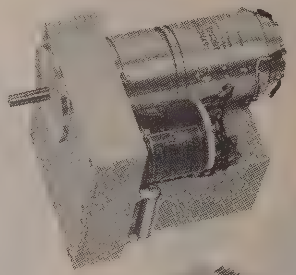

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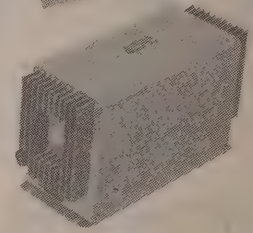

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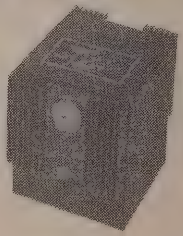

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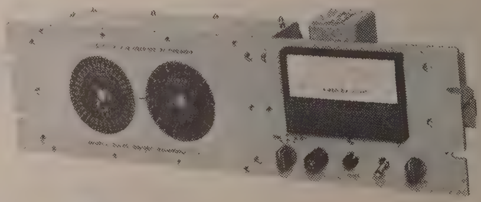

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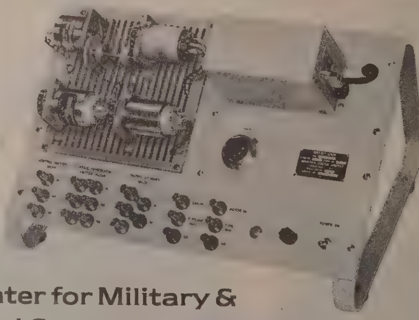

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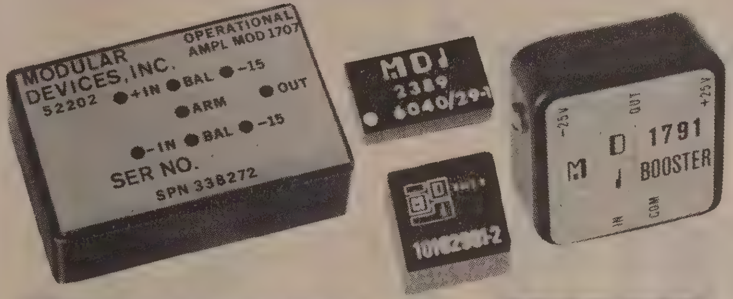

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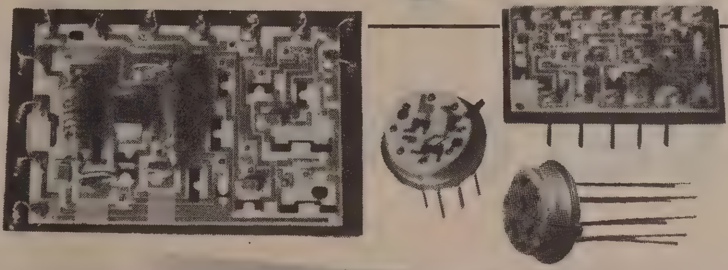

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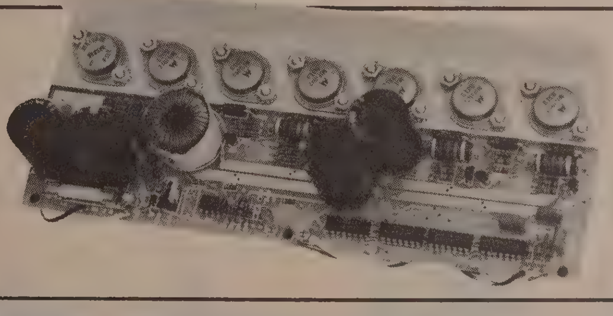

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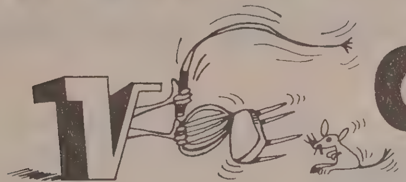

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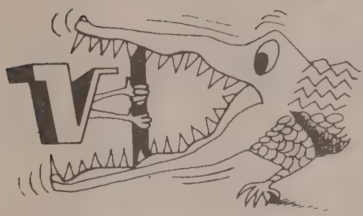

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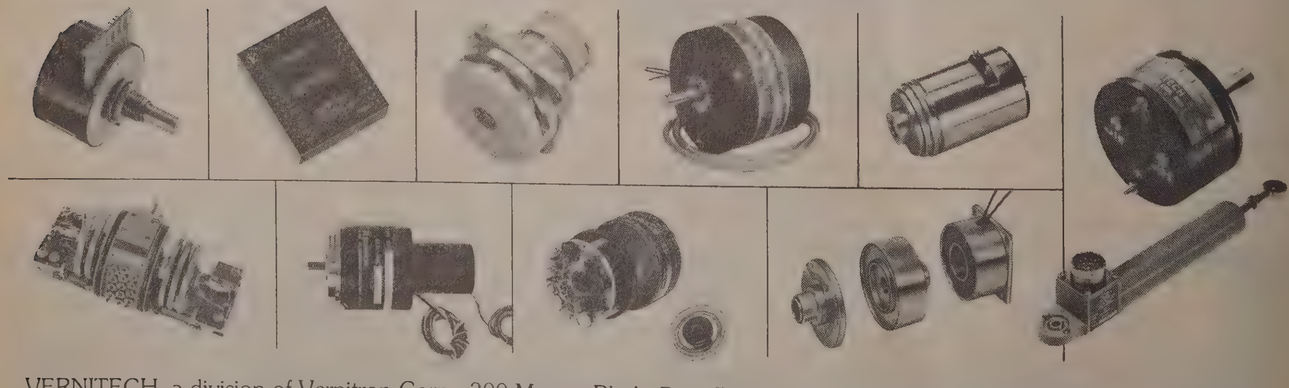

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MINIGLOSSARY SERVO COMPONENTS

SPECIFICATIONS

Excitation: The input voltage and frequency.

Transformation Ratio: The ratio of the output voltage, at maximum coupling, to the input voltage.

Phase Shift: The lead or lag of the output voltage with respect to the input voltage. For most synchros and resolvers, the phase shift can be approximated by the angle whose tangent is the ratio of the primary winding's DC resistance to its reactive component.

Impedance: Specified as R + jX, where R is the AC resistive component and X is the reactive component. Important impedances are: (a) Z_{po} (or Z_{ro} for rotor primary units), which is the impedance of the primary winding with the secondary open; (b) Z_{so}, which is the impedance of the secondary winding with the primary open; and (c) Z_{ss}, which is the impedance of the secondary with the primry shorted (essentially when driven by a low impedance).

Null Voltage: The voltage remaining when the unit is at electrical zero or in the minimum coupling position.

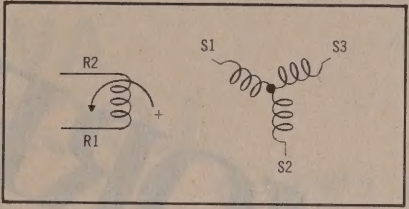
Accuracy: The error of the position of the rotor with respect to the electrical angle. It is defined as the output voltage driven by the "speed" (pole pairs) of the unit, referenced to the starting point of the calibration (usually the electrical zero position). Error is commonly expressed in minutes of arc (1/60 of a degree) or in seconds of arc.

Loads: For a transmitting unit, the impedance that the output voltage signal faces. This can be a receiver, a differential with its load, a control transformer, an A/D converter, etc.

Operation Temperature: The ambient temperature range over which the unit performs its primary function.

FUNCTIONS

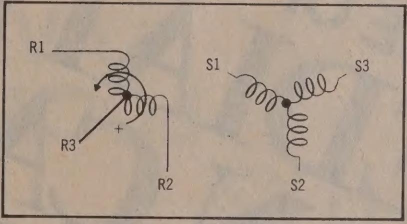
Transmitter: A unit with a Y-connected stator that outputs a signal proportional to the position of its single-phase excited rotor. High power units, called "torque transmitters," are used to drive one or more receivers. Low power transmitters are used to drive control transformers.



Receiver: A unit with a three-phase stator excited by the input, usually from a torque transmitter, and a single-phase rotor that follows the resulting stator field. Usually used to drive a position pointer.

Control Transformer: A unit with a three-phase stator excited by the input from a transmitter and a single-phase rotor mechanically driven to the null position by an external motor or other device.

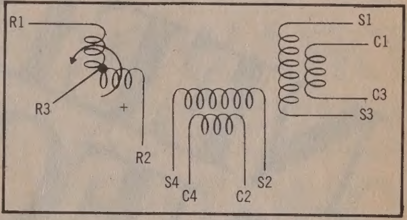
Differential: A unit with a three-phase stator and a three-phase rotor. It is usually connected between a transmitter, which excites its stator, and a receiver or control transformer. It can be used to "dial in" correction factors for the synchro chain.



Transolver: A unit with a three-phase stator and a two-phase rotor that can be used either as a control transmitter (with one rotor phase excited and the other shorted), or as a control transformer with the signal obtained from one phase of the rotor—making sure the other phase is equally loaded to prevent unbalances.

Differential Resolver: A unit with a two-phase stator and a three-phase rotor that is used as a transolver with the advantage that when connected as a control transformer, the signal does not travel through slip rings.

Resolver: A unit with a two-phase rotor and a two-phase stator that is used to create or receive SIN-COS signals such as vector resolutions for solving inertial platform coordinate transformations, unknowns of right triangles, etc. Resolvers can also be used as transmitting, differential, or receiving elements by proper choice of impedances. It is also possible to use resolvers as phase shifters where, in one mode, one rotor phase is excited and the two stator windings are feeding an appropriate RC network and indicating a phase shift, referred to the input, that corresponds to the rotor position.



Compensated Resolver: A unit with a "2×2" phase stator and a two-phase rotor used as a resolver with the added benefit of feedback windings in parallel with the stator windings that increase the useful accuracy over a wide range of environmental operating conditions.

Linear Transformer: A unit with a single-phase stator and single-phase rotor designed to provide a linear output voltage that is directly proportional to the rotor input angle. It operates over a range of less than ±90°, and is analogous to a potentiometer providing infinite resolution, but without contact between the elements. It can be used only with AC voltages.

Brushless Synchro: Available in two types—hairspring and bobbin. Hairspring synchros use spiral wound conductor springs to pick off the rotor signal, and are generally limited to a ±165° rotation. Most have mechanical stops to prevent damage due to overrotation. Bobbin synchros pick off the rotor signal with rotary transformers inside the unit, allowing the rotor unlimited motion.

Pancake Unit: A name derived from the physical dimensions of the unit, which has a diameter that exceeds axial length. Sizes range from under 1" to 20" or more. The unit is frequently used as a gimbal pickoff element and is designed to fit a particular application envelope. It can be supplied as a rotor and stator only.

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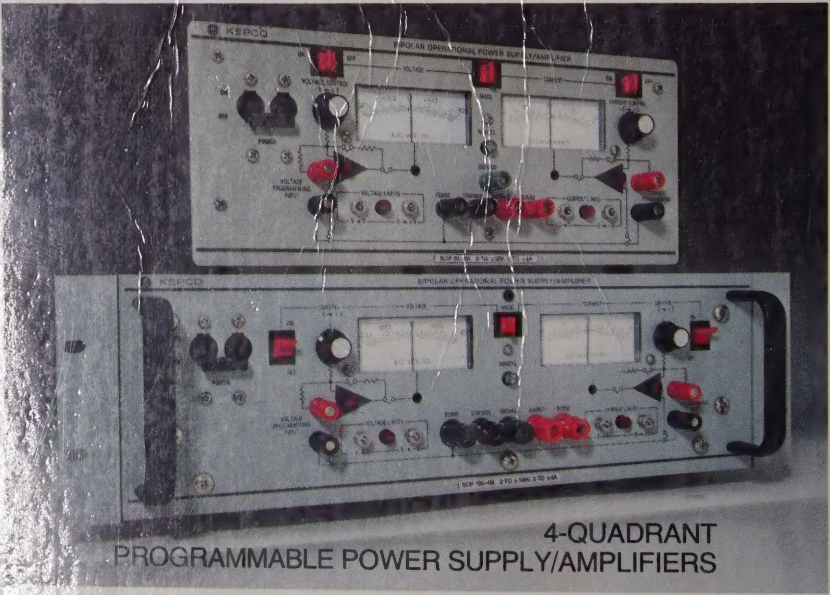
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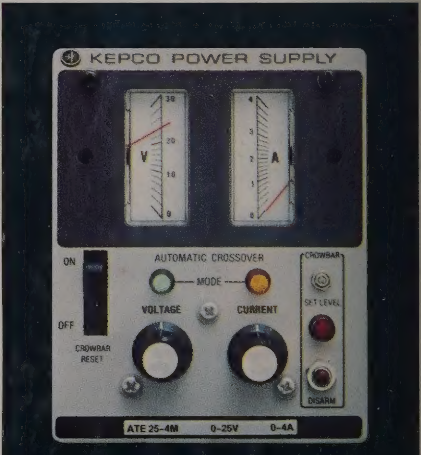
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